

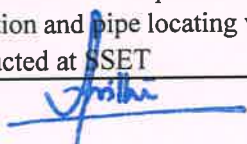
SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY, KARUKUTTY



3.5.1. Number of functional MoUs/linkages with institutions/ industries in India and abroad for internship, on-the-job training, project work, student / faculty exchange and collaborative research during the last five years

Sl. No.	Name of the MoU / linkage	Name of the institution / industry with whom the MoU / linkage is made, with contact details	Year of signing MoU / linkage	Purpose of the MoU/Linkage (nternship, on-the-job training, project work, student / faculty exchange and collaborative research)	Duration of MoU / linkage	List the actual activities under each MOU/ Linkage and web -links year-wise
1	MoU	Hungkuang University, Taiwan R.O.C, Dr. Yueh-guey Huang, President, Hungkuang University,	2018	Academic and cultural exchange between two countries	2018-2025	Student exchange, Faculty development, Academic programmes
2	MoU	Shimane University, Japan , Yasunao Hattori President Shimane University	2018	Student exchange and to promot research. education and academic culture	2018-2025	Student exchange as part of intership
3	MoU	Daffodil International University, Yousuff Mahbul, Vice chancellor	2018	Academic aad cultural exchanges between the two Institutions	2018-2023	Other Academic Activities
4	MoU	Kochi Metro Rail Limited, Managing Director, Kochi Metro Rail	2018	FIELD PROJECT	2018-2021	Field Project
5	MoU	Furtwangen University of Applied Sciences, Germany	2015	Joint conferences, Joint teaching	2015-tiil date	Interaction with B.Tech students
6	MoU	Hermann Sewerin GmbH	2015	Providing of qualified projecl support and support and training of staff or students	2015-till date	Organized workshop on leak detection and pipe locating were conducted at SSET




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7	MoU	LimCo International GmbH, Germany	2015	For developing and applying new technologies and to adapt approved technologies to the specific tropical conditions	2015-till date	Student training at LimCo ,Germany
8	MoU	University of Applied Sciences Ravensburg-Weingarten, Germany	2015	Cultural exchange and exchange of undergraduate and graduate students as well as faculty	2015-2020	Student excgane and collaborative research
9	MoU	NIVUS GmbH	2015	For developing and applying new technologies and to adapt approved technologies to the specific tropical conditions	2015-till date	worth several lakhs for SCMS Water Institute for technical teaching, demonstration and training
10	Collaboration-De-Addicto (EM De-addiction Stimulator for alcohol addicts and severely depressed)	De-Addicto (EM De-addiction Stimulator for alcohol addicts and severely depressed)	2018	Collaborative research	2018-2019	Collaborative research
11	MEDICOS- A Mini Virtual Hospital for Villagers	Secretary, Karukutty Gramapanchayat	2018	Implementation of Mini Virtual Hospital for Villagers	2018-2019	Successfully implemented a Mini Virtual Hospital for Villagers
12	A Muscle Interface for Assisting the paralysed	Lakeshore Hospital, Ernakulam, Kerala	2018	To provide technical Brain to Muscle interface for paralysed persons	2017-2019	Provided technical support for Brain to Muscle interface for paralysed persons
13	Smart switching toilet with urine diversion system for flood region	Secretary, Karukutty Gramapanchayat	2018	To implement Smart switching toilet with urine diversion system for flood region	2018-2019	Provide technical support to implement Smart switching toilet with urine diversion system for flood region under Karukutty panchayat



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14	Research collaboration leading to publication of a paper	Technical University Bulgaria	2019	Collaborative research work	2019-2020	Published a paper with collaboration with Technical University Bulgaria
15	Research collaboration leading to publication of a paper	Federation University Australia	2021	Funded Projects and Invited Talks	2021-2022	Covid -19 related project completed
16	MoU	Wave Electronics, Kizhakkambalam, Ernakulam	2021	For collaborative research	2021-2026	Three B.Tech students from SSET did their intership with Wave electronics
17	MoU	Evo Global Technologies, UK	2022	For collaborative research	2022-2023	Research / Paper Published
18	MoU	Kerala State Remote Sensing and Environment Centre (KSREC)	2022	Funded Projects and Invited Talks	2022-	Other Academic Activities
19	Collaboration	Dept. of Nano Science and Tech.	2022	For collaborative research	2022-2023	Other Academic Activities
20	Collaboration	Ground Water Department, Alapuzha	2022	For collaborative research	2022-2024	Other Academic Activities
21	Collaboration	Ground Water Department, Palakkad	2022	For collaborative research	2022-2025	Other Academic Activities
22	MoU	Knitstart Ventures PVT	2022	Research Projects	2022 onwards	B.Tech students did their Intership and one of our B.Tech student's placed there
23	Collaboration	Cochin University of Science and Technology.	2022	Analysis and Instrumental support	2022-Till date	Research Paper Published
24	Consultancy project	Uno Tech Marine Engineering	2022	Consultancy project	2022-23	B.Tech students did their Intership
25	MoU	AGAPPE Diagnostics	2022	Research ,Project Internships	date	Intership
26	MoU	C-DAC	2022	Research ,Project Internships	2022-2025	Interaction with B.Tech students
27	Collaboration /MoU	Infosys Cmpus connect	2019	Placement	2019-till date	Campus connect programs and placement drives
28	Research publication Collaboration	Springer Nature	2023	As chief Editor for Publication in Springer Nature for a conference Proceedings	2023-till date	One Faculty Selected as Chief editor



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29	Research collaboration leading to publication of a paper	EASTERN UNIVERSITY SRI LANKA (EUSL)	2023	Research and paper publication	2023-	Research Projects
30	MoU	GJ Eco Power	2018	Research and Projects	2018	projects
31	Research collaboration	Bharat Mata College	2023	Research and paper publication	2023	Research Projects
32	Research collaboration leading to publication of a paper	Centre Material Science and Engineering, University of Florida	2023	Add-on Courses, Conferences and Research Activities	2023-	Research Projects
<i>Total Number of functional MoUs/linkages with institutions/ industries in India and abroad for internship, on-the-job training, project work, student / faculty exchange and collaborative research during the last five years</i>						32




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HUNGKUANG
University



SCMS

GROUP OF EDUCATIONAL INSTITUTIONS

MEMORANDUM OF UNDERSTANDING

between

Hungkuang University (Taichung, Taiwan R.O.C)

and

SCMS Group of Educational Institutions (Kerala, India)

Hungkuang University, located at Taichung, Taiwan R.O.C. and SCMS Group of Educational Institutions, located at Cochin, Kerala, India wish to develop academic/cultural exchange between the two institutions in education, research and other areas, and agree to formally establish a collaborative relationship with each other. Subject to mutual consent, the provisions of the agreement are as follows:

Article I.

The areas of collaboration include any program offered by either university in which the two institutions believe collaboration is feasible and desirable and which would develop and enhance a mutually beneficial relationship between the two universities.

Article II.

Subject to the approval of the President of each institution and the availability of funding, assistance shall be carried out through any one or more of the following activities or programs as mutually agreed to by both parties:

- i. Student Exchange Program
- ii. Faculty Exchange Program
- iii. Special Short-term Academic Programs
- iv. Staff Development Projects
- v. Joint Research and Activities




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Article III.

This cooperation agreement shall become effective as soon as the presidents of both institutions sign it, and will remain in force for a period of five years. This MOU will be automatically renewed on the same terms and conditions for another five years unless either party raises a written notification 6 months prior to the date of expiration. Either party reserves the right to terminate this agreement upon a one-year prior written declaration by the terminating party.

Article IV.

Any amendment to this MOU shall be based on the mutual consent and requires the written approval of the President of each institution that shall be appended hereto. This declaration will become effective with the agreement of both parties.



Dr. Yueh-Guey Huang
President
Hungkuang University



Prof. Pramod P. Thevannoor
Vice Chairman
SCMS Group of Educational
Institutions, India

Date: Mar. 22, 2019

Date: 22/03/2014.



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Varun Menon G <varunmenon@scmsgroup.org>

Arrangement of talk for Hungkuang University

2 messages

國際處李昭妮 <peyton5400@hk.edu.tw>

Mon, May 18, 2020 at 10:34 AM

To: vinodp@scmsgroup.org

Cc: 田其虎國際長 <tigert@hk.edu.tw>, varunmenon@scmsgroup.org, pramod@scmsgroup.org, gopakumars@scmsgroup.org, praveensal@scmsgroup.org, 醫工系蔡明慈主任 <anniemtt@sunrise.hk.edu.tw>, 環安系盧信忠主任 <hclu@sunrise.hk.edu.tw>, 國際處楊蜀瑜秘書 <gracetaiwan@hk.edu.tw>, Fannie Leung <fannie@hk.edu.tw>

Dear Dr. Vinod,

Greetings!

I'm Peyton Lee, a coordinator of Hungkuang University International Office responsible for global collaboration projects.

It is undeniable that education has been hit particularly hard by the COVID-19 pandemic. School closures in countries worldwide, universities switch to online courses and endless of international exchange programs being put on hold.

Under such circumstances, we'd like to grab this opportunity to thank you for agreeing to deliver a webinar to our students and faculty, so that our collaboration gets to continue in a different way. The honor is definitely ours.

For us 27th May 10.30a.m. to 12.00p.m. your time is perfect. We would very much appreciate it if you could kindly send me your CV and topic you'd like to present, I'll then share with our departments. Also, I'll help set up the meeting room and send you the webinar link right after we have it confirmed.

Till I hear from you, take care and be safe!

Best regards,

Peyton Lee 李昭妮

Coordinator, Office of International and Cross-Strait Affairs 國際暨兩岸事務處

Hungkuang University 弘光科技大學

886-4-26318652 ext. 2233

Vinod P <vinodp@scmsgroup.org>

Mon, May 18, 2020 at 11:31 AM

To: 國際處李昭妮 <peyton5400@hk.edu.tw>

Cc: 田其虎國際長 <tigert@hk.edu.tw>, Varun Menon G <varunmenon@scmsgroup.org>, pramod p thevanloor <pramod@scmsgroup.org>, Gopakumar S <gopakumars@scmsgroup.org>, "Dr. Praveensal C.J."

<praveensal@scmsgroup.org>, 醫工系蔡明慈主任 <anniemtt@sunrise.hk.edu.tw>, 環安系盧信忠主任

<hclu@sunrise.hk.edu.tw>, 國際處楊蜀瑜秘書 <gracetaiwan@hk.edu.tw>, Fannie Leung <fannie@hk.edu.tw>

Good Morning

Thanks for inviting me to the talk. I am really excited to share my ideas regarding "Machine Learning Approaches for Detecting Malicious Code". In this talk I will discuss the following:

- [1] What is malware?
- [2] State of Art detection methods
- [3] Machine learning approaches for detecting malware
- [4] Attacks on machine learning-based malware scanners
- [5] Countermeasures
- [6] Ongoing Cybersecurity research at SCMS, Kerala, India



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You can also suggest if something more needs to be discussed. I will share my CV and photograph by today evening.

Regards

Vinod

[Quoted text hidden]

--
"Be less curious about people and more curious about ideas" --Marie Curie

Dr. Vinod P.

Professor & Head - Department of Computer Science & Engineering

SCMS School of Engineering and Technology

Ernakulam, Kerala, India, Pin code- 683582



A handwritten signature in blue ink, appearing to read "Vinod P.", written over a horizontal line.

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弘光科技大學
HUNGKUANG
University

Certificate of Appreciation

This is presented to

DR. Varun G Menon

For imparting his valuable wisdom and expertise as a speaker in a
webinar entitled,

"COVID-19 Impact and Opportunities for Students"

Held on June 15, 2020.



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校長

President

黃月桂

Yueh Guey Huang



2020年06月15日



**Agreement of Cooperation
between
SCMS Group of Educational Institutions
and
Hochschule Furtwangen / Furtwangen University of Applied Sciences (HFU)**

In order to extend the effective and mutually beneficial cooperation and develop academic and cultural exchange in education, research and other areas, SCMS Group of Educational Institutions and Hochschule Furtwangen hereby agree to cooperate toward the internationalization of higher education.

The areas of cooperation will include any program offered at either university which is felt to promote the above-mentioned goals. However, any specific program shall be subject to mutual consent, availability of funds and the approval of both universities. Such programs may include:

- a) exchange of faculty members
- b) exchange of students
- c) exchange of publications
- d) joint research projects
- e) joint conferences
- f) joint teaching projects
- g) joint cultural programs.

The terms of such mutual assistance and cooperation shall be discussed and agreed upon in writing by the responsible authority of each university prior to the initiation of any particular program or activity.

This agreement shall take effect upon approval by both parties and shall remain in effect for an initial period of five years. Thereafter it shall automatically be renewed annually. However, either university may terminate the agreement in writing at least ten months prior to the beginning of an academic year.

Cochin, India
4.09.2015

Prof. Pramod P. Thevannoor
Vice Chairman
SCMS Group of Educational Institutions
Cochin, Kerala, INDIA



22. SEP. 2015

Prof. Dr. Ralf Schaefer
President
Hochschule Furtwangen / Furtwangen University
of Applied Sciences



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SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY, KARUKUTTY



International Seminar on Education, Opportunities & Life in Europe

August 25th, 2017

10.30 AM to 12.30 PM

- 10:00 AM :** Welcome Address by Prof. M Madhavan, Principal, SSET
- 10:10 AM :** Objective of the Seminar by Dr. Sunny George, Director, SCMS Water Institute
- 10:20 AM :** Presidential Address by Representative from SCMS GROUP
- 10:30 AM :** Felicitation by Dr. Praveensal C J, Vice-Principal, SSET
- 10:40 AM :** MoU Exchange Ceremony - Furtwangen University, Germany & SCMS
- 10:50 AM :** Address by Prof. Dr. Ulrich Mescheder, Director of Institute for Applied Research, Furtwangen University, Germany
- 11:20 AM :** Address by Dr. George Thomas, Frontiers S.A. Laussane, Switzerland
- 11:50 AM :** Vote of Thanks by Dr. Anitha G Pillai, Dean-Academics & Head Department of Civil Engineering



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International Seminar on Education, Opportunities & Life in Europe

Seminar was conducted on August 25th, 2017 at SSET in two sessions.

In the first session Prof. M Madhavan, Principal, SSET gave the welcome address and Dr. Sunny George, Director, SCMS Water Institute presented the objective of this seminar. Presidential Address gave by P.C Pillai, Group Director SCMS Group. SCMS is having an MoU with University of Furtwangen in order to have students & faculty exchange, joint research, institutional strengthening, etc. After Felicitation by Dr. Praveensal C J, Vice-Principal, SSET, the MoU between SSET and Furtwangen University, Germany were exchanged between P.C Pillai and Prof. Dr. Ulrich Mescheder, Director of Institute for Applied Research, Furtwangen University, Germany. Prof Mescheder is an internationally renowned scientist on sensor as well as nanotechnology at Furtwangen University. It's one of the most prestigious universities in Europe. Dr George Thomas is a former Indian student who did his M.Tech and PhD from University of Konstanz, Germany and now working as scientist in Switzerland. Both of them spoke on career journey linking Indo- German- Swiss opportunities in education, research, entrepreneurship etc. It was an invaluable opportunity for students from all disciplines of engineering who are interested to do their M.Tech or Ph D programme in Europe. Dr. Anitha G Pillai, Dean-Academics & Head Department of Civil Engineering gave vote of thanks to the gathering.

In the afternoon session, Prof. Dr. Ulrich Mescheder addressed M.Tech environmental engineering students on latest advancements in sensor as well as nanotechnology in environmental engineering research and business. He gave a brief on Furtwangen University's role in the development of sensor technology and algorithms necessary for the sensor systems, as well as the interface of the sensor technology to the higher level information system and a briefing on general aspects of microtechnology.



A handwritten signature in blue ink, appearing to read "Anitha G Pillai".

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Speech by Prof. Dr. Ulrich Mescheder, Director of Institute for Applied Research, Furtwangen
University, Germany



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Prof. Dr. Ulrich Mescheder, Director of Institute for Applied Research, Furtwangen University, Germany addressing M.Tech students of SSET



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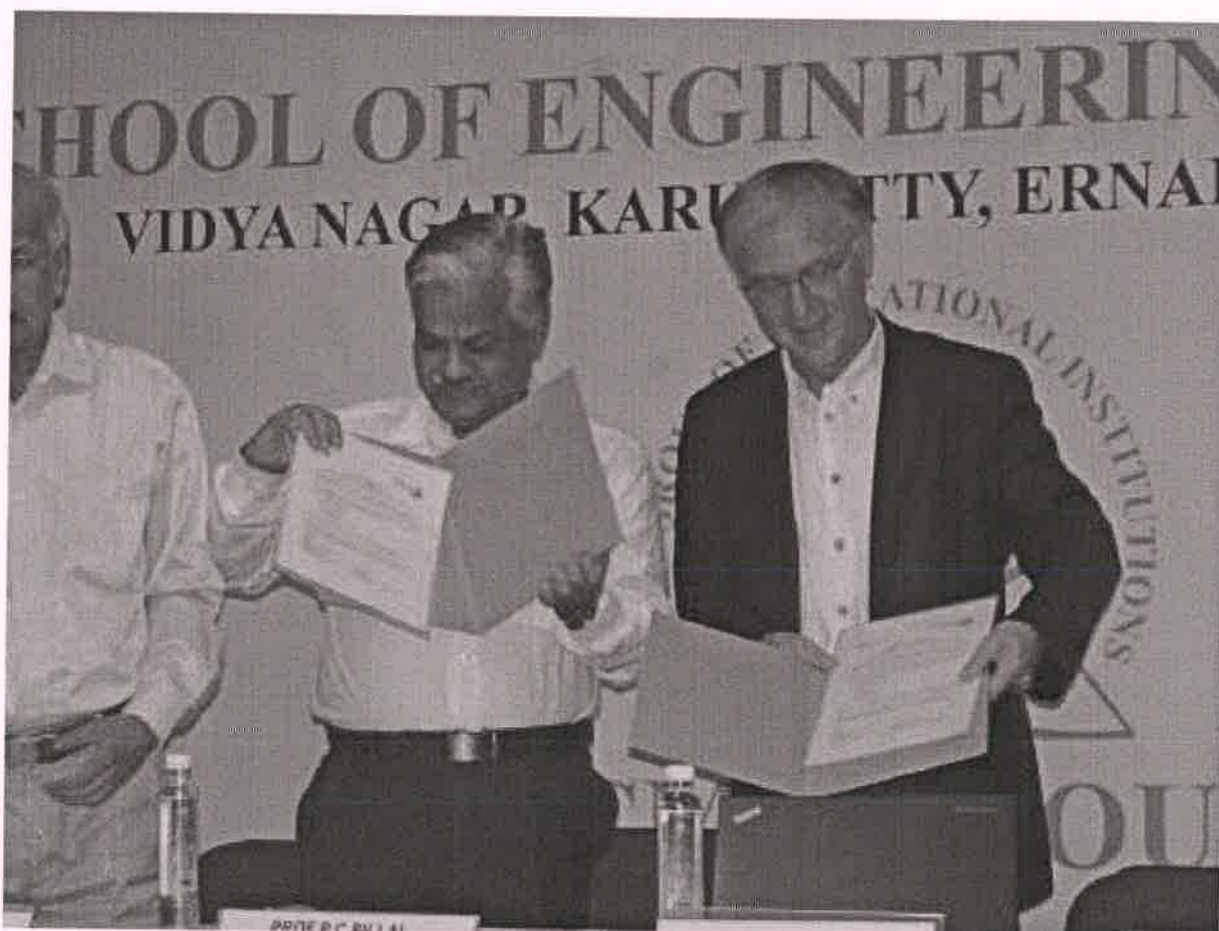
Prof. Dr. Ulrich Mescheder, Director of Institute for Applied Research, Furtwangen University, Germany addressing B.Tech students of SSET

MoU Exchange Ceremony - Furtwangen University, Germany & SCMS

SCMS School of Engineering and Technology renewed MoU with Furtwangen University, Germany. SCMS is having an MoU with University of Furtwangen in order to have students & faculty exchange, joint research, institutional strengthening, etc. This MoU is valid for five years. The new MoU between SCMS and Furtwangen University, Germany were exchanged between P.C Pillai, Group Director, SCMS Group and Prof. Dr. Ulrich Mescheder, Director of Institute for Applied Research, Furtwangen University, Germany; during the inaugural session of International seminar on education, opportunities & life in Europe on August 25th, 2017 at SSET campus.



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MoU between SCMS and Furtwangen University, Germany were exchanged between P.C Pillai, Group Director, SCMS Group and Prof. Dr. Ulrich Mescheder, Director of Institute for Applied Research, Furtwangen University, Germany



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DN 052158

Memorandum of Understanding
between

Agappe Diagnostics Ltd, Pattimattom, Ernakulam

and

SCMS Group of Educational Institutions, Cochin

This Memorandum of Understanding (hereinafter referred to as MoU) is made on the 29th Day of September 2022 between,

M/s. Agappe Diagnostics Limited (CIN No.U24239MH1998PLCH15413), a Company duly incorporated and existing under the laws of India whose registered office at Office No:401 & 402, Jaisingh Business Centre, Sahar Road, Andheri(East), Mumbai, Maharashtra, India - 400099 and Corporate office at Agappe Hills, Pattimattom (PO), Dist. Ernakulam, Kerala -683 562, India+; hereafter referred to as "Agappe" on one part and, SCMS Group of Educations Institutions, Cochin, mentioned hereafter as "Institute" on the other part as partners.

Whereas Agappe is a fast-growing company in the field of Invitro Diagnostics and Institute is a leading educational institute.

No. 15286 Date 29.9.22 Rs. 100/-

Sold to: Joseph Shanmugan Kuzhijil (H)
Mullakattanam



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MOYANAGAR, PALISSERY, ERNAKULAM, KERALA - 683 576

P.C. Nirmala, Stamp Vendor, Puthencra

Dr Rao R L



കേരളം കേരള KERALA

DN 052103

WHEREAS both Agappe and Institute (hereinafter called 'Parties') desire to carry out programmes for promoting Medical-Engineering interaction, herein referred to as "Programme", jointly with the diligence and efficiency as desired within this MoU in conformity with appropriate administrative, financial and educational practices and implement all such plans, activities and reforms as required for the Programme.

WHEREAS Agappe and Institute agree to enter into a MoU with the terms and conditions as follows.

OBJECTIVES

The major objectives for which the parties associate with each other are:

- To facilitate academic interactions among stakeholders of both Parties.
- To provide training by relevant experts from Agappe and thereby strive to improve the technical competency of eligible undergraduate and post graduate students of the Institute.
- To share ideas and implement methods, for product development activities through project guidance and technological support from Agappe

No. 15408 Date: 22.9.22 Rs. 100
Sold to: Agappe Diagnostics Ltd.
Pattinathom



P.C. Nirjala, Stamp Vendor, Puthencherry

SEP 2022
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VIDYANAGAR
ERNAKULAM
20021

- d. Collaborate to share and exchange information between both parties for mutual benefit and technology enhancement.
- e. Strive to provide Placement and internship opportunity to the eligible undergraduate and postgraduate students of the Institute.

THE PROGRAMME

The Parties have agreed to execute this MoU for Collaboration with the primary objective of providing training to the students on Agappe products and services and certain soft skills.

The primary focus will be to provide training, project guidance, internship, and limited placement support at free of charge.

This MoU is to formalize joint programmed activities that will help to establish a mutually beneficial relationship built on academic, scientific, and technological cooperation which include organizing workshops, conferences, collaborative research, hackathons, project guidance, internship, training programs, industry-institution interface as may be mutually agreed between the parties.

FACULTY EXCHANGE AND CONSULTANCY

It is highly encouraged to share the skills and expertise of both the parties for mutual benefit. Sharing Institute's Engineering domain expertise as well as Agappe Research & Development domain expertise will help both the parties to create a innovative culture. This may result in development of several Indigenous Healthcare affordable solutions.

NON-DISCLOSURE OF CONFIDENTIAL INFORMATION

The Parties shall keep all the information shared in terms of this Agreement as confidential

All intellectual property rights of Agappe including such technological innovations developed during the course of the program shall be vested with them as being its owners or their licensors wherever the context applies. The faculty and students of Institute who get the opportunity to obtain exposure to the intellectual knowhow of Agappe shall not disclose the same by any means and it shall be the responsibility of Institute to ensure the same.



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Both the parties shall exclusively own and continue to retain all rights and title to its trade name/s, trademark/s and logo/s and nothing contained herein is intended to assign or transfer any of the said rights in the trade names/trademarks and logo/s to the other Party.

INDEMNITY

Both parties hereby indemnify and shall keep indemnified and protected the other party and their respective officers and employees from and against any claims or actions arising out of or in any way relating to the provision and implementation of the Programme as per this MoU.

DURATION

This MoU will be active for a period of Three Years from 1st October 2022, the date of this MoU. It will be extended for a further period by mutual consent after evaluating the activities conducted.

TERMINATION

Either party has the right to terminate this MoU by giving ninety days written notice to the other party.

JURISDICTION

In the event of any dispute arising out of this MoU, the parties agree that the courts of Ernakulam, Kerala alone will have jurisdiction.

The two parties of this MoU agree to act in good faith and in a spirit of mutual understanding and accommodation to facilitate the achievement of goals set under the Programme.



J. J. J.

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ERNAKULAM, KERALA-683 576

[Signature]



[Signature]

Dr Rag R L

Redesigning of valve system in 3-part hematological analyzer

A PROJECT REPORT

Submitted by

ASWIN SURENDRAN SCM19ME016

ATHUL M SCM19ME017

SANDEEP BIJU SCM19ME040

SANJAY T J SCM19ME043

to

the A. P. J. Abdul Kalam Technological University

in partial fulfillment of the requirements for the award of the Degree

of

Bachelor of Technology

In

Mechanical Engineering



DEPARTMENT OF MECHANICAL ENGINEERING
SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY

KARUKUTTY

DECEMBER 2022

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DEPARTMENT OF MECHANICAL ENGINEERING
SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY
KARUKUTTY
2022 - 2023



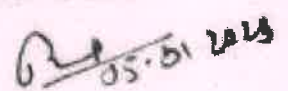
CERTIFICATE

This is to certify that the report entitled **Redesigning of valve system in 3-part hematological analyzer** submitted by **Aswin Surendran, Athul M, Sandeep Biju, Sanjay T J**, to the APJ Abdul Kalam Technological University in partial fulfillment of the B.tech. degree in Mechanical Engineering is a bonafide record of the project work carried out by him/her under my/our guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

Project Coordinator

Dr. Vidya Chandran
Mr. Francis Thomas
Assistant Professor
Dept. of Mechanical Engineering
SCMS School of Engineering
and technology, Karukutty

Project Guide


05.01.2023
Dr. Rag R L
Head of Department
Dept. of Mechanical Engineering
SCMS School of Engineering
and technology, Karukutty





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KOLLAM, KERALA-683 576



Dr Raa R L

Abstract

Impedance technology was a revolution in the history of Hematology. Mispa Count X is the first indigenous 3-part hematology analyzer in India, which works on the principle of impedance technology. The analyzer produces the measurement results of 18 parameters with throughput of 60 samples per hour. Mispa Count X was compared with benchmark analyzers Coulter DxH 800 and Sysmex XN 1000 to validate its performance. The working of the device relates to a unique method and device for blood sample dilution in hematology analyzers. Before starting an analysis, a hematology cell counter must be diluted precisely defined volume of whole blood sample with a dilution reagent.. This dilution process must be repeatable with an extremely high performance and dilution ratio. In most cases used so-called shear valves to make very precise blood volume cuts. However, these components in the hematology systems are usually extremely costly and issue a much higher complexity on the system in many ways. This project is thus a investigative study to investigate a new passive abrasion mechanism and method so-called "shear block", which could replace current rotary valves in Boule's current one hematology system. This method has many advantages such as lower cost, simplified mechanism, flexibility in the face of integration with microfluidic systems and that fewer complex control systems and equipment, which reduces calibration and maintenance needs. The hypothesis for this study is therefore that the Shear Block dilution method is only affected of blood viscosity.



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ERNAKULAM, KERALA-683 576

Dr Rag. R. L.



Raghav G R <raghavgr@scmsgroup.org>

Fwd: Internship - Agappe Diagnostics Ltd

2 messages

Dr. Rag R.L <rag@scmsgroup.org>
To: Raghav G R <raghavgr@scmsgroup.org>

Wed, Jan 18, 2023 at 11:46 AM

Dr. Rag R. L.

Professor & Head, Department of Mechanical Engineering



SCMS School of Engineering & Technology
Karukutty - 683 582.
Phone: 0484 2450330 | Mob: 9446941654
website: <https://scmsgroup.org/sset/>
email: rag@scmsgroup.org

On Thu, Nov 17, 2022 at 1:16 PM Remya Stephen <remya.stephen@agappe.in> wrote:

Dear Sir,

This is w.r.t our discussion yesterday regarding the internship of 4 students from SCMS (Mr. Athul M, Mr. Aswin Surendran, Mr. Sanjay T J, Mr. Sandeep Biju) in the R&D Equipment division at Agappe Diagnostics Ltd. As discussed, please find below the documents required to be submitted at the time of their onboarding. Request you to kindly communicate the same to them.

1. Adhar card copy
2. PAN card copy
3. 1 passport size photo
4. Bonafide certificate from college

Also, please let us know if it would be okay for them to start their internship on 21/Nov/2022.

Regards,

Remya Stephen

HR

Agappe Diagnostics Ltd

9745314444



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Dr Rag R L

*This message (including any attachments) is intended only for the use of the individual or entity to which it is addressed and may contain information that is non-public, proprietary, privileged, confidential, and exempt from

disclosure under applicable law or may constitute as attorney work product. If you are not the intended recipient, you are hereby notified that any use, dissemination, distribution, or copying of this communication is strictly prohibited. If you have received this communication in error, notify us immediately by telephone and (i) destroy this message if a facsimile or (ii) delete this message immediately if this is an electronic communication. Thank you*

Dr. Rag R.L <rag@scmsgroup.org>
To: Raghav G R <raghavgr@scmsgroup.org>

Wed, Jan 18, 2023 at 11:48 AM

Dr. Rag R. L.

Professor & Head, Department of Mechanical Engineering



SCMS School of Engineering & Technology
Karukutty - 683 582.
Phone: 0484 2450330 | Mob: 9446941654
website: <https://scmsgroup.org/sset/>
email: rag@scmsgroup.org

----- Forwarded message -----

From: **Remya Stephen** <remya.stephen@agappe.in>

Date: Sun, Nov 20, 2022 at 3:36 PM

Subject: RE: Internship - Agappe Diagnostics Ltd

To: Dr. Rag R.L <rag@scmsgroup.org>

Cc: Sujith P S <sujith.ps@agappe.in>, Vineeth P Mathew <vineeth.mathew@agappe.in>, Varghese Ouseph <varghese.ouseph@agappe.in>

Dear Sir,

Noted. Please take this as a confirmation from our end regarding the same. The starting date for their internship would be 22/Nov/2022 (Tuesday). Please inform the students to report at our Corporate Office at Pattimattom on 22/Nov by 8.30 am. Please ask them to carry the below mentioned documents also.

1. Adhar card copy
2. PAN card copy
3. 1 passport size photo
4. Bonafide certificate from college

Regards,

Remya Stephen

HR

Agappe Diagnostics Ltd

9745314444



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ERNAKULAM, KERALA-683 576

From: Dr. Rag R.L <rag@scmsgroup.org>

Sent: 19 November 2022 14:48

To: Remya Stephen <remya.stephen@agappe.in>
Subject: Re: Internship - Agappe Diagnostics Ltd

Dear Madam,

Since the students are having examinations, 22-11-2022 will be convenient. Kindly do the needful.

With regards,

[Quoted text hidden]

[Quoted text hidden]

[Quoted text hidden]



A handwritten signature in blue ink, appearing to be "Anitha".

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ERNAKULAM, KERALA-683 576

A handwritten signature in black ink, appearing to be "Dr Rag R L".
Dr Rag R L

SSET

welcomes



Varghese N. Ouseph
Associate Vice-President
Agappe Diagnostics Ltd.

AGAPPE

30-09-2022



Joshi
PRINCIPAL
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ERNAKULAM, KERALA - 683 576



SSET SCMS SCHOOL OF
ENGINEERING AND TECHNOLOGY
Campus: Vidya Nagar, Karukutty, Ernakulam - 683576 Kerala
Website: www.scmsgroup.org/sset Tel: 0484 2882900/0484 2450330

Accredited by



Dr. Raj R.

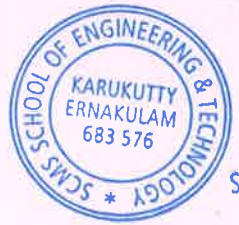


GPS Map Camera

Ernakulam, Kerala, India
799X+VRH, Palissery, Kerala 683576, India
Lat 10.269594°
Long 76.399641°
30/09/22 10:07 AM GMT +05:30



Arithi



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ERNAKULAM, KERALA-683 576

Dr Rag R L



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 799X+VRH, Palissery, Kerala 683576, India
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 Long 76.39964°
 30/09/22 10:08 AM GMT +05:30

Prithi



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Dr Rag R L



Technology
, Karukutty



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Men's Hostel

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799X+VRH, Palissery, Kerala 683576, India
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Long 76.39965°
30/09/22 10:34 AM GMT +05:30



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KARUKUTTY

Dr Rag R L



കേരളം KERALA

25AA 736508

This Memorandum of Understanding ("MoU") is executed on this 20th day of December in the year Two Thousand and Eighteen at Kochi by and between;

Kochi Metro Rail Limited, a joint venture company of Government of India and Government of Kerala, entrusted for setting up a world-class metro rail system in Kochi, having its Corporate Office at 8th Floor, Revenue Tower, Park Avenue, Kochi-682011, Kerala, India, represented by its Managing Director, Sh. Mohammed Hanish, I.A.S, (hereinafter referred to as "KMRL", which the term shall unless otherwise repugnant to the context shall mean and include all its successors and permitted assigns) on the FIRST PART;



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ERNAKULAM, KERALA-683 576

Joshi

Managing Director
Kochi Metro Rail Ltd
Kochi-682 011



43762

NO. _____ Date _____
Link _____ To _____

LISSY SEBASTIAN
GJM Court Vendor, Ekm

Kochi metro rail Ltd
Liissy Sebastian

Memorandum of Understanding between KMRL & SCMS-WI



केरल KERALA

25AA 736509

The SCMS Water Institute, a Centre of Excellence on Water, represented by SCMS Group of Educational Institutions, having its registered office at Prathap Nagar, Muttom, Kochi, Kerala, and represented by its Vice Chairman, Sh. Pramod P Thevannoor, (hereinafter referred to as "SCMS", which the term shall unless otherwise repugnant to the context shall mean and include all its successors and permitted assigns) on the SECOND PART.

KMRL and SCMS are hereinafter collectively referred to as "Parties" and may also be referred to individually as "Party".

1. The Mission of KMRL is to provide a reliable, safe, efficient, viable and customer friendly mass rapid transit systems for the Greater Kochi Region, which is environmentally and financially sustainable. KMRL also aims at enhancing the quality of life of the people in the region. KMRL wants to implement rainwater harvesting systems at the metro stations, depot, as well as

43263

LISSY SEBASTIAN
GJM Court Vendor, Evm



PRINCIPAL Managing Director
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viaducts so as to reduce its dependency on treated water from public distribution network. KMRL looks to carry out a pre-feasibility study on the implementation of rain water harvesting systems at its facilities.

2. SCMS is committed to promote water audit, conservation and management. Over the last few years, SCMS has been providing technical support to Local Self Governments (LSGs) in Kerala in addressing their challenges in managing the water resources.

3. The purpose of this MoU is to establish the basis and structure of a collaboration between the above-mentioned parties to integrate best practices in rainwater harvesting at metro stations and viaducts to ensure water sustainability of Kochi Metro.

CLAUSE 1: OBJECTIVES

- 1.1 To have an integrated, systematic effort to address effective utilization of rainwater collected over metro stations, depot and viaducts.
- 1.2 To reduce the dependency on public water distribution system and to contribute excess water resources to overcome the water scarcity in the city.
- 1.3 To have a comprehensive water management policy for the operations of Kochi Metro.



[Handwritten signature]

[Handwritten signature]
Managing Director
Kochi Metro Rail Ltd
Kochi-682 031

Memorandum of Understanding between KMRL & SCMS-WI

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1.4 As a part of achieving the above objectives, SCMS would assist KRML in these specific tasks:

- a. Assess the water use patterns at metro stations.
- b. Provide technical assistance to KMRL in conducting water audit at metro stations.
- c. Quantify the harvestable rainwater and assess feasibility of harvesting at selected locations.
- d. Provide technical assistance for KMRL and associated stakeholders covering all aspects of rainwater harvesting.
- e. Provide technical advisory support to KMRL for the development of a Comprehensive Water Management Policy.

1.5 By mutual agreement between the Parties mentioned above, additional, sustainable water initiatives may be developed under the auspices of this MOU.

CLAUSE 2: EXECUTION

2.1 The KMRL will ensure and coordinate the participation of the staff and other resources. KMRL will nominate a senior officer for the initiatives, who will have the requisite skills, experience and authority to keep the initiative moving forward in a timely manner and who will have direct access to the key decision makers.



Managing Director
Kochi Metro Rail Ltd
Kochi-682 011

Memorandum of Understanding between KMRL & SCMS-WI

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- 2.2 The Managing Director / or any of the competent officers of KMRL, who has the decision-making authority under this collaboration, commits to meeting with the representatives of SCMS at major decision points, to discuss options and/or communicate his/her decision to SCMS. Such meetings shall be held at Kochi. No expenditure will be reimbursed to SCMS for attending such meetings.

CLAUSE 3: RESPONSIBILITIES OF THE PARTIES

- 3.1 This MoU does not involve the transfer of financial resources between the Parties or generate any obligations to either Party to compensate each other in case the actions and programs agreed upon do not take place. Each Party is responsible for its own expenses.

- 3.2 KMRL and SCMS agree to jointly and individually seek financial resources for the projects under this collaboration from public and private sources. The obligations with personal and/or third parties, assumed by either of the Parties, will not lead to obligations to the other Party and are of sole responsibility of the Party that has assumed them. KMRL agrees to provide SCMS with requisite data, maps, drawings, information, reports, etc. that are necessary for the execution of the objectives as listed in this MoU.



3.3 KMRL and SCMS agree that all the data provided and study reports created as part of this collaboration can be made available in the general public domain, unless it is specifically agreed mutually that a data or portions of a report need to be held confidential, in the best interest of the human settlements in cities.

CLAUSE 4: DURATION

4.1 This Memorandum of Understanding has the duration of three years from the date of its execution and can be extended further based on mutual agreement by a written agreement by all Parties.

CLAUSE 5: ALTERATIONS AND ADDITIONS

5.1 Any alteration of the conditions and clauses established in this Memorandum of Understanding must be agreed and signed by all Parties to this MoU.

5.2 Any issue not defined in the MoU should be agreed formally between the Parties, signed by the Parties, and added to this MoU.



Memorandum of Understanding between KMRL & SCMS-WI




Managing Director
Kochi Metro Rail Ltd
Kochi-682 011


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CLAUSE 6: RESCISSION

6.1 The Memorandum of Understanding can be cancelled by either Party, formally, with a minimum of thirty days' notice, through a written letter or due to a change in law that will not permit its execution.


IN WITNESSTH WHEREOF the parties hereto have set their hands and seal on the day and year first mentioned herein above.


For Kochi Metro Rail Ltd.
A.P.M.Mohammed Hanish
Managing Director,
Kochi Metro Rail Ltd.


For SCMS Water Institute
Pramod P Thevannoor
Vice Chairman, SCMS
Group of Educational
Institutions




Witness 1

Name: **Dr. Sunny George**
Director, SCMS WATER
INSTITUTE
Signature: 



Witness 2

Name: **G.P. HARI**
Additional GM (Urban Transport)
Kochi Metro Rail Ltd
Signature: 

20/12/2018

Memorandum of Understanding between KMRL & SCMS-WI



CMS Water Institute signing MoU with Kochi Metro Rail Corporation (KMRL), Kochi for conducting a feasibility study of the potential of rain water harvesting at the stations of Kochi Metro, viaducts and depot.



Prithi

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MoU Signing Ceremony - Kochi Metro Rail Limited

Consultancy Service Agreement for the Canal Oriented Projects Being Executed by Kochi Metro Rail Limited

In 2018 SWI conducted a feasibility study to install rainwater harvesting at metro stations and viaducts to ensure water sustainability of KMRL. This [project was successfully completed and the RWH systems are now installed at various metro stations, so KMRL assigned SWI as a knowledge partner to develop additional, sustainable water initiatives. As a part of this SWI adjudged the adequacy of flood plain studies and Water Channel Modelling studies (including analysis using relevant software) to be done as part of the Canal projects to achieve the project objectives of the "Canal Oriented Projects" executed by KMRL.



SCMS Water Institute Signing MoU with Kochi Metro Rail Limited for consultancy service for the canal oriented projects being executed by KMRL

Approved by

HOD



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Report of Market Canal Visit by SCMS Water Institute on March 30th, 2022

As part of the Integrated Urban Regeneration and Water Transport System (IURWTS) Project SCMS Water Institute members visited the Market Canal in Kochi along with the members from Kochi Water Metro and Antea Group consultants on 30th March, 2022. The following observations and suggestions were made:

1. The canal is highly polluted with domestic sewage and solid waste. Wastewater flow into the canal is mostly through the storm drains discharging into the canal. The vegetation growth inside the canal and the solid waste is obstructing the free flow. The canal is now stagnant and silted.
2. Canal rejuvenation efforts shall include a wastewater diversion and treatment strategy. Specially designed sewers that intercept the dry weather flow can be sent to GCDA Centralized treatment unit/new treatment plant before disposing into the estuary.
3. Alternatively, dredging of the entire canal stretch deep into the estuary will help in increasing the flushing out mechanism and dilute the wastewater pollution in the canal during the tidal periods.
4. Providing bar screens in the storm drains will prevent the inflow of solid waste into the canal through these drains.
5. The tidal influence in the canal prevent free flow from storm drains into the canal during HAT. This causes accumulation of storm water within the drains and may result in urban flooding especially when high tide coincides with heavy rainfall within the catchment. Increasing the volume of storm drains or creating sub surface storm tanks can increase the holding capacity and thereby reduce flooding in such situations. Exact design for these can be developed after detailed modelling studies.
6. Tidal influence on the storm drains can be avoided by constructing an overflowing weir at the drain outlet into the canal. A non-returned valve (NRV) shall be provided to prevent tidal water flowing back into the storm drains.
7. The silt deposition on the upstream side of the proposed weir in the storm drain may be dredged at regular intervals for ensuring proper functioning of NRV.
8. During heavy rainfall combined with HAT, pumping station shall be established for pumping out the accumulated runoff in the storm drains or from the storm tanks into market canal so as to avoid urban flooding scenario.



[Signature]

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ERNAKULAM, KERALA-683 576

[Signature]

Director

SCMS Water Institute

Eldho Thomas

From: mratishmenon@gmail.com
Sent: 16 December 2021 21:36
To: Eldho Thomas
Cc: Ajith A; csunnygeorge@gmail.com
Subject: Re: IURWTS - Technical Note on Control Structure for Market Canal

Sir,

After reviewing the report please find our comments below.

- 1) The proposal to have a permanent vertical drop weir in the market canal to prevent backflow during HAT conditions is not scientific. The weir will become an obstruction to the natural flushing of the canal and can also be a reason for urban flooding . NRVs will get clogged easily due to high solid content in the canal and frequent siltation will also be caused on the upstream side of the weir . Having a mechanical aeration system to control anaerobic conditions which could set in at the bottom of the canal due to impounding is not a sustainable solution.
- 2) The calculations shows that there is not much of an advantage in controlling water level fluctuations in the upstream section of canal and subdrains due to the proposed weir.
- 3) Our design calculations also shows that the base width of the proposed weir (if constructing) need to be 2 m and not 1.5 m.

Hope this helps.

Thanks & Regards,
Ratish

On Thu, Dec 9, 2021 at 1:51 PM Eldho Thomas <eldho.t@kmrl.co.in> wrote:
Sir,

Please find attached the technical note on providing Control Structure in Edapally Canal as part of IURWTS Project.

May kindly review and provide your comments at the earliest.

Regards,

Er. Eldho Thomas
Manager - Civil
Kochi Metro Rail Limited | www.kochimetro.org
A Joint Venture company of Govt. of India & Govt. of Kerala
4th Floor, JLN Stadium Metro Station, Banerji Rd, Kochi-682017, India.
| Ph: 0484-2846700 | Fax: 0484 2970810 | Mob: 8281707041

Ratish Menon PhD

Associate Professor (Environmental Engineering)



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SCMS Water Institute
SCMS School of Engineering and Technology
Karukutty, Ernakulam District
Kerala-683582, India

Telephone: +91 484 2439 033
Mobile: +91 9746083929

email: ratishmenon@scmsgroup.org
Website: www.scmsgroup.org/swi



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A handwritten signature in blue ink, appearing to read "Anilika", written over a horizontal line.

PRINCIPAL

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ERNAKULAM, KERALA-683 576

A handwritten signature in black ink, appearing to read "J. J. Joseph", written over a horizontal line.

Director

SCMS Water Institute

Eldho Thomas

From: mratishmenon@gmail.com
Sent: 16 December 2021 21:36
To: Eldho Thomas
Cc: Ajith A; csunnygeorge@gmail.com
Subject: Re: IURWTS - Technical Note on Control Structure for Market Canal

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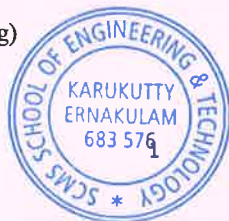
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Er. Eldho Thomas
Manager - Civil
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4th Floor, JLN Stadium Metro Station, Banerji Rd, Kochi-682017, India.
| Ph: 0484-2846700 | Fax: 0484 2970810 | Mob: 8281707041

--
Ratish Menon PhD
Associate Professor (Environmental Engineering)



A handwritten signature in blue ink, appearing to be "Ajith A.", written over a horizontal line.

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VIDYANAGAR, PALLISSERY, KARUKUTTY
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Telephone: +91 484 2439 033
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email: ratishmenon@scmsgroup.org
Website: www.scmsgroup.org/swi



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Feasibility Study on Implementation of Rain Water Harvesting Systems at Kochi Metro Facilities



Submitted by

SCMS Water Institute

SCMS School of Engineering and Technology

Karukutty, Ernakulam



July, 2020

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ERNAKULAM, KERALA-683 576



ACKNOWLEDGEMENTS

We are thankful to Kochi Metro Rail Ltd for entrusting SCMS Water Institute with this project. We are grateful to Shri. Alkesh Kumar Sharma IAS, Managing Director of KMRL and former Managing Director, Shri. A.P.M Muhammed Hanish IAS, for taking keen interest in this project. We thank Mr. Manikandan Aniyath, (General Manager - O&M) and Mr. G. P. Hari, (Additional General Manager-Urban Transport) for their inputs and mentorship during this project. We acknowledge the cooperation of Engineering Division, KMRL and timely help of Mr. Arul Raj Sankar (Dy-General Manager - Civil Dept.) and Mr. Dileep, (Manager - Civil O&M) during this project.

We like to place on record our deep gratitude to Prof. Pramod P Thevannoor (Vice Chairman, SCMS Group) for his constant encouragement and support to SCMS Water Institute.

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I like to express special thanks to Dr. Ratish Menon (Associate Professor) and Ms. Merin Mathew (Asst. Professor) for their utmost commitment in making this study successful.

Thanks are due to all faculty, staff and students at SCMS School of Engineering and Technology for their commitment to serve through this project.

Dr. Sunny George
Director
SCMS Water Institute

01/07/2020



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PROF. PRAMOD P. THEVANNOOR

14.03.2019

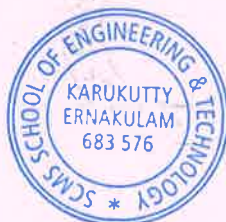
Foreword

It is with much pleasure that SCMS Water Institute provide technical support to KMRL in order to conduct a feasibility study for exploring the possibility of rainwater harvesting at Metro stations, Depot and Viaducts. Rain water harvesting is one of the most effective methods of water management and water conservation. The harvested rainwater not only can be used at the time of need, but can also help to reduce the ever increasing cost of water. When the harvested rain water after filtration is recharged into the ground or to open wells or to bore wells, it can augment the natural processes of replenishment.

I take this opportunity to congratulate KMRL which thought of the possibility of harvesting rain water from the stations of Kochi Metro. This will certainly be an eye opener for other government and public buildings of the State. Moreover this will give a great message to thousands of persons who travel through Kochi Metro every day. This initiative has particular importance as Kerala is one of the exceptional geographical areas of our country, which receives maximum annual rainfall.

I also place on record my appreciation for the SCMS Water Institute team and the students who worked on this project. Let me wish all the best on behalf of SCMS Group of Educational Institutions for this innovative initiative.

PRAMOD P. THEVANNOOR
VICE CHAIRMAN



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1.0 BACKGROUND

The state of Kerala is blessed with 44 rivers and abundant rainfall with an annual average rainfall of 3100 mm. The recent changes in rainfall pattern, population explosion, groundwater exploitation and extensive urbanization have put a considerable burden on the state's water resources. It is surprising to see that many regions in the state are facing water scarcity despite Kerala being one of the wettest places in India. Recent study by SCMS Water Institute found that majority of wards in Kochi Municipal Corporation is under immense water stress and urban water security is a major challenge to be addressed for this fastest growing city of Kerala¹.

Kochi metro, a rapid transit system serving the city (Figure 1.1), exert a significant demand on urban water. Kochi Metro Rail Limited wants to reduce its water foot print so as to contribute towards urban water security and sustainability. Reduction in water foot print can be achieved in two ways. i) by preventing misuse or overuse of water at Metro facilities and ii) by reducing dependency on public water distribution system. A detailed water audit at metro stations and yard would help in understanding water conservation opportunities at metro facilities. On the other hand, harvesting the rain water collected on station roof-tops, depot and viaducts would help in reducing the dependency on Kerala Water Authority water supply. KMRL has entrusted SCMS Water Institute to study both these aspects. This report is an outcome of such a study where SCMS Water Institute conducted a detailed water audit and also assessed the feasibility of harvesting rainwater from the roof-tops of metro stations and depot. A draft water policy for Kochi Metro is also provided to act as a guide for further activities of KMRL.

¹ SWI (2015), Development of water policy for Kochi Municipal Corporation- Background study report, SCMS Water Institute



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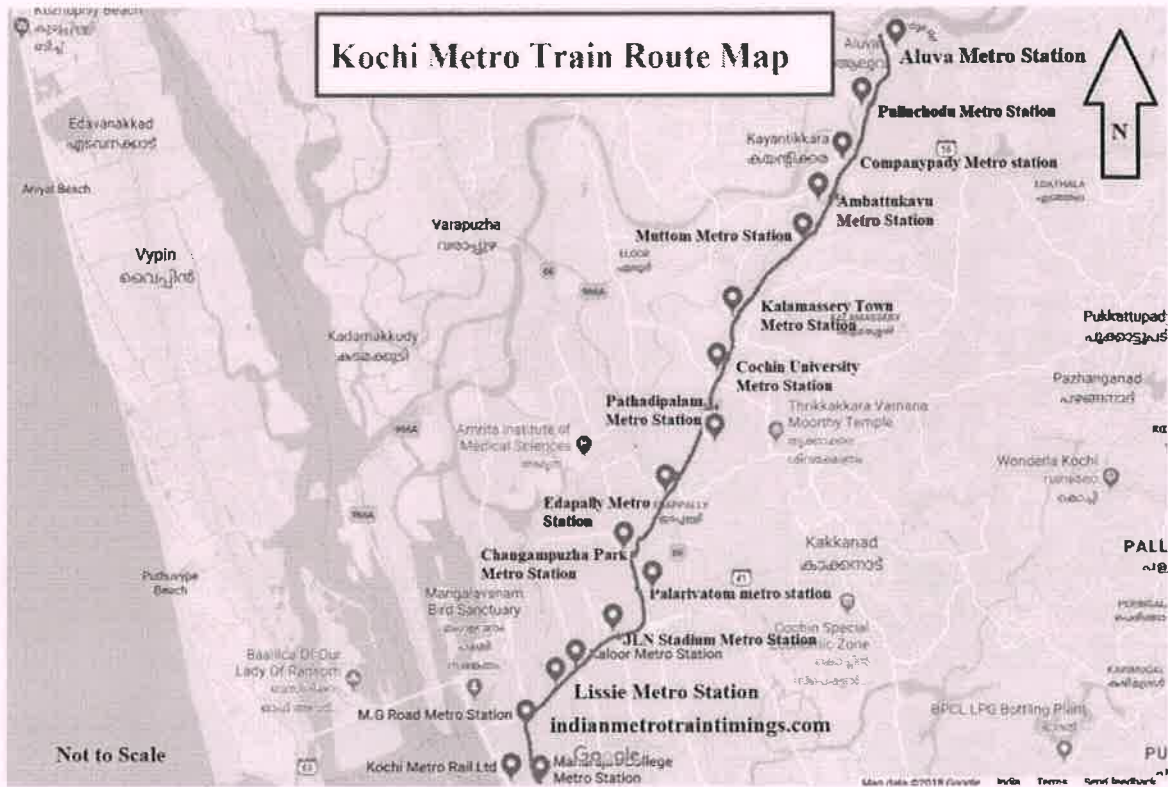


Figure 1.1 Kochi metro stations



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2.0 WATER AUDIT

A water audit is a systematic review of a site to identify opportunities to improve its water use efficiency. The site may be a public water utility, facility (institutional or commercial properties like malls, office, schools etc.) or a household. Audit recommendations are developed based on surveys and assessments of water-using hardware, fixtures, equipment, landscaping, and management practices at the site. Water audit involves tracking, assessing and validating all components of flow from the site of withdrawal or treatment through the water distribution system and into the consumer's properties. Water auditing examines the major areas of water use, including human consumption, personal hygiene & sanitation, washing, cleaning, laundry, gardening etc. Water auditing is an ongoing process and rarely stays consistent in a site or system over time. Therefore in order to gauge progress from adopted water conservation and cutbacks, water audit should be performed on a regular basis. In addition it provides convincing overview of the water use trends, effectiveness of conservation measures and potential cost and water savings.

Water audit was done at 16 metro stations and metro yard using questionnaire survey. The questionnaire was developed based on literature review and observations and discussions. The KMRL staff, housekeeping staff, gardeners, plumbers at each station and yard were interviewed as a part of water audit (Fig.2.1). The garden usage of water was estimated by measuring the flow through garden hose using water can and stop watch (Fig.2.2).



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Figure 2.1 Interview of staff done during water audit



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Figure 2.2 Discharge measurement of garden house at station

2.1 Water Sources

Metro stations use Kerala Water Authority supply for station uses like cleaning, toilet usage etc. Package water is used for drinking and either open well or bore well supply is used for gardening. Metro yard use open well water for all uses in the metro yard. Table 2.1 shows various water sources at each metro station and metro yard.



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Table 2.1 Water sources at different metro stations and metro yard

Name of the station	Sources of water			
	KWA	Open well	Bore well	Package water
Aluva	*	*		*
Pulinjodu	*	*	*	*
Companypady	*	*	*	*
Ambattukavu	*		*	*
Muttom	*		*	*
Kalamassery	*		*	*
Cusat	*		*	*
Pathadippalam	*		*	*
Edappally	*	*		*
Changampuzha park	*	* (not in use)	*	*
Palarivattom	*	* (not in use)	*	*
JLN stadium	*	*		*
Kaloor	*	*		*
Lissie	*		*	*
MG road	*		*	*
Maharajas	*		*	*



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2.2 Water Circuit Diagrams

Water circuit diagram shows how the water flows from the source to the consumers. It also identifies the position of pumps and other treatment facilities. Based on the walk through surveys, discussions with staff and managing committee water circuit diagrams were prepared for all 16 metro stations and the metro yard. The water circuit diagram for Aluva station is shown in figure 2.3. Water use diagrams for other stations are given in Annexure A.

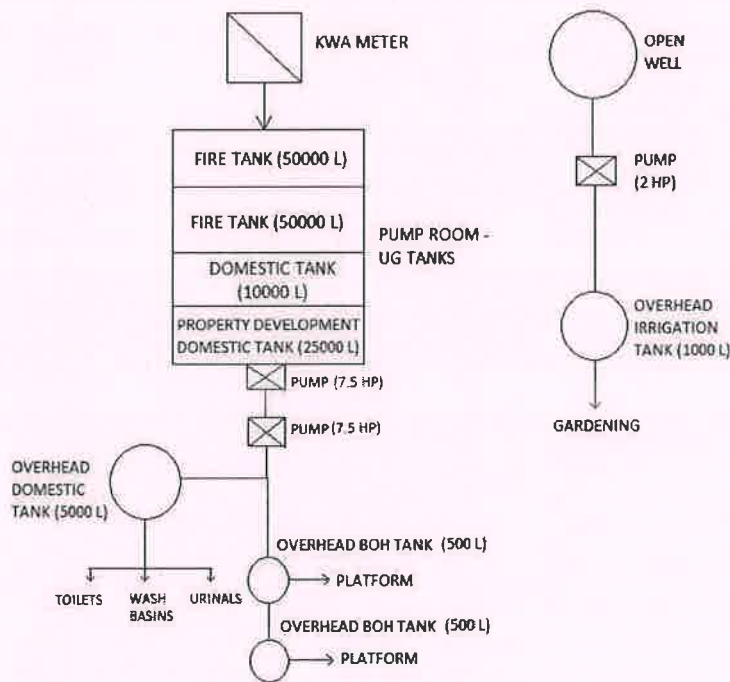


Figure 2.3. Water circuit diagram for Aluva Station

At Aluva metro station KWA water passes through a meter and is collected in an underground sump of 135 KL capacity that consists of 2 fire tanks and 2 domestic tanks. From the tank, water is pumped to 3 overhead tanks, overhead domestic tank of 5000 L capacity and 2 overhead BOH tanks of 500 L each. From the over head domestic tank, water is taken for domestic uses. Water from overhead BOH tanks are used for platform cleaning.



At Edappally metro station the KWA water is passed through a meter and is collected in an underground sump of 135 KL capacity, which consists of 2 fire tanks and 2 domestic tanks. From the tank water is pumped to 2 overhead domestic tanks of 4000 L capacity each. From the overhead domestic tanks water is taken for domestic uses.

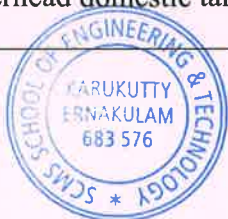
At JLN Stadium metro station the KWA water is passed through a meter and is collected in an underground sump of 135 KL capacity, which consists of 2 fire tanks and 2 domestic tanks. From the tank water is pumped to an overhead domestic tank of 5000 L capacity. From the overhead domestic tank water is taken for domestic uses.

At M G Road metro station the KWA water is passed through a meter and is collected in an underground sump of 135 KL capacity, which consists of 2 fire tanks and 2 domestic tanks. From the tank water is pumped to 2 overhead tanks, overhead domestic tank of 5000 L capacity and an overhead BOH tank of 1000 L. From the overhead domestic tank water is taken for domestic uses. Water from overhead BOH tank is used for platform cleaning.

At Pulinjod, Companyady, Ambattukavu, Muttom, Kalamassery, Cochin University, Pathadipalam, Changampuzhapark and Kaloore metro stations, the KWA water is passed through a meter and is collected in an underground sump of 60 KL capacity, which consists of 2 fire tanks and 2 domestic tanks. From the tank water is pumped to an overhead domestic tank of 5000 L capacity. From the overhead domestic tank water is taken for domestic uses.

At Palarivattom metro station the KWA water is passed through a meter and is collected in an underground sump of 60 KL capacity, which consists of 2 fire tanks and 2 domestic tanks. From the tank water is pumped to 2 overhead domestic tanks of 4000 L and 2500 L capacity. From the overhead domestic tanks water is taken for domestic uses.

At Lissie and Maharajas metro station the KWA water is passed through a meter and is collected in an underground sump of 60 KL capacity, which consists of 2 fire tanks and 2 domestic tanks. From the tank water is pumped to 2 overhead domestic tanks of 5000 L and 1000 L capacity. From the overhead domestic tanks water is taken for domestic uses.



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At Aluva and Kaloor metro stations open well is used as the source for gardening. Water from open well is pumped to an overhead irrigation tank of 1000 L capacity and from there water is taken for gardening.

At Ambattukavu, Muttom, Kalamassery, Cochin University, Pathadipalam metro stations bore well is used as a source for gardening. Water from bore well is pumped to an overhead irrigation tank of 1000 L capacity and from there water is taken for gardening.

At Edappally metro station open well is used as a source for gardening. Water from open well is pumped to an irrigation tank of 1000 L capacity and from there water is taken for gardening.

At Changampuzha park and Palarivattom metro stations bore well is used as a source for gardening. Water from bore well is pumped to an overhead irrigation tank of 2000 L capacity (above pump room) and from there water is pumped to an overhead irrigation tank of 1000 L capacity and from there water is taken for gardening.

At JLN Stadium metro station, open well is used as a source for gardening. Water from open well is pumped to an overhead irrigation tank of 2000 L capacity (above pump room) and from there water is pumped and used for gardening.

At Lissie metro station, open well is used as a source for gardening. Water from open well is pumped to an overhead irrigation tank of 1000 L capacity (above pump room) and from there water is pumped and used for gardening.

At M G Road metro stations bore well is used as a source for gardening. Water from bore well is pumped to an overhead irrigation tank of 1000 L capacity (above pump room) and from there water is pumped to an overhead irrigation tank of 1000 L capacity and from there water is taken for gardening. A

t Maharajas metro station bore well is used as a source for gardening. Water from bore well is pumped to a precast tank near the bore well and from there water is pumped and used for gardening.



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The waste water from all the metro stations is not given any treatment and is currently discharged to the public drains.

2.3 Water Use Diagrams

The water use for various activities in the metro stations and metro yard were identified during water audit. The water usage for cleaning, gardening and toilet usage is considered. Figure 2.4 shows the water use diagram for Aluva metro stations. 81% of the total water is used in toilets. 14% is used for gardening and remaining 5% for cleaning purposes. The water use diagrams for other stations are given in Annexure A. The water usage for drinking is given in figure 2.5.

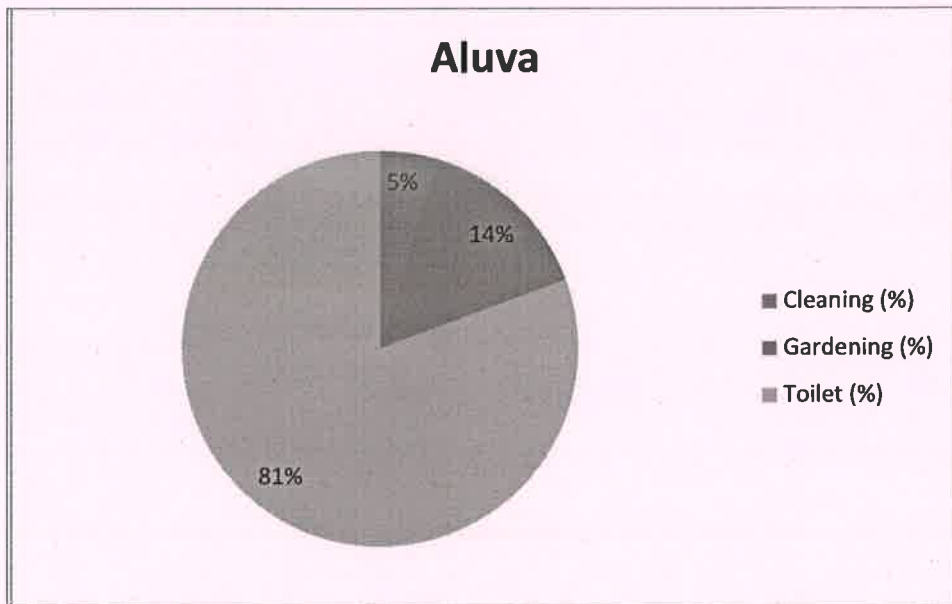


Figure 2.4 Water usage at Aluva station



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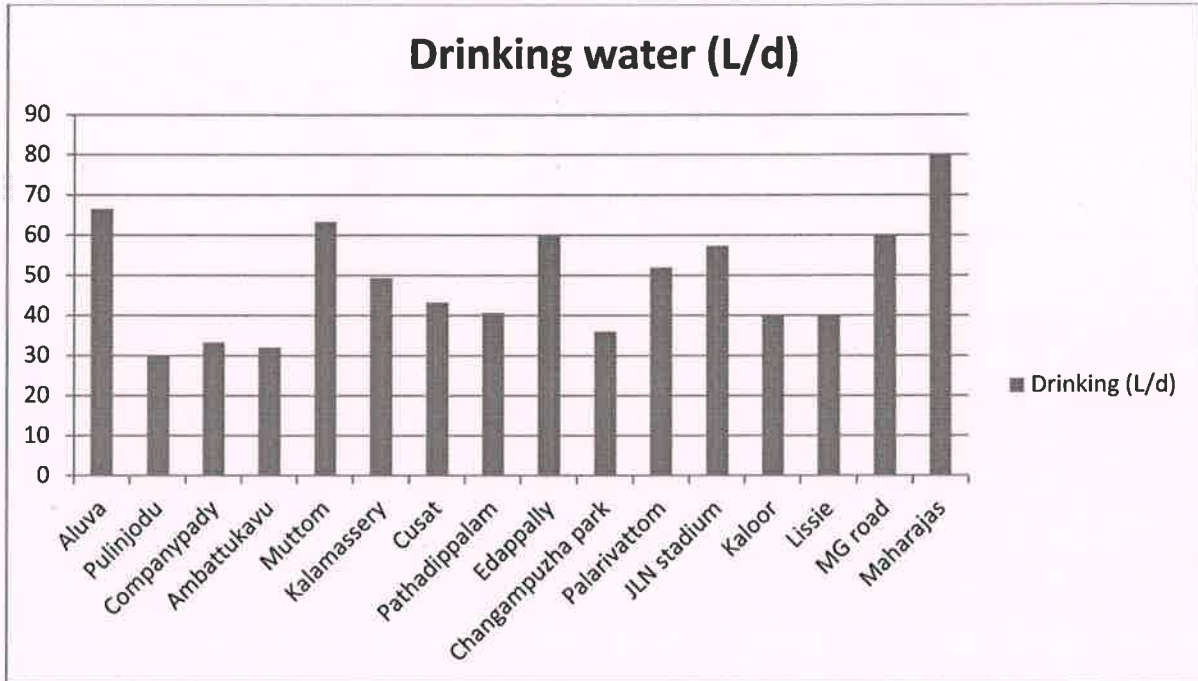


Figure 2.5 Station wise consumption of drinking water

2.4 Audit Recommendations for Potential Water Savings

Based on the findings from the water audit, the following can be recommended to reduce water use and increase the usage efficiency.

- 1) Rainwater harvesting can be done by collecting water from the roof top and using the collected water for domestic uses and gardening thereby reducing the dependency on KWA water.
- 2) Water meter can be installed in the pumps, so that water usage can be properly metered. Thus the water consumption can be identified and controlled.
- 3) Waste water treatment unit can be installed at every station and the treated wastewater can be reused for gardening and cleaning purposes.



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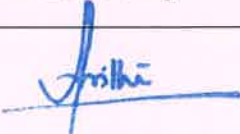
- 4) Leaky water devices can be replaced with a new device, so that water loss due to leakage can be prevented.
- 5) Replace the washroom fixtures with fixtures which discharge less amount of water.
- 6) Replace the pressmatic taps in washrooms (washbasins) with sensor type taps. The pressmatic taps cause wastage of water since a particular amount of water is discharged through the pressmatic tap in every press, even if the water is used or not used by the user. If a sensor tap is used, the discharge from the tap will be as per the requirement of the user and the wastage of water can be minimized.
- 7) Planting native and drought-tolerant plant species minimizes the need for supplemental irrigation. Thus reducing the water demand for irrigation.
- 8) Water audit shall be done annually. The total water consumption, change occurred in the water consumption, water consumption pattern and water losses can be properly monitored and thus water use efficiency can be improved.
- 9) Increase the awareness among the public to save water, to use the half flush system in toilets so that water use can be reduced.
- 10) Awareness creation among the housekeeping staff, to use optimum amount of water for cleaning and avoid over usage of water.

3.0 RAINWATER HARVESTING

Kerala is mostly subject to humid tropical wet climate experienced by most of Earth's rainforests. Kerala has two rainy seasons, the first starts in June and the second in mid-October and finally ends around mid-November. Kerala receives an average annual rainfall of 3107 mm – that amount to 7,030 crore m³ of water. Kerala averages 120–140 rainy days per year. Tapping the rain water as a resource is a logical move to

Rain water harvesting is the accumulation and deposition of rainwater for reuse on site rather than allowing it to runoff. Rainwater harvesting is a simple method by which rainfall is collected for




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future usage. The collected rainwater may be stored, utilized in different ways or directly used for recharge purposes. With depleting groundwater levels and fluctuating climate conditions, rainwater harvesting can go a long way to help mitigate these effects. Capturing the rainwater can help recharge local aquifers, reduce urban flooding and most importantly ensure water availability in water-scarce zones.

3.1 General Methods of Rain Water Harvesting

3.1.1 Surface runoff harvesting

In urban area rainwater flows away as surface runoff. This runoff could be caught and used for recharging aquifers by adopting appropriate methods (Fig.3.1).

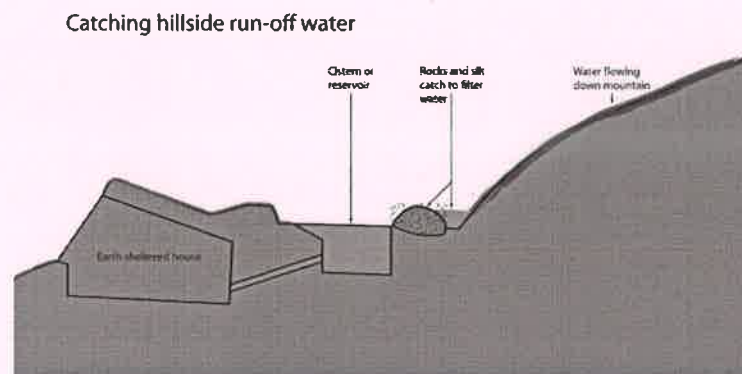


Figure 3.1 Runoff rainwater harvesting

3.1.2 Rooftop rainwater harvesting

It is a system of catching rainwater where it falls. In rooftop harvesting, the roof becomes the catchments, and the rainwater is collected from the roof of the house/building. It can either be stored in a tank or diverted to artificial recharge system. This method is less expensive and very effective and if implemented properly helps in augmenting the groundwater level of the area (Fig. 3.2).

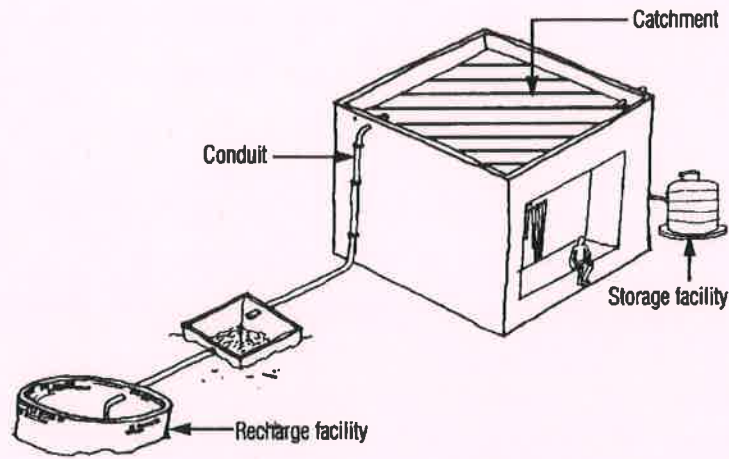


Figure 3.2 Rooftop rainwater harvesting

3.2 Rainwater Harvesting at Metro Stations and Depot

In Kochi city the groundwater table is fluctuating day by day due to over exploitation of groundwater aquifers. The water stress diagram of Kochi Corporation in the year 2014 is shown in fig 3.3. In such scenario reducing the water foot print of Kochi metro can contribute towards the urban water security of Kochi. The station wise total water dependence of Kochi Metro is shown in fig 3.4.



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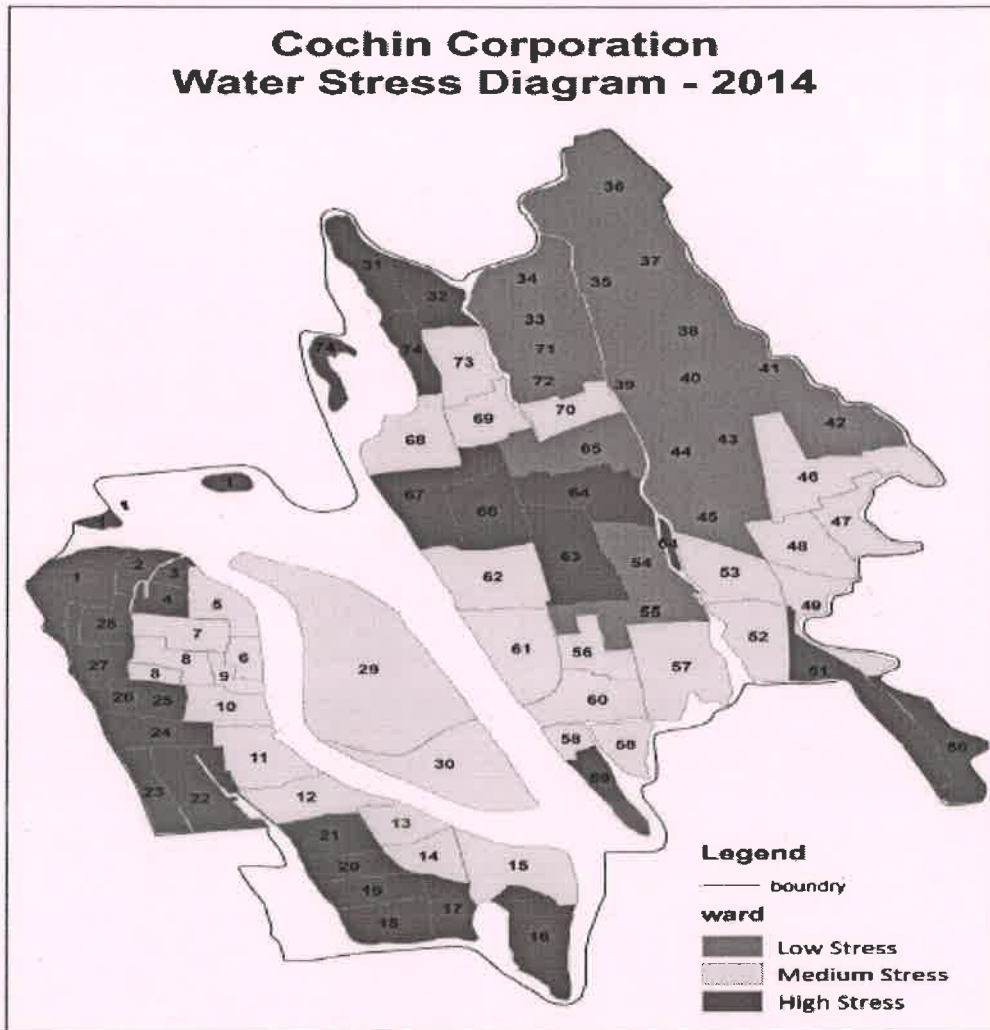


Figure 3.3 Water stress diagram of Kochi Corporation in the year 2014 (SWI, 2015)

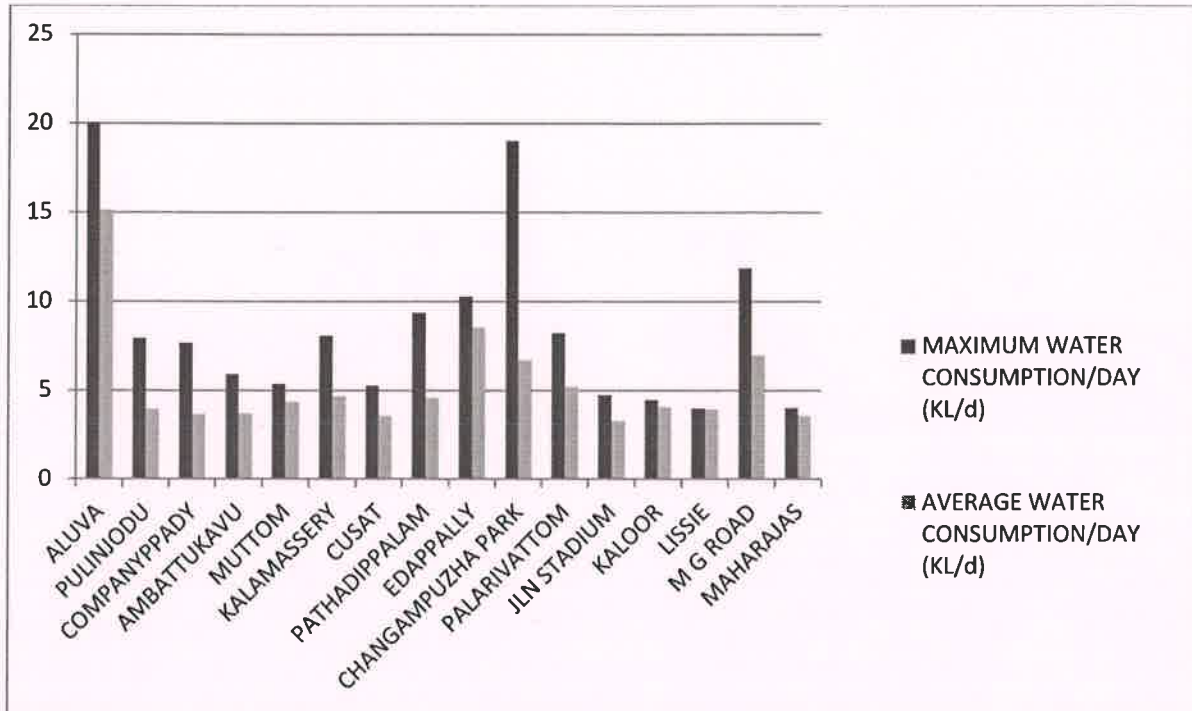


Figure 3.4 Total water dependence of Kochi Metro

During rainy season the rainwater from metro station roof tops and the viaducts are discharged to the drains and roads without utilization (Fig 3.5). In most of the area in Kochi city the rainwater is left unutilized and as a result, during rainy days flooding occurs in many regions in the city. The flooding points in the Kochi metro stretch was identified by field observation done on November 24, 2018 and collecting data from newspaper reports. About 23 flooding points were identified in the Kochi metro stretch (Aluva station to Maharajas station) and about 10 flooding points were facing severe condition. The reason of flooding was identified to be the insufficient capacity of drains and lack of infiltration capacity of the native soil. The flooding points along the Kochi metro stretch is shown in fig 3.6 to 3.13. Rainwater harvesting and usage of this water at metro stations can control such flooding situations within the city.



Figure 3.5 Present scenario of rainwater in the metro stations

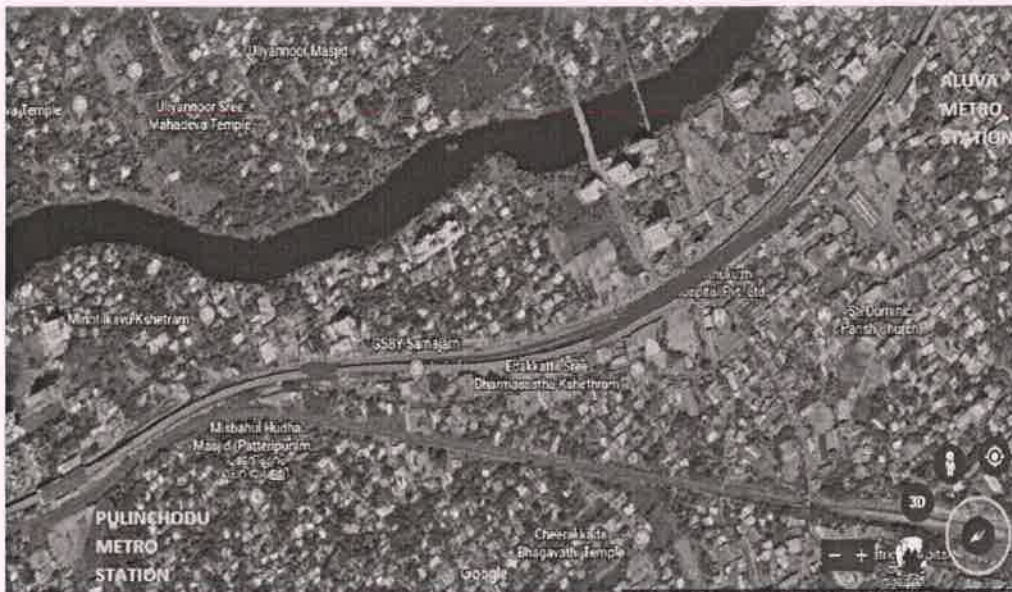


Figure 3.6 Flooding points between Aluva and Pulinjodu station

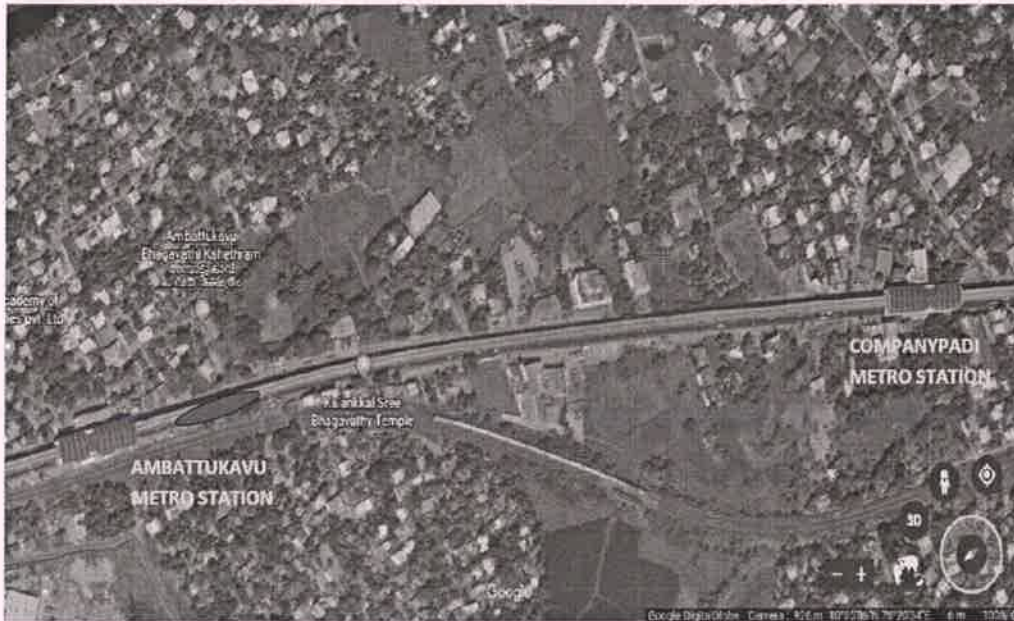


Figure 3.7 Flooding points between Companypady and Ambattukavu station

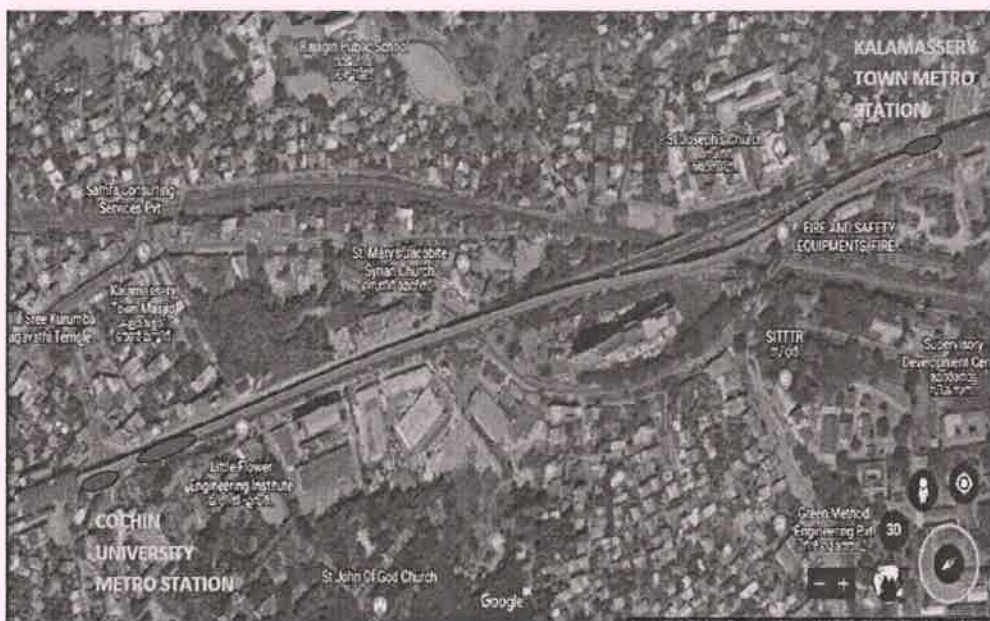


Figure 3.8 Flooding points between Kalamassery and Cochin University station



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Figure 3.9 Flooding points between Pathadipalam and Edappally station



Figure 3.10 Flooding points between Edappally and Changampuzha park station



Figure 3.11 Flooding points between Palarivattom and JLN Stadium station



Figure 3.12 Flooding points between Lissie and M G Road station



Figure 3.13 Flooding points between M G Road and Maharajas station

Rainwater harvesting at metro stations and depot can be done using roof top rainwater harvesting. At each metro station, roof area will be utilized for rainwater collection. And the viaducts will also be utilized for rainwater harvesting.

3.3 Rainwater collecting surfaces and its properties

3.3.1 Roof surface

At each metro station and metro depot, roof area will be utilized for rainwater collection. Table 3.1 shows the effective roof area available for rainwater harvesting at 16 metro stations and metro yard.



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Table 3.1 Effective roof area available at 16 metro stations and metro yard

METRO STATION	ROOF AREA (m²)
Aluva	2086.155
Pulinjodu	2086.155
Companypady	2086.155
Ambattukavu	2086.155
Muttom	2669.355
Kalamassery	2086.155
Cochin University	2086.155
Pathadipalam	2086.155
Edappally	2086.155
Changampuzha Park	2086.155
Palarivattom	2086.155
JLN Stadium	3411.34
Kaloor	2086.155
Lissie	2086.155
M G Road	2086.155
Maharajas	2086.155

3.3.2 Viaduct

Kochi metro viaducts can also be utilized to harvest rainwater. The viaducts almost extends to a length of 18.4 KM and has an effective rainwater collecting area of approx. 170016 m².

3.4 Water collection potential of Kochi metro

5 year rainfall data for the period 2013 to 2017 at Kochi city is shown in figure 3.14. The average rainfall Kochi city receives in each month is shown in figure 3.15. The per day water collection potential of 16 metro stations and viaducts are shown in Table 3.2.

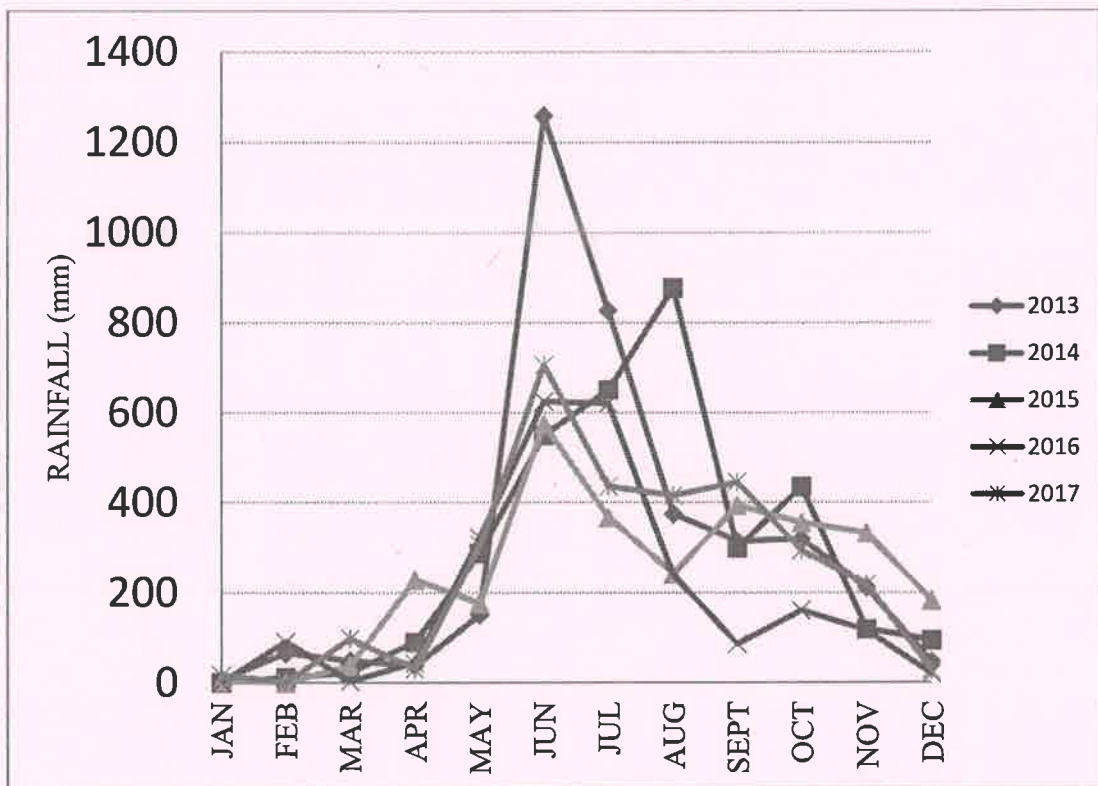


Figure 3.14: 5 year rainfall data for Kochi city (2013-2017)

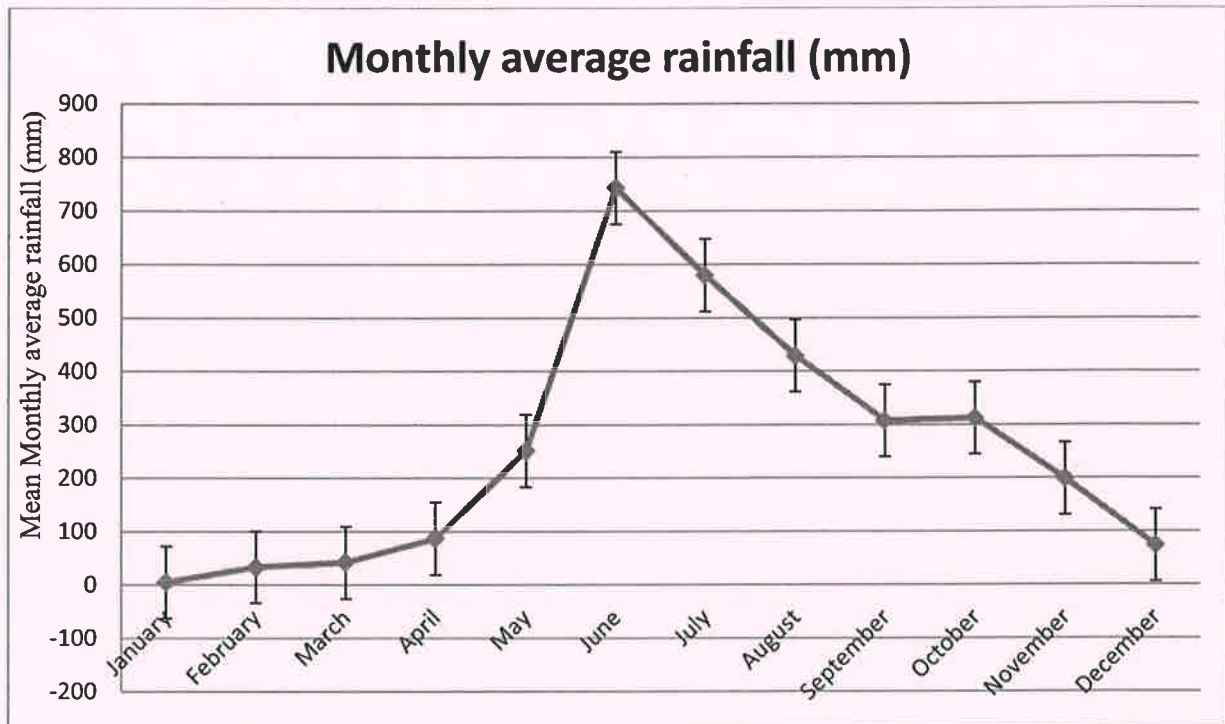


Figure 3.15 Monthly average rainfall at Kochi city

Table 3.2 Water collection potential of 16 metro stations and viaduct

METRO STATION	WATER COLLECTION POTENTIAL (KL/ d)
Aluva	51.64
Pulinjodu	51.64
Companypady	51.64
Ambattukavu	51.64
Muttom	66.08

Kalamassery	51.64
Cochin University	51.64
Pathadipalam	51.64
Edappally	51.64
Changampuzha Park	51.64
Palarivattom	51.64
JLN Stadium	84.45
Kaloor	51.64
Lissie	51.64
M G Road	51.64
Maharajas	51.64
Viaducts	4209.14

3.5 Feasible rainwater harvesting option for metro stations

To find out the feasible option for rainwater harvesting at each station, the groundwater profile and soil profile at each station were analyzed.

3.5.1 Soil profile at each metro station

The soil profiles of 16 metro stations were identified using bore log data at each station. The soil profiles of 16 metro stations are shown in figures 3.16 to 3.19.

ALUVA STATION	PULINJODU STATION	COMPANYPADY STATION	AMBATTUKAVU STATION
Lateritic soil (2.5 m)	Sand, tar and metal soiling (0.6 m)	Filled laterite soil (2 m)	Laterite soil (2.3 m)
Sand (0.8 m)	Laterite clay with pebbles (2.1 m)	Lateritic clay with sand and pebbles (4.1 m)	Lateritic clay with sand and pebbles (1.8 m)
Stiff clay (3 m)	Medium laterite (0.7 m)	Silty lateritic clay with sand and pebbles (2.5 m)	Medium laterite (1.3 m)
Clayey sand (5 m)	Lateritic clay with sand and pebbles (1.7 m)	Lateritic clay with sand and pebbles (4.8 m)	Lateritic clay with sand (6.8 m)
Lateritic clayey sand (4.7 m)	Lateritic clay with sand (3.7 m)	Lateritic silty clay (1.5 m)	Silty weathered rock (4.7 m)
Silty clayey sand (5.5 m)	Soft rock (1 m)	Soft rock (1 m)	Hard rock (6 m)
Hard rock (5 m)	Hard rock (5 m)	Hard rock (5 m)	

Figure 3.16 Soil profile of Aluva, Pulinjodu, Companyapdy, Ambattukavu station

MUTTOM STATION	KALAMASSERY STATION	COCHIN UNIVERSITY STATION	PATHADIPALAM STATION
Laterite soil (5.7 m)	Filled laterite soil (2 m)	Sandy silty clay (10.2 m)	Sandy silty clay (7.2 m)
Lateritic clay with little sand (2.7 m)	Medium laterite (3.8 m)	Sandy clay (3.3 m)	Sandy clayey silt (4.6 m)
Lateritic clayey sand (3.1 m)	Lateritic clay with sand and pebbles (3 m)	Silty clay (1.5 m)	Soft rock (6.5 m)
Lateritic clayey sand (4.7 m)	Silty lateritic clay with sand (4.4 m)	Soft rock (2 m)	Hard rock (3 m)
Silty clayey sand (5.6 m)	Silty weathered rock (7.1 m)	Clayey sand (2 m)	
Hard rock (5 m)	Soft rock (1 m)	Weathered rock (0.5 m)	
	Weathered rock (2.6 m)	Soft rock (8.5 m)	
	Soft disintegrated rock (9 m)	Hard rock (2 m)	
	Hard rock (5 m)		

Figure 3.17 Soil profile of Muttom, Kalamassery, Cochin University, Pathadipalam station

EDAPPALLY STATION	CHANGAMPUZHA PARK STATION	PALARIVATTO M STATION	JLN STADIUM STATION
Fine to medium sand(9.5 m)	Fill (0.5 m)	Taring (0.8 m)	Clayey sand (1.7 m)
Sandy clayey silt (0.7 m)	Medium dense to dense sand(6.8 m)	Fine sand (4.5 m)	Silty clay with sand (2.5 m)
Silty clay (2.9 m)	Soft sandy clay (1.2 m)	Sandy clay (1.5 m)	Silty clay (6.3 m)
Fine to medium sand (1.4m)	Very stiff sandy clay (1.7 m)	Clay (3.55 m)	Clayey sand (7.7 m)
Soft rock (0.5 m)	Medium stiff clay (11.8 m)	Sandy clay (9 m)	Clay with silty sand (3.5 m)
Hard rock (5 m)	Dense sand (1.5 m)	Silty lime clay with sand (10.38 m)	Clayey sand (3.6 m)
	Medium dense clayey sand (1.5 m)	Weathered rock (2.05 m)	Silty clay (3.7 m)
	Very dense clayey sand (7.3 m)	Soft rock (1.2 m)	Silty clay with sand (3.4 m)
	Hard sandy clay (2.65 m)	Rock (6 m)	Coarse sand with trace of clay (2.3 m)
	Soft rock (1.05)		Fine sand with trace of clay (3.3 m)
	Hard rock (2.5 m)		Lime clay with sand(2.8 m)
			Silty clay (5.2 m)
			Silty weathered clay (3.1 m)

Figure 3.18 Soil profile of Edappally, Chagampuzha park, Palarivattom, JLN Stadium station

KALOOR STATION	LISSIE STATION	M G ROAD STATION	MAHARAJAS STATION
Filling soil (0.9 m)	Silty sand	Fill (0.9 m)	Lateritic fill (1.3 m)
Very soft sandy clay (4.3 m)	Silty sand with clay (4.6 m)	Loose sand (4.6 m)	Sand (1.4 m)
Clayey sand with shell dust (6.7 m)	Clayey silt	Very dense sand (3.3 m)	Sandy clay (4.1 m)
Clayey sand with decayed wood (2.1 m)	Clayey silt with shell dust (9.2 m)	Medium stiff sandy clay (1.4 m)	Silty clay with sand (1.2 m)
Loose sand with clay (2.3 m)	Clayey silt with garvel (3.9 m)	Soft clay (4.7 m)	Silty clay (11 m)
Stiff sand with clay (5.2 m)	Clayey silt	Medium stiff lateritic sandy clay (1.4 m)	Sandy clay (0.8 m)
Lateritic sandy clay (4.1 m)	Sandy clayey silt (13 m)	Very stiff lateritic sandy clay (3.7 m)	Lateritic clay with pebbles (1.7 m)
Very stiff clay (5 m)	Clayey silt (3.6 m)	Medium dense clayey sand (10.8 m)	Lateritic clay (2.3 m)

Medium sand (5.3 m)	Silty sand with clay (5.2 m)	Very dense sand (4.2 m)	Lateritic clay with decayed wood (6.1 m)
Coarse sand (1.9 m)	Sandy clayey silt with organic matters (7.2 m)	Hard sandy clay (7.7 m)	Sandy clay (3.6 m)
Sandy clay (1.8 m)	Silty sand (3m)	Very dense sand (7.3 m)	Dense sand (3.3 m)
Sand with decayed wood (2.5 m)			Sandy clay (0.4 m)
Medium sand with decayed wood (4.2 m)			Very dense sand
Very dense sand (3.7 m)			Coarse sand with medium sand (5.6 m)
			Hard silty clay (16.2 m)
			Hard charcolic clay with decayed wood (1 m)

Figure 3.19 Soil profile of Kaloor, Lissie, M G Road, Maharajas station

In all of the 16 metro stations the soil profile mostly consist of high clay content. So the groundwater recharging is limited in such a case, since clay has less permeability, infiltration capacity and yield. So recharging the entire water harvested is not possible and if it is done it will lead to issues such as flooding.

3.5.2 Ground water profile at each metro station



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The groundwater profile at each metro station was identified by field investigation. Figure 3.20 shows the field investigation for groundwater profile. Table 3.21 shows the groundwater levels at each metro station. Figure 3.21 shows the ground water profile of Muttom metro station.



Figure 3.20 Field investigation for groundwater profile

Table 3.3 Groundwater levels at each metro station

METRO STATION	GROUNDWATER LEVELS FROM GROUND LEVEL – PRE MONSOON (m)	
	LHS SIDE	RHS SIDE
Aluva	1.7	1.45
Pulinjodu	5.0	3.0
Companypady	2.3	1.5
Ambattukavu	6.0	6.5
Muttom	5.0	5.0
Kalamassery	6.0	6.35
Cochin University	3.75	1.4
Pathadipalam	5.0	5.65
Edappally	1.35	2.4
Changampuzha Park	1.55	0.65
Palarivattom	1.65	2.5
JLN Stadium	1.0	1.55
Kaloor	1.15	0.65
Lissie	1.75	1.25
M G Road	1.45	0.85
Maharajas	1.6	1.55

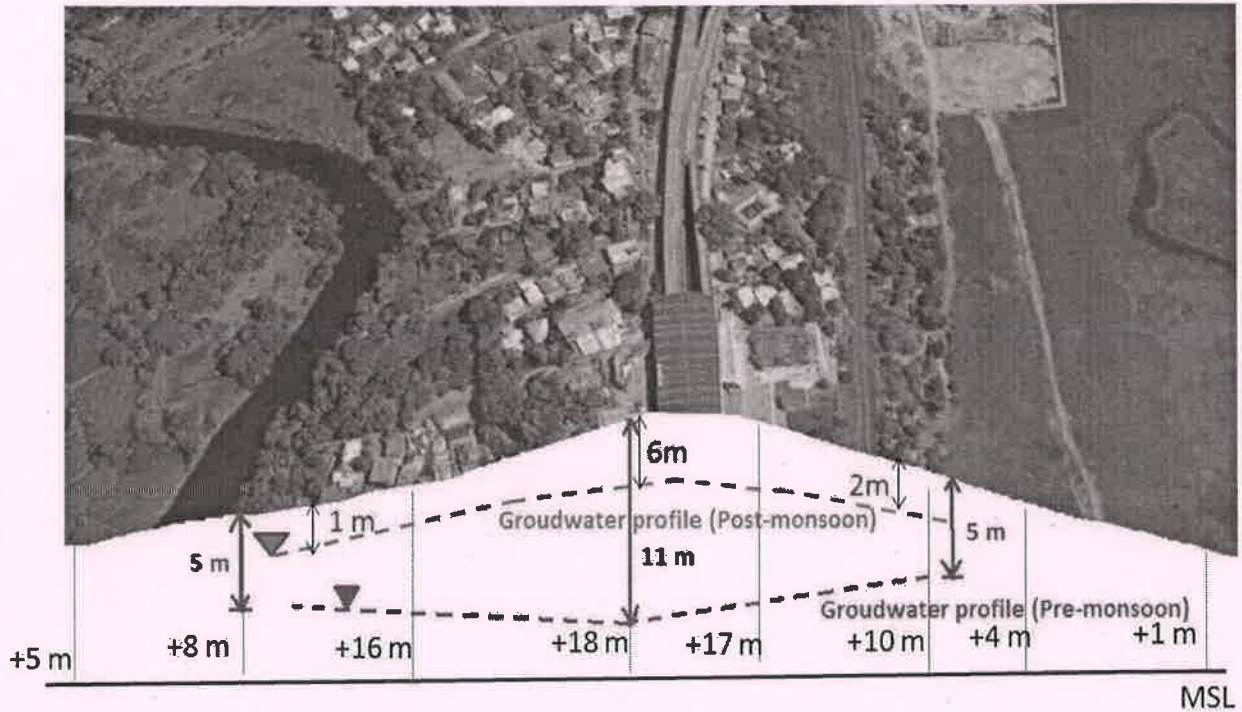


Figure 3.21 Muttom station- Groundwater profile

The Kochi city is a high water table area. From field investigation the entire metro stretch has high water table during monsoon. This condition also limits the possibility of recharging the complete rainwater collected.

The best option for 16 metro stations is to collect rainwater from the roof top and viaducts and the collected rainwater will be stored in the underground sump provided under the pump room. The capacity of the underground sumps is shown in table 3.4. The water stored in the sump will be used for the domestic activities in the station. And the excess rainwater collected will be used to recharge the groundwater through open wells and bore wells in the station. The excess water remaining after groundwater recharge (in case of an overflow from open well or bore well) will be discharged to the public drains. The rainwater harvesting circuit at the metro stations are shown in figures 3.22 to 3.25.

Table 2 Water holding capacity of sumps at each station

METRO STATION	WATER HOLDING CAPACITY OF SUMP (KL)
Aluva	135
Pulinjodu	60
Companypady	60
Ambattukavu	60
Muttom	60
Kalamassery	60
Cochin University	60
Pathadipalam	60
Edappally	135
Changampuzha Park	60
Palarivattom	60
JLN Stadium	135
Kaloor	60
Lissie	60
M G Road	135
Maharajas	60

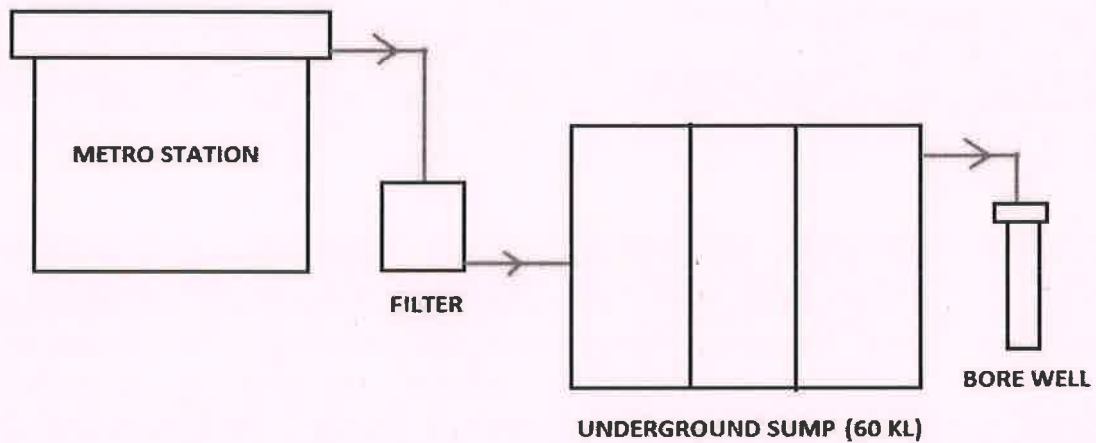
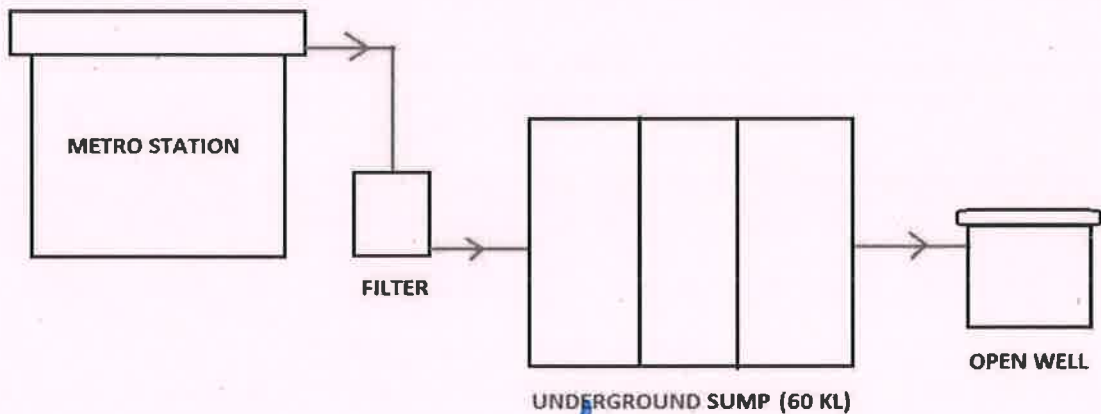


Figure 3.22 Rainwater harvesting circuit diagram for Ambattukavu, Muttom, Kalamassery, Cochin University, Pathadipalam, Lissie and Maharajas metro stations



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Figure 3.23 Rainwater harvesting circuit diagram for Pulinjodu, Companyypady, Changampuzha park, Palarivattom and Kaloor metro stations

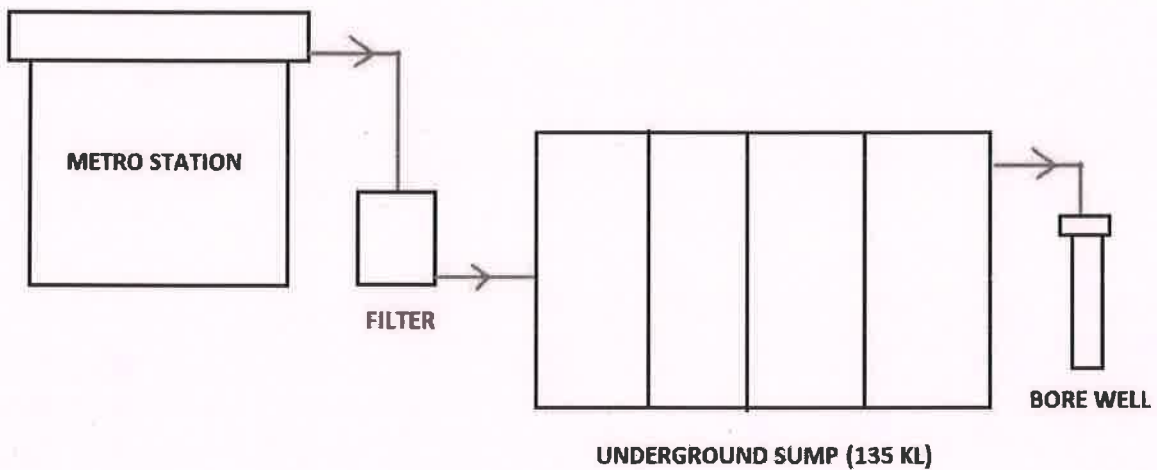


Figure 3.24 Rainwater harvesting circuit diagram for M G Road metro station

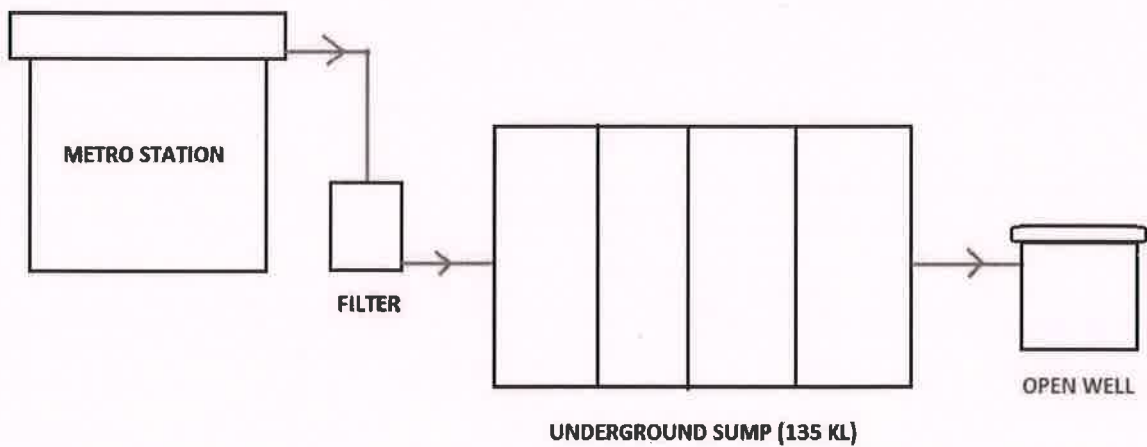


Figure 3.25 Rainwater harvesting circuit diagram Aluva, Edappally and JLN Stadium metro stations



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At Ambattukavu, Muttom, Kalamassery, Cochin University, Pathadipalam, Lissie and Maharajas metro stations rainwater from the roof top and viaducts will be collected and the collected rainwater will be stored in the underground sump of capacity 60 KL provided under the pump room. The water stored in the sump will be used for the domestic activities in the station. And the excess rainwater collected will be used to recharge the groundwater through the bore wells in the station. The excess water remaining after groundwater recharge (in case of an overflow from bore well) will be discharged to the public drains.

At Pulinjodu, Companypady, Changampuzhapark, Palarivattom and Kaloore metro stations rainwater from the roof top and viaducts will be collected and the collected rainwater will be stored in the underground sump of capacity 60 KL provided under the pump room. The water stored in the sump will be used for the domestic activities in the station. And the excess rainwater collected will be used to recharge the groundwater through the open wells in the station. The excess water remaining after groundwater recharge (in case of an overflow from open well) will be discharged to the public drains.

At M G Road metro station rainwater from the roof top and viaducts will be collected and the collected rainwater will be stored in the underground sump of capacity 135 KL provided under the pump room. The water stored in the sump will be used for the domestic activities in the station. And the excess rainwater collected will be used to recharge the groundwater through the bore wells in the station. The excess water remaining after groundwater recharge (in case of an overflow from bore well) will be discharged to the public drains.

At Aluva, Edappally and JLN Stadium metro stations rainwater from the roof top and viaducts will be collected and the collected rainwater will be stored in the underground sump of capacity 135 KL provided under the pump room. The water stored in the sump will be used for the domestic activities in the station. And the excess rainwater collected will be used to recharge the



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groundwater through the open wells in the station. The excess water remaining after groundwater recharge (in case of an overflow from open well) will be discharged to the public drains.

4.0 COST ESTIMATE FOR IMPLEMENTING RAINWATER HARVESTING SYSTEM

The cost estimate for implementing rainwater harvesting system was calculated using Delhi Schedule of Rates (DSR) and current market rate of products. The cost estimate for 1 year included the cost for implementing the system and the maintenance cost for the filter media and the rainwater harvesting pipes and devices. Table 4.1 shows the cost estimate (Implementation cost + One year maintenance cost) for the implementation of rainwater harvesting system in 16 metro stations. Further details on the cost estimation for each station is provided in annexure C.

Table 4.1 Cost estimate for harvesting rainwater at metro stations

METRO STATION	COST ESTIMATE (Rs.)
Aluva	24,17723
Pulinjodu	12,38820
Companypady	14,63872
Ambattukavu	11,56486
Muttom	11,78709
Kalamassery	13,38468
Cochin University	12,40479
Pathadipalam	12,38312
Edappally	26,40656

Changampuzha Park	15,46112
Palarivattom	12,67487
JLN Stadium	23,95243
Kaloor	11,62490
Lissie	12,85341
M G Road	13,16581
Maharajas	8,74782
TOTAL	Rs. 2,37,61562

The total implementation cost for the project is 2.2 Crores (excluding the maintenance cost). The total cost for 1 year including implementation cost and 1 year maintenance cost is 2.37 Crores.



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5.0 COST- BENEFIT ANALYSIS

The cost benefit analysis is the procedure for estimating all costs involved and possible benefits to be derived out of the activity. The major benefits of rainwater harvesting and groundwater recharge are :

- Reduction in tap water consumption in metro stations
- Improvement in the groundwater table and associated reduction in the dependence on tanker water supply for KMRL as well as the nearby residents.
- Reduction in storm water flow into the public drains. Thus the public drains can hold more storm water runoff from roads thus reducing flooding on the roads during rainy days.

Table 5.1 shows the monetizing of benefits of this project for a year

Table 5.1 Monetizing benefit of rainwater harvesting implementation at Metro stations for 1 year.

BENEFIT	COST / Yr (Rs.)
Tap water consumption	8,72,640
Groundwater recharge	79,13,050
Road repair cost due to flooding	69,82,500
Total (Rs.)	Rs. 1,57,68190

$$\text{Cost benefit ratio} = \frac{\text{Cost Estimate for 1 year}}{\text{Benefit cost for 1 year}}$$

$$= \frac{2,37,61562}{1,57,68190}$$

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= 1.50

The cost benefit ratio indicates the number of years it take to get back all the cost spend for the implementation and maintenance of the project in the form of monetized benefits. So, it will take 1.5 years to get back the 2.37 Cr. spend for the project. As this system will be in place for many years, the benefits derived in terms of money would keep on increasing.



A handwritten signature in blue ink, appearing to read 'Anitha', written over a horizontal line.

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6.0 WATER POLICY

Need for Water Policy

Kochi Metro Rail Ltd. is committed to conserve water and to avoid its misuse or overuse. Availability of good quality freshwater is a prerequisite for smooth working of metro stations and its operations. The city through which Kochi metro pass through experience intensive urbanization and under strong impact of global climate change which will the demand for water. Kochi Metro as an official consumer of water is therefore committed to adopt necessary measures to ensure effective water management. It is against this background that Kochi Metro Rail Limited has identified and recognized the need for a organization level water policy to prepare for the ever increasing water related challenges.

Water Management

Adopting best practices of water management not only exemplify the commitment of Kochi Metro towards conservation of water but also create a replicable model for other public offices and every section of the society who use this transport system. Kochi Metro aims to identify the opportunities for conservation and reducing the water foot print.

Water Audit

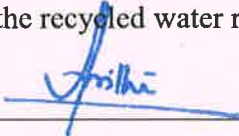
Water audit is the qualitative and quantitative analysis of water consumption to improve water use efficiency. It helps in reducing misuse and over use of water. Periodical water audits at the Kochi metro facilities would help in understanding the consumption patterns and improve water use efficiency. Water cost could be cut down to the minimum possible level.

Reuse and Recycle

About 80% of the water usage is discharged as waste water and if even a portion of this waste water can be recycled and reused, the total water demand for the metro can be brought down. Kochi metro shall adapt best practices in waste water recycling at stations and depot and promote the reuse of the recycled water resource.

Rain Water Harvesting




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Kochi Metro area receive an average annual rainfall of 3 meters. KMRL shall adopt rainwater harvesting from the roof tops of the stations and depot thus reducing the dependency on Kerala Water Authority supply especially during the rain. Excess water shall be used for recharging ground water aquifer thereby benefitting public. Storm water loss shall be controlled to reduce street flooding.

Water Literacy

KMRL consider it as a priority to improve the water literacy among the public and engage people to spread awareness on water conservation, harvesting and efficient usage. KMRL shall plan and implement water literacy programmes in the coming years and excel as a model for best practices in water management.

Planning of projects

KMRL shall make it necessary for major and medium projects to estimate their water demand during construction and also during operation. It shall plan ahead to meet this additional water demand without increasing pressure on existing system. An assessment shall be carried out to determine the impact of the proposed project on available water resources.

Follow up

This water policy gives directions for sustainable management of water resources by KMRL. Periodical review of this policy is essential to serve the changing needs of future. This policy statement shall be supplemented with implementation strategies and operational action plans for realizing the water policy objectives.



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Water Policy

Kochi Metro Rail Ltd. is committed to conserve water and to avoid its misuse or overuse. It identifies the opportunities to reduce water consumption for its operations and passengers and explore for more sustainable sources so as to alleviate the urban water stress at Kochi. This shall be achieved by:

- ❖ Harvesting the rain water from the roof tops of the stations and depot thus reducing the dependency on Kerala Water Authority supply especially during the rain.
- ❖ Improving the water literacy among the KMRL staff, passengers and public and engaging people to spread awareness on water conservation and efficient usage.
- ❖ Adapting best practices in waste water recycling at stations & depot and promoting the reuse of the recycled water resource.
- ❖ Conducting periodical water audits at the Kochi metro facilities to help in understanding the consumption patterns and improve water use efficiency.
- ❖ Making it necessary for major and medium projects to estimate their water demand during construction and also during operation.
- ❖ Maintaining and protecting the water assets under KMRL.
- ❖ Adopting internationally accepted water saving accessories at KMRL facilities.
- ❖ Reducing water foot print of metro stations and offices.



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ANNEXURE - A



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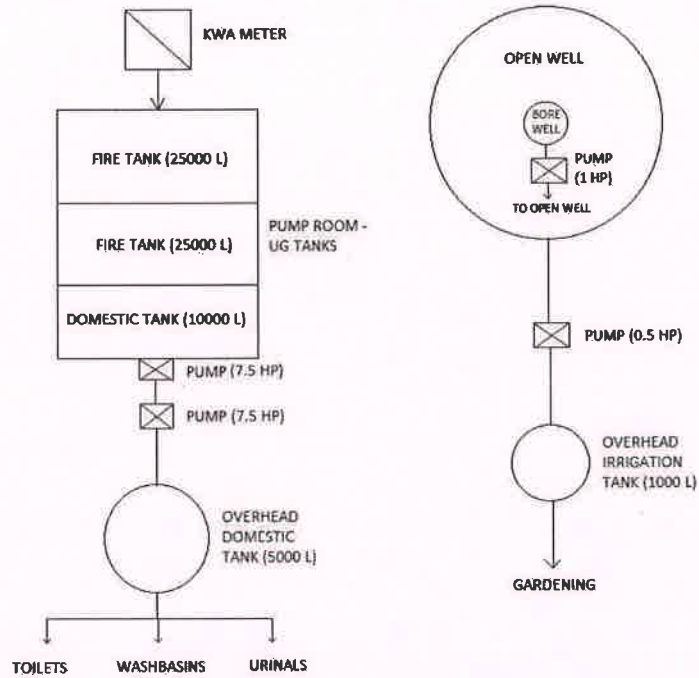
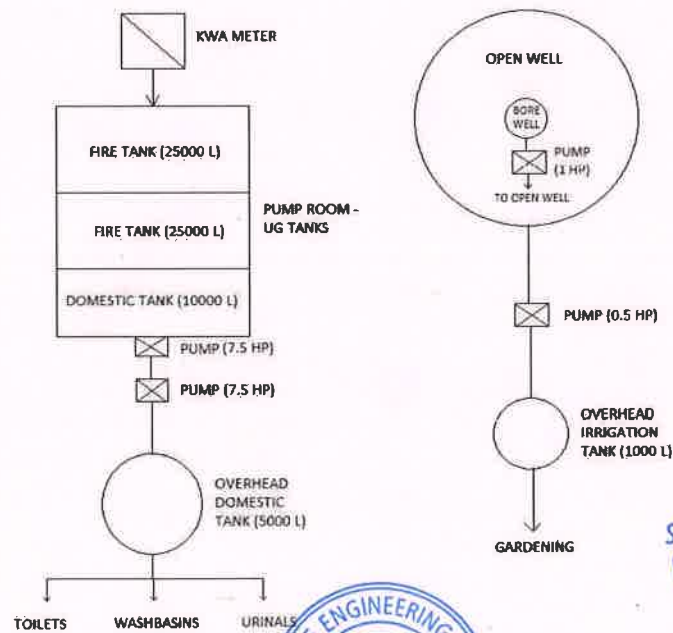


Fig 1 : Water circuit diagram for Pulinjodu metro station



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Fig 2 : Water circuit diagram for Companyady metro station

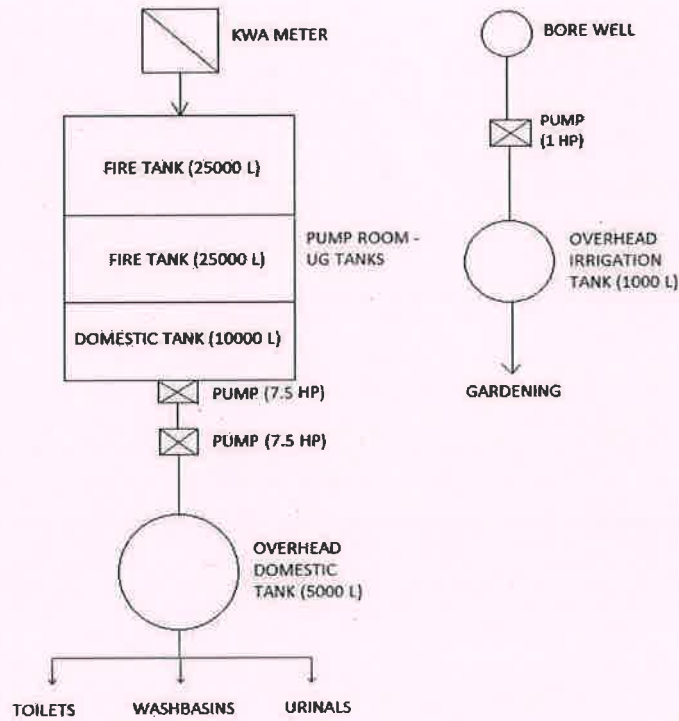


Fig 3 : Water circuit diagram for Ambattukavu metro station



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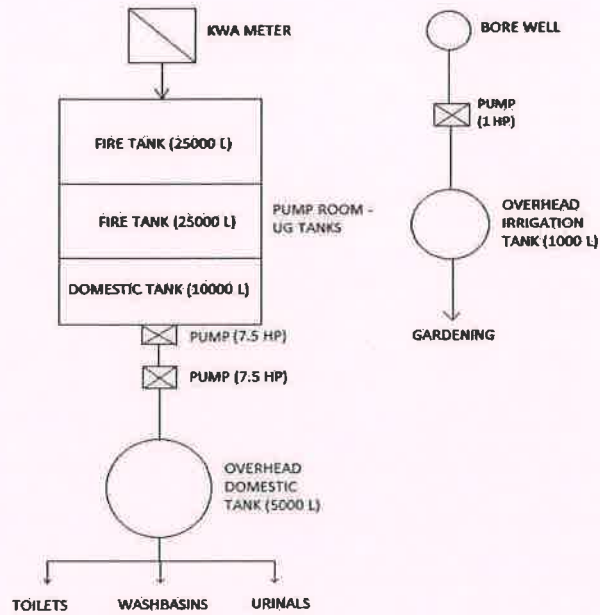
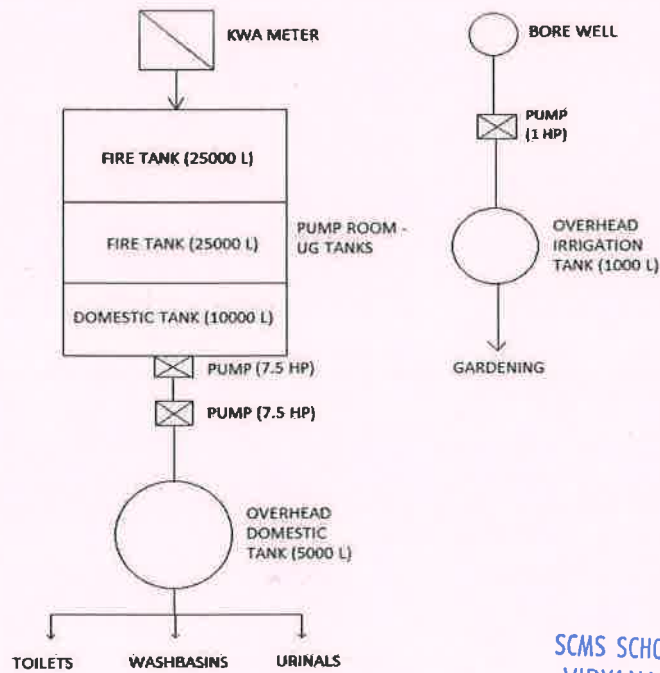


Fig 4 : Water circuit diagram for Muttom metro station



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Fig 5 : Water circuit diagram for Kalamassery metro station

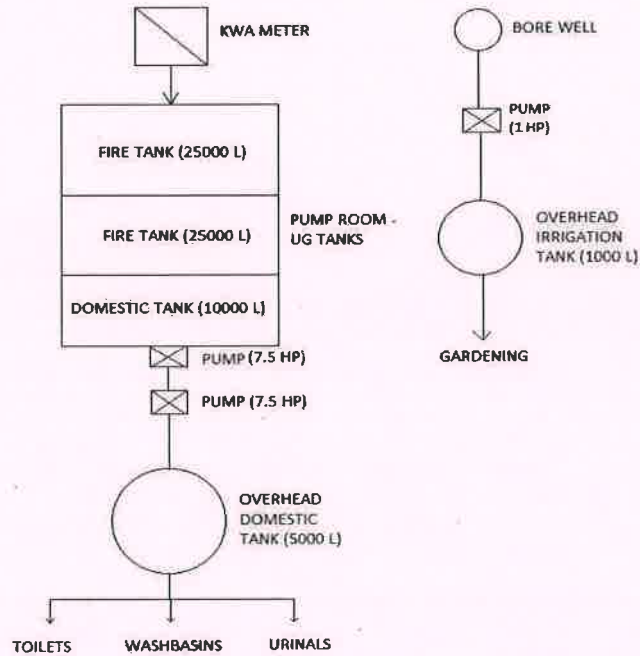
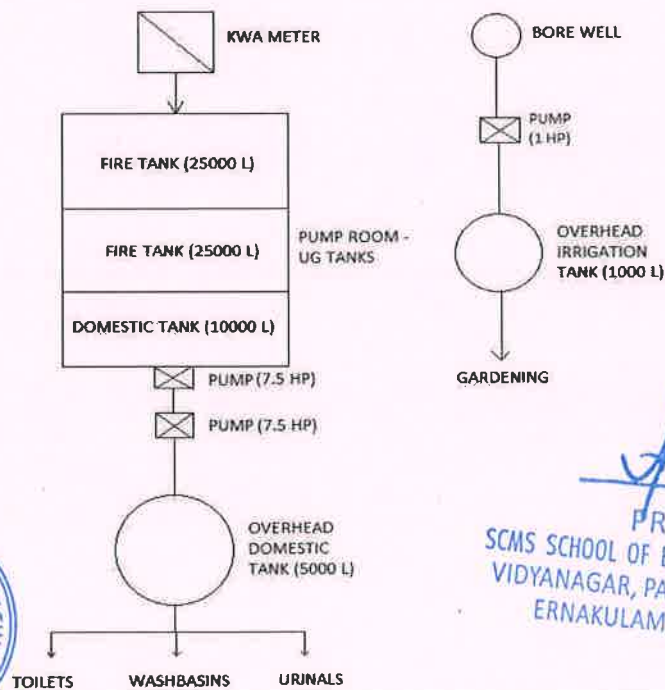


Fig 6 : Water circuit diagram for Cochin University metro station



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Fig 7 : Water circuit diagram for Pathadipalam metro station

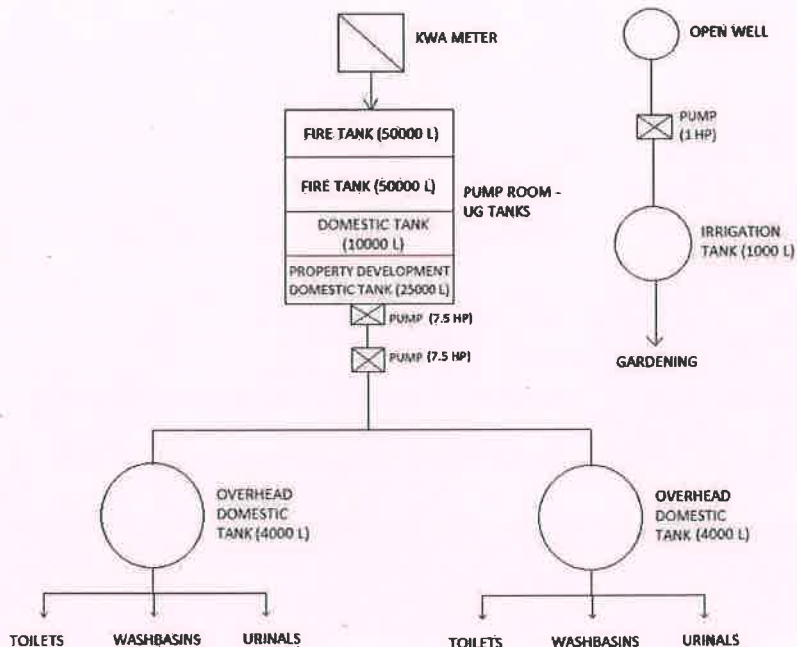


Fig 8 : Water circuit diagram for Edappally metro station



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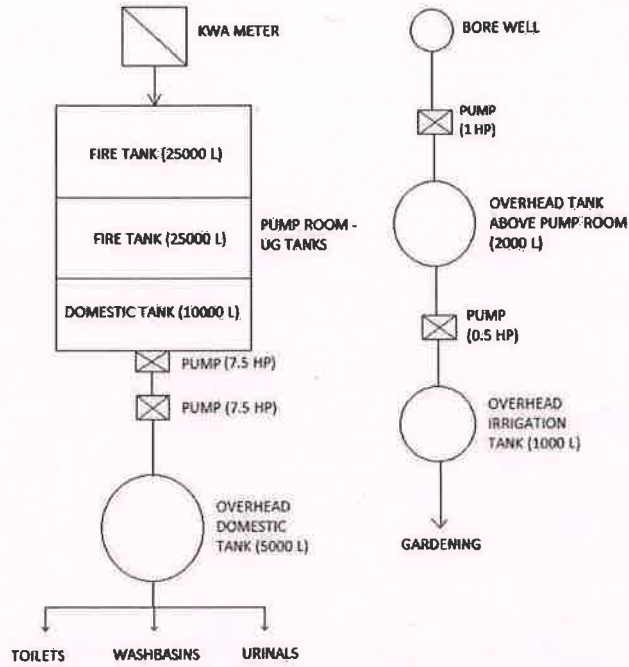
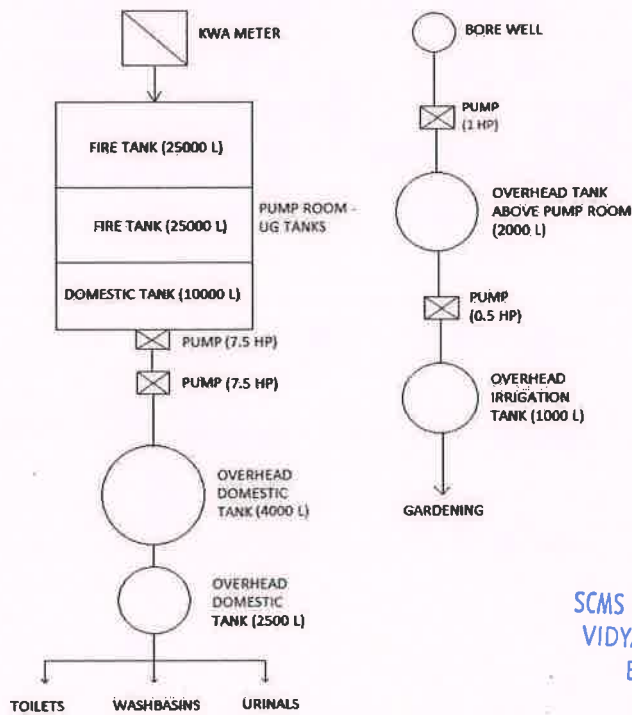


Fig 9: Water circuit diagram for Changampuzha Park metro station



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Fig 10 : Water circuit diagram for Palarivattom metro station

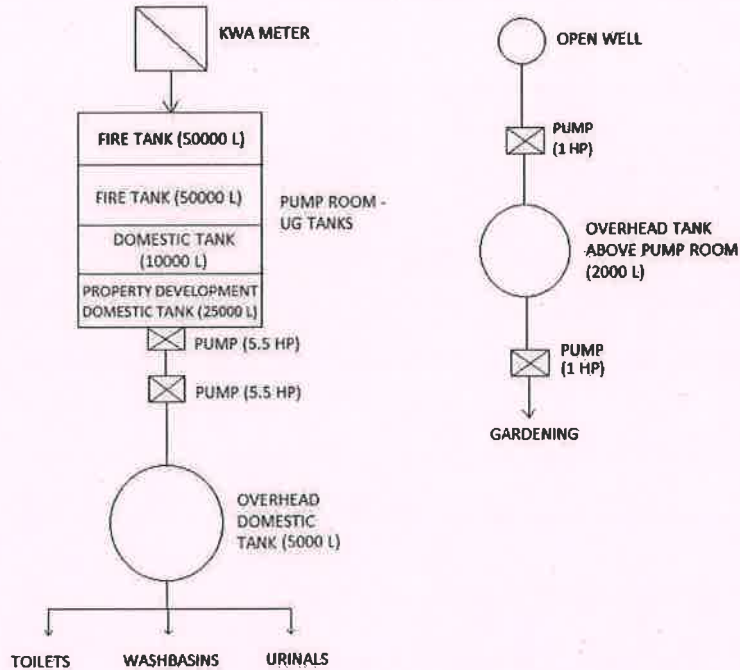
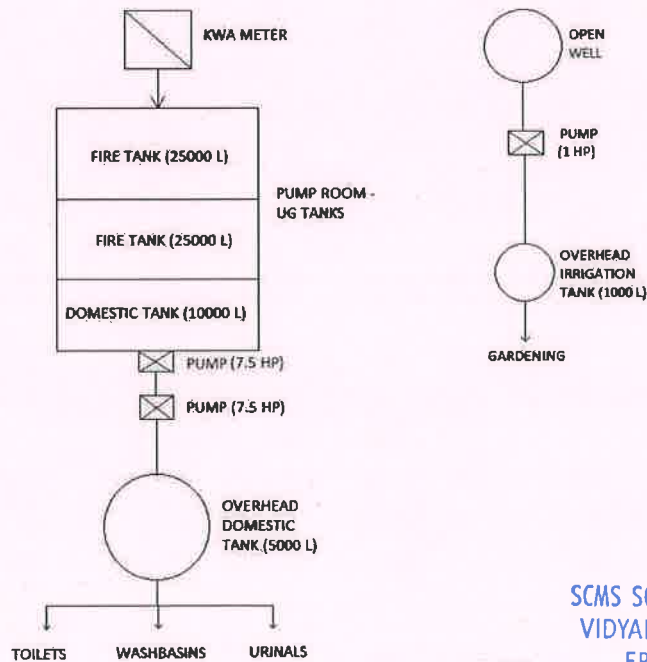


Fig 11 : Water circuit diagram for JLN Stadium metro station



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Fig 12 : Water circuit diagram for Kaloor metro station

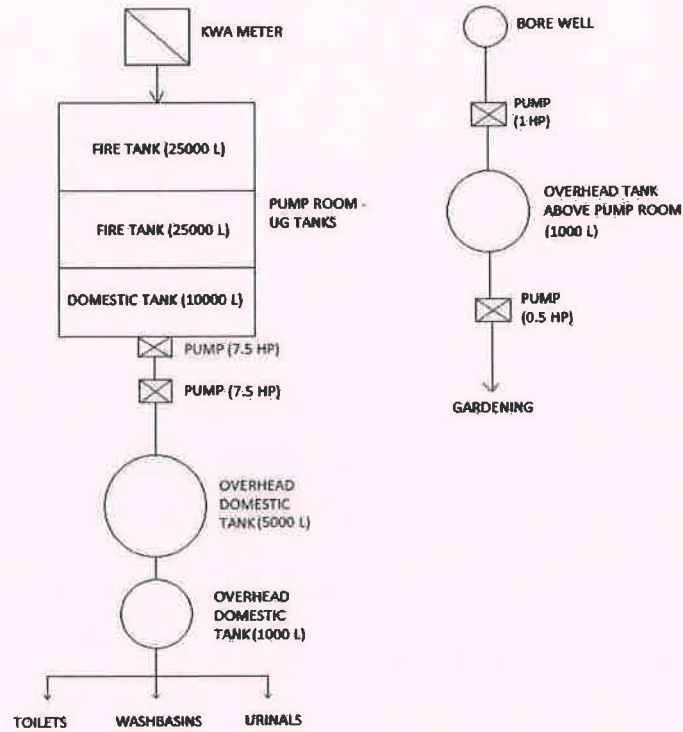


Fig 13 : Water circuit diagram for Lissie metro station



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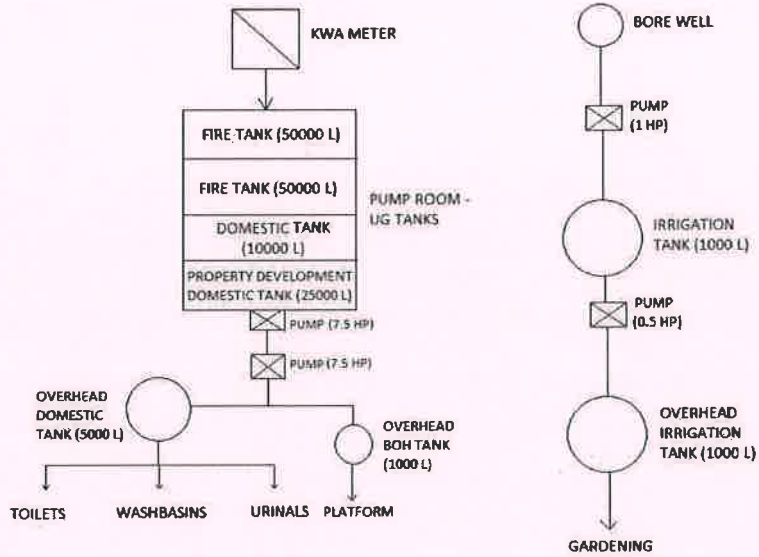


Fig 14 : Water circuit diagram for M G Road metro station

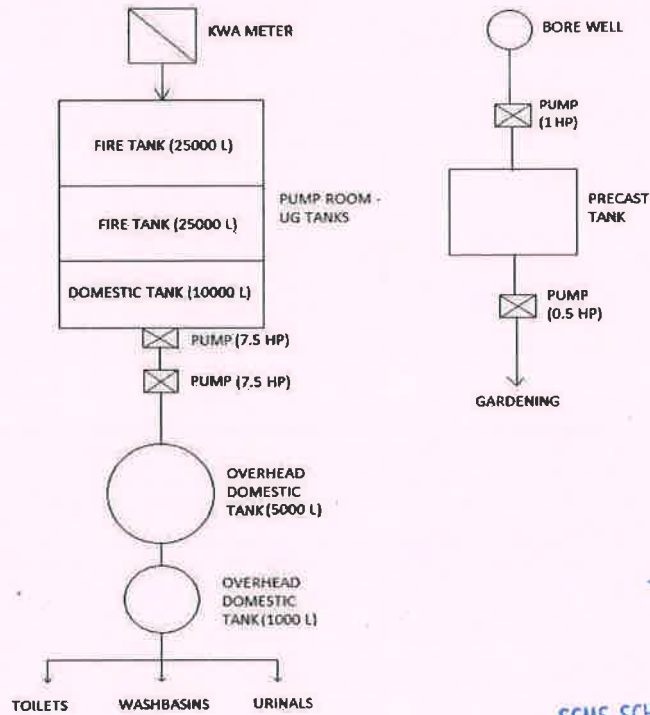


Fig 15 : Water circuit diagram for Maharajas metro station

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ANNEXURE B



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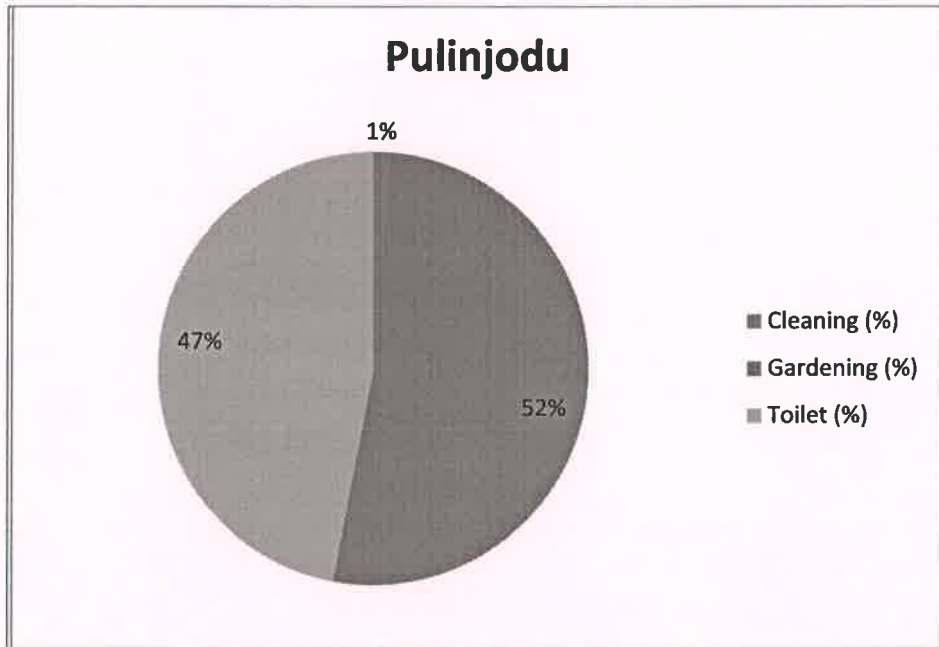


Fig 1: Water usage at Pulinjodu station



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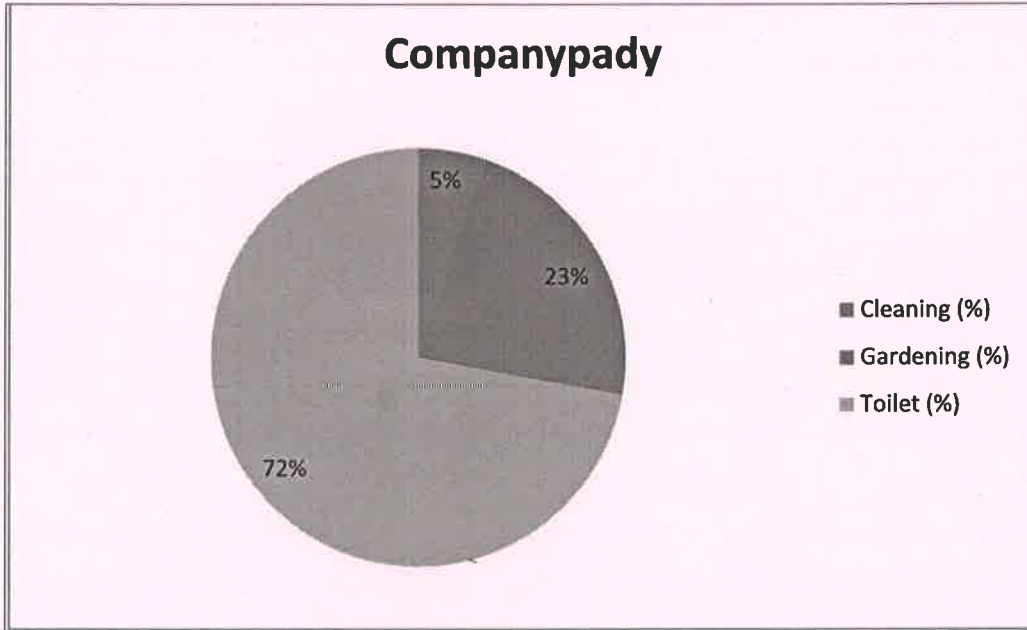


Fig 2 : Water usage at Companypady station

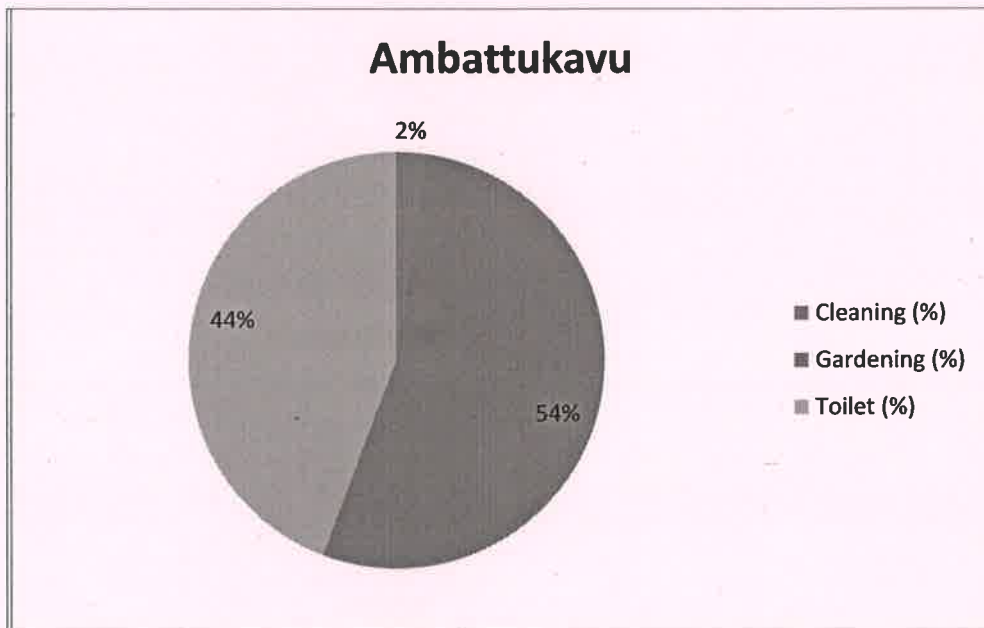


Fig 3 : Water usage at Ambattukavu station



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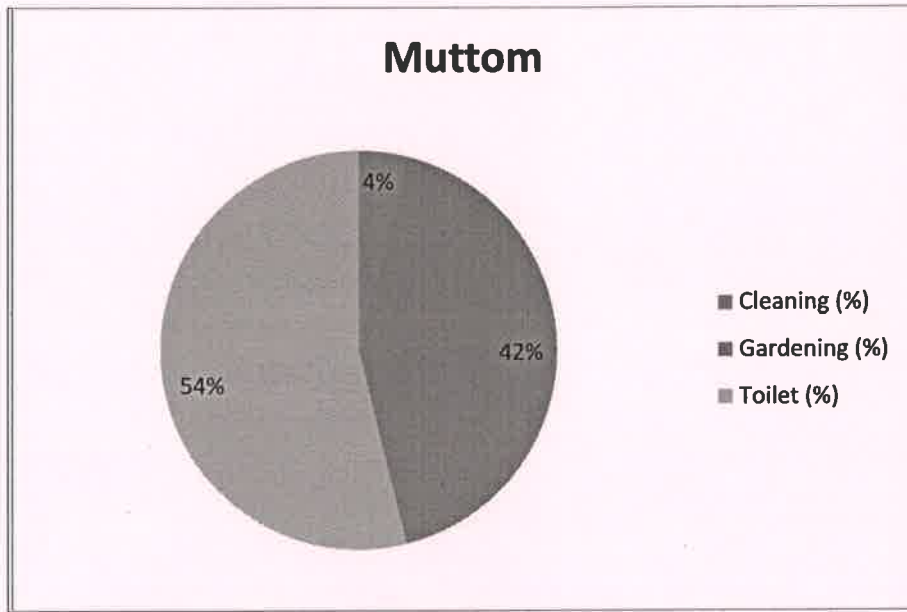


Fig 4 : Water usage at Muttom station

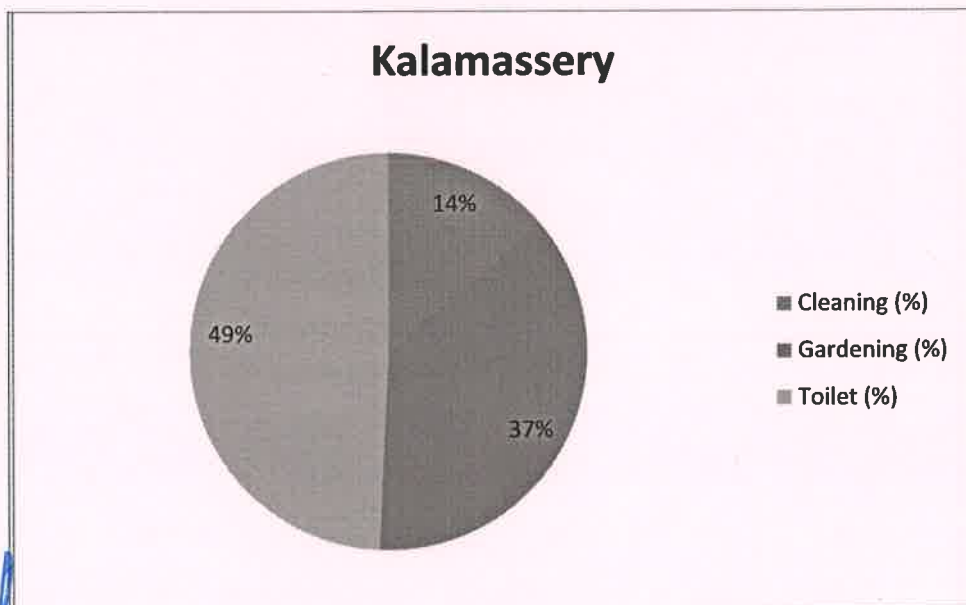


Fig 5 : Water usage at Kalamassery station



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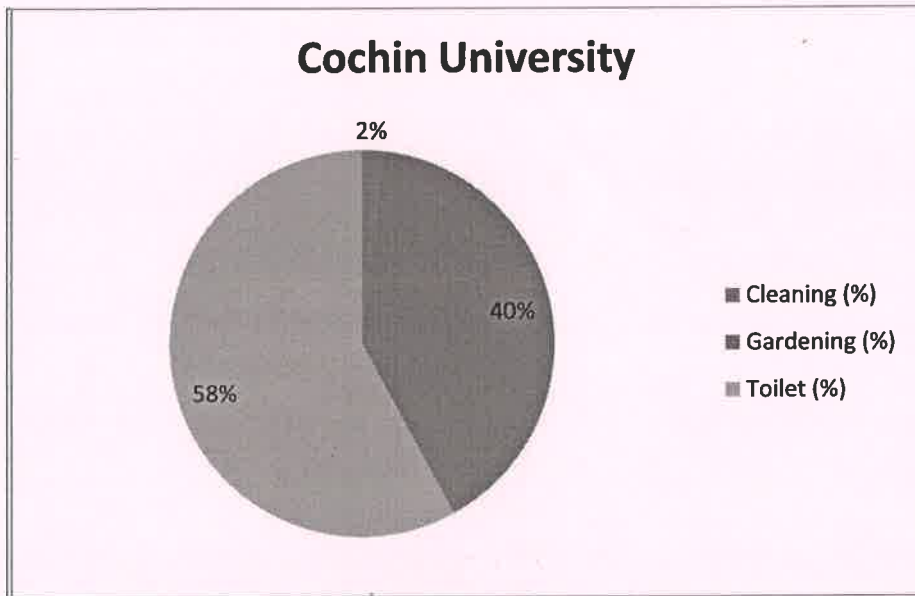


Fig 6: Water usage at Cochin University station

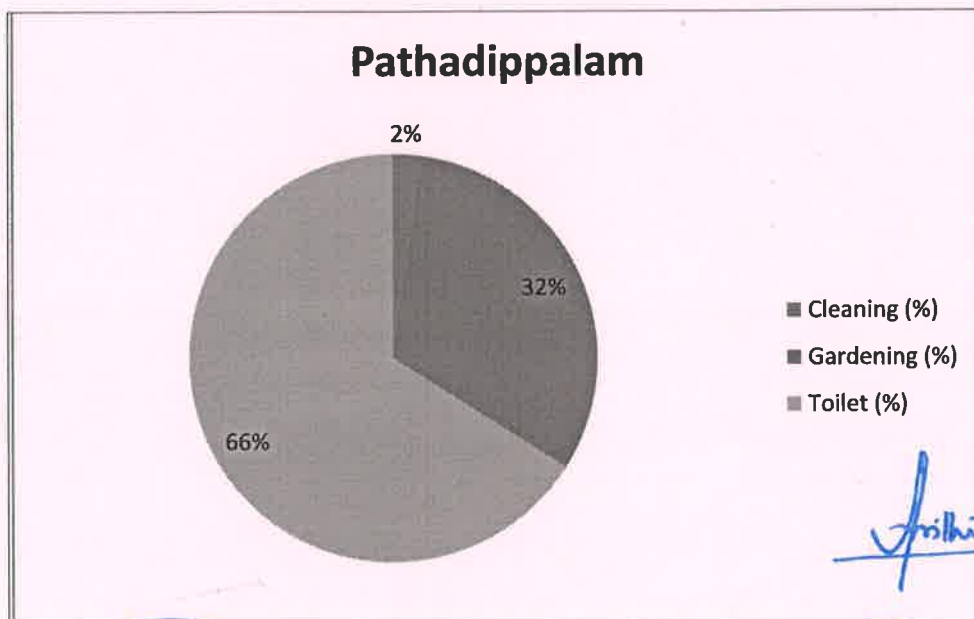


Fig 7 : Water usage at Pathadipalam station

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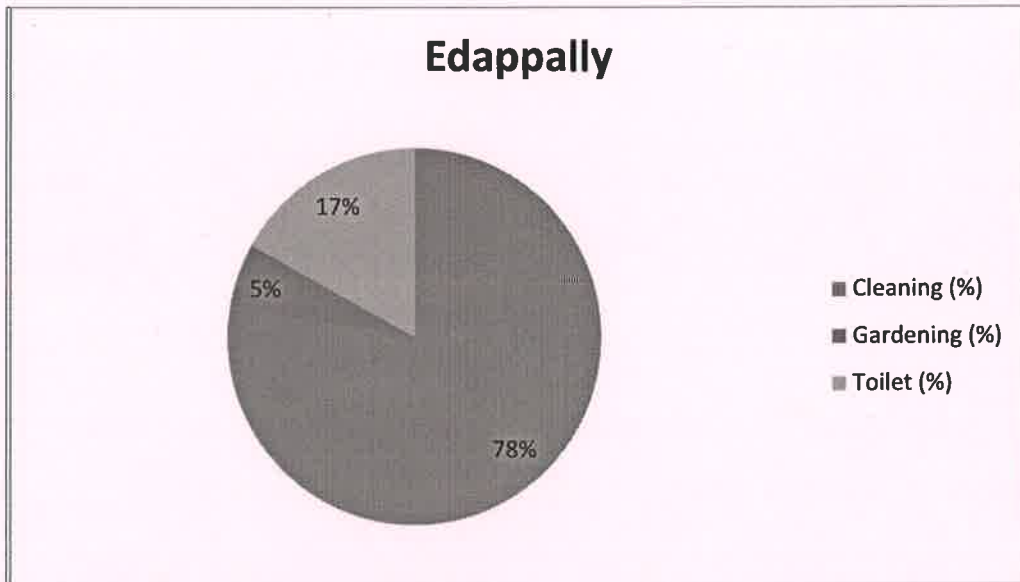


Fig 8 : Water usage at Edappally station

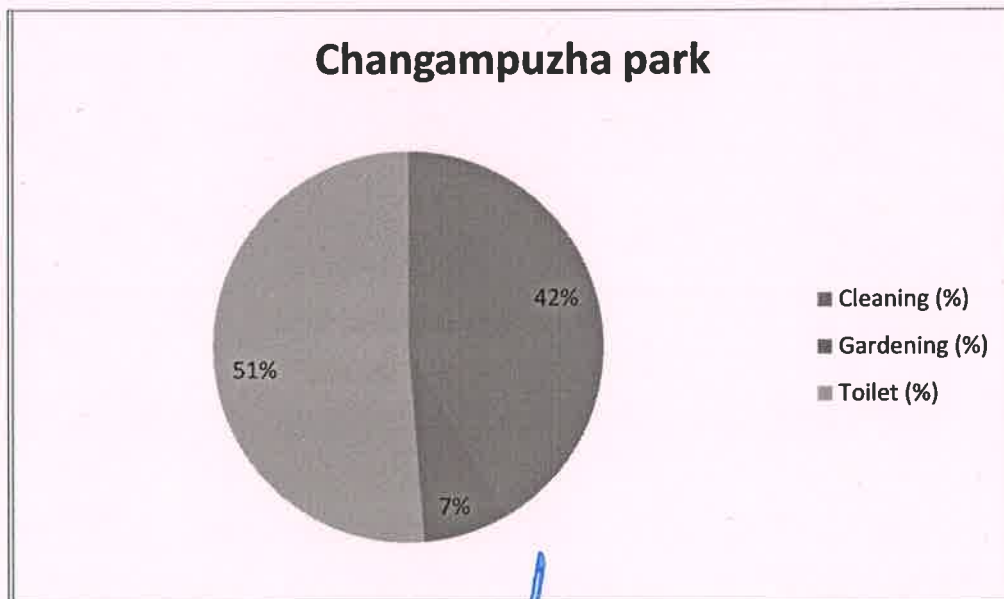


Fig 9 : Water usage at Changampuzha Park station



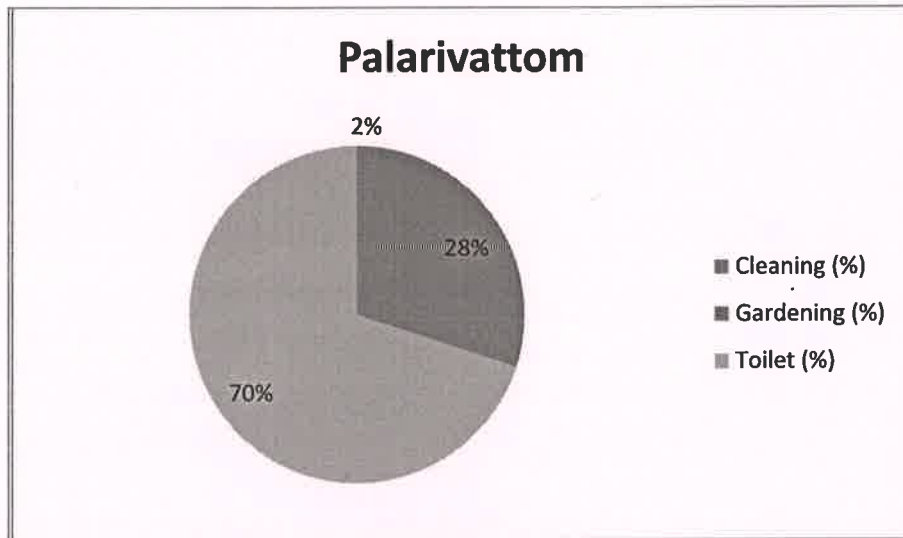


Fig 10 : Water usage at Palarivattom station

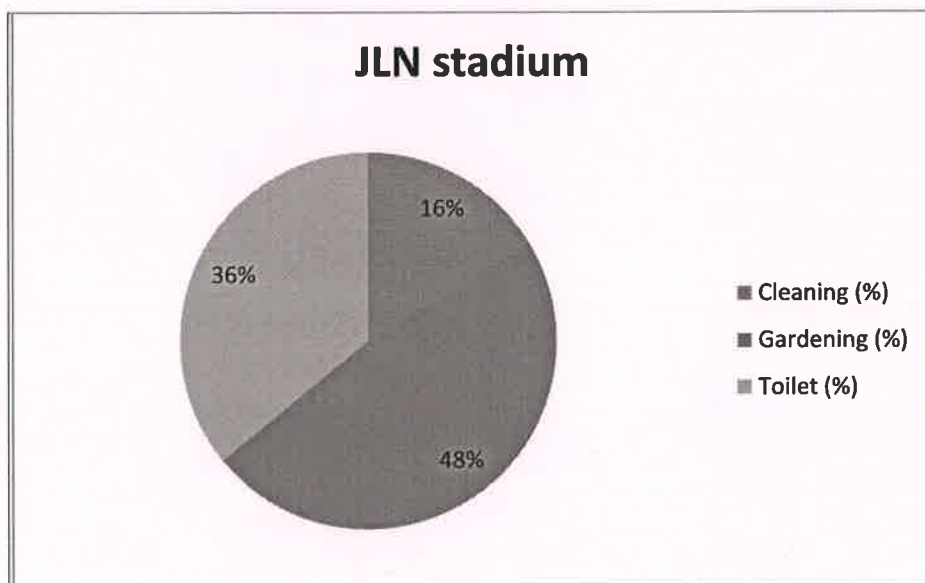


Fig 11 : Water usage at JLN stadium station

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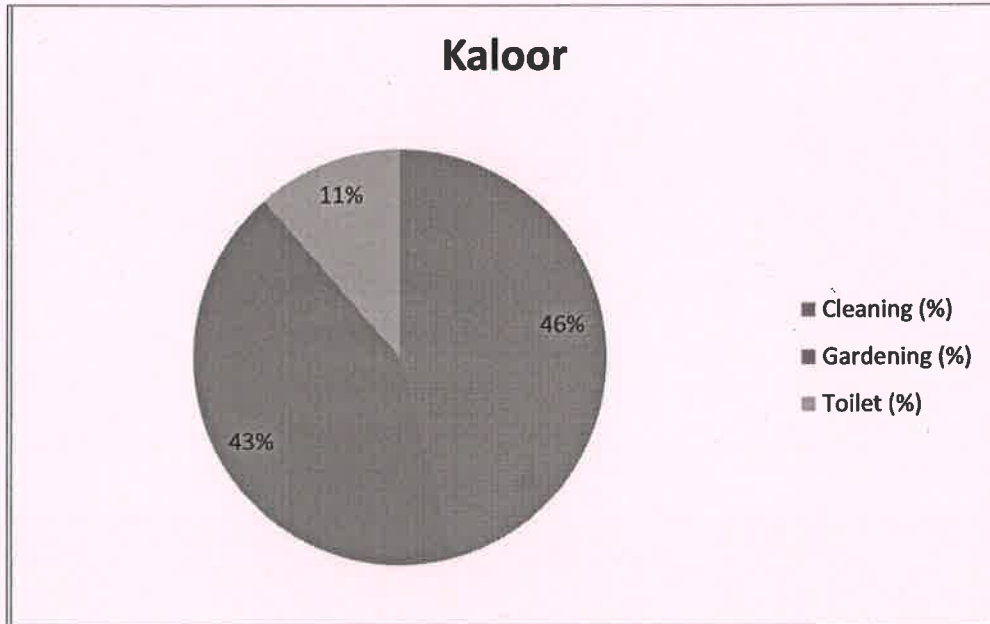


Fig 12 : Water usage at Kaloor station



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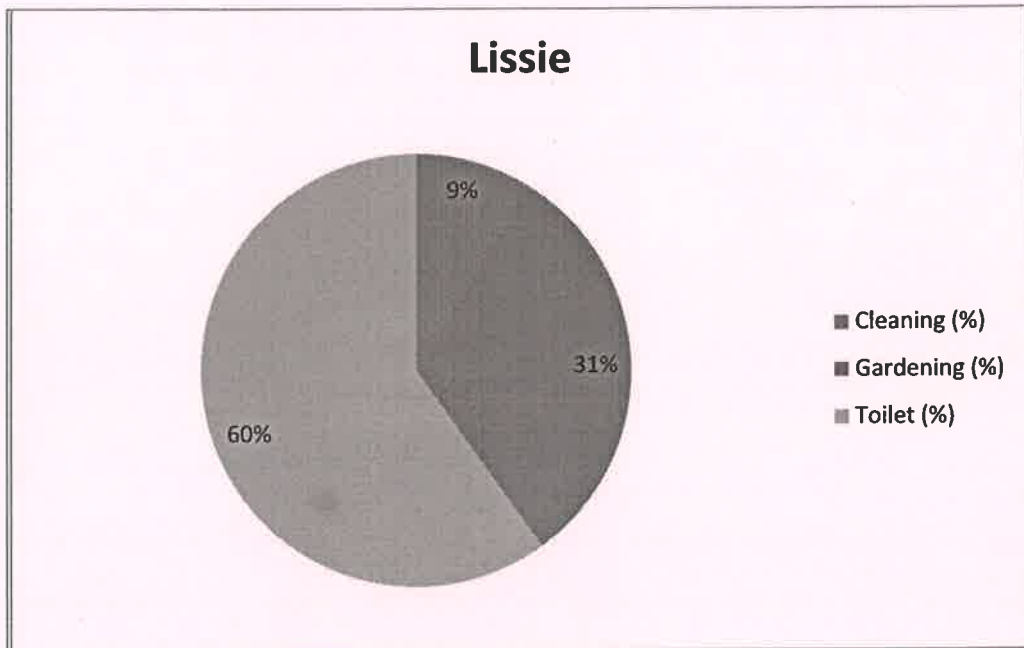


Fig 13 : Water usage at Lissie station

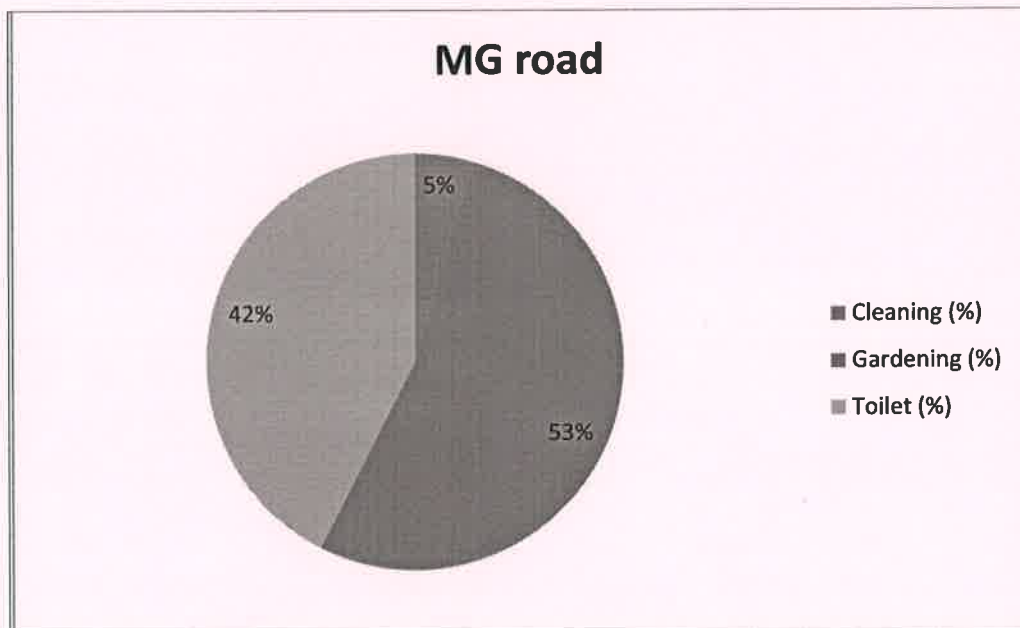


Fig 14 : Water usage at M G Road station

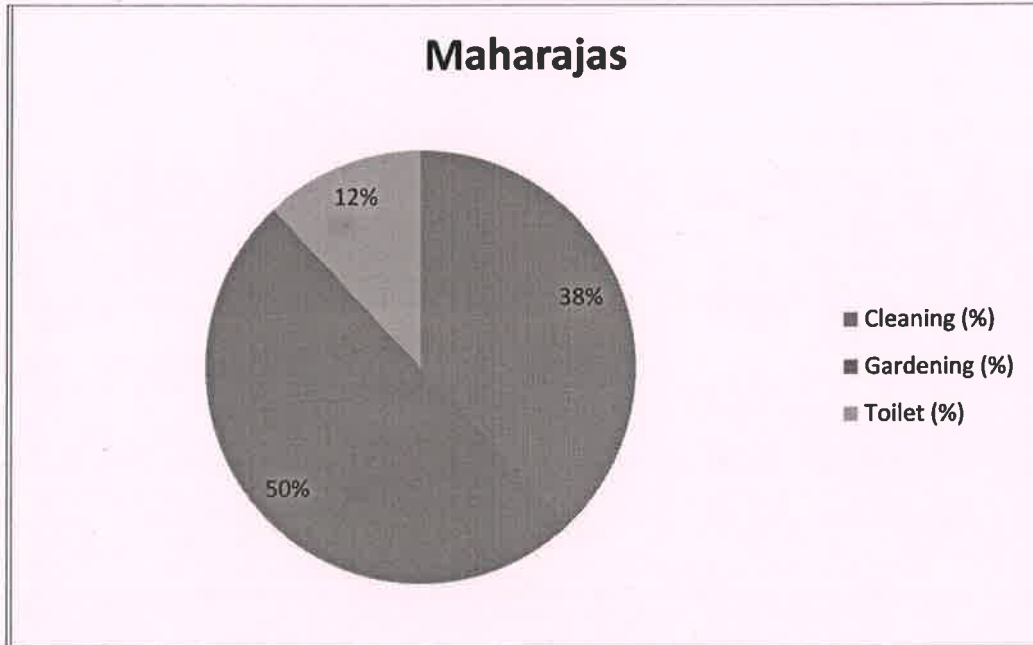


Fig 15 : Water usage at Maharajas station



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ANNEXURE - C

Cost Estimation



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Table 1 : Detailed cost estimate for the implementing rainwater harvesting system for Aluva metro station

ITEM	UNIT	DIMENSIONS			NUMBERS	TOTAL QUANTITY	RATE / unit	AMOUNT
		LENGTH (m)	BREADTH (m)	HEIGHT (m)				
Removing of existing paving tile	m ³	15	1.36	nil	1	20.4	81.00	1652
Earth work excavation	m	15	nil	nil	1	15	525.00	7875
Disposal of excess material					1			
Backfilling and relaying of existing paving tile	m	15	nil	nil	1	15	312.00	4680
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	15	nil	nil	1	15	1008	15120
Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	326	nil	nil	1	326	6557	2137582
Sand filter system	nos	nil	nil	nil	1	1	50000	50000

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Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	nil	1	1	65550.18	65550
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	nil	1	1	15520.54	15521
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	nil	1	1	15000	15000
Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	nil	0.4608	2	2914.00	1343
Water proofing and laying	m2	1	1	nil	nil	2	2	600	1200
Water meter	nos	nil	nil	nil	nil	1	1	1200	1200
Float	nos	nil	nil	nil	nil	1	1	1000	1000
								TOTAL ESTIMATE	2317723



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Table 2 : Detailed cost estimate for the implementing rainwater harvesting system for pulinjodu metro station

ITEM	UNIT	DIMENSIONS			NUMBERS	TOTAL QUANTITY	RATE / unit	AMOUNT
		LENGTH (m)	BREADTH (m)	HEIGHT (m)				
Removing of existing paving tile	m ²	58.85	1.65	nil	1	97.1025	81.00	7865.3025
Removing of existing paving tile	m ²	15.2	1.36	nil	1	20.672	81.00	1674.432
Earth work excavation					1			
Disposal of excess material	m	74.05	nil	nil	1	74.05	525.00	61155.67
Backfilling and relaying of existing paving tile	m	74.05	nil	nil	1	74.05	312.00	23103.6



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Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	66.571	nil	nil	1	66.571	6345	422392.99	5
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	15.2	nil	nil	1	15.2	1008	15321.6	
Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	11.026	nil	nil	2	22.052	6557	144594.96	4
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	38.544	nil	nil	2	77.088	4046	311898.04	8
Sand filter system	nos	nil	nil	nil	1	1	50000	50000	
Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	65550.18	65550.18	
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15520.54	15520.54	
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15000	15000	



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Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	2	0.4608	2914.00	1342.7712
Water proofing and laying	m2	1	1	nil	2	2	600	1200
Water meter	nos	nil	nil	nil	1	1	1200	1200
Float	nos	nil	nil	nil	1	1	1000	1000
							TOTAL ESTIMA	TE
								1138820



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Table 3 : Detailed cost estimate for the implementing rainwater harvesting system for companpadi metro station

ITEM	UNIT	DIMENSIONS			NUMBERS	TOTAL QUANTITY	RATE / unit	AMOUNT
		LENGTH H (m)	BREADTH H (m)	HEIGHT (m)				
Removing of existing paving tile	m ²	79.39	1.65	nil	1	130.9935	81.00	10610.47
Removing of existing paving tile	m ³	52.475	1.36	nil	1	71.366	81.00	35
Earth work excavation			nil	nil	1			108903.3
Disposal of excess material	m	131.865	nil	nil	1	131.865	525.00	4
Backfilling and relaying of existing paving tile	m	131.865	nil	nil	1	131.865	312.00	41141.88
Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	79.39	nil	nil	1	79.39	6345	503729.5
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	52.475	nil	nil	1	52.475	1008	52894.8





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Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	10.876	nil	nil	2	21.752	6557	142627.8
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	87.284	nil	nil	1	87.284	4046	353151.0
Sand filter system	nos	nil	nil	nil	1	1	50000	50000
Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	65550.18	65550.18
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15520.54	15520.54
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15000	15000
Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	2	0.4608	2914.00	1342.771
Water proofing and laying	m2	1	1	nil	2	2	600	1200
Water meter	nos	nil	nil	nil	1	1	1200	1200
Float	nos	nil	nil	nil	1	1	1000	1000
							TOTAL ESTIMA TE	1363872. 46



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Table 4 : Detailed cost estimate for the implementing rainwater harvesting system for Ambattikavu metro station

ITEM	UNIT	DIMENSIONS			NUMBERS	TOTAL QUANTITY	RATE / unit	AMOUNT
		LENGTH H (m)	BREADTH H (m)	HEIGHT T (m)				
Removing of existing paving tile	m ²	47.05	1.65	nil	1	77.6325	81.00	6288.232
Removing of existing paving tile	m ²	11.1	1.36	nil	1	15.096	81.00	1222.776
Earth work excavation					1			
Disposal of excess material	m	109.15	nil	nil	1	109.15	525.00	57303.75
Backfilling and relaying of existing paving tile	m	58.15	nil	nil	74.05	74.05	312.00	23103.6



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Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	47.05	nil	nil	1	66.571	6345	422392.9
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	61.7	nil	nil	1	15.2	1008	15321.6
Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	8	nil	nil	2	16	6557	104912
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	34	nil	nil	2	68	4046	275128
Sand filter system	nos	nil	nil	nil	1	1	50000	50000
Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	8	65550.18
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	4	15520.54
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15000	15000
Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	2	0.4608	2914.00	1342.771
Water proofing and laying	m2	1.	1	nil	2	2	600	1200
Water meter	nos	nil	nil	nil	1	1	1200	1200
Float	nos	nil	nil	nil	1	1	1000	1000



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Backfilling and relaying of existing paving tile	m		nil	nil	1	74.05	312.00	23103.6
Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	43.21	nil	nil	1	66.571	6345	42239.2.995
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	11.8	nil	nil	1	15.2	1008	15321.6
Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	8.284	nil	nil	2	16.568	6557	10863.6.376
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	36	nil	nil	2	72	4046	29131.2
Sand filter system	nos	nil	nil	nil	1	1	50000	50000.65550.18
Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	65550.18	15520.54
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15000	15000.1342.7
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15000	15000.712
Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	2	0.4608	2914.00	1200
Water proofing and laying	m2	1	1	nil	2	2	600	1200
Water meter	nos	nil	nil	nil	1	1	1200	1200





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Float	nos	nil	nil	nil	nil	1	1	1000	1000
								TOTAL ESTIMATE	1078709

Table 4 : Detailed cost estimate for the implementing rainwater harvesting system for kalamassery metro station

ITEM	UN	DIMENSIONS			NUMB ERS	TOTAL QUANTITY	RATE / unit	AMOU NT
		LENGT H (m)	BREAD TH (m)	HEIGH T (m)				
Removing of existing paving tile	m2	46.4	1.65	nil	1	76.56	81.00	6201.36
Removing of existing paving tile	m2	11.575	1.36	nil	1	15.742	81.00	1275.10
								2



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Earth work excavation						1			61155.6
Disposal of excess material	m	88.375	nil	nil	nil	1	88.375	525.00	7
Backfilling and relaying of existing paving tile	m	57.975	nil	nil	nil	1	74.05	312.00	23103.6
Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	76.8	nil	nil	nil	1	66.571	6345	422392.995
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	11.575	nil	nil	nil	1	15.2	1008	15321.6
Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	7.659	nil	nil	nil	2	15.318	6557	100440.126
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	56.57	nil	nil	nil	2	113.14	4046	457764.44
Sand filter system	nos	nil	nil	nil	nil	1	1	50000	50000
Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	nil	1	1	65550.18	65550.18
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	nil	1	1	15520.54	15520.54
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	nil	1	1	15000	15000
Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	nil	2	0.4608	2914.00	1342.77



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Water proofing and laying	m2	1	1	1	nil	2	2	600	1200
Water meter	nos	nil	nil	nil	nil	1	1	1200	1200
Float	nos	nil	nil	nil	nil	1	1	1000	1000
								TOTAL	1238468.4
								ESTIMATE	0

Table 7 : Detailed cost estimate for the implementing rainwater harvesting system for cochin university metro station

ITEM	UN IT	DIMENSIONS			NUMB ERS	TOTAL QUANTITY	RATE / unit	AMO UNT
		LENGT H (m)	BREADT H (m)	HEIGH T (m)				
Removing of existing paving tile	m2	30.8	1.65	nil	1	50.82	81.00	4116.4 2
Removing of existing paving tile	m2	20.6	1.36	nil	1	28.016	81.00	2269.2 96
Earth work excavation	m	51.4	nil	nil	1	51.4	525.00	



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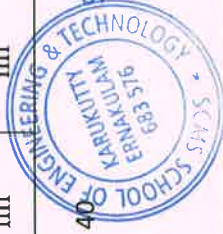


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Disposal of excess material					1			61155.67
Backfilling and relaying of existing paving tile	m	51.4	nil	nil	1	74.05	312.00	23103.6
Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	30.8	nil	nil	1	66.571	6345	422392.995
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	20.6	nil	nil	1	15.2	1008	15321.6
Supply and fixing of 160 mm diameter UPVC pipe (with clamping)	m	9	nil	nil	1	9	1250	11250
Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	12	nil	nil	2	24	6557	157368
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	36.17	nil	nil	2	72.34	4046	292687.64
Sand filter system	nos	nil	nil	nil	1	1	50000	50000
Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	65550.18	65550.18
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15520.54	15520.54
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15000	15000



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Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	2	0.4608	2914.00	1342.7
Water proofing and laying	m2	1	1	nil	2	2	600	1200
Water meter	nos	nil	nil	nil	1	1	1200	1200
Float	nos	nil	nil	nil	1	1	1000	1000
							TOTAL ESTIMATE	114047 8.712

Table 8: Detailed cost estimate for the implementing rainwater harvesting system for Pathadipalam metro station

ITEM	UNIT	DIMENSIONS			NUMBERS	TOTAL QUANTITY	RATE / unit	AMOUNT
		LENGTH H (m)	BREADTH (m)	HEIGHT T (m)				
Removing of existing paving tile	m2	47.95	1.65	nil	1	79.1175	81.00	6408.517
Removing of existing paving tile	m2	39	1.36	nil	1	53.04	81.00	4296.24
Earth work excavation	m	86.95	nil	nil	1	86.95	525.00	61155.67

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Disposal of excess material					1				
Backfilling and relaying of existing paving tile	m	86.95	nil	nil	1	74.05	312.00	23103.6	
Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	47.95	nil	nil	1	66.571	6345	422392.9	95
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	39	nil	nil	1	15.2	1008	15321.6	
Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	10	nil	nil	2	20	6557	131140	
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	40	nil	nil	2	80	4046	323680	
Sand filter system	nos	nil	nil	nil	1	1	50000	50000	
Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	65550.18	65550.18	
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15520.54	15520.54	
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15000	15000	
Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	2	0.4608	2914.00	1342.771	2
Water proofing and laying	m2	1	1	nil	2	2	600	1200	
Water meter	nos	nil	nil	nil	1	1	1200	1200	
Float	nos	nil	nil	nil	1	1	1000	1000	



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Disposal of excess material					1				
Backfilling and relaying of existing paving tile	m	20	nil	nil	1	20	312.00	6240	
Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	30	nil	nil	1	30	6345	190350	
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	40	nil	nil	1	40	1008	40320	
Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	322	nil	nil	1	322	6557	2111354	
Sand filter system	nos	nil	nil	nil	1	2		50000	
Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	65550.18	65550.1	8
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15520.54	15520.5	4
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15000	15000	15000
Concrete breaking and repair	m2	0.48	0.48	nil	2	0.4608	2914.00	1342.77	12
Water proofing and laying	m2	1	1	nil	2	2	600	1200	1200
Water meter	nos	nil	nil	nil	1	1	1200	1200	1200
Float	nos	nil	nil	nil	1	1	1000	1000	1000

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Removing of existing paving tile	m2	87.15	1.65	nil	1	143.7975	81.00	11647.5
Removing of existing paving tile	m2	85.375	1.36	nil	1	116.11	81.00	9404.91
Earth work excavation					1			61155.6
Disposal of excess material	m	117.15	nil	nil	1	117.15	525.00	7
Backfilling and relaying of existing paving tile	m	117.15	nil	nil	1	74.05	312.00	23103.6
Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	87.15	nil	nil	1	66.571	6345	422392.995
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	30	nil	nil	1	15.2	1008	15321.6
Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	8	nil	nil	2	16	6557	104912
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	80	nil	nil	2	160	4046	647360
Sand filter system	nos	nil	nil	nil	1	1	50000	50000
Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	65550.18	65550.18
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15520.54	15520.54



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ERNAKULAM, KERALA-683 576



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KOCHI METRO RAIL LIMITED

Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	1	15000	15000
Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	2	2	0.4608	2914.00	1342.77
Water proofing and laying	m2	1	1	nil	2	2	2	600	1200
Water meter	nos	nil	nil	nil	1	1	1	1200	1200
Float	nos	nil	nil	nil	1	1	1	1000	1000
								TOTAL	1446111
								ESTIMATE	.864

Table 11 : Detailed cost estimate for the implementing rainwater harvesting system for Palarivattom metro station



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ITEM	UN	DIMENSIONS			HEIGH T (m)	NUMB ERS	TOTAL QUANTIT Y	RATE / unit	AMOU NT
		LENGT H (m)	BREAD TH (m)						
Removing of existing paving tile	m2	68.768	1.65	nil	1	113.4672	81.00	9190.84	
Removing of existing paving tile	m2	64.168	1.36	nil	1	87.26848	81.00	7068.74	
Earth work excavation					1			688	
Disposal of excess material	m	132.936	nil	nil	1	132.936	525.00	69791.4	
Backfilling and relaying of existing paving tile	m	132.936	nil	nil	1	132.936	312.00	41476.0	
Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	68.768	nil	nil	1	68.768	6345	436332.	
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	64.168	nil	nil	1	64.168	1008	64681.3	
Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	8	nil	nil	2	16	6557	104912	
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	35	nil	nil	2	70	4046	283220	
Sand filter system	nos	nil	nil	nil	1	1	50000	50000	



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Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	1	65550.18	65550.1	8
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	1	15520.54	15520.5	4
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	1	15000	15000	15000
Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	2	0.4608		2914.00	1342.77	12
Water proofing and laying	m2	1	1	nil	2	2		600	1200	1200
Water meter	nos	nil	nil	nil	1	1		1200	1200	1200
F'loat	nos	nil	nil	nil	1	1		1000	1000	1000
								TOTAL	1167486	
								ESTIMATE	.817	



[Signature]

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Table 12 : Detailed cost estimate for the implementing rainwater harvesting system for JLN stadium metro station



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KOCHI METRO RAIL LIMITED

ITEM	UN IT	DIMENSIONS			NUMB ERS	TOTAL QUANTITY	RATE / unit	AMOUNT
		LENGT H (m)	BREADT H (m)	HEIGH T (m)				
Removing of existing paving tile	m ²	20	1.65	nil	2	66	81.00	5346
Removing of existing paving tile	m ³	20	1.36	nil	1	27.2	81.00	2203.2
Earth work excavation			nil	nil	1			
Disposal of excess material	m	60	nil	nil	1	60	525.00	31500
Backfilling and relaying of existing paving tile	m	60	nil	nil	1	60	312.00	18720
Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	10	nil	nil	2	20	6345	126900
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	20	nil	nil	1	20	1008	20160
Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	296	nil	nil	1	296	6557	1940872
Sand filter system	no s	nil	nil	nil	1	1	50000	50000
Butterfly valve (for 450 mm pipe)	no s	nil	nil	nil	1	1	65550.18	65550.1 8



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Non return valve (for 450 mm pipe)	no s	nil	nil	nil	1	1	1	15520.54	15520.5	4
Air releasing valve (for 450 mm pipe)	no s	nil	nil	nil	1	1	1	15000	15000	15000
Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	1	0.2304	1	2914.00	671.385	6
Water proofing and laying	m2	1	1	nil	1	1	1	600	600	600
Water meter	no s	nil	nil	nil	1	1	1	1200	1200	1200
Float	no s	nil	nil	nil	1	1	1	1000	1000	1000
								TOTAL	2295243	
								ESTIMATE	.306	

Table 13 : Detailed cost estimate for the implementing rainwater harvesting system for Kaloor metro station



[Signature]

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ITEM	UNIT	DIMENSIONS			NUMBERS	TOTAL QUANTITY	RATE / unit	AMOUNT
		LENGTH (m)	BREADTH (m)	HEIGHT (m)				
Removing of existing paving tile	m ²	26.375	1.65	nil	1	43.51875	81.00	3525.01
Removing of existing paving tile	m ²	23.19	1.36	nil	1	31.5384	81.00	2554.61
Earth work excavation			nil	nil	1			
Disposal of excess material	m	77.34	nil	nil	1	77.34	525.00	40603.5
Backfilling and relaying of existing paving tile	m ²	26.375	nil	nil	1	26.375	312.00	8229
Backfilling and relaying of existing paving tile	m ²	23.19	nil	nil	1	23.19	312.00	7235.28
Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	42.15	nil	nil	1	42.15	6345	267441.
Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	7.652	nil	nil	1	7.652	6557	50174.1
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	122.65	nil	nil	1	122.65	4046	496241.



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Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	35.19	nil	nil	1	35.19	1008	35471.5
Sand filter system	nos	nil	nil	nil	2	2		50000
Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	65550.18	65550.1
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15520.54	15520.5
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15000	15000
Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	2	0.4608	2914.00	1342.77
Core cutting for compound wall	m2	0.5	0.5	nil	1	0.25	5000	1250
Water proofing and laying	m2	0.5	0.5	nil	1	0.25	600	150
Water meter	nos	nil	nil	nil	1	1	1200	1200
Float	nos	nil	nil	nil	1	1	1000	1000
							TOTAL	1062490
							ESTIMATE	.234



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Table 14 : Detailed cost estimate for the implementing rainwater harvesting system for Lissie metro station

ITEM	UNIT	DIMENSIONS			NUMBERS	TOTAL QUANTITY	RATE / unit	AMOUNT
		LENGTH (m)	BREADTH (m)	HEIGHT (m)				
Removing of existing paving tile	m ²	72.55	1.65	nil	1	119.7075	81.00	9696.30
Removing of existing paving tile	m ²	26.9	1.36	nil	1	36.584	81.00	2963.30
Earth work excavation					1			61155.6
Disposal of excess material	m	145.1	nil	nil	1	145.1	525.00	7
Backfilling and relaying of existing paving tile	m	99.45	nil	nil	1	99.45	312.00	31028.4
Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	72.55	nil	nil	1	72.55	6345	460329.
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	72.55	nil	nil	1	72.55	1008	73130.4



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Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	8	nil	nil	nil	2	16	6557	104912
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	36	nil	nil	nil	2	72	4046	291312
Sand filter system	nos	nil	nil	nil	nil	1	1	50000	50000
Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	nil	1	1	65550.18	65550.18
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	nil	1	1	15520.54	15520.54
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	nil	1	1	15000	15000
Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	nil	2	0.4608	2914.00	1342.77
Water proofing and laying	m2	1	1	nil	nil	2	2	600	1200
Water meter	nos	nil	nil	nil	nil	1	1	1200	1200
Float	nos	nil	nil	nil	nil	1	1	1000	1000
								TOTAL	1185341
								ESTIMATE	.323



[Signature]

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Table 15 : Detailed cost estimate for the implementing rainwater harvesting system for M G road metro station

ITEM	UNIT	DIMENSIONS			NUMBERS	TOTAL QUANTITY	RATE / unit	AMOUNT
		LENGTH H (m)	BREADTH H (m)	HEIGHT T (m)				
Removing of existing paving tile	m ²	55.8	1.65	nil	1	92.07	81.00	7457.67
Removing of existing paving tile	m ²	26.8	1.36	nil	1	36.448	81.00	2952.288
Earth work excavation					1			
Disposal of excess material	m	125.4	nil	nil	1	125.4	525.00	61155.67
Backfilling and relaying of existing paving tile	m	82.6	nil	nil	1	74.05	312.00	23103.6
Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	77.4	nil	nil	1	66.571	6345	422392.9
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	48.2	nil	nil	1	15.2	1008	15321.6



Prithu

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Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	8	nil	nil	2	16	6557	104912
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	37	nil	nil	2	74	4046	299404
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	31.9	nil	nil	1	31.9	4046	129067.4
Sand filter system	nos	nil	nil	nil	1	1	50000	50000
Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	65550.18	65550.18
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15520.54	15520.54
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15000	15000
Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	2	0.4608	2914.00	1342.771
Water proofing and laying	m2	1	1	nil	2	2	600	1200
Water meter	nos	nil	nil	nil	1	1	1200	1200
Float	nos	nil	nil	nil	1	1	1000	1000
							TOTAL	1216580.7
							ESTIMATE	14

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Table 16 : Detailed cost estimate for the implementing rainwater harvesting system for Maharajas metro station

ITEM	UNI T	DIMENSIONS			NUMB ERS	TOTAL QUANTITY	RATE / unit	AMOUN T
		LENGTH (m)	BREADT H (m)	HEIGHT (m)				
Removing of existing paving tile	m ²	39.75	1.65	nil	1	65.5875	81.00	5312.58
Removing of existing paving tile	m ²	5	1.36	nil	1	6.8	81.00	75
Earth work excavation					1			550.8
Disposal of excess material	m	44.75	nil	nil	1	44.75	525.00	23493.7
Backfilling and relaying of existing paving tile	m	44.75	nil	nil	1	44.75	312.00	13962
Supply and fixing 450 mm diameter UPVC pipe (with excavation)	m	39.75	nil	nil	1	39.75	6345	252213.75
Supply and fixing of 160 mm diameter UPVC pipe (with excavation)	m	5	nil	nil	1	5	1008	5040





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Supply and fixing 450 mm diameter UPVC pipe (with clamping)	m	8	nil	nil	2	16	6557	104912
Supply and fixing 300 mm diameter UPVC pipe (with clamping)	m	27	nil	nil	2	54	4046	218484
Sand filter system	nos	nil	nil	nil	1	1	50000	50000
Butterfly valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	65550.18	65550.18
Non return valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15520.54	15520.54
Air releasing valve (for 450 mm pipe)	nos	nil	nil	nil	1	1	15000	15000
Concrete breaking and repair including cutting of steel reinforcement	m2	0.48	0.48	nil	2	0.4608	2914.00	1342.77
Water proofing and laying	m2	1	1	nil	2	2	600	1200
Water meter	nos	nil	nil	nil	1	1	1200	1200
Float	nos	nil	nil	nil	1	1	1000	1000
							TOTAL	774782.
							ESTIMATE	3787



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**AGREEMENT OF COOPERATION
BETWEEN
SCMS
AND
SHIMANE UNIVERSITY**

SCMS, INDIA and Shimane University, JAPAN herewith agree on the following:

1. SCMS and Shimane University will try to cooperate in the spirit of mutual understanding to establish close friendly relations.
2. SCMS and Shimane University will promote the exchange of students, faculty, research, education and academic culture. The details necessary to promote these exchanges will be worked out separately.
3. Through the above activities, SCMS and Shimane University endeavor to improve the educational and academic cultures of both countries, while at the same time promoting greater friendship and contributing to international understanding, goodwill, and peace.
4. This Agreement shall take effect upon the date of the signatures of the Vice Chairman of SCMS and the President of Shimane University, and shall remain in effect for five years from the date of the signatures. For the renewal of this Agreement, SCMS and Shimane University shall enter into negotiations within six months of its expiration.
5. This Agreement may be pre-terminated upon written notice to the other party without prejudice to the completion of any existing exchange and joint program.
6. This Agreement is to be executed in English and each party shall retain a copy.

(Signature)



Pramod Prathapachandran Thevannoor
Vice Chairman
SCMS

Date 18/12/2018



Yasunao Hattori
President
Shimane University

Date 18/12/2018



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SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA 683 576

**A SUPPLEMENTARY AGREEMENT FOR STUDENT EXCHANGE
BETWEEN
SCMS
AND
SHIMANE UNIVERSITY**

SCMS, INDIA and Shimane University, JAPAN herewith agree to the following provision of cooperation on the basis of article 2 of the Principal Agreement for the purpose of promoting student exchange between the two parties.

(Exemption of the Tuition of Students)

1. SCMS and Shimane University shall waive the examination fee, the entrance fee and the tuition of the students who are accepted on the basis of this Supplementary Agreement.

(Exchange Student Number and Period of Exchange)

2. On the basis of the above provision 1, SCMS and Shimane University may send up to two students each year, making an effort to balance the number of students.
3. SCMS and Shimane University shall send students to the other party for a period of six months or no more than one full academic year at the beginning of a semester of the host party.

(Selection of Students)

4. SCMS and Shimane University shall take reasonable care to ensure the students to be recommended are capable of having sufficient knowledge in their academic fields and language ability necessary to study at the host party.

(Student Status)

5. SCMS and Shimane University shall allow students to be enrolled as non-degree students (Special Auditing Students or Special Research Students).

(Credits)

6. University credits earned at the host party may be honored by the student's home party.

(Financing)

7. Travel expenses, living expenses, books and supplies, and all other personal necessary expenses are the responsibility of individual students. Exchange students will be required to purchase health insurance valid in the host country and insurance for accidents especially designed for foreign students before their travel to the host country.

(Terms of Supplementary Agreement)

8. This Supplementary Agreement shall come into effect upon the latter date of the signatures below and shall remain in effect for five years on the condition that any amendments in that period must be agreed upon in writing by SCMS and Shimane University.

(Extension of Supplementary Agreement)

9. For the renewal of this Supplementary Agreement, SCMS and Shimane University shall enter into negotiations within six months of its expiration.

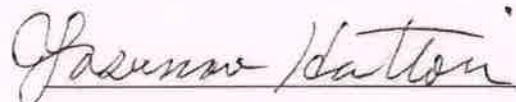
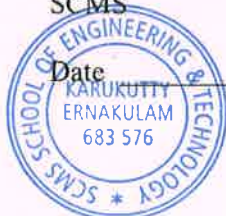
(Agreement Documents)

10. This Supplementary Agreement is executed in English and each party shall retain a copy.

(Signature)



Pramod Prathapachandran Thevannoor
Vice Chairman
SCMS



Yasunao Hattori
President
Shimane University

Date 18/12/2018

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ERNAKULAM, KERALA-683 576



Varun Menon G <varunmenon@scmsgroup.org>

Regarding the renewal of Agreement

15 messages

國際課國際連携G <ied-koryu@office.shimane-u.ac.jp>
To: "Dr. Varun G Menon" <varunmenon@scmsgroup.org>

Wed, Sep 13, 2023 at 8:23 AM

Dear Dr. Varun G Menon,
International Relations
SCMS School of Engineering and Technology,

Warmest greetings from Shimane University, Japan!

My name is KITAO Chiaki, an administrative staff of the International Division at Shimane University, Japan. I am responsible for managing our partnerships with other universities. Taking this opportunity, I would like to express our sincere appreciation for your valuable cooperation in maintaining our academic relationship over the years. I am pleased to inform you that the Academic Agreement between SCMS and Shimane University will expire in December, and it is time to discuss the renewal of the agreement. Shimane University is willing to continue our partnership for another 5 years, and we would be grateful if you could let us know your intentions regarding this matter.

Attached to this email, you will find the draft of the AOC and SEA for review.

Please feel free to contact me if you have any questions or concerns.
We sincerely hope to receive your positive response soon.



Sincerely yours,

Chiaki,

--

KITAO Chiaki (Ms)
International Div.
SHIMANE UNIVERSITY
1060 Nishikawatsu, Matsue, Shimane
690-8504, JAPAN
tel:+81-(0)852-32-9735
fax:+81-(0)852-32-6481
e-mail:ied-koryu@office.shimane-u.ac.jp

2 attachments

-  Draft_AOC_SCMS_SU.doc
48K
-  Draft_SEA_SCMS_SU.doc
35K



Chiaki

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ERNAKULAM, KERALA-683 576

Dr. Varun G Menon <varunmenon@scmsgroup.org>
To: PRINCIPAL SSET <principalsset@scmsgroup.org>

Mon, Sep 18, 2023 at 11:26 AM

Ma'am,
Please find the request for renewal of collaboration from Shimane University. Looking forward to your approval
[Quoted text hidden]

Thanks and Regards,

Dr. Varun G Menon, Senior Member IEEE

Professor and Head

Department of Computer Science and Engineering

International Collaborations -in charge

SCMS School of Engineering and Technology

SCMS Group of Educational Institutions

Kerala, India - 683 576, Mob: +91 8714504684

Associate Editor - Physical Communications Journal, Elsevier

Series Editor - IEEE Transactions on Intelligent Transportation Systems

Series Editor - IEEE Communications Standards Magazine


Technical Editor - Computer Communications Journal, Elsevier


Associate Editor - Alexandria Engineering Journal, Elsevier

Associate Editor - IET Networks

Editorial Member - IEEE Future Directions Newsletter

2 attachments

 **Draft_AOC_SCMS_SU.doc**
48K

 **Draft_SEA_SCMS_SU.doc**
35K

Dr. Varun G Menon <varunmenon@scmsgroup.org>
To: 国際課国際連携G <ied-koryu@office.shimane-u.ac.jp>
Cc: PRINCIPAL SSET <principalsset@scmsgroup.org>

Mon, Sep 18, 2023 at 11:27 AM

Dear Ms. KITAO Chiaki,

Thank you very much for the email. I will get back to you as soon as possible.

Regards

[Quoted text hidden]

[Quoted text hidden]

PRINCIPAL SSET <principalsset@scmsgroup.org>
To: "Dr. Varun G Menon" <varunmenon@scmsgroup.org>

Mon, Sep 18, 2023 at 1:33 PM

Noted. Will revert. Let me know the period (from and to) of last agreement.

Regards,

Dr. Anitha G. Pillai |

Principal



SCMS

School of Engineering & Technology

SCMS School of Engineering & Technology (SSET)
Vidya Nagar, Palissery, Karukutty - 683 576, Kerala, India.

Tel: 91-484-2882901


Mob: 9497775295

e-mail: principalsset@scmsgroup.org

anithagpillai@scmsgroup.org

[Quoted text hidden]




PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Dr. Varun G Menon <varunmenon@scmsgroup.org>
To: PRINCIPAL SSET <principalsset@scmsgroup.org>

Mon, Sep 18, 2023 at 1:40 PM

Ma'am,

Please find the attached signed MoU(previous).

Regards

[Quoted text hidden]

 **Shimane University - Agreement of Cooperation.pdf**
507K

PRINCIPAL SSET <principalsset@scmsgroup.org>
To: "Dr. Varun G Menon" <varunmenon@scmsgroup.org>

Mon, Sep 18, 2023 at 1:51 PM

Noted
Regards,

Dr. Anitha G. Pillai |
Principal



SCMS
School of Engineering & Technology

SCMS School of Engineering & Technology (SSET)
Vidya Nagar, Palissery, Karukutty - 683 576, Kerala, India.
Tel: 91-484-2882901
Mob: 9497775295
e-mail: principalsset@scmsgroup.org
anithagpillai@scmsgroup.org

[Quoted text hidden]

PRINCIPAL SSET <principalsset@scmsgroup.org>
To: "Dr. Varun G Menon" <varunmenon@scmsgroup.org>, HOD Computer Science Engineering Department
<hodcssset@scmsgroup.org>, HOD Artificial Intelligence and Data Science <hoddsaisset@scmsgroup.org>

Tue, Sep 19, 2023 at 9:50 AM

Do needful to get the new agreement signed.
Regards,

Dr. Anitha G. Pillai |
Principal



SCMS
School of Engineering & Technology

SCMS School of Engineering & Technology (SSET)
Vidya Nagar, Palissery, Karukutty - 683 576, Kerala, India.
Tel: 91-484-2882901
Mob: 9497775295
e-mail: principalsset@scmsgroup.org
anithagpillai@scmsgroup.org



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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA - 683 576

[Quoted text hidden]

Dr. Varun G Menon <varunmenon@scmsgroup.org>
To: PRINCIPAL SSET <principalsset@scmsgroup.org>
Cc: HOD Computer Science Engineering Department <hodcssset@scmsgroup.org>, HOD Artificial Intelligence and Data Science <hoddsaisset@scmsgroup.org>

Tue, Sep 19, 2023 at 10:00 AM

Noted ma'am.
Will do the needful and update you
[Quoted text hidden]

Dr. Varun G Menon <varunmenon@scmsgroup.org>
To: 国際課国際連携G <ied-koryu@office.shimane-u.ac.jp>

Tue, Sep 19, 2023 at 1:31 PM

1/11/24, 9:17 AM

SCMS Group of Institutions Mail - Regarding the renewal of Agreement

Cc: PRINCIPAL SSET <principalsset@scmsgroup.org>, HOD Computer Science Engineering Department <hodcssset@scmsgroup.org>

Dear Ms. KIATO Chiaki,

We have gone through the draft AOC and are happy to proceed with the collaboration for the next 5 years. Please let me know the next steps required.

Regards,
Varun

[Quoted text hidden]

[Quoted text hidden]

国際課国際連携G <ied-koryu@office.shimane-u.ac.jp>

Wed, Sep 20, 2023 at 6:42 AM

To: "Dr. Varun G Menon" <varunmenon@scmsgroup.org>

Cc: PRINCIPAL SSET <principalsset@scmsgroup.org>, HOD Computer Science Engineering Department <hodcssset@scmsgroup.org>

Dear Dr. Varun G Menon,

Thank you for your response. We are pleased to know that SCMS has agreed to update our Agreement.

However, we would like to inform you that we need to obtain approval from our university committee before renewing the agreement. Once we receive the approval, we can proceed to the signing step.

Therefore, we kindly request a few months to complete our internal process. We will keep you updated on any progress made.

We apologize for any inconvenience caused and appreciate your patience and understanding.

Thank you and have a great day!

Sincerely,

Chiaki,

KITAO Chiaki,
International Div.
Shimane University

On 2023/09/19 17:01, Dr. Varun G Menon wrote:

Dear Ms. KIATO Chiaki,

We have gone through the draft AOC and are happy to proceed with the collaboration for the next 5 years. Please let me know the next steps required.

Regards,
Varun

[Quoted text hidden]

<mailto:e-mail%3Aied-koryu@office.shimane-u.ac.jp>

Thanks and Regards,

*

*

*Dr. Varun G Menon, */Senior //Member IEEE/

[Quoted text hidden]




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SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Dr. Varun G Menon <varunmenon@scmsgroup.org>

Wed, Sep 20, 2023 at 10:45 AM

To: 国際課国際連携G <ied-koryu@office.shimane-u.ac.jp>
Cc: PRINCIPAL SSET <principalsset@scmsgroup.org>, HOD Computer Science Engineering Department <hodcssset@scmsgroup.org>

Dear Ms. KITAO Chiaki,

Thank you for the reply. Looking forward to further updates from you.

Regards,
Varun

[Quoted text hidden]

Thanks and Regards,

Dr. Varun G Menon, Senior Member IEEE

[Quoted text hidden]

国際課国際連携G <ied-koryu@office.shimane-u.ac.jp>
To: "Dr. Varun G Menon" <varunmenon@scmsgroup.org>
Cc: PRINCIPAL SSET <principalsset@scmsgroup.org>, HOD Computer Science Engineering Department <hodcssset@scmsgroup.org>

Thu, Dec 7, 2023 at 8:16 AM

Dear Dr. Varun G Menon,

Greetings from Shimane University!

I am sorry to have kept you waiting so long, but I am pleased to inform you that we have got approval from the internal meeting to renew our agreement, and now we are ready to sign.

I am arranging to have our president signature first, and would like to send the signed documents to you for your president's signature.

Could you please let me know your mailing address?

Thank you for your kind patience.
Looking forward to hearing from you.

Sincerely,

Chiaki,

KITAO Chiaki,
International Div.
Shimane University

[Quoted text hidden]

Dr. Varun G Menon <varunmenon@scmsgroup.org>
To: 国際課国際連携G <ied-koryu@office.shimane-u.ac.jp>
Cc: PRINCIPAL SSET <principalsset@scmsgroup.org>

Fri, Dec 8, 2023 at 3:26 PM

Dear Chiaki,

Thank you for sharing the wonderful news. Please find the mailing address below. If possible, please send me the document tracking ID once you post it.

Dr. Varun G Menon,
Deputy Dean (Research & Development)
Professor - Computer Science and Engineering
International Collaborations -in charge
SCMS School of Engineering and Technology, Kerala
India - 683 576



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SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

MOBILE: +91 8714504684

Regards,
Varun

[Quoted text hidden]

Thanks and Regards,

Dr. Varun G Menon, Senior Member IEEE
Deputy Dean (Research & Development)
Professor - Computer Science and Engineering
International Collaborations -in charge
SCMS School of Engineering and Technology
SCMS Group of Educational Institutions, Kerala, India - 683 576

Area Editor - Physical Communications Journal, Elsevier
[Quoted text hidden]

国際課国際連携G <ied-koryu@office.shimane-u.ac.jp>
To: "Dr. Varun G Menon" <varunmenon@scmsgroup.org>
Cc: PRINCIPAL SSET <principalsset@scmsgroup.org>

Tue, Dec 12, 2023 at 5:46 AM

Dear Dr. Varun G Menon,

Thank you for your reply.
I will post the signed agreement via EMS today and it's tracking number is "EN289370901JP".

Once your president sign the agreement, I would like to ask you to send one copy back to us the following address for our record.

KITAO CHIAKI
International Division, Shimane University
1060 Nishikawatsu-cho, Matsue, Shimane 690-8504, JAPAN
TEL:+81-852-32-9735

Thank you for your cooperation.

Sincerely,

Chiaki,

KITAO Chiaki
International Div.
Shimane University

On 2023/12/08 18:56, Dr. Varun G Menon wrote:
Dear Chiaki,

Thank you for sharing the wonderful news. Please find the mailing address below. If possible, please send me the document tracking ID once you post it.

*Dr. Varun G Menon, *
Deputy Dean (Research & Development)
Professor - Computer Science and Engineering
International Collaborations -in charge
SCMS School of Engineering and Technology, Kerala,
India - 683 576

MOBILE: +91 8714504684
*
*



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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Regards,
Varun

[Quoted text hidden]

>> <mailto:ied-koryu@office.shimane-u.ac.jp

[Quoted text hidden]

>> <mailto:e-mail%3Aied-koryu@office.shimane-u.ac.jp
<mailto:e-mail%253Aied-koryu@office.shimane-u.ac.jp>>

[Quoted text hidden]

[Quoted text hidden]

Dr. Varun G Menon <varunmenon@scmsgroup.org>
To: 国際課国際連携G <ied-koryu@office.shimane-u.ac.jp>
Cc: PRINCIPAL SSET <principalsset@scmsgroup.org>

Tue, Dec 12, 2023 at 5:48 AM

Dear Chiaki,
Thank you for the EMS details. Once received I will update you.

Regards
[Quoted text hidden]

Thanks and Regards,

Dr. Varun G Menon, *Senior Member IEEE*
[Quoted text hidden]



Chiaki
PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576



Varun Menon G <varunmenon@scmsgroup.org>

Invitation of Applications from SCMS for MATSUE INTERNSHIP PROGRAM - JAN 28 - FEB 10 , 2024 in Matsue city, JAPAN - Deadline: MAY 31, 2023

18 messages

Asa Kerala <asanipponkerala@gmail.com>

Fri, Apr 28, 2023 at 10:54 PM

To: Varun Menon SCMS <varunmenon@scmsgroup.org>

Cc: Gopakumar S <meenagopan1984@gmail.com>, T J Thomas <tjthomas.6125@gmail.com>, Subhash T J <tjsubhash@gmail.com>, bebymathew@gmail.com, MADHU S NAIR <cmd@cochinshipyard.com>, Edgar Morris <edgarfmorris@gmail.com>, Hudson Peter <hudsonpeter4@gmail.com>

Dear Dr. Varun G Menon,

Greetings.

This has reference to the telephonic discussion we had last week on the invitation of Applications of candidates for Matsue Internship Program in Japan this year.

As you are aware, the formal name of the Program is Lake Nakaumi, Lake Shinji & Mt. Daisen Region Indian Human Resources Intake and Business Alliance Promotion Project. This Program is organized by Matsue City Authorities in association with AOTS, Tokyo and ASA Kerala. This time the Program will be in February 2024.

As usual, we have received the Program Announcement for this year from Matsue City Authorities. They are inviting the 3rd and 4th year Engineering students of 2023-24.

The following documents of the Program are attached.

1. Application Guidelines
2. Program Flyer
3. Application form

You may please note that as usual, they are inviting only a total of 6 (SIX) students from three Colleges, for this Internship. Further, they have included non-IT Branches of Engineering also.

This internship program will provide the participants an opportunity to get selected for employment in Japan.

Matsue City Authorities have separately indicated that they mostly prefer Pre-final year students, as the students have more time to plan and will be more inclined to accept opportunities in Japan.

Kindly make your recommendations as follows.

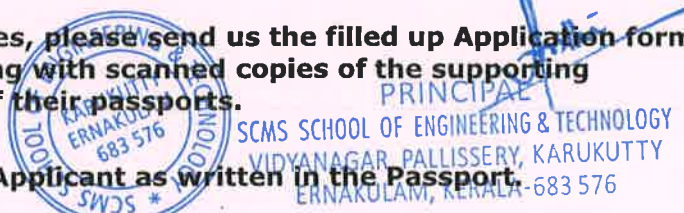
1. Four Applicants from Pre-Final Year students of IT, Computer Science and other Branches of Engineering
2. Two Applicants from Final Year students. Please select them based on their strong intention to take employment in Japan.

The Applicants should meet the qualifications specified in Para 3 of the Application Guidelines.

As instructed in Para 11 of the Guidelines, please send us the filled up Application forms both in EXCEL Format and PDF files along with scanned copies of the supporting documents. Also please attach copies of their passports.

Please take care to write the **Name of the Applicant as written in the Passport.**

APPLICATION DEADLINE: MAY 31, 2023 at Nippon Kerala Centre



The Candidates may have to appear for an Interview at Nippon Kerala Centre after submission. The Date of the Interview shall be informed later. We will be selecting two students from among them.

We will forward the Applications of the selected students to the Matsue city Authorities in Japan by the first week of June 2023.

Matsue will announce the names of the approved candidates by end June 2023.

The approved candidates will have to attend Online Japanese Language classes for 10 hours per week from July 2023 to January 2024.

Internship in Japan will be for a period of two weeks from JANUARY 28 to FEB 10, 2024.

The Participants on successful completion of the Internship, are eligible to become Associate Members of our Alumni Society.




Hope you will kindly do the needful. In case you need any further clarification, you may please contact my colleague in ASA Kerala, Mr. Hudson Peter (Mob: 9447169399).

Eagerly await your timely response.

Thanks and regards

Sincerely yours
Gopakumar S
President
ASA Kerala
Nippon Kerala Centre
KINFRA Hi-Tech Park
HMT Colony P.O.
Kalamassery-683503
Kerala, India
<http://www.asakerala.org/>
asanipponkerala@gmail.com
+91 75580 81097

3 attachments

-  **Application Guidelines - Matsue Internship-'23-'24.pdf**
423K
-  **Matsue Program Flyer - '23-'24.pdf**
955K
-  **Application form- Matsue Internship-'23-'24.xlsx**
152K

Dr. Varun G Menon <varunmenon@scmsgroup.org>

Tue, May 2, 2023 at 11:09 AM

To: Asa Kerala <asanipponkerala@gmail.com>

Cc: Gopakumar S <meenagopan1984@gmail.com>, T J Thomas <tjthomas.6125@gmail.com>, Subhash T J <tjsubhash@gmail.com>, Beby Mathew <bebymathew@gmail.com>, MADHU S NAIR <cmd@cochinshipyard.com>, Edgar Morris <edgarfmorris@gmail.com>, Hudson Peter <hudsonpeter4@gmail.com>

Dear Sir,

Thank you very much for the information. We will shortlist the students and update you at the earliest. Thank you once again for the collaboration with SCMS.

Regards,

Varun

[Quoted text hidden]

--

Thanks and Regards,

Dr. Varun G Menon, Senior Member IEEE
Professor and Head




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ERNAKULAM, KERALA-683 576

Diagnostic-Code: smtp; The recipient server did not accept our requests to connect. Learn more at <https://support.google.com/mail/answer/7720> [cochinshipyard.com 162.215.226.3: timed out]
Last-Attempt-Date: Thu, 04 May 2023 02:56:49 -0700 (PDT)
Will-Retry-Until: Thu, 04 May 2023 22:39:58 -0700 (PDT)

----- Forwarded message -----

From: "Dr. Varun G Menon" <varunmenon@scmsgroup.org>
To: Asa Kerala <asanipponkerala@gmail.com>
Cc: Gopakumar S <meenagopan1984@gmail.com>, T J Thomas <tjthomas.6125@gmail.com>, Subhash T J <tjsubhash@gmail.com>, Beby Mathew <bebymathew@gmail.com>, MADHU S NAIR <cmd@cochinshipyard.com>, Edgar Morris <edgarfmorris@gmail.com>, Hudson Peter <hudsonpeter4@gmail.com>
Bcc:
Date: Tue, 2 May 2023 11:09:46 +0530
Subject: Re: Invitation of Applications from SCMS for MATSUE INTERNSHIP PROGRAM - JAN 28 - FEB 10 , 2024 in Matsue city, JAPAN - Deadline: MAY 31, 2023
----- Message truncated -----

Mail Delivery Subsystem <mailer-daemon@googlemail.com>
To: varunmenon@scmsgroup.org

Fri, May 5, 2023 at 12:28 PM



Message not delivered

There was a problem delivering your message to **cmd@cochinshipyard.com**. See the technical details below.

LEARN MORE

The response was:

The recipient server did not accept our requests to connect. Learn more at <https://support.google.com/mail/answer/7720> [cochinshipyard.com 162.215.226.3: timed out]

Final-Recipient: rfc822; cmd@cochinshipyard.com
Action: failed
Status: 4.4.1
Diagnostic-Code: smtp; The recipient server did not accept our requests to connect. Learn more at <https://support.google.com/mail/answer/7720> [cochinshipyard.com 162.215.226.3: timed out]
Last-Attempt-Date: Thu, 04 May 2023 23:58:32 -0700 (PDT)

----- Forwarded message -----

From: "Dr. Varun G Menon" <varunmenon@scmsgroup.org>
To: Asa Kerala <asanipponkerala@gmail.com>
Cc: Gopakumar S <meenagopan1984@gmail.com>, T J Thomas <tjthomas.6125@gmail.com>, Subhash T J <tjsubhash@gmail.com>, Beby Mathew <bebymathew@gmail.com>, MADHU S NAIR <cmd@cochinshipyard.com>, Edgar Morris <edgarfmorris@gmail.com>, Hudson Peter <hudsonpeter4@gmail.com>
Bcc:
Date: Tue, 2 May 2023 11:09:46 +0530
Subject: Re: Invitation of Applications from SCMS for MATSUE INTERNSHIP PROGRAM - JAN 28 - FEB 10 , 2024 in



Jmike
PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
PONNAMBALAM, KERALA - 683 576

Matsue city, JAPAN - Deadline: MAY 31, 2023

----- Message truncated -----

Dr. Varun G Menon <varunmenon@scmsgroup.org>

Fri, May 26, 2023 at 1:20 PM

To: Asa Kerala <asanipponkerala@gmail.com>

Cc: Gopakumar S <meenagopan1984@gmail.com>, T J Thomas <tjthomas.6125@gmail.com>, Subhash T J <tjsubhash@gmail.com>, Beby Mathew <bebymathew@gmail.com>, MADHU S NAIR <cmd@cochinshipyard.com>, Edgar Morris <edgarfmorris@gmail.com>, Hudson Peter <hudsonpeter4@gmail.com>, PRINCIPAL SSET <principalsset@scmsgroup.org>

Dear Sir,

Please find the attached application forms and certificates of the six shortlisted students from SCMS School of Engineering and Technology for the Matsue internship program. Mr. Alan Varghese has applied for the passport today. The passport copies of all others have been attached. Please let me know any further information received.

1	Meenakshy R Nambiar	Semester 6 (CSE)
2	Alan Varghese Paul	Semester 6 (CSE)
3	Gasteena Laurienda Pess	Semester 4 (CSE)
4	Akash T S	Semester 4 (CSE)
5	Clariss Isidore	Semester 4 (CSE)
6	Aina Arun	Semester 4 (CSE)

Google Drive Link of documents

 **SCMS_Students Application Forms.rar**

Thanks and Regards,
Varun

On Fri, Apr 28, 2023 at 10:55 PM Asa Kerala <asanipponkerala@gmail.com> wrote:

[Quoted text hidden]

[Quoted text hidden]

Mail Delivery Subsystem <mailer-daemon@googlemail.com>

Sat, May 27, 2023 at 1:30 PM

To: varunmenon@scmsgroup.org



Delivery incomplete

There was a temporary problem delivering your message to **cmd@cochinshipyard.com**. Gmail will retry for 47 more hours. You'll be notified if the delivery fails permanently.

[LEARN MORE](#)

The response was:

The recipient server did not accept our requests to connect. Learn more at <https://support.google.com/mail/answer/7720> [cochinshipyard.com 162.215.226.3: timed out]



John
PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

----- Forwarded message -----

From: **Dr. Varun G Menon** <varunmenon@scmsgroup.org>

Date: Wed, 11 Jan, 2023, 10:17 pm

Subject: Fwd: Good news! Three students were selected from SCMS for Matsue Internship.

To: Lenita Biju <lenitabiju@gmail.com>, Anjali Krishna <anjali2sheeja@gmail.com>, Sreelakshmi <sreelakshmiudhayan@gmail.com>

Please check

----- Forwarded message -----

From: **Asa Kerala** <asanipponkerala@gmail.com>

Date: Wed, Jan 11, 2023 at 7:20 PM

Subject: Good news! Three students were selected from SCMS for Matsue Internship.

To: Varun Menon SCMS <varunmenon@scmsgroup.org>

Cc: Gopakumar S <meenagopan1984@gmail.com>, E V John <evj001@gmail.com>, MADHU S NAIR <cmd@cochinshipyard.com>, Kovoov Ninan Jacob

<jnkovoov@yahoo.com>, Edgar Morris <edgarfmorris@gmail.com>, T J Thomas <tjthomas.6125@gmail.com>, Subhash T J <tjsubhash@gmail.com>, Beby Mathew <bebymathew@gmail.com>, Hudson Peter <HUDSONPETER4@gmail.com>

- Dear Dr. Varun Menon,

Wish you Happy New Year! Hope you are fine.

Today we received good news from Matsue City Authorities of Japan.


We are extremely happy to inform you that the following three students from SCMS got selected for Matsue Internship in February this year.

Ms. ANJALI KRISHNA
Ms. SREELAKSHMI T U
Ms. LENITA BIJU

In this connection, we have to prepare the following documents for obtaining visa from the Japanese Consulate at Chennai, for the selected students.

- 1. Visa application form (Please fill up the Form attached.)
- 2. Original Passport along with a photocopy of bio pages.
- 3. Invitation letter. (Received from Japan)
- 4. Schedule of stay. (Received from Japan)
- 5. Flight itinerary. (Awaiting from Japan)
- 6. Daily itinerary. (Received from Japan and attached to this.)




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ERNAKULAM, KERALA-683 576

- 7. Parent's Consent Letter. (Please fill up the form attached.)
- 8. Copy of Passport or Aadhar card of Parent.
- 9. Last 3 months Bank statement of Parent
- 10. Visa Fee - Rs. 1500/-

Kindly inform the selected students accordingly and request them to submit the above documents at the earliest.

The departure from Kochi is on FEB 04, 2023. So we may have to make preparations as quickly as possible.

So we request your early action. The Tentative Schedule for the Program is also attached for your information.

You will shortly hear from us on their Pre-Departure Orientation Session.

Thanks and regards

Sincerely yours

Gopakumar S

President

ASA Kerala

Nippon Kerala Centre

KINFRA Hi-Tech Park

HMT Colony P.O.

Kalamassery-683503

Kerala, India

<http://www.asakerala.org/>

asanipponkerala@gmail.com

+91 75580 81097

--
Thanks and Regards,

Dr. Varun G Menon, *Senior Member IEEE*

Professor and Head

Department of Computer Science and Engineering

International Collaborations -in charge

SCMS School of Engineering and Technology

SCMS Group of Educational Institutions

Kerala, India - 683 576, Mob: +91 8714504684



A handwritten signature in blue ink, appearing to be "Joshi".

PRINCIPAL

SCMS SCHOOL OF ENGINEERING & TECHNOLOGY

VIDYANAGAR, PALLISSERY, KARUKUTTY

ERNAKULAM, KERALA-683 576

Associate Editor - Physical Communications Journal, Elsevier
Series Editor - IEEE Transactions on Intelligent Transportation Systems
Series Editor - IEEE Communications Standards Magazine
Technical Editor - Computer Communications Journal, Elsevier
Associate Editor - Alexandria Engineering Journal, Elsevier
Associate Editor - IET Networks
Editorial Member - IEEE Future Directions Newsletter



A handwritten signature in blue ink, appearing to be "Anil K".

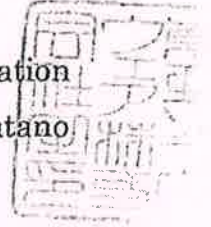
PRINCIPAL
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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Employment Offer Letter

2023/04/11

Dear Ms. Sreelakshmi T U,

TOA Software Corporation
President, Hiroyuki Hatano



We hope that you are doing well.

Thank you very much for your application for our company's "New graduates recruitment".

We are pleased to inform you that, as a result of the employment screening test, we have decided to employ you.

All employees of TOA Software Corp. are looking forward to working with you.

We hope that the last few days of student life will be fulfilling.

Please fill out the "Acceptance of Offer of Employment" form, affix your seal, and return it to us.

Sincerely,

- The date of joining the company is scheduled for Tuesday, November 21, 2023.
"Chance of change depending on acquisition status."

Condition for Suspension of Offer of Employment

- This notice is subject to approval by the Ministry of Justice of Japan regarding status of residence and period of stay.

If a status of residence (working visa) allowing employment is not granted by the date of joining into the company, the offer of employment will be null and void.



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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA, INDIA

Salary Detail

2023/04/1

Income (Starting Salary) ①		
Basic Salary	¥190,000.00	Starting salary for university graduates
Deduction (Approximate)		All expenses are calculated based on the basic salary
Health Insurance	¥9,443	After enrollment, if you get sick or injured, you will only have to pay 30% of the medical expenses at the hospital. The remaining 70% will bear by Japan government. The actual amount you have to pay is 18.942 Yen per month but the company will bear half of this amount.
Welfare Pension	¥17,385	This is a public pension, everyone who lives in japan must join this. A fixed amount of pension will be paid in the future. The company will plus the same amount and pay every month. If you pay this amount for 10 years then you will get a pension every month after your retirement according to the amount you have paid. If you return to your country before 10 years, you will get a certain percentage of the amount back according to the government rule.
Employment Insurance	¥1,140	On paying for this insurance, If you lose your job, you will receive unemployment benefits and job search support.
Income Tax	¥3,410	Tax according to the salary income. If you have income then it is mandatory to pay this tax.
Membership fee	¥500	Use this for employee condolences, ceremonies etc. (Reserve)
Total Deduction ②	¥31,878	Amount deducted from your salary
Total ①-②=③	¥158,122	(Approximate) Salary after deduction

The month starts from the 21st of the previous month and ends on the 20th of the current month.
Eg: October (9/21 ~ 10/20)

Salary day is 25th day of every month. If that day or the previous day of that day is a holiday then before that day will be the salary day.



[Handwritten Signature]

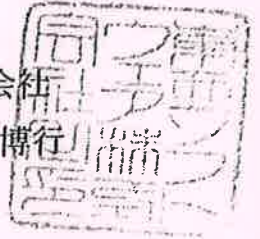
PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

採用内定通知書

Sreelakshmi T U 様

令和5年4月11日

東亜ソフトウェア株式会社
代表取締役社長 秦野 博行



拝啓 ますますご健勝のこととお喜び申し上げます。

さて、このたびは弊社の新卒社員募集に際し、ご応募いただき誠にありがとうございました。

採用選考試験の結果、貴殿を採用させていただくことに内定いたしましたので、ここに
通知差し上げます。

貴殿と共に働く日を社員一同心待ちにしております。

残り少ない学生生活も充実したものにになりますようお祈りいたします。

つきましては、「採用内定承諾書」に必要事項をご記入、押印のうえ、ご返信くださいますようお願い致します。

敬具

- ・入社日は、令和5年11月21日（火）を予定しております。
取得状況によって変更する可能性があります。

内定停止条件

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代表取締役 桑野 博行 様

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令和 年 月 日



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Daffodil
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University

**MEMORANDUM OF UNDERSTANDING (MoU)
AND ACADEMIC COLLABORATION**

BETWEEN

SCMS GROUP OF EDUCATIONAL INSTITUTIONS, COCHIN, INDIA

AND

DAFFODIL INTERNATIONAL UNIVERSITY, DHAKA, BANGLADESH

SCMS Group of Educational Institutions, Cochin, India and Daffodil International University, Dhaka, Bangladesh, aim to establish and develop a close partnership to promote academic and cultural exchanges between the two Institutions through mutual assistance, specially, in the areas of teaching and research.

This Agreement of Co-operation, upon approval of the Vice Chancellor of Daffodil International University and the Vice Chairman of SCMS Group of Educational Institutions will serve as a general framework for institutional co-operation. It will facilitate faculty members to discuss and develop specific programs of co-operation. Each University will designate a liaison officer to co-ordinate the application of this Agreement in the best interest of both Institutions. Co-operative relations shall be carried out through the activities such as:

- **Short Project Internships / Study Tours / Summer Program:** Students from partner universities will agree to participate in Short Project Internships / Study Tours / Summer Program in various research areas. The partner institution will circulate the notices and program plan among students and motivate them to attend the program for capacity building and cross cultural education.
- **Faculty Exchange:** The exchange of academic staff for short duration in order to share expertise and knowledge among staff and students of both institutions.
- **Resources Share:** The acquiescence of access to the Library database, Journal and other online resources for both staff and students of each university.
- **Blended Learning Courses:** Both Partner institutions may arrange blender learning courses/program for the students where students will study specific subjects in their home institution and rest of them will complete in the partner institution
- **Scholarship Opportunity:** Both Institution may arrange scholarship opportunity for meritorious students of partner institution and cooperate accordingly.



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The provisions and activities specified in this Agreement are subjected to the availability of funds and the approval of the Authorized Officers of both Institutions. A separate financial agreement to be finalized prior to implementation of the program arrangement.

The Agreement shall take effect from the date of signing and shall be valid for an initial period of 5 (five) years. Any amendment and/or modification of this Agreement require the written approval of the Vice Chancellor of Daffodil International University and the Vice Chairman of SCMS Group of Educational Institutions and shall be appended hereto. Neither University shall take action relative to this Agreement without consultation with the partner in this Agreement.

**Signed on behalf of
SCMS Group of Educational Institutions
India**

**Signed on behalf of
Daffodil International University
Bangladesh**



Prof. Pramod P Thevanoor
Vice Chairman
SCMS Group of Educational Institutions

Date: 25/07/2018



Prof. Dr. Yusuf Mahbubul Islam
Vice Chancellor
Daffodil International University

Date: 25/07/2018



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SSET/155/19/0638

14.05.2019

Mr. Ramit Arko
Student – ID 181-33-4450
Electrical and Electronics Engineering
Daffodil International University
Dattapara, Ashulia
Savar, Dhaka.

Dear Mr. Ramit Arko,

We have pleasure to invite you to our campus to participate in the Internship / Study Tour program for International students offered by Centre for Robotics, SCMS School of Engineering and Technology.

The objective of this programme is to impart knowledge in the field of robotics to students from all streams of engineering and help them build prototypes and make their innovative ideas come to reality. The program duration is two weeks - June 16 – July 1, 2019.

We look forward to your visit to our campus and we wish you all the best.

Yours sincerely,

PRAMOD P. THEVANNOOR
VICE CHAIRMAN – SCMS GROUP



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14.05.2019

Mr.Md. Sazzad Sarker (Passport No. EA0142391)
Student – ID 181-33-4594
Electrical and Electronics Engineering
Daffodil International University
Dattapara, Ashulia
Savar, Dhaka.

Dear Mr. Md. Sazzad Sarker,

We have pleasure to invite you to our campus to participate in the Internship / Study Tour program for International students offered by Centre for Robotics, SCMS School of Engineering and Technology.

The objective of this programme is to impart knowledge in the field of robotics to students from all streams of engineering and help them build prototypes and make their innovative ideas come to reality. The program duration is two weeks - June 16 – July 1, 2019.

We look forward to your visit to our campus and we wish you all the best.

Yours sincerely,

PRAMOD P.THEVANNOOR
VICE CHAIRMAN – SCMS GROUP



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14.05.2019

Mr.M.Atiq Faisal Rafi (Passport No. BY0667816)
Student – ID 172-15-10028
Computer Science and Engineering
Daffodil International University
Dattapara, Ashulia
Savar, Dhaka.

Dear Mr. Atiq Faisal Rafi,

We have pleasure to invite you to our campus to participate in the Internship / Study Tour program for International students offered by Centre for Robotics, SCMS School of Engineering and Technology.

The objective of this programme is to impart knowledge in the field of robotics to students from all streams of engineering and help them build prototypes and make their innovative ideas come to reality. The program duration is two weeks - June 16 – July 1, 2019.

We look forward to your visit to our campus and we wish you all the best.

Yours sincerely,

PRAMOD P.THEVANNOOR
VICE CHAIRMAN – SCMS GROUP



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14.05.2019

Mr. Nimai Chandra Das (Passport No. EA0270621)
Student – ID 143-33-2265
Electrical and Electronics Engineering
Daffodil International University
Dattapara, Ashulia
Savar, Dhaka.

Dear Mr. Nimai Chandra Das,

We have pleasure to invite you to our campus to participate in the Internship / Study Tour program for International students offered by Centre for Robotics, SCMS School of Engineering and Technology.

The objective of this programme is to impart knowledge in the field of robotics to students from all streams of engineering and help them build prototypes and make their innovative ideas come to reality. The program duration is two weeks - June 16 – July 1, 2019.

We look forward to your visit to our campus and we wish you all the best.

Yours sincerely,

PRAMOD P. THEVANNOOR
VICE CHAIRMAN – SCMS GROUP



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14.05.2019

Mr. Khandker M. Qaiduzzaman
Lecturer
Department of Software Engineering
Daffodil International University
Dattapara, Ashulia
Savar, Dhaka.

Dear Mr. Khandker Qaiduzzaman,

We have pleasure to invite you to our campus to engage in sessions for our students and faculty as part of the Exchange Programme between our institutions.

The objective of the association between SCMS Group of Educational Institutions and Daffodil International University, Dhaka, Bangladesh, is to establish and develop a close partnership to promote academic and cultural exchanges between the two Institutions through mutual assistance, specially, in the areas of teaching and research.

We look forward to your visit to our campus.

Yours sincerely,

PRAMOD P. THEVANNOOR
VICE CHAIRMAN – SCMS GROUP



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Varun Menon G <varunmenon@scmsgroup.org>

Academic Collaboration with Daffodil International University

50 messages

Dr. Varun G Menon <varunmenon@scmsgroup.org>
To: morsalin.a@daffodilvarsity.edu.bd

Tue, Jun 19, 2018 at 11:09 AM

Respected Mr. Salahuddin Morsalin

Thank you for your time and consideration. Let me introduce as Dr. Varun G Menon, in charge of International Collaborations at SCMS Group of Educational Institutions, India.

We are interested in having academic collaboration with Daffodil International University. Collaboration could be in the areas of student exchange programs, faculty exchange programs, research collaborations, joint seminars and conferences.

We have a dedicate team of faculty and students working in areas like Robotics, Brain Signal Analysis, Computational fluid dynamics. Water Quality Monitoring and Assessment, Limnology, Water Audit, Environmental Remote Sensing , Android Malware Analysis. Research collaborations in these areas is another possibility.

We have academic collaborations with leading international universities like Vrije University-Brussels, Furtwangen University-Germany, University of Applied Sciences Ravensburg Weingarten- Germany, Shimane University-Japan and more.

Please let me know if we could discuss and take forward this initiative.

For your information we are the No 1 ranked private educational institutions in the state. You can find more information about our institutions in www.scmsgroup.org and about our Engineering Institute in www.scmsgroup.org/sset/

Have a Great Day.

Thanks and Regards,

Dr. Varun G Menon

Associate Professor-Computer Science Engineering
Exe. Officer-Corporate Relations & International Collaborations
SCMS School of Engineering and Technology
Kerala, India-683582
Office: +91-484-2450330 Mob: +91-8714504684
Web: <http://www.scmsgroup.org/sset/computer-science-engineering/dr-varun-g-menon>



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International Affairs, DIU <int@daffodilvarsity.edu.bd>

Sat, Jun 23, 2018 at 6:42 PM

To: varunmenon@scmsgroup.org

Cc: "Office of the International Affairs, DIU" <mobility@daffodilvarsity.edu.bd>, Scholarship News <scholarship@daffodilvarsity.edu.bd>, "International, DIU" <international@daffodilvarsity.edu.bd>

Dear Dr. Varun G Menon,

Greetings from DIU!

Thanks for your email and showing interest in the academic partnership. Yes, we can collaborate in the areas of student exchange programs, faculty exchange programs, summer school research collaborations, joint seminars and conferences.

I have attached here the sample agreement copy of DIU, Could you please check and fill it with your information. Besides, I have attached here the fact sheet of DIU where you can check our common details and department.



CENTRE FOR ROBOTICS

**SCMS SCHOOL OF ENGINEERING AND
TECHNOLOGY Vidya Nagar, Palissery, Karukutty,
Cochin - 683 582, Kerala**



Report

**Internship Programme On Robotics
And Automation 2019
For International Students**

From

**Daffodil International University
Bangladesh**

17th June 2019 to 1st July 2019



J. J. J.
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Program Objective:

Our Vice Chairman, SCMS Group of Institutions, Prof. Promod P Thevannoor who initiated this internship program by signing an MOU with Daffodil International University, Bangladesh. The workshop focuses on imparting knowledge on the working principle of different equipments in FAB Lab and also in Robotics and Automation specifically in Swarm Robotics. This will acquire the skills to develop a project from scratch. 3D models and laser cutter give them necessary aid in developing parts of their projects and assemble and then implement.

The students were given an awareness about the e-Yantra, a project by IIT Mumbai funded by MHRD under National Mission on Education through ICT (NMEICT). The basics of Robotics and programming concepts were introduced to the students using the FIREBIRD V robotic kit of ELSI Lab established by e-Yantra.

Program Coordinators:

- Dr. Sunil Jacob, Director, SCMS Centre For Robotics & Professor, ECE Dept.
- Mr. Vinoj P.G, Assistant Professor, ECE Dept
- Mrs. Sreeja Rajesh, Assistant Professor, CSE Dept
- Mrs. Asha Jacob, Lab Assistant, CSE Dept
- Dr. Varun G Menon, Exe. Officer Corporate Relations & International Collaborations, & Associate Professor, CSE Dept
- Dr. Saira Joseph, HOD & Associate Professor, ECE Dept
- Mrs. Sushitha P.K, Lab Instructor, CSE Dept
- Mrs. Renjy P.L, Lab Instructor, ECE Dept
- Mrs. Smitha P.C, Lab Instructor, ECE Dept
- Mrs. Listy Jeemon, Lab Instructor, ECE Dept
- Mrs. Jyothylekshmi S, Lab Instructor, ECE Dept
- Mrs. Aiswarya T Soman, Lab Instructor, Basic Science Dept
- Mr. Nikhil Asok N, Assistant Professor, ME Dept
- Mr. Premanand R, Lab Instructor, ME Dept

List of Participants

- Khandker M Qaiduzzaman, Faculty, Software Engineering Dept.
- NimaiChandra Das, Student, Electrical and Electronics Engineering Dept.
- M Atique Faisal Rafi, Student, Computer Science and Engineering Dept.
- Md Sazzad Sarker, Student, Electrical and Electronics Engineering Dept.
- Ramit Arko, Student, Electrical and Electronics Engineering Dept.

Deligates

- Dr. Vinod P, Dean of Research & HOD CSE Dept.
- Dr. Sheeja Janardhanan, Professor, ME Dept.



A handwritten signature in blue ink, appearing to read "Sheeja".

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17-06-2019, Monday

Official Inauguration, 10:00 am

Prof. S. Gopakumar, Senior Group Director, SCMS Group of Institutions formally inaugurated the Internship program. In his inaugural address, he stressed the need and importance of conducting such training programs among International students. He mentioned that such programs will create awareness of modern technologies and help them to familiarize machineries and equipments used by engineers. Dr. Praveensal C J, Principal, talk about SSET and express heartfelt gratitude to our Vice Chairman, SCMS group of Institutions, Prof. Promod P Thevannoor who initiated this internship program by signing an MOU with Daffodil International University, Bangladesh. Dr. Varun G Menon, International Partnerships-in charge gave the welcome speech and presented the theme address. Dr. Sunil Jacob, Director, SCMS Center for Robotics gave the vote of thanks and introduced the team members of internship and schedule of internship to the participants.

Campus Visit (11.00 am- 12.30 pm) Dr. Sunil Jacob

Mr. Haridas V.K, Foreman, Automobile Engg Department demonstrate the functions of ‘4 Stroke Petrol Engine’, ‘Vertical Boring Machine’, ‘System of Horizontal Boring Machine’. Mr. K K Gopalakrishnan, Workshop Superintendent, Mechanical Engineering Department demonstrated the working of ‘CNC machines’, ‘Conventional Lathe machines’, etc.. The team visited the library Dr. Pradeep P Thevannoor Learning Resource Centre.



Prishi

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Robotics and Automation (1.30 pm-2.30pm) Dr. Sunil Jacob

The terms “automation” and “robotics” are sometimes used interchangeably, but there are minor differences between the two. Automation is the process of using technology to complete human tasks. Robotics is the process of developing robots to carry out a particular function. Dr. Sunil Jacob, Professor & Director, SCMS Centre for Robotics, had taken a session about Robotics and Automation.



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2D Design (2.30 pm - 3.30 pm) Dr. Saira Joseph

2D design is the creation of flat or two-dimensional images for applications such as electrical engineering, mechanical drawings, architecture and video games. 2D designs normally incorporate computer-aided drafting and individual drawing skills. Laser cutting is a technology that uses a laser to cut materials, and is typically used for industrial manufacturing applications, but is also starting to be used by schools, small businesses, etc.. Laser cutting works by directing the output of a high-power laser most commonly through optics. When cutting stainless steel or aluminum, the laser beam simply melts the material, and high pressure nitrogen is used to blow the molten metal out of the kerf.



Dr. Saira Joseph, HOD & Associate Professor ECE Dept. had taken session in 2D Design. In this session, different tools available in CorelDraw – a vector graphics editor used in Laser Cutter Machine was explained.

18-06-2019, Tuesday

2D Design (9.15 am – 3.30 pm) Dr. Saira Joseph

The students designed their own circuit in Corel Draw and fabricated using Laser Cutter in the FAB Lab. Mrs. Smitha P C, Lab Instructor, ECE Dept, explains the different settings for print the design in Laser Cutter.




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19-06-2019, Wednesday

Embedded C Programming- 9.15 am – 3.30 pm Mrs. Sreeja Rajesh

C is a general-purpose programming language that is extremely popular, simple and flexible. It is machine-independent, structured programming language which is used extensively in various applications. Embedded C is a generic term given to a programming language written in C, which is associated with particular hardware architecture. Embedded C is an extension to the C language with some additional header files. These header files may change from controller to controller.



Sreeja
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Mrs Sreeja Rajesh, Assistant Professor, CSE Dept took a session on Introduction to Computers and Programming concepts. Later they have done sample C programs in computer.



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Mrs. Asha Jacob and Mrs Sushitha P.K Lab Instructors, CSE Dept were assisting the students.

20-06-2019, Thursday

Familiarize Firebird V Robotic Kit 9.15 am – 12.30 pm Mrs Asha Jacob

Fire Bird V is designed by NEX Robotics and Embedded Real-Time Systems lab, CSE IIT Bombay. The students were given an awareness about the e-Yantra, a project by IIT Mumbai funded by MHRD under National Mission on Education through ICT(NMEICT). As a Universal Robotic Research Platform, Fire Bird V provides an excellent environment for experimentation, algorithm development and testing. The session was handled by Mrs Asha Jacob, Lab Asst. CSE Dept.



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Introduction about robots and familiarize Firebird V robotic kit. They had done sample programs on LED, LCD display, Buzzer and Timer in Firebird V Robot. Mrs. Sreeja Rajesh, Asst. Prof, CSE Dept assist the students.

Robotic Fish NEMO-Navigational Emergency Marine Object (1.30 pm-2.30pm)

Dr. Sheeja Janardhanan

Navigational Emergency Marine Object (NEMO) is a robotic fish developed at the SSET FAB lab. It is a remote surveillance underwater vehicle with shark-like swimming abilities. This project made its way to the national finals of eYantra Ideas Challenge (eYIC) 2019 jointly organized by the Department of CSE, IIT Bombay and MHRD at IIT Bombay campus under the title “Bio-Inspired Fish Shaped Unmanned Underwater Vehicle for Remote Surveillance”.



The project mentored by Dr. Sheeja Janardhanan, Professor, ME Dept had explained working principle of NEMO.

21-06-2019, Friday

Gesture Control Robot 9.15 am – 12.30 pm Mr Vinoj P G

Gesture Controlled robot is a kind of robot which can be controlled by hand gestures not by old buttons. It just need to wear a small transmitting device in the hand which included an acceleration meter. This will transmit an appropriate command to the robot so that it can do whatever we want.



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Mr Vinoj P G, Assistant Professor, ECE Dept. discusses about accelerometer based gesture control robot, that includes what is an accelerometer, TX and RX section, its working & applications.

Fritzing (1.30 pm-2.30pm) Mr Vinoj P G

Fritzing is a free tool that allows users to create clean and professional images of electronics projects for teaching or sharing.



Joshi

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Mr Vinoj P G, Assistant Professor, ECE Dept. explains different tools available in the software.

Workbench (2.30 pm-3.30pm) Mrs. Jyothylekshmi S

Mrs. Jyothylekshmi S, Lab Instructors of ECE Dept had explained the workbench in the FAB Lab. She talks about the different tools and soldering methods available in the lab.



22-06-2019, Saturday

Machine Learning 9.15 am - 12.30 pm Dr Vinod P

Machine Learning is the scientific study of algorithms and statistical models that computer systems use in order to perform a specific task effectively without using explicit instructions, relying on patterns and inference instead. It is seen as a subset of artificial intelligence.



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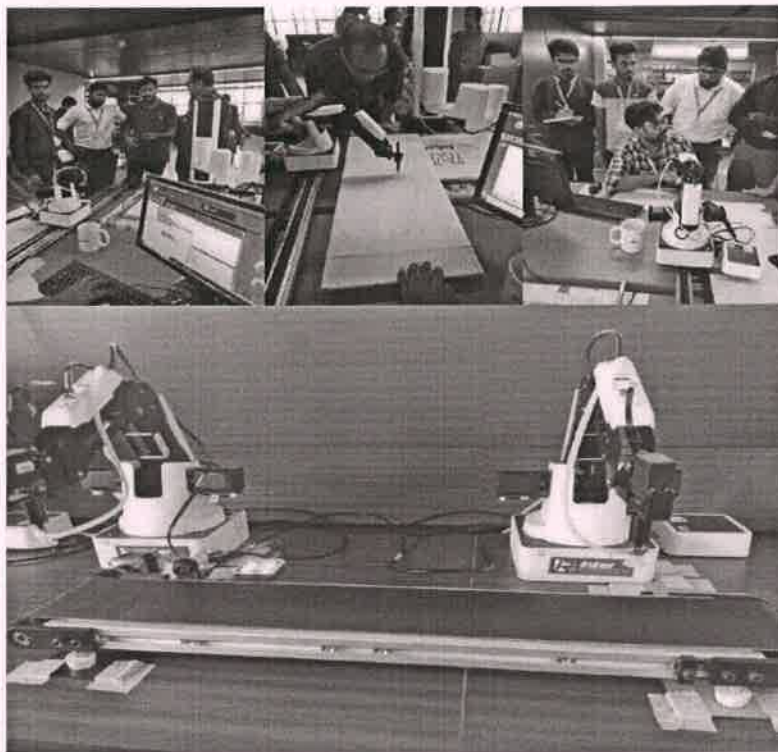
Dr Vinod P, HOD & Professor, CSE Dept. explains different aspect of Machine Learning like algorithms and field of application etc.

Industrial Visit 1.30 pm – 4.30 pm Dr. Sunil Jacob

The team visit Inker Robotics Pvt Ltd, Thrissur, one among the few leading companies that spearhead Robotics Education in the country. They gave right guidance and exposure to real world Robotics. Dr. Sunil Jacob and Dr. Vinod P were accompany the team.



Sunil Jacob
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24-07-2019, Monday

PCB Designing 9.15 am – 11.15 am Mrs. Smitha P C

A printed circuit board (PCB) mechanically supports and electrically connects electronic components or electrical components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet layers of a non-conductive substrate. Mrs. Smitha P C, Lab Instructor, ECE Dept. explained different methods of PCB designing.



Smitha
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SMD Assembling 11.15 am – 12.30 pm Mrs. Renji P L

SMD stands for Surface Mount Device and they are components that can be solder on the surface of a circuit board. The best way to solder surface mount devices (SMDs) onto printed circuit boards (PCBs) is with a reflow oven, but when that's not possible, a hot-air station can be successfully used.



Mrs. Renji P L, Lab Instructor, ECE Dept. had explained the working of hot-air station used for SMD soldering.

Fire Bird V Projects 1.30 pm – 3:30 pm



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A Session was handled by Mrs. Asha Jacob, Lab Assistant, CSE Dept. This session discussed about working of Pulse Width Modulator; Servo Motor, ADC Converter etc. in Fire Bird V robotic kit and sample programs were done. Mrs. Sreeja Rajesh, Asst. professor, CSE Dept. assist the team.

25-07-2019, Tuesday

Vinyl Cutter 9.15 am – 10.45 am Mrs. Smitha P C

A Vinyl Cutter is a type of computer-controlled machine. Small Vinyl Cutters look like a desktop printer. Like a printer controls a nozzle, the computer controls the movement of a sharp blade over the surface of the material. This blade is used to cut out shapes and letters from sheets of thin self-adhesive plastic (vinyl). The vinyl can then be stuck to a variety of surfaces depending on the adhesive and type of material. While these machines were designed for cutting vinyl, they can also cut through computer and specialty papers, as well as thicker items like thin sheets of magnet. Dr. Sunil Jacob, handle this session.



Mrs. Smitha P C assists the team to take the prints of their own designs.

Machine Learning 11.00 am – 12.30 pm Dr. Vinod P

The **Pandas** package is the most important tool at the disposal of Data Scientists and Analysts working in **Python** today. The powerful machine learning and glamorous visualization tools may get all the attention, but **pandas** is the backbone of most data projects.



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Dr. Vinod P, take detailed session on this package.

3D Designing 1.30 pm – 3.30 pm Mr.Nikhil Asok N

3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file. The creation of a 3D printed object is achieved using additive processes. In an additive process an object is created by laying down successive layers of material until the object is created.



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Mr. Nikhil Asok N, Assistant Professor, Automobile Engineering Dept, had taken a session in 3D printer software - Onshape. Mr. Premanand R, Lab Instructor, ME Dept. assist the team.

26-07-2019, Wednesday

ShopBot 9.15 am - 12.30 pm Dr. Sunil Jacob

ShopBot Desktop is a digital fabrication powerhouse. It's built to perform like a big tool, built to be rugged, and built to last. In addition to impressive woodworking capabilities, the Desktop delivers engraving level precision, and the power and rigidity to machine parts from wood, plastic, aluminum, and other materials. The Desktop can perform a wide range of workbench, prototyping and production projects. And it is an agile platform for digital fabrication.



Dr. Sunil Jacob had explained and demonstrates the working of Shop Bot.

Swarm Robotics 1.30 pm - 3.30 pm Dr. Sunil Jacob

Swarm Robotics is an approach to the coordination of multiple robots as a system which consists of large numbers of mostly simple physical robots. It is supposed that a desired collective behavior emerges from the interactions between the robots and interactions of robots with the environment.

Dr. Sunil Jacob had taken a detailed session about Swarm Robotics and its functionality. Later the team draws the circuit in Corel Draw and fabricated the design in Laser Cutter and assembled the circuits to form master and slave robots. Mrs. Renjy P.L, Mrs. Smitha P.C, Mrs. Listy Jeemon and Mrs. Jyothylekshmi S, Lab Instructors of ECE Dept and Miss. Aiswarya T Soman, Lab Instructor, Basic Science Dept were assist the team.



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27-07-2019, Thursday

3D Designing 9.15 am – 2.30 pm Mr.Nikhil Asok N

Kinematics is a branch of classical mechanics that describes the motion of points, bodies (objects), and systems of bodies (groups of objects) without considering the forces that cause them to move.



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Mr. Nikhil Asok N was explained the method for creating kinematic movement using Onshape software. Students design their own designs in this software and later printed it in 3D printer in FAB Lab. Mr. Premand R, Lab Instructor, Me Dept assist the students.

3D Printing 2.30 pm – 3.30 pm Mrs. Listy Jeemon

3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file. Mrs. Listy Jeemon, Lab Instructor, ECE Dept explained the working of 3D printer.



28-07-2019, Friday

Swarm Robotics - Coding & Demonstration 9.15 am – 3.30 pm Dr. Sunil Jacob

Dr. Sunil Jacob was explained the coding for swarm robotics movement and demonstrate its working. Mrs. Asha Jacob, Lab Assistant, CSE Dept. help the team for coding.



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29-07-2019, Saturday

Projects Demonstration & Idea Discussion 9.15 am–12.30 pm Dr. Sunil Jacob

An interactive session conducted by Dr. Sunil Jacob with the students for their innovative ideas and clarification of doubts regarding the implementation of their ideas. And also take workshop feedback. They were also given an opportunity to explore different social relevant, prize won and funded projects done by SSET engineering students. Some of them are:

- **Brain Wave Nerve Excitation for Physically Disabled** award winning project in Gandhian Young Technological Innovation Award, Presented at Rashtrapathi Bhavan
- **A De-Addiction Coil For Drug Addicts** award winning project in AICTE-ECI Chhatra Vishwakarma Awards in Electronics, IIT Delhi.
- **Muscle to Machine Interface for Paralyzed Person (MMIPP) Ver.2** win the award in Sastrayaan 2018 at CUSAT, Kochi
- **Bionic Haptic Arm**, funded by Kerala State Council for Science Technology and Environment (KSCSTE)
- **Bug-bot for Mosquito Attractor** funded by Kerala State Council for Science Technology and Environment (KSCSTE)
- **Eco Friendly Traffic Junctions** funded by Kerala State Council for Science Technology and Environment (KSCSTE)
- **Wearable Device for Detection And Prevention of Heart Failure** funded by Kerala State Council for Science Technology and Environment (KSCSTE)
- **Brain to Brain Interface for all leaving being** funded by SSET in Collaborator Backyard Brain and Neurosky
- **Low Cost 3D printer** funded by SSET



Robotics Session at SCMS College of Polytechnic Mr.Khandker M Qaiduzzaman



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Mr. Khandker M Qaiduzzaman, International Exchange Faculty from Daffodil International University, Bangladesh conducted two sessions on Robotics at SCMS College of Polytechnic on 19th and 24th June, 2019. Inspired from the session, the students of polytechnic created their own model of a 'Line Following Robot'.

01-07-2019, Monday

Executive Seminar Hall 10.00 am – 12.00 pm

Valedictory Function

Two weeks long workshop successfully completed and the valedictory function was held on 1st July 2019. Dr. Saira Joseph, Associate Professor & HOD ECE, compare the function. The function started with a prayer song by Mrs. Jyothylekshmi S, Lab Instructor, ECE Dept. Welcome speech was delivered by Dr. Varun G Menon, Exe. Officer Corporate Relations & International Collaborations, & Associate Professor, CSE Dept. The core members of SCMS Centre for Robotics Mr. Vinoj P.G, Assistant Professor, ECE Dept and Mrs. Sreeja Rajesh, Assistant Professor, CSE Dept. talk about the SCMS Centre for Robotics and its future plans.



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Dr. Praveensal C J, Principal, SSET shared his views in robotics and told that Robotics education will be a key determiner in employment and will make a significant difference in facing the challenges in the coming decade. He also mentioned about the importance of conducting such prestigious International Collaboration events.



Dr.E.M.Somasekharan Nair, Professor, Emeritus, Mechanical Engineering Dept. blessed the function with his valauble speech.



Certificates and mementos were distributed to all participants of the workshop by Principal and HODs of different departments.



Praveensal C J
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Dr. Sunil Jacob, talk about the workshop and propose the future plans and projects in collaboration with Daffodil International University. Later he distributed certificates to all the staff members who actively contributed in the workshop.



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Mr.Khandker M Qaiduzzaman, Faculty, Software Engineering Dept. share his experience and talk about the future plans in collaboration with Daffodil International University and SSET. Ramit Arko, Student, Electrical and Electronics Engineering Dept. share his experience and memorize the hospitality and caring of our people.



Ms. Asha Jacob, Lab Assistant, CSE, SSET, core member of SCMS Centre for Robotics and Program Coordinator of the workshop delivered the Vote of Thanks.



Anil
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At last, the function was ended with enjoy the sweet melody songs of Nafeez sir (the nick name of Mr.Khandker M Qaiduzzaman, Faculty) in Bangla language.



Participants from Daffodil International University, Bangladesh with Dr. Praveensal C. J, Principal, SSET, Dr. E.M. Somasekharan Nair, Professor, Emeritus, ME Dept. and Programme Coordinators



Praveensal

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Participants from Daffodil International University, Bangladesh with
Core members of SCMS Centre for Robotics



Participants from Daffodil International University, Bangladesh with
Programme Coordinators

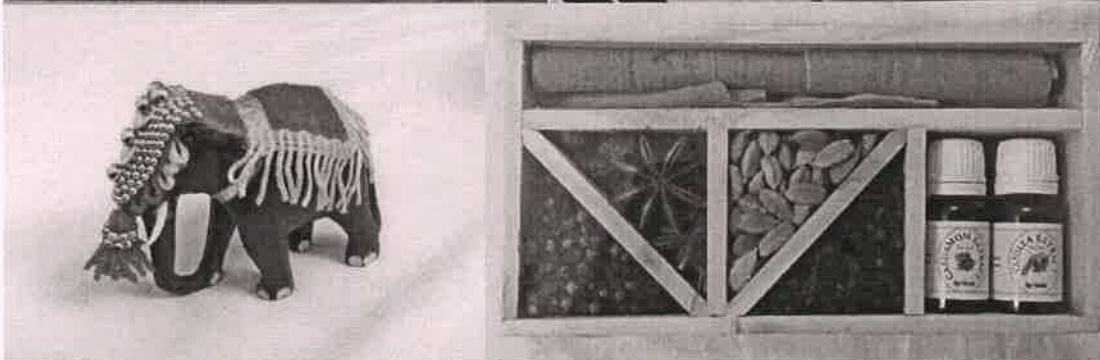


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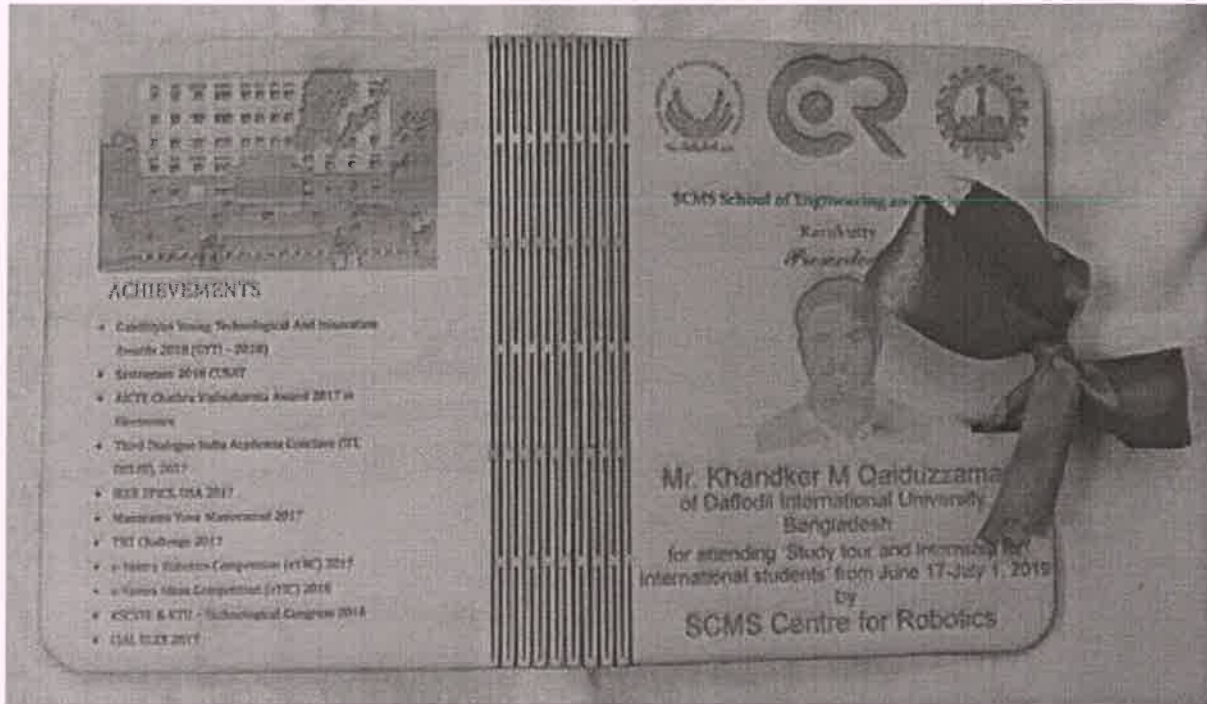
Prestigious Moment



Certificates and Gifts given to the Participants



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Model of Mementos given to the participants



Arshi

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COLLABORATING TO LEARN

A warm welcome to students & faculty of Daffodil International University, Bangladesh, to SCMS Centre for Robotics for Study Tour and Internship.

SCMS Centre for Robotics welcomes students and faculty of Daffodil International University, Bangladesh, for Study Tour and Internship at SCMS Centre for Robotics. The session will be led by Dr. Sunil Jacob, Director, Centre for Robotics, SSET, from 12th June to 1st July 2019. Mr. Khairul M. Qaduzaman, Lecturer, Department of Software Engineering, Daffodil International University, will be conducting sessions on Artificial Intelligence, Robotics and Machine Learning at SCMS School of Engineering and Technology and SCMS College of Polytechnics.

17th June to 1st July, 2019

SCMS CENTRE FOR ROBOTICS

Banner & Flux

PRESS COVERAGE

ബംഗ്ലാദേശ് സർവകലാശാല - എസ്.സി.എം.എസ്. ഇന്റേൺഷിപ്പ് പ്രോഗ്രാം തുടങ്ങി

കളമശ്ശേരി > റോബോട്ടിക്സ് മേഖലയിൽ ഹ്രസ്വകാല പരിശീലനത്തിനായി ബംഗ്ലാദേശിലെ ഡാഫോഡിൽ അന്തർദ്ദേശീയ സർവകലാശാലയിൽനിന്നുള്ള വിദ്യാർത്ഥികളുടെ സംഘം എസ്.സി.എം.എസിലെത്തി. മാനേജ്മെന്റ്, എൻജിനീയറിങ് വിഭാഗങ്ങളിലെ വിദ്യാർത്ഥി-ഫാക്കൽറ്റി എക്സ്ചേഞ്ച് ഇന്റേൺഷിപ്പ് പ്രോഗ്രാം, സാങ്കേതിക കൈമാറ്റം, പഠന സമ്പ്രദായം എന്നീ മേഖലകളിൽ പരസ്പര സഹകരണത്തോടെ പ്രവർത്തിക്കുന്നതിനായി നേരത്തെ ഒപ്പുവെച്ച ധാരണയുടെ അടിസ്ഥാനത്തിലാണ് സന്ദർശനം.

ആർട്ടിഫിഷ്യൽ ഇൻറലിജൻസ്, മെഷീൻ ലേണിങ് എന്നീ വിഭാഗങ്ങളിൽ എസ്.സി.എം.എസ്. പോളിടെക്നിക്കിലും ഇവർ ക്ലാസുകളിൽ പങ്കെടുക്കും. എസ്.സി.എം.എസിലെ റോബോട്ടിക്സ് സെന്ററിന്റെ തലവൻ ഡോ. സുനിൽ ജേക്കബിന്റെ നേതൃത്വത്തിലാണ് പരിശീലനം.

എൽഎൽ.ബി.

Amika

MALAYALA MANGRAMA



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Cooperation Agreement

Preamble:

Both the institutions SCMS group and SEWERIN have interests on special fields of water and wastewater technology and it was found out that there could be synergies in working together. The goal of this cooperation between the both parties is to support the training and joint handling of projects in the field of leak detection technologies.

1. This cooperation agreement is established between the following two institutions:

- **SCMS Group of Educational Institutions**
SCMS Campus
Prathap Nagar, Muttom
Cochin - 683 106, Kerala, India
Represented by Prof. Pramod P. Thevannoor
Vice Chairman

and

HERMANN SEWERIN GMBH
Robert-Bosch-Straße 3
33334 Gütersloh
Represented by Dr. Swen Sewerin
CEO

2. SCMS Group as a private educational institution offers undergraduate and graduate programs in management, business and technology and has R&D activities on various fields. The SCMS Water Institute (SWI) is a division of SCMS Group of Educational Institutions with the following objectives:

- Developing water and wastewater technologies including reuse of water and recycling of valuable components
- Fine-tuning of given technologies for local conditions
- Framing water policies
- Performing environmental impact assessments and water audits
- Offering water related capacity building on all levels



SEWERIN
Hermann Sewerin GmbH
Robert-Bosch-Str. 3 - 33334 Gütersloh
Tel.: 0 52 41 / 9 34 - 0
Fax: 0 52 41 / 93 44 44

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SEWERIN

SEWERIN is a private, independent and owner-operated company. Our focus lies on developing, producing and distributing worldwide water and gas leak detection instruments.

Our own research, development and production department secures our independence and international pole-position in the field of leak detection technology.

These both institutions are interested in a close cooperation to develop and to adapt approved technologies to the specific tropical conditions. The focus lies on water and pipe location equipment, leak detection in particular.

For the specific project applications separate *Letters of Intend* will be agreed on.

3. The role of the two partners is as follows:

SCMS:

- identification of fields for research and application
- basic investigation for the preparation of research and application projects
- providing of qualified project support by staff or students of SCMS Group

SEWERIN:

- supply of the necessary technical equipment
- providing of qualified project support
- support and training of staff or students

4. Results, which are worked out in common projects will be published or used together, but only upon mutual agreement.
5. All technical information as well as information about projects, which are exchanged in the frame of this cooperation, will be handled confidentially. All rights will stay with the institution which has delivered this information.
6. The cooperation can be terminated from each side to the end of a year by written notice three months in advance.

Cochin, 4.09.2015

(signature/ stamp)



Gütersloh, 10.09.2015

(signature/ stamp)

SEWERIN

Hermann Sewerin GmbH
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Tel.: 052 41 / 934 - 0
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MoU Signing Ceremony - SEWERIN GmbH

An internationally successful and technologically innovative German company which is a world leader in pipe location and water leak detection has MoU with SCMS Group for academic and technological collaboration. Sewerin has donated both leak detection and pipe locating instruments worth several lakhs for SCMS Water Institute. Students and in- service engineers from government are being trained by SCMS Water Institute using these equipment's from SEWERIN GmbH.

• “Water Pipe Leak Detection and Pipe Tracing”; by Sewerin GmbH, Germany, September 26, 2016

On September 26, 2016 a workshop on leak detection and pipe locating were conducted at SSET. Dr. Syed Ibrahim, Honorary Consul of Germany in Kerala & Director, Goethe-Zentrum, Trivandrum inaugurated the workshop conducted at SCMS School of Engineering and Technology, Karukutty, Ernakulam and experts from Sewerin were resource persons. These workshops were an example of an academia-industry joint research initiative, where the participants from various sections of the society like water authority, irrigation department, consultants, technicians, NGOs and students got hands on training in the usage and application of leak detection and pipe locating technologies.



Mr. Lutz Höernschemeyer, Manager, Sewerin from Germany conducting training program on leak detection & pipe locating in association with SWI at the 'Joint leak detection training facility' at SSET campus on September 26, 2016



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- “Water pipe leak detection & tracing training”, October 18, 2015

SCMS Water Institute at SCMS School of Engineering & Technology, Karukutty, Ernakulam enjoys a MoU with SEWERIN GmbH for the training and skill development in the usage of leak detection sensors for monitoring water distribution networks. SCMS School of Engineering and Technology, Karukutty, Ernakulam in collaboration with SEWERIN, GmbH, Germany, a pioneer in leak detection has conducted a training workshop on October 18, 2015 at our main campus to train M.Tech Environmental Engineering students of SSET and donated the state of the art technology sensors to SCMS Water Institute for the mentioned purpose. Hon: Vice Chancellor of KTU was kind enough to accept these equipments from SEWERIN GmbH on behalf of SCMS Water Institute.



Mr. Lutz Höernschemeyer, Manager, Sewerin from Germany giving a demonstration for students of SSET to locate water pipe on October 18, 2015

Approved by

HOD



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Cooperation Agreement

Präambel:

The Institutions SCMS Group and LimCo International GmbH (Limco) had several meetings in the frame of Indian-German cooperation activities. During the discussions about various technological aspects of water and wastewater it was found out that there could be best synergies in working together. The goal of this cooperation between the both parties is to develop and to apply together best economic and effective solutions in the named fields in research and practical applications, under involvement of staff and students from both sides and from further partners.

- This cooperation agreement is established between the following two institutions:
- **SCMS – School of Engineering and Technology SSET**
SCMS Campus
Prathap Nagar, Muttom
Cochin 683 106, Kerala, India
represented by Prof. Pramod P. Thevanoor
Vice Chairman.
- **LimCo International GmbH**
Blarerstr. 56, 78462 Konstanz, Germany
represented by the Managing Director Dr. Almut Gerhardt
- **SCMS** group as a private educational institution offers undergraduate and post graduate programs in management, business and technology and has R&D activities on various fields. SCMS Water Institute is an activity of SCMS Group of Educational Institutions at SSET with the following objectives:
 - developing water and wastewater technologies including reuse of water and recycling of valuable components
 - finetuning of given technologies for local conditions
 - framing water policies
 - performing environmental impact assessments and water audits
 - offering water related capacity building on all levels

LimCo International GmbH is specialized in the research, development, consulting, education and engineering in the water sector. We especially develop innovative technologies for continuous monitoring of water quality for drinking, surface, re-use and wastewater as well as



U. Gerhardt

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Technologiezentrum Konstanz
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seawater and aqua/maricultures, such as the Multispecies Freshwater Biomonitor, the LimCo Biosensor System and the new biofilm sensor. We are partner in several national and international applied research projects in aquatic and soil ecotoxicology, we have lecturing contracts with the HTWG Konstanz and we exchange and co-supervise students at different career levels. We also perform consultancies in stream and land fill assessments.

- These both institutions are interested in a close cooperation to develop and apply new technologies and to adapt approved technologies to the specific tropical conditions. The focus is water and wastewater treatment, re-use of water from rain water, aquacultures, etc.

For specific project applications separate Letters of Intend (LoI) will be agreed on.

Following projects could be of interest among others:

- Adapt the Multispecies Freshwater Biomonitor (MFB) to Indian conditions to monitor WWTP effluents, rivers, reservoirs for drinking water, etc.
- Adapt the biofilm sensor to monitor water quality in drinking water tanks and swimming pools
A goal of the cooperation is to apply the research results on a technical level in practical application in larger scale, e.g. in a pilot WWTP plant of SSET.
- The role of the two partners is as follows:

SCMS:

- identification of fields for research and application
- basic investigation for the preparation of research projects (elaborating of funding sources and proposal writing)
- providing of qualified project support by staff or students of SSET
- performing local research work by applying this technology in India.

LimCo:

- Technology transfer such as demonstration, workshops, lectures
- Technology loan for pilot plants and applications
- Co-supervision of research work and joint publications
- Student exchange and support (both ways)



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- Results, which are worked out in common research projects will be published or used together.
- All technical information resp. technology as well as information about projects, which are exchanged in the frame of this cooperation, will be handled confidentially. All rights will stay with the institution which has delivered this information resp. technology.
- The cooperation can be terminated from each side to the end of a year by written notice three months in advance.
- The following had been agreed by both partners based on the points mentioned above:

1. SCMS Group shall help LimCo as a Knowledge Partner.
2. Student to come in Spring for 1 month to learn the equipment (covered by project of Prof. Fritsch (BWS), Limco is looking for a room as soon as this is approved).
3. Student works in India on application of the biomonitor in India with a native species (3 months): financed by the locally by SSET.
4. Writing joint research papers for scientific journals.
5. Application for further funding for research in this field in Indian conditions.
6. Joint research, workshops and demonstration of equipment & technology in India.

Cochin,

27/01/2015

(signature/ stamp)

Konstanz,

13.01.2015

(signature/ stamp)



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The Institutions SCMS Group and LimCo International GmbH (Limco) had several meetings in the frame of Indian-German cooperation activities. During the discussions about various technological aspects of water and wastewater it was found out that there could be best synergies in working together. The goal of this cooperation between the both parties is to develop and to apply together best economic and effective solutions in the named fields in research and practical applications, under involvement of staff and students from both sides and from further partners.

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 - offering water related capacity building on all levels

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D-78462 Konstanz

seawater and aqua/maricultures, such as the Multispecies Freshwater Biomonitor, the LimCo Biosensor System and the new biofilm sensor. We are partner in several national and international applied research projects in aquatic and soil ecotoxicology, we have lecturing contracts with the HTWG Konstanz and we exchange and co-supervise students at different career levels. We also perform consultancies in stream and land fill assessments.

- These both institutions are interested in a close cooperation to develop and apply new technologies and to adapt approved technologies to the specific tropical conditions. The focus is water and wastewater treatment, re-use of water from rain water, aquacultures, etc.

For specific project applications separate Letters of Intend (LoI) will be agreed on.

Following projects could be of interest among others:

- Adapt the Multispecies Freshwater Biomonitor (MFB) to Indian conditions to monitor WWTP effluents, rivers, reservoirs for drinking water, etc.
- Adapt the biofilm sensor to monitor water quality in drinking water tanks and swimming pools
A goal of the cooperation is to apply the research results on a technical level in practical application in larger scale, e.g. in a pilot WWTP plant of SSET.
- The role of the two partners is as follows:

SCMS:

- identification of fields for research and application
- basic investigation for the preparation of research projects (elaborating of funding sources and proposal writing)
- providing of qualified project support by staff or students of SSET
- performing local research work by applying this technology in India.

LimCo:

- Technology transfer such as demonstration, workshops, lectures
- Technology loan for pilot plants and applications
- Co-supervision of research work and joint publications
- Student exchange and support (both ways)



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- Results, which are worked out in common research projects will be published or used together.
- All technical information resp. technology as well as information about projects, which are exchanged in the frame of this cooperation, will be handled confidentially. All rights will stay with the institution which has delivered this information resp. technology.
- The cooperation can be terminated from each side to the end of a year by written notice three months in advance.
- The following had been agreed by both partners based on the points mentioned above:

1. SCMS Group shall help LimCo as a Knowledge Partner.
2. Student to come in Spring for 1 month to learn the equipment (covered by project of Prof. Fritsch (BWS), Limco is looking for a room as soon as this is approved).
3. Student works in India on application of the biomonitor in India with a native species (3 months): financed by the locally by SSET.
4. Writing joint research papers for scientific journals.
5. Application for further funding for research in this field in Indian conditions.
6. Joint research, workshops and demonstration of equipment & technology in India.

Cochin,

27/01/2015



(signature/ stamp)

Konstanz,

13.01.2015



(signature/ stamp)



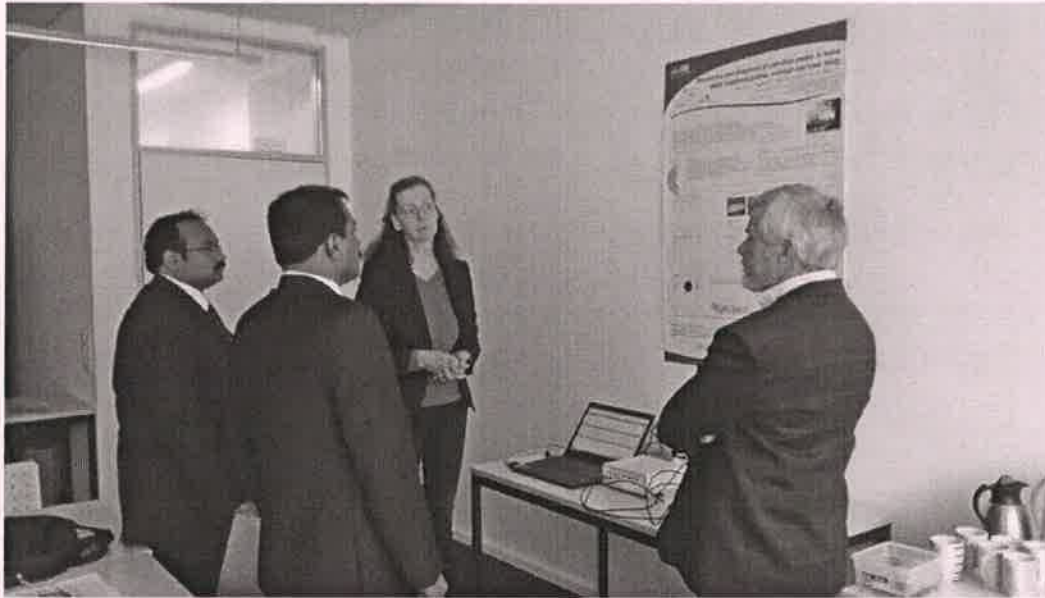


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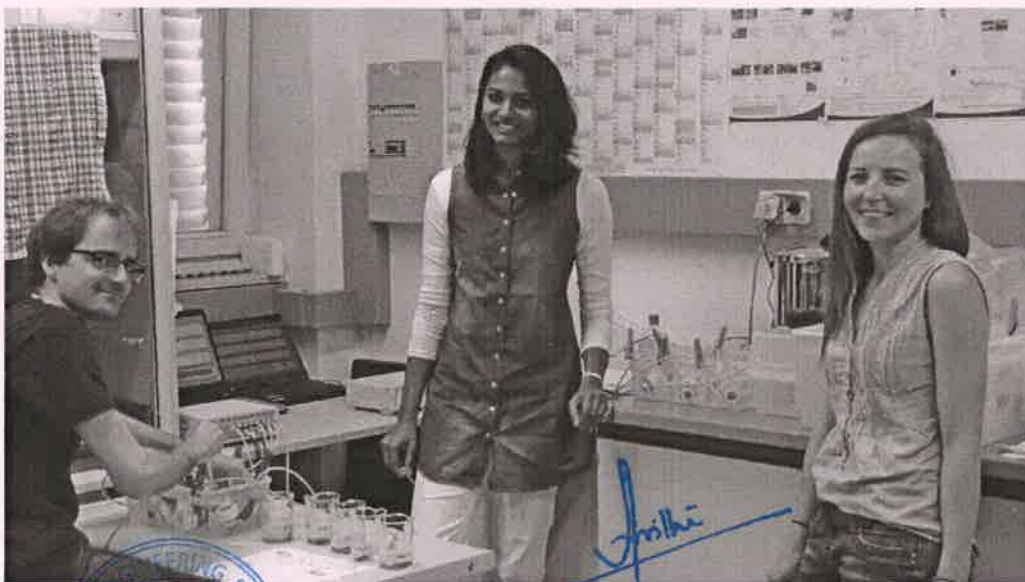
LimCo International GmbH
Technologiezentrum Konstanz
Blarerstr. 56
D-78462 Konstanz

LimCo International GmbH, Germany

LimCo GmbH, an expert in biomonitoring, has given their Automated Multi species Biomonitoring Device costing Rs 8 lakhs to SCMS Water Institute for optimizing and fine tuning the instrument to Indian conditions.

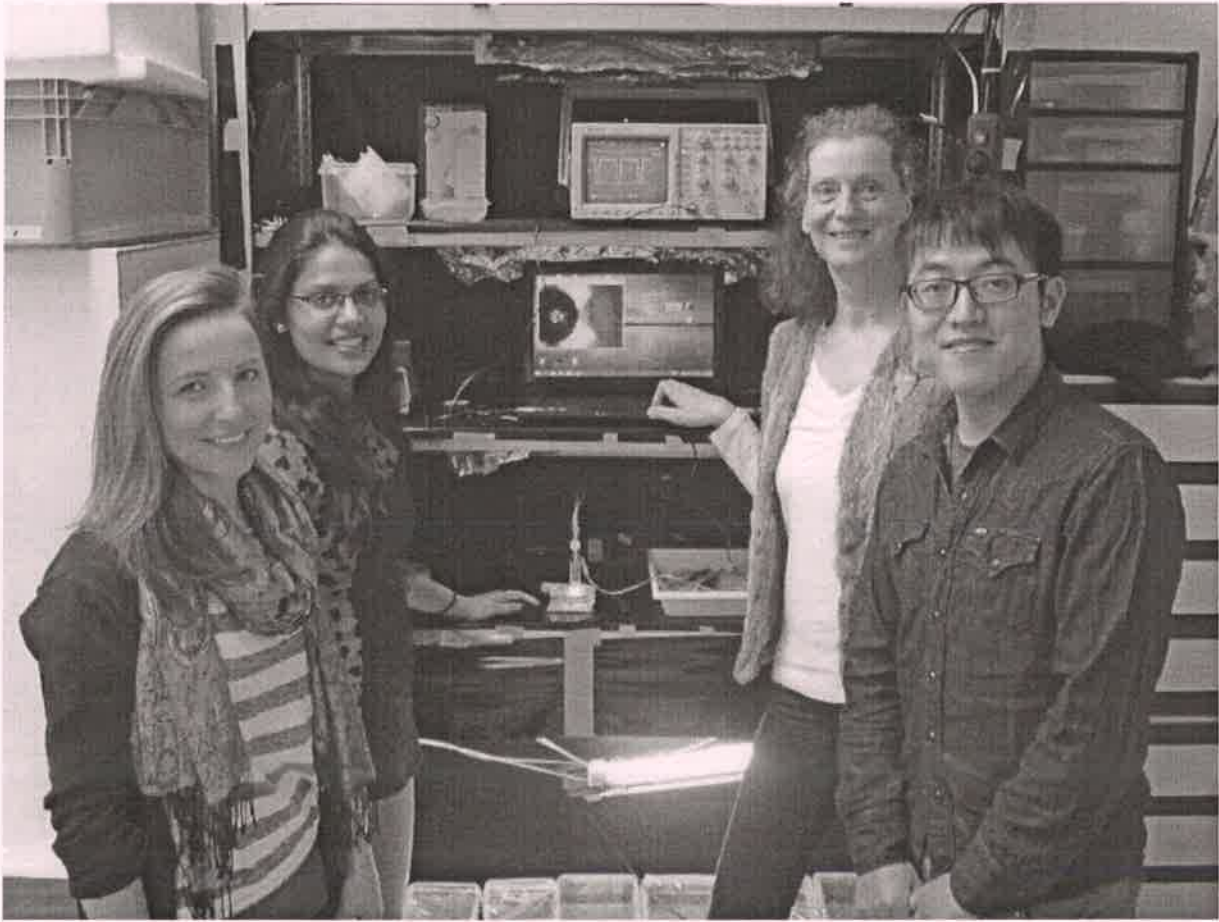


Merin Mathew (2013 admission) student from the first batch of M. tech Environmental Engineering) was selected to undergo advanced training at International GmbH, Konstanz, Germany for a period of five weeks in May 2015. Limco International GmbH is an internationally reputed German company, a consultant in Limcology (science of fresh water). Merin Mathew got training in their worldwide unique IP-protected LimCo BioSensor system (LBS) based on the established Multispecies Freshwater Biomonitor (MFB). After the training, the biosensing equipment was brought to SCMS Water Institute for conducting studies in India and Merin Mathew is continuing the project at SCMS Water Institute.



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• Linda Joy (2014 admission) of M. tech Environmental Engineering undergone a one month industrial training at Limco International GmbH, Germany from 22nd October to 22nd November 2015.



J. M. K.
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ERNAKULAM, KERALA-683 576

Approved by

N. K.

HOD

Agreement on Partnership and Co-operation

Between

SCMS-COCHIN

SCMS group of Educational Institutions

Cochin/India

And

Hochschule Ravensburg-Weingarten (HRW)

Germany

SCMS-Cochin of the SCMS group of Educational Institutions Cochin/India (in the following denoted as SCMS-Cochin) and Hochschule Ravensburg-Weingarten/Germany (in the following denoted as HRW) agree to the following terms:

1. DEFINITIONS

In this agreement, unless otherwise stipulated, HOME institution shall mean the institution at which faculty and students intend to teach/graduate. HOST institution shall mean the Institution that has agreed to receive faculty and staff from the HOME institution.

Unless otherwise stipulated, the academic year of SCMS-Cochin means three terms spread between July and April. Likewise, regarding HRW, the academic year means two semesters October to February and March to September.

2. PURPOSE

The objective of this agreement is to establish special relations and cooperation between the two institutions in order to enrich the understanding of the culture of the two countries concerned. This agreement is to make possible and to institute the exchange of undergraduate and graduate students as well as faculty between the institutions on a continuing basis.

The purpose of exchange of faculty members is to promote collaborative research, internationalise the curricula and to further mutual understanding.

The purpose of the student exchange will be to enable students to take units (classes) but not to study for a full period of the degree at the HOST institution. Units passed at the HOST institution will normally be accepted for credit towards the degree of the candidate's HOME institution for which he or she is enrolled. It will be the responsibility of each participant in



[Signature]

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the Students Exchange Program to obtain official approval from his or her own institution for units taken at the HOST institution.

3. NUMBERS

Faculty Exchange:

Subject to the teaching schedule, SCMS-Cochin will send up to 2 (two) faculty members in each academic year and HRW will send up to 2 (two) faculty members during the duration of the agreement unless amended by mutual agreement. The faculty on exchange will have to essentially teach at least one full course, meeting the total number of contact hours as prescribed by the HOST institution. Both the institutions agree that they will make every effort to schedule the class sessions in such a way as to minimize the stay of the faculty on exchange at their campus. However, each institution will ensure that such rescheduling of class sessions will in no way lead to compressing the course or reduce the minimum prescribed contact hours.

In principle, the exchange of faculty will occur on a one-for-one basis. The number may vary in a given year, but over a fixed period of five years, the total number of faculty participants shall be balanced.

Student exchange:

Subject to the availability of suitable candidates SCMS Cochin will send up to 5 (five) students in each academic year and HRW will send up to 5 (five) students in each academic year during the duration of the agreement unless amended by mutual agreement. The period of study will be for one or two trimesters at SCMS Cochin or one or two semesters at HRW. The duration of a period of exchange would normally be up to one year.

In principle the exchange of students will occur on a one-for-one basis. The number may vary in a given year, but over a fixed period of five years, the total number of student participating shall be balanced.

Organizing International Study weeks

Both the institutions agree to accept the terms from each other on international study weeks for a maximum duration of two weeks.

4. SELECTION OF STUDENTS

The HOME institution will screen applications from its student body for exchange. The program is available for graduate students who have completed at least one third of the requirements of the graduate program.



J. J. J.

Each institution will send the other, completed applications for their students sixteen weeks before the beginning of the entry semester or term. The exchange students may apply to any academic program offered at the respective HOST institution.

The HOST institution will reserve the right to make final judgement of the eligibility of each student nominated. The HOST Institution also retains the right to assess a student candidate's language proficiency (if applicable) or previous academic background before admitting that student to any one course. This may have the net effect of restricting the range of courses at the HOST institution, open to the visiting guest student. All exchange students shall abide by the rules and regulations of the HOST institution.

5. RESPONSIBILITIES OF THE TWO INSTITUTIONS

SCMS Cochin and HRW agree to accept exchange students from each other and enroll them as full-time "not-for-degree" students for the regular semesters of the academic year. Each institution will provide the necessary counseling and assistance to the exchange students.

6. FINANCIAL RESPONSIBILITIES OF THE TWO INSTITUTIONS

Student Exchange:

Each HRW-student studying at SCMS-Cochin will be provided, without further cost, with:

- Tuition
- Orientation
- Reports and statement of results (transcript)

Each SCMS Cochin student studying at HRW will be provided, without further cost, with:

- Tuition
- Orientation
- Reports and statement of results (transcript)

Faculty Exchange:

The financial details of faculty procedures will be as detailed below:

- SCMS Cochin agrees to meet the cost of economy class ticket by the shortest route to Cochin, India for the exchange faculty from HRW
- SCMS Cochin will meet the cost of local transport of the visiting faculty from HRW during their stay at Cochin
- SCMS Cochin will provide accommodation and food to visiting faculty from HRW at its guest house located on campus during their stay at Cochin. However, if the visiting faculty decides to make any alternative arrangement for accommodation elsewhere it will be at their cost.



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- SCMS Cochin and HRW will, in addition to all the above and as it is the practice in similar exchange arrangements with other international institutions, pay each visiting faculty for every full credit course taught by them amounts mutually agreed by the two institutions

The participating institutions shall not be responsible for any private arrangements made by participating staff members concerning exchange of accommodation and vehicles. It is not anticipated that spouses or dependents will accompany a faculty member. Where such arrangement is planned it is understood that additional expenses are the responsibility of the faculty member.

7. FINANCIAL RESPONSIBILITY OF EXCHANGE STUDENTS

Each student participating in the exchange program shall meet the full costs related to:

- Travel to and from India and Germany and vice versa as the case may be
- Books and stationery
- Travel documents and visa
- Living and subsistence expenses as an exchange student
- Application or related fees for participating in the program as may be charged by the HOME institution
- The cost of health and/or medical insurance at the HOST institution and the HOST country

The HOME institution shall satisfy itself that the nominated student has met the financial conditions stipulated before granting acceptance.

The HOST institution shall render all assistance to the student in seeking accommodation within reasonable distance of the campus

Where a student spends more than one semester or term at a HOST institution by enrolling in parts of two academic years, the student must have the funds to cover living and subsistence costs over the summer and/or winter break.

8. SCMS WATER INSTITUTE

As a project of collaborative research the

SCMS Water Institute (SWI)

has been founded in February 2012 at SCMS Cochin, at the beginning under the name "Centre of Sustainable Water Technology and Management"

The objectives of SWI are the following:

- developing water and wastewater technologies including reuse of water and recycling of valuable components



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- finetuning given technologies for local conditions
- framing water policies
- performing environmental impact assessments and water audits
- offering water related capacity building on all levels
- taking up demand driven initiatives on a consultancy basis

Students and staff of both institutions being the main actors to meet these objectives, these activities of the SWI are included into the agreement.

The details of the structure and organization of SWI, both on side of SCMS group and on side of HRW, have been developed in the last years and will be improved further.

The fact of this cooperation between the two institutions can be used by both institutions in their external communication.

For student or staff exchange within common projects of the two institutions under the SWI scheme, each institution will cover the costs for travelling and the expenses of living of its own members. There will be no financial transfer between the institutions for establishing the necessary infrastructure of the institute.

9. TERMS OF AGREEMENT AND AMENDMENT

This agreement shall remain in force for a period of 5 (five) years from 10th December 2015 with the understanding that it may be revised, terminated or suspended pending availability of places by either party giving six months written notice to the other party and in a manner that the student(s) participating in the exchange scheme is in no way adversely affected.

Either party may terminate the Agreement at any time during the term by the provision of six months written notice to the other party.

10. GENERAL

SCMS Cochin and HRW shall undertake all the measures as are seen reasonable to give maximum effect to this exchange program. Such actions will include the exchange of academic handbooks, newsletters and promotion material.

SCMS Cochin and HRW will be responsible for regular review of the exchange program on a yearly basis. The review is essential to make appropriate and mutually agreed modifications as may be required, and to identify new opportunities of cooperation in scholarship and research.

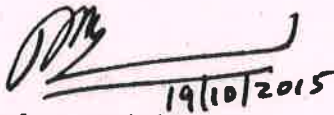


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ERNAKULAM, KERALA-683 576

11. SIGNATURES

This agreement constitutes the entire agreement between the parties. There are no understandings, agreements, or representations, oral or written, not specified herein regarding this agreement. No amendments, consent, or waiver of terms of this agreement shall bind either party unless writing and signed by all parties. Any such amendment, consent, or waiver shall be effective only in the specific instance and for the specific purpose given. SCMS Cochin and HRW by signature of their authorized representatives below, acknowledge having read and understood the agreement and agree to be bound by these terms and conditions.

For and on behalf of SCMS Cochin



19/10/2015

Prof. Pramod Thevanoor
Vice-Chairman

Date:

Witness

For and on behalf of Hochschule Ravensburg-Weingarten



Prof. Dr. Michael Pfeffer
Vice Rector Research and International Relations

Witness: Prof. Dr. Johannes Fritsch
International Coordinator
Energy and Environmental Engineering



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UNIVERSITY OF APPLIED SCIENCES RAVENSBURG-Weingarten, Germany

SCMS Water Institute (SWI) at SSET has Memorandum of Understanding with University of Applied Sciences, Ravensburg-Weingarten in order to develop SWI into a Centre for Excellence in water within the coming few years. A project named “Establishment of a Centre of Competence on Water and Waste Water” has been sanctioned by Württemberg-Stiftung, Stuttgart, Germany for this purpose.

This project includes:

- Joint research on different mechanisms on membrane separation named Low Energy Electro dialysis, Forward Osmosis, Effluent Water Treatment etc.
- Faculty and Student Exchange
- Strengthening of the M. Tech Environmental engineering course at SSET.
- Institutional strengthening
- Automation in water treatment.

SCMS Group has various collaborations with this university since 2010. SCMS Water Institute itself is fruit of this collaboration initiative. Two visionaries namely, Prof Dr Johannes Fritch of University of applied sciences, Ravensberg- Weingarten, Germany and late Prof Dr. Pradeep P Thevannor, then Vice Chairman of SCMS Group were the key persons initiated this collaborative mission. As per the MoU between these two institutions, joint research, student and faculty exchange, institutional strengthening etc are the main aims of this technical collaboration.

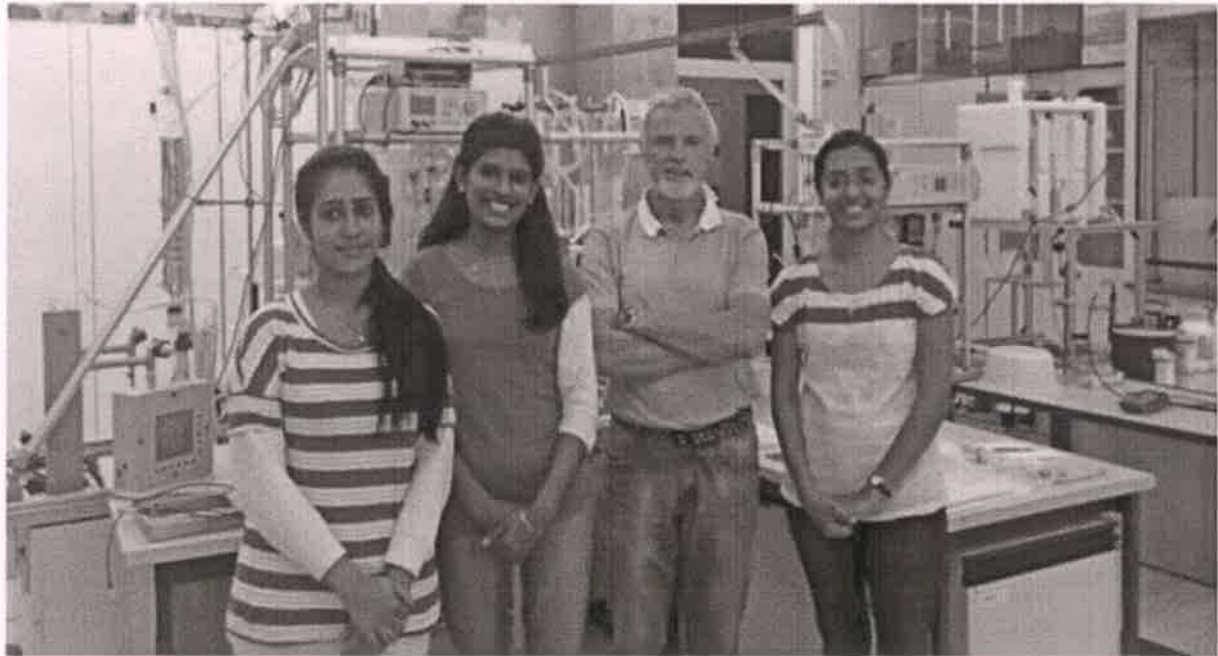


Prof Pramod P Thevanoor, Vice Chairman of SCMS Group, in the presence of Honourable Mr Jorn Rhode, Consul General of Germany in Bengaluru, and Shri. K M Chandrasekhar IAS (Retd), Vice Chairman, Kerala State Planning Board signing the MoU with Prof. Dr. Michael Pfeffer, Vice Rector, University of Applied Science, Ravensburg-Weingarten on October 19, 2015



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Aleena James, Ashly Mary Mammen and Neenu Georgina Johnson (2013 admission) of M. Tech Environmental Engineering at SSET had been at University of Applied Sciences Ravensburg-Weingarten, Germany, as part of the student exchange programme between University of Applied Science Ravensburg-Weingarten and SSET during November – December 2014.



Approved by

HOD



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Cooperation Agreement

Preamble:

Both the institutions SCMS Group and NIVUS have interests on special fields of water and wastewater technology and it was found out that there could be synergies in working together. The goal of this cooperation between the both parties is to support the training and joint handling of projects in the field of flood prevention, new technologies and protection of the environment. We are focussing especially on flow measurement technologies.

1. This cooperation agreement is established between the following two institutions:

• **SCMS School of Engineering and Technology (SSET)**

SCMS Campus

Prathap Nagar, Muttom

Cochin 683 106, Kerala, India

Represented by Mr. Pramod P. Thevannoor

Vice Chairman

and

NIVUS GmbH

Im Täle 2

75031 Eppingen

Represented by Mr. Schmalz and Mrs. Vondenhof

2. **SCMS Group** as a private educational institution offers undergraduate and graduate programs in management, business and technology and has R&D activities on various fields. SCMS Water Institute is a division of SCMS Group of Educational Institutions at SSET with the following objectives:

- Developing water and wastewater technologies including reuse of water and recycling of valuable components
- Fine-tuning of given technologies for local conditions
- Framing water policies
- Performing environmental impact assessments and water audits
- Offering water related capacity building on all levels



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VIDYANAGAR, PALLISSERY, KARUKUTTY



Im Täle 2 • D/75031 Eppingen
Tel. +49 67 262 9191-0
Fax +49 67 262 9191-999
Internet: www.nivus.de

NIVUS

NIVUS is a private, independent and owner-operated company.

Our focus lies on measurement technology for water and wastewater using the ultrasonic technology.

Our own investigation, development and production department secures our independence and international pole-position in the field of flow measurement technology.

These both institutions are interested in a close cooperation to develop and apply new technologies and to adapt approved technologies to the specific tropical conditions. The focus is water and wastewater technology, flow measurement in particular.

For the specific project applications separate *Letters of Intend* will be agreed on.

3. The role of the two partners is as follows:

SCMS:

- identification of fields for research and application
- basic investigation for the preparation of research and application projects
- providing of qualified project support by staff or students of SSET

NIVUS:

- supply of the necessary technical equipment
- providing of qualified project support
- support and training of staff or students

4. Results, which are worked out in common projects will be published or used together, but only upon mutual agreement.
5. All technical information as well as information about projects, which are exchanged in the frame of this cooperation, will be handled confidentially. All rights will stay with the institution which has delivered this information.
6. The cooperation can be terminated from each side to the end of a year by written notice three months in advance.

Cochin, 4.09.2015

Eppingen, 04/09/2015

(signature/ stamp)



(signature/ stamp)



Joshi

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MoU Signing Ceremony - NIVUS GmbH

NIVUS is another company having remarkable association with SCMS Group. NIVUS which is an internationally reputed company in ultrasonic flow measurements, has provided equipment's worth several lakhs for SCMS Water Institute for technical teaching, demonstration and training purposes.



SWI team and SSET students conducting field studies and projects using the instruments sponsored by NIVUS GmbH, Germany to SWI

SCMS brings sensor to rate water loss in transit

SMITHA N. | DC
KOCHI, FEB. 21

Transmission loss of water is a term Kerala, facing an acute drought, will have to grapple with now, and the SCMS Water Institute at SCMS School of Engineering, Kariyur, has come up with an ultrasonic sensor which can help measure it.

The sensor can automatically assess water velocity, water level, depth of water body and quantity of water discharged and help quantify the water loss.

"The real-time measurements along with satellite remote sensing data of the area will help estimate the demand, supply and deficit," said Dr. Sunny George, director of SCMS Water Institute. "It will be helpful in preparing and implementing an effective water management system. It will also improve water use efficiency in the canal network."

A recent survey conducted by the students of the institute on various stretches of Chalakudy river diversion canal network revealed that a huge



SCMS students testing the ultrasonic sensor.

quantity of water is lost mainly through the main parts of the canal and unauthorised pumping to nearby areas. The total discharge at Ezhattumugham, where the right bank canal starts, was measured to be 4,700 litres per second while the measurements at Edalakkad junction, about 5.5 km downstream, showed a discharge of 2,000 litres per second. This means about 1,000 litres of water is lost during the transit.

Though the irrigation department has no actual data on the quantity of water transmission loss, an earlier study conducted by the Kerala Agricultural University in Palakkad had found that though targeted efficiency of canal irrigation system is more than 90 per cent, actual efficiency was only 40 to 60 per cent. As per the Directorate of Economics and Statistics, the net irrigated area in the state is 10.4 million hectares.



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Two German technologists who are international experts on Environmental Hydraulics provided training for MTech Environmental Engineering students of SSET on 07-02-2018

Approved by

HOD



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EVO GLOBAL
TECHNOLOGIES

Memorandum of Understanding

PREPARED FOR

Varun G Menon

SCMS School of Engineering & Technology

PREPARED BY

Paul Williams

Evo Global Technologies LTD



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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

This Memorandum of Understanding (MOU) is entered on the 23th day of November in 2022 (herein referred to as the "Effective Date") into by and between:

Varun G Menon of **SCMS School of Engineering and Technology, Kerala IN**, (herein referred to as "Partner A") and

Paul Williams of **Evo Global Technologies LTD, London UK**, (herein referred to as "Partner B").

Parties may be referenced individually as "Party" and collectively as "Parties".

Recitals

WHEREAS, Partner A is in the business of providing professional undergraduate and postgraduate programs to students in all engineering disciplines.

WHEREAS, Partner B is in the business of providing enterprise and small to medium businesses with custom software solutions.

WHEREAS, Partner A wants to collaborate with Evo Global so they can provide their students employment and internships working on software that will be used by companies all around the world.

WHEREAS, Partner B wants to provide internships in mobile application development to SCMS School of Engineering and Technology students.

WHEREAS, Parties collectively desire to enter into this MOU to memorialise the terms and conditions of their anticipated collaboration.

NOW, THEREFORE, the Parties agree to the following terms and conditions:




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ERNAKULAM, KERALA-683 576

Purpose

The goal of this MOU is to lay the groundwork in good faith for future cooperative projects that will benefit both Parties. To fulfil each Party's own goals and the partnership's overall goals, the Parties concur that they will cooperate and act in unison.

The purpose of this MOU is to define the terms of the Parties' working relationship so that it may be evaluated to see if a future commercial partnership would succeed. The Parties are not required to contribute money or make payment under this MOU. There are no legal responsibilities placed on the Parties by this MOU.

Roles & Resources

The Parties concur to make the following materials available in order to advance their business relationship.

- Party A will supply a group of students to work on the application's development.
- Party B is responsible for providing the crew with housing for the project's length as well as the tools and technical know-how required to finish the project.

Project Incentives

Each team member will receive £50 per month, depending on how well they perform. Partner A will get 10% of the total amount paid to the team for this project as compensation for consulting services.



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ERNAKULAM, KERALA-683 576

Confidentiality

The parties acknowledge and agree that they each will utilise such information for their own business objectives. It is possible for the Parties to communicate sensitive information because of the nature of their respective businesses and desire to collaborate.

Throughout their working relationship, the Parties pledge to protect all trade secrets and sensitive information in the strictest of confidence. Any given confidential information may not be divulged to unauthorised third parties by the parties. The parties may, at their discretion, enter into a non-disclosure agreement to protect the privacy of sensitive data and trade secrets.

Entire Agreement

The Parties agree this MOU represents the most current agreement between the Parties and supersedes all other written or oral agreements. If Parties wish to update the terms or otherwise adjust provisions of this MOU, Parties shall do so by the drafting and signing of a new MOU or partnership contract.




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ERNAKULAM, KERALA-683 576

Terms & Termination

This agreement shall be effective from the Effective Date of this MOU until **31 / 3 / 2023**. Both Parties may terminate this MOU by means of signing a termination addendum.

The undersigned Parties acknowledge and agree to this MOU:

SCMS School of Engineering & Technology - CS Head of Department

Varun G Menon

Evo Global Technologies LTD - CTO

Paul Williams



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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576



കേരളം കേരल KERALA

DV 853786

Memorandum of Understanding

Between

SCMS School of Engineering and Technology, Vidya Nagar, Palissery, Karukutty
Ernakulam, Kerala 683576, Represented by
Prof.Pramod P.Thevannoor, Vice Chairman, SCMS Group of Educational Institutions

and

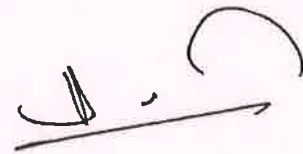
Kerala State Remote Sensing and Environment Centre (KSREC), Vikas Bhavan,
Thiruvananthapuram, Kerala 695033, Represented by Sri. A. Nizamudeen, Director

This Memorandum of Understanding (MOU) sets for the terms and understanding between the SCMS School of Engineering and Technology, and the Kerala State Remote Sensing and Environment Centre (KSREC), to collaborate on student training, internships, support for student projects, research and technology on Geospatial Technology.

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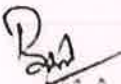
09.12.2022

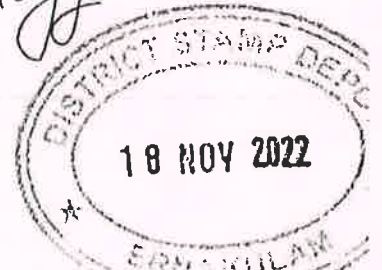
TO SCMS School of Engineering & Technology



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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA - 683576

Ernakulam
Karukutty


A. NIZAMUDEEN
DIRECTOR





കേരളം കേരल KERALA

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1. Background

SCMS School of Engineering and Technology (SSET) was established in 2001 by the SCMS Group of Educational Institutions to provide quality professional education in engineering & technology. It is affiliated to AICTE, Delhi and APJ Abdul Kalam Technological University (initially Kerala Technological University), a Kerala State Government University. SSET offers B.Tech programs in 8 disciplines, M.Tech programs in 6 specializations and is an approved research centre for PhD under APJ Abdul Kalam Technological University.

Kerala State Remote Sensing and Environment Centre (KSREC) was established in 1995 by the Government of Kerala under the aegis of the National Natural Resources Management System (NNRMS). KSREC is an autonomous body under the Department of Planning & Economic Affairs for carrying out research, training, awareness programs, and other related activities in the application of Remote Sensing and GIS in Land and Water Resources management, environmental monitoring, and upkeep.

63475 09.12.2022
SOLD TO SCMS School of Engineering & Technology
Principal
Kannakkattay
M.A. KUNJU BEEVI
HIGH COURT VENDOR
DISTRICT STAMP DEPO.
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ERNAKULAM

2. Objectives of Industry-Academic Interaction Programme

The major objectives for which the parties associate with each other are:



- a. To effectively share the facilities and expertise to improve advanced education, research, and consultancy capabilities.
- b. To facilitate academic and research interactions among employees of both Institutes.
- c. Increase the relevance of the academic research and consultancy in the research and product development initiatives.
- d. Collaborate to share and exchange information between both parties for mutual benefit and knowledge enhancement.
- e. To enable the use of laboratories and test facilities in SSET on a preferential basis and concessional rate by KSREC and vice versa.
- f. To provide an opportunity for students from undergraduate, graduate, and research scholars of SSET to undertake industrial training and projects in the KSREC for mutual benefit.
- g. To encourage the training of employees of the KSREC in Continuing Education activities, Skill development activities, and Subject up gradation workshops using the facilities of SSET.
- h. To provide expert faculty from KSREC for academic and training programs of SSET.
- i. To provide advice in formulating the curriculum and syllabus of courses of SSET by the experts from KSREC.
- j. To conduct joint/collaborative research and consultancy.

3. Reporting

The effectiveness and adherence to the agreement will be monitored by the Vice Chairman of SCMS Group and the Director of KSREC on an annual basis.

4. Funding


This MOU is not a commitment of funds. Any financial implications shall be discussed and decided on a case-by-case basis on mutual agreement.

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5. Duration

This MOU is at will and may be modified by mutual consent of authorized officials from the SCMS School of Engineering and Technology (SSET), and the Kerala State Remote Sensing and Environment Centre (KSREC).

This MOU shall become effective upon signature by the authorized officials from the SCMS School of Engineering and Technology (SSET), and the Kerala State Remote Sensing and Environment Centre (KSREC) and will remain in effect until modified or terminated by any one of the partners by mutual consent. In the absence of mutual agreement by the authorized officials from the SCMS School of Engineering and Technology (SSET) and the Kerala State Remote Sensing and Environment Centre (KSREC), this MOU shall end on (end date of partnership).

6. Contact Information

Partner name : SCMS School of Engineering and Technology
Partner representative : Prof. Pramod P. Thevannoor
Position : Vice Chairman – SCMS Group
Address : Vidya Nagar, Palissery, Karukutty, Ernakulam – 683 576.
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Fax : 0484-2623885
E-mail : pramod@scmsgroup.org

Partner name : KSREC
Partner representative : Sri. A. Nizamudeen
Position : Director
Address : Vikas Bhavan, Near Legislative Assembly,
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Thiruvananthapuram – 695 033.
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Fax : 0471 2300624
E-mail : directorksrec@yahoo.in

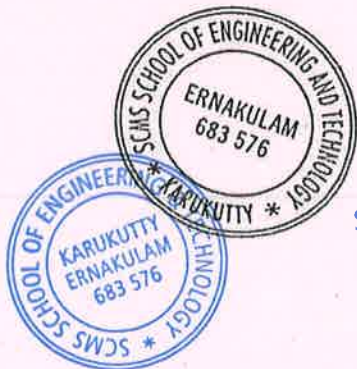


Date: 12/12/22
Prof. Pramod P. Thevannoor
SCMS School of Engineering and Technology

PRAMOD P THEVANNOOR
VICE CHAIRMAN
SCMS GROUP OF EDUCATIONAL INSTITUTIONS



Date: 12.12.2022.
Sri. A. Nizamudeen
KSREC
Director



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Government of Kerala

Department of Environment & Climate Change

4th Floor, KSRTC Bus Terminal, Thampanoor, Thiruvananthapuram- 695 001

Ph: 0471-2326264 (Off)

E-mail: envt.dir@kerala.gov.in web: www.envt.kerala.gov.in

PROCEEDINGS OF THE DIRECTOR

Present: Mir Mohammed Ali IAS

Sub: Research and Development - Project Proposal entitled "Micro Plastic Pollution: Source characterization, transport modeling and assessment of impact on fish population in Kadambayar river and Vembanad backwater region"- Grant - in - aid- Sanctioned-1st Installment released- Order issued.

DIRECTORATE OF ENVIRONMENT & CLIMATE CHANGE

No. DoECC/AEO1/R&D/2879/2019

dated 10.03.2020

Read:

- (1) G.O. (Rt) No. 105/2019/ Evt. Dated 30.10.2019.
- (2) Proposal received from Dr.Nisha L, Associate Professor, Department of Civil Engineering, SCMS School of Engineering and Technology
- (3) Minutes of the R&D Committee meeting held on 5-6th August 2019.
- (4) Triparty agreement executed on 03.02.2020.

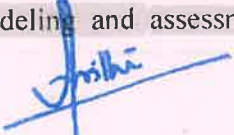
ORDER

As an implementation mechanism for the state plan scheme "Environmental Research and Development", Government vide G.O cited (1) have authorized Director, Directorate of Environment and Climate Change to release the funds to the agencies undertaking the projects. Vide paper (2) cited a proposal entitled "Micro Plastic Pollution: Source characterization, transport modeling and assessment of impact on fish population in Kadambayar river and Vembanad backwater region" received under R&D scheme and the same was selected by the R&D committee meeting held on 05.08.2019 & 6.08.2019.

Vide paper read (1) Govt. have accorded Administrative Sanction for a total amount of Rs.13,09,000/- for 2 year with first installment of Rs.5,23,600/-. Vide paper read (4) above, Directorate of Environment and Climate Change, the Principal, SCMS School of Engineering and Technology, The Principal Investigator of the project; have executed a Triparty agreement in the prescribed format.

Approval is hereby accorded for the research project entitled "Micro Plastic Pollution: Source characterization, transport modeling and assessment of impact on fish population in




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Kadambayar river and Vembanad backwater region” for a period of 2 years with Dr. Nisha L, Associate Professor, Department of Civil Engineering, SCMS School of Engineering and Technology. The terms and conditions and directions contained in the agreement executed vide paper read (4) and the guidelines of scheme should be complied with scrupulously by the Institution and Principal Investigator and timely submission of prescribed documents shall be ensured.

In accordance with the approved modalities, terms and conditions and as per the agreement read (3) above, the grant shall be released in 3 installments, at the rate of 60:20:20 respectively. Therefore sanction is accorded for the release of **Rs. 5,23,600/- (Rupees Five Lakh Twenty three Thousand and Six Hundred only)** to the Principal, SCMS School of Engineering and Technology as the First Installment of grant for the project in the subject matter with Dr. Nisha L, Associate Professor, Department of Civil Engineering, SCMS School of Engineering and Technology. The Principal Investigator and to credit the amount to the bank account - A/C No. **345801010030000 IFSC Code: UBIN0558885**. The expenditure shall be met from the Head of account “**3435-03-103-99 -Research and Development- (Plan- Voted)**” in the current year’s budget.

The Principal Investigator has to furnish the progress report, Expenditure Statement and Utilization Certificate (in KFC Form 44) to the Directorate within 30 days from end of first year.

Sd/-
Director


To

Dr. Nisha L, Associate Professor, Department of Civil Engineering,
SCMS School of Engineering and Technology.

Copy to:

1. The Accountant General (A&E/Audit), Thiruvananthapuram
2. The District Treasury Officer, Thiruvananthapuram
3. Principal, SCMS School of Engineering and Technology.
4. Accounts section
5. Bill Copy
6. Stock file.

Forwarded By Order


Administrative Officer



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Micro Plastic Pollution: Source characterization, transport modelling and assessment of impact on fish population in Kadambrayar river and Vembanad backwater region

Submitted to

The Department of Environment and Climate Change



DEPARTMENT OF CIVIL ENGINEERING

SCMS SCHOOL OF ENGINEERING & TECHNOLOGY, KARUKUTTY

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ENDORSEMENT FROM HEAD OF THE INSTITUTION

(To be given on letter head)

Title of the Project: “Micro Plastic Pollution: Source characterization, transport modelling and assessment of impact on fish population in Kadambrayar river and Vembanad backwater region”

The Institute certifies the participation of Dr. Nisha.L as the Principal Investigator and Dr. Ratish Menon as the Principal Co-investigator for the project and that in the unforeseen event of discontinuance by the Principal Investigator, the Principal Co-investigator or any other equally qualified Investigator will assume the responsibility of the fruitful completion of the project (with due information to the DoECC).

Certified that the equipments and other basic facilities mentioned in the Part IV of Application Form and such other administrative facilities as per terms and conditions of the grant, will be extended to the investigator(s) throughout the duration of the project.

The Institute assumes to undertake the financial and other management responsibilities of the project.

Date:

Place:

Name and Signature of

Head of the Institution



A handwritten signature in blue ink, appearing to read "Nisha", written over a horizontal line.

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APPLICATION PRO FORMA FOR GRANT FOR RESEARCH PROJECT

(To be filled in by the Principal Investigator)

1. Title of the Project : Micro Plastic Pollution: Source characterization, transport modelling and assessment of impact on fish population in Kadambrayar river and Vembanad backwater region.
2. Name and Designation of the Principal Investigator : Dr. Nisha.L,
Associate Professor,
Department of Civil Engineering,
SCMS School of Engineering and
Technology, Karukutty- 683 576.
3. Name and Designation of the Co-
Investigator : Dr. Ratish Menon
Associate Professor,
Department of Civil Engineering,
SCMS School of Engineering and
Technology, Karukutty- 683 576.
4. Postal Address of the Principal
Investigator and the Co-Investigator :Associate Professor,
Department of Civil Engineering,
SCMS School of Engineering and
Technology, Karukutty- 683 576.
5. Name of the
institution(s)/organization(s) in which
the project will be carried out (Specify
whether College (Government / Aided/
Autonomous/ Private), University
Department, Government Institution,
Non-governmental organization, etc.) : SCMS School of Engineering and
Technology, Karukutty- 683 576 (Private
Engineering College affiliated to KTU)
6. Name of other
institution(s)/Organisation(s) involved
in the project (Specify whether College
(Government / Aided/ Autonomous/
Private), University Department,
Government Institution, Non-
governmental organization, etc.): : N.A



A handwritten signature in blue ink, appearing to read "Nisha", written over a horizontal line.

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7. Geographic location of research project site (latitude and longitude), wherever applicable : Brahmapuram(10.0010° N, 76.3788° E), Kochi, River Kadambrayar at Brahmapuram and Lake Vembanad
8. Participation of public and private sector and/or other government ventures: : NA
(Please give details regarding sharing of work components, cost and outputs, including implementation arrangements, and modalities of achievement of the envisaged objectives against the stated milestones of work)
9. Duration of the Project : 24 Months
10. Total amount of assistance required : Rs. 13,09,000




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Micro Plastic Pollution: Source characterization, transport modelling and assessment of impact on fish population in Kadambrayar river and Vembanad backwater region.

Abstract

The project envisages assessing the presence and abundance of Microplastics in river Kadambrayar flowing near the open solid waste dumping site at Brahmapuram. Two sets of sampling with three sediment samples from nearby Kadambrayar river and five top soil samples from various parts of Brahmapuram waste dumping yard were carried out during the months of January – February 2019. The study confirmed the presence of an average of 100 microplastic pieces per 100 gram of river sediments of Kadambrayar in Brahmapuram and a similar quantity of 178 particles in the top soil of Brahmapuram. The results of the preliminary study carried out indicates that the open dumping site at Brahmapuram acts as a primary as well as secondary source of microplastics, which gets accumulated at the top soil in the area. This gets transported via erosion and run off into the river Kadambrayar. The unprecedented amount of microplastics detected in the sediment samples motivated the planning of this proposal assessing the environmental implications of this observation. Projects aims at detecting and quantifying the microplastics in the top soil at Brahmapuram. It also attempts to model the transport of microplastics from top soil into the river using an erosion model. Once the microplastics reach the aquatic environment, it is highly likely that these will be ingested by the aquatic organisms including fishes. There is a growing body of evidence for microplastic ingestion by freshwater as well as marine fish species. The microplastic ingestion by the fishes and its subsequent incorporation into the food chain is likely to have far reaching economic and environmental consequences for a state like Kerala. The preliminary study conducted in the institute also suggested river Kadambrayar as a major pathway for transport of microplastics into Lake Vembanad. This project would attempt to determine the possibility of incorporation of microplastics into the food chain by assessing and quantifying the presence of microplastics in fish species of both a freshwater ecosystem (River Kadambrayar) and a saline water environment (Lake Vembanad). Finally, the project also proposes to assess the implications of presence of microplastics in the aquatic environment by carrying out laboratory studies for assessing the life cycle changes brought out by microplastics in the identified commercially important species in the river and Lake. This project can be a pioneering work which evaluates the ramifications of microplastics incorporation into food chain due to improper handling and disposal of plastic wastes.



Joshi

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Keywords: Microplastics, Solidwaste management, Emerging pollutants, ATR-FTIR spectroscopy, Single-use plastics, Kochi



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State of Art of the subject

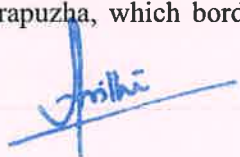
(including work done in India and elsewhere)

Plastics are a versatile material and have been used for making a variety of products that make human life easier. Many materials were introduced later to substitute plastics, but most of these materials couldn't challenge the overall versatility of plastics. However due to their longevity and non-biodegradability, plastics are becoming a major pollutant. The accumulation of plastics in oceans, water bodies, soil and air is becoming a challenging issue [Sruti et.,al 2016; Naidu et.,al 2017]. The longevity of plastics causes long distance conveyance and accumulation in soil, water and air [Sruti et.,al 2016].

As per US NOAA definition, microplastics are small plastic pieces of less than 5mm in size. They can be either primary or secondary in origin. The primary sources include plastic microbeads in personal care products and synthetic fibres from textile industry. The secondary sources includes the degradation of synthetic polymers like high density polyethylene, low density polyethylene, polystyrene, poly propylene, PET etc by physical, chemical or biological ways. Several studies shows the presence of microplastics in marine habitats, fresh water systems, aquatic organisms, sea foods and even in human tissues [Sruti et.,al 2016; Naidu et.,al 2017; Seth et.,al 2018; Baretet.,al 2019].As per the UN Environment agency, one million plastic drinking bottles are produced every minute and about 5 trillion single use plastic bags are purchased every year worldwide. India produces around 5.6 million tonnes of plastic annually [Toxics link 2014].

Studies of microplastics in Kerala, is limited. Kochi city was selected as the broad study area as it is the second most urbanized city on the west coast of India [Naidu et., al 2017] and also due to its high density of population, large riverine discharge and industrial and marine discharges. With its high density of population, solid waste management is one of the challenges faced by the State. The intensity of plastic pollution in Kochi can be assessed by the analysis of soil samples from Brahmapuram, the small village which has become the waste dumping yard of Kochi since 2017. The city does not have proper solid waste disposal methods and the drinking water pollution in the city is around 50%. As per reports, Kochi city generates around 380 tonnes of solid waste per day, of which 150 tonnes are biodegradable and 100 tonnes comprise of plastic waste. The major portion of this waste is dumped at Brahmapuram, a suburban village [Kerala Suchitua Mission 2018; Kerala SPCB Directory 2010]. This subsequently pollutes the rivers of Kadambayar and Chitrapuzha, which borders the open




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dumping yard of Brahmapuram [Kerala SPCB Directory 2010]. According to the 'Water and Air Quality Directory 2010' published by the SPCB Kerala, the mean value of DO in Brahmapuram was only 2 mg/litre against the minimum limit of 4 mg/litre prescribed by the Central Pollution Control Board(CPCB). As per Kerala Suchitwa Mission statistics of 2018, Kerala produces 480 tonnes of plastic waste per day as the administration fails to enforce a ban on plastic material below 50 microns [Kerala Suchitwa Mission reports 2018]. On an average, a family in the state produces 60 grams of plastic waste per day and of these Kochi municipal corporation alone generates 16 tonnes of plastic wastes a day [Kerala Suchitwa Mission reports 2018]. The main portion of this plastic waste is dumped into Brahmapuram.

The recent study conducted by Anupama (2019) confirmed the presence of an average of 100 microplastic pieces per 100 gram of river sediments of Kadambayar in Brahmapuram and a similar quantity of 178 particles in the top soil of Brahmapuram. The size distribution of particles showed that comparatively larger particles of size range between 2.36mm-4.75mm were present in the top soil than that in river sediments which had more number of particles in size range below 2.36 mm. The study found that the major part of microplastics was contributed by polyethylene which is the main constituent of single use plastics. It was followed by polypropylene, which are used as packaging materials. Also there was slight amount of polyethylene terephthalate (PET).

The preliminary study carried out by Anupama (2019) indicated the magnitude of microplastics contamination at Brahmapuram. This unprecedented amount of microplastics detected in both the top soil and the sediments motivated this proposal. The microplastics in the top soil would eventually find its way into the river and from there into Lake Vembanad. The River Kadambayar is the source of water for nearby panchayats and supports a number of freshwater fish species. Several farmers and families of fishermen had depended on Kadambayar for their livelihood till a few years ago, but the depleted quality of water in the river has made fishing unsustainable. The presence of microplastics would further accentuate the problem and would have far reaching environmental consequences. Seasonal analysis of microplastics in the river could also identify the contribution of Kadambayar to the microplastics found in the back water regions of Vembanad lake, a popular Ramsar wetlands in India.

There is a scarcity of information about the occurrence of microplastics (MPs) in edible fish tissues in India, especially in Kerala. Kerala with a network of rivers, lagoons and backwaters flowing into a nutrient enriched coastal sea has an abundance of aquatic resources. This factor,




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added to the diversity of the fishing technology, provided the socio-ecological basis for fish becoming an integral part of the cuisine of this region of the Indian sub-continent (<http://www.fao.org/3/Y1290E/y1290e0g.htm>). The reports of microplastics in tuna in Arabian Sea anchovies in Alapuzha, Indian Mackerel and Honeycomb Grouper in Tuticorin and mackerel caught from the coastal waters off Mangalore indicate that pieces/ strands of plastic enter the food chain [Kumar et al.,2018].

With this background, the objective of this study was to provide a critical assessment of the presence of microplastics in the top soil and in the sediment of river Kadambayyar which is flowing round the dumping yard of Brahmapuram and to investigate the presence of microplastics in the fish species in river Kadambayyar and Lake Vembanad. Effort would also be made to model the transport of microplastics from land to the river and also to assess the effects of microplastics on the life cycle of the identified fish species.

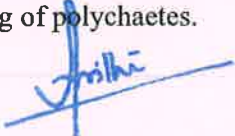
Literature Survey

Several studies have been conducted worldwide to estimate the severity of plastic pollution that we face today. These studies primarily focus on microplastic pollution because of their persistent nature and the adverse effects on our environment. Some of the relevant studies carried out are briefly described here:

The first report of microplastics in lake and estuarine sediments in India were carried out by in Vembanad lake, Kerala [Sruti et.,al 2016]. Vembanad lake is one of the Ramsar sites in India. Samples were collected from 10 different locations during pre-monsoon period from March-April 2016. Out of the 10 sampling location, 8 were in the fresh water zone that is south of Thaneermukkam bund and the remaining 2 were in the salt water zone from north of Thaneermukkam bund. The results obtained shows the mean abundance of 252.8 microplastic particles and consists mainly of polyethylene, polystyrene and polypropylene. Higher concentration of microplastics were found in high salinity areas.

Microplastics enters the living organisms through the food web. The evidence for this have been obtained by the study of benthic invertebrates from the coastal waters of Kochi, south-eastern Arabian sea [Naidu et al.,2018] Studies were conducted on the species of *Sternaspis scutata* and *Magelona cinta*. Samples were collected, sieved through 0.5mm mesh and preserved in Formalin-Rose Bengal mixture. The observations were carried out using DXR-microscope. The results disclosed the presence of microplastics in the form of polystyrene fibres. This was postulated to be due to non-selective feeding of polychaetes.




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To assess the occurrence of microplastics in fishes, a study was conducted in two harbours of Tuticorin, south-east coast of India [Kumar et al.,2018]. Fish species used in the study were *Rastrillegar kanagurta* (Indian Mackerel) and *Epinephalus merra*. The intestinal contents of these fishes were removed and digested for 5 days at 60°C. It was then filtered through a millipore filtration unit. Hot needle test was used to confirm the presence of microfibrils. Results showed the presence of poly ethylene and polypropylene.

The presence of microplastics were also detected in the inland fresh waters of China [Wang and Li, 2016] Samples were collected at a depth of 0-20cm. After wet peroxide oxidation, the samples were filtered and observed under stereo microscopic and scanning electron microscopy (SEM). It was observed that degradation of large particles of plastic occurred either on land or in water. Biofouling was reported to change the density of particles which in turn leads to its suspension in water.

Microplastic pollution and its reduction strategies were explained in the review paper [Wu et al,2017] The paper estimated that the production of petroleum based plastics is exceeding 300 million tonnes in 2015. The study suggests that, microbeads in the cosmetics can be replaced with natural exfoliating materials. Also the use of biodegradable materials like polyacetide and polyhydroxy alkanooates was reported to limit the pollution caused by non-biodegradable plastics. Reuse, recycle and recovery of plastics need to be improved.

Microplastics acts not only as a source of toxic chemicals but also as a sink for toxic materials [De Sa and Oliveira, 2018]. Microplastics are difficult to clean up because of their small size and widespread distribution

Objectives

The specific objectives of the proposed project are as follows

1. To detect and categorize the microplastics in sediments and topsoil using ATR FT-IR spectroscopy.
2. To quantify the microplastics in each sample.
3. Model the export of microplastics into the river from land
4. The analyse common commercially used fish species of Kadambayar and Lake Vembanad to assess the presence of microplastics and the possibility of transfer of microplastics through food web.
5. To conduct laboratory studies to assess the effects of microplastics on the life cycle of the identified species.



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Methodology

Top soil and sediment samples would be collected from various locations of Kadambrayar near Brahmapuram (Fig 1). Sediment samples would be taken from Kadambrayar at different locations and samples of topsoil would be collected from various locations of the open dump at Brahmapuram. The samples would be collected once in every month during the specified tenure of the project. The samples would then be sealed air tight in order to avoid contamination.

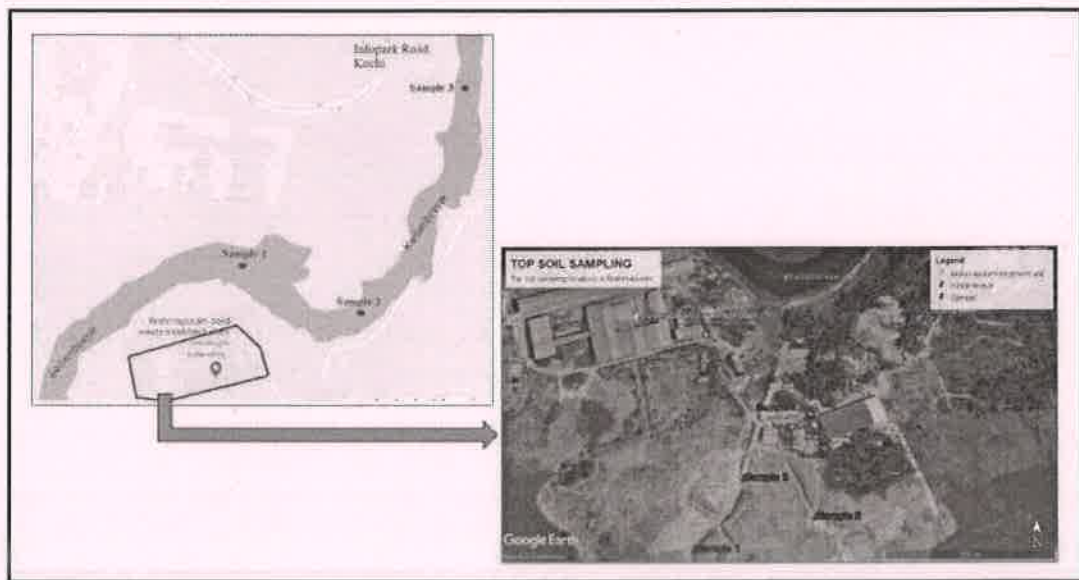


Fig.1. Study area

The water quality analysis would be conducted in the laboratory to evaluate pH, electrical conductivity, biological oxygen demand (BOD), hardness, chlorides, iron, nitrite and alkalinity of the water samples. The water quality analysis will serve as a tool to evaluate the magnitude of pollution at River Kadambrayar due to the open dump at Brahmapuram and assess the seasonal variation.

The sediment samples would be analysed as per US National Oceanic and Atmospheric Administration (US NOAA) protocol. Soil and sediment samples would be first oven dried at 90°C for 24 hours and are then disaggregated manually. The disaggregated samples are then sieved through a series of sieve sets of 25mm, 10mm,



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4.75mm, 2.63mm and 1.70mm respectively. Then the sieved samples below 4.75mm are subjected to wet peroxide oxidation using 30% concentrated H₂O₂ and left overnight for 24 hours to digest the organic matter. Then density separation is carried out using sodium chloride of density 1.3g/ml to separate the microplastics using floatation technique. The supernatant would be then filtered using filter paper and microplastics are extracted. The water quality analysis of river Kadambayar carried out previously has indicated high organic pollution (Average BOD of 125 mg/L). Due to the high organic contamination on plastic pieces, the organic oxidation is repeated for a minimum of 3 times and packed in air tight bags to avoid air borne contamination and for getting accurate results in spectroscopic analysis. Otherwise the organic contamination may lead to erroneous results.

The extracted microplastics are again washed in millipore water just before placing it in the ATR FT-IR spectroscope. Once the specimen is placed properly, scanning is performed and the infrared spectra of the sample is generated with the help of a software called Spectrum. This generated spectrum is compared with the spectra available in the digital library automatically and the best suited match is displayed as the result. Preliminary work carried out indicates that the organic contamination in the samples, would interfere with the generation of good quality peaks in the spectra. Hence, a minimum percentage of 60% match would be selected as the best suited one.

Modelling transport of microplastics from top soil to river

Microplastics from land reaches river and subsequently to backwaters through the surface runoff and soil erosion. The impact of microplastics on the river as well as backwater ecosystem depends on the quantity and characteristics of the microplastics being transported from land. As part of the proposed project a mathematical model would be developed to quantify the transport of microplastics and understand their fate in river as well as in backwaters. Model simulation results will be validated from field measurements. Such a model will be replicable and could be used at other locations in Kerala to understand land to surface water contribution of microplastics.

Assessment of microplastics in fish species in River Kadambayar and Lake Vembanad

This study proposes to assess and quantify the presence of microplastics in fish species of both a freshwater ecosystem (River Kadambayar) and a saline water environment (Lake Vembanad). Commercially available fish samples would be collected from the river Kadambayar and Lake Vembanad. After rinsing the fish in sterile water to remove visible



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debris, the fish species would be identified according to the FAO species identification sheets. The fish would then be dissected using stainless steel kit, and would be placed in pre-sterilized zip-lock bags, sealed and stored ($-4\text{ }^{\circ}\text{C}$) for analysis. The intestinal contents of fish would be scraped and transferred to clean crucibles. Three times the volume of content of 10% KOH would then be added to the samples and allowed to digest for 5 days at $60\text{ }^{\circ}\text{C}$. Once a clear solution is visible, the digested contents would be filtered through Filtration Unit. The filter papers are then labeled, observed and would be photographed under a Microscope for visual identification. Compounds suspected for microbeads and microfibers would be marked on filter paper. Primary confirmation of microfibers would be determined by Hot Needle Test wherein plastic fibers curl or deflect when a hot needle tip is moved around the fiber. Later, the suspected particulates would be photographed, isolated and analyzed by FTIR for confirmation of polymer functional groups.

Assessment of lifecycle changes due to microplastics in the identified fish species

Although some aquatic organisms have been shown to ingest plastic, few studies have investigated the life cycle changes brought about by the effects of plastic waste on animals. Exposure to environmentally relevant concentrations of microplastics could interfere with hatching, growth rates, feeding preferences and innate behaviours of fishes. This coupled with the increased incidence of microplastics in the aquatic environment makes it mandatory that the effects microplastics in inducing lifecycle changes in the fish species be investigated.

Laboratory experiments on microplastic grazing and accumulation in marine organisms have usually been carried out in controlled conditions in small experimental units, where the organisms have been exposed to a known concentration of plastic particles. Such studies have given insight into the potential of microplastic ingestion by various aquatic organisms, and raised questions regarding the hazards due to microplastic ingestion. One possibility for collecting realistic data is to study the processes in aquariums resembling natural environments. Experiments would be carried out in small scale aquarium in a temperature controlled condition provided with aeration. The water quality characteristics maintained in the aquarium will closely resemble the water quality of the natural environment which is replicated. The experimental aquaria will contain contained a selection of fishes that are common in the lake Vembanad and would be left to acclimatize to the experimental conditions for one to two weeks. A control aquarium would also be maintained in the same condition. The experimental set up would then be exposed to a selected range of microplastics mimicking the concentration



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detected in the natural environment. The morphology of the microplastics would also be the same as that found in the natural environment. The parameters which would be monitored include the weight, reproductive habits and life cycle changes and behavior exhibited. This would then be compared to the control aquarium which would not be exposed to microplastics. After the study the bodies of the fishes (the viscera and gills and eviscerated flesh (whole fish excluding the viscera and gills)) exposed to microplastics would be studied for microplastics ingestion as described in the methodology section.



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Year-wise work plan

Work plan including time schedule & chart

Sl. No.	Activity	1 st Year				2 nd Year			
		1 st Qtr	2 nd Qtr	3 rd Qtr	4 th Qtr	1 st Qtr	2 nd Qtr	3 rd Qtr	4 th Qtr
1	Detailed Literature Survey								
2.	Identification of relevant fish species for assessing the presence of microplastics in fishes								
2	Sampling and Analysis of Top soil, sediment and water samples								
3	Sampling and analysis of fish to determine micoplastics in fish species								
4.	Laboratory studies for assessing the life cycle changes in the selected species of fish								
5	Modelling Export of microplastics from land to river and Validation								
6	Compilation of results, Final report preparation and submission								

Minimum required tenure of the project: 24 months

Practical relevance/utility of the project

A number of studies have been carried out indicating presence of microplastics in both freshwater and marine environments. A few studies have also indicated presence of



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microplastics in fishes also [Kumar et al.,2018]. But most of these studies have concluded that, though the presence of microplastics in the fish is a matter of significant environmental pollution due to plastics, the concern about its transfer to edible parts of the fish could not be ascertained, since fish sellers usually remove the gut/intestinal tracts prior to selling and gut/intestinal tracts of the selected fish species is not consumed. However, there is increasing evidence of edible parts of the fish also been contaminated due to microplastics. In this project the focus would be on microplastics and its morphology (fragments, films, filaments, beads, and foams) in the viscera and gills and eviscerated flesh (whole fish excluding the viscera and gills) of the species selected. Gills of the fishes are the first organ exposed to anthropogenic particles during respiration and this increases the probability of particles getting stuck in the gills of fishes. The microplastics thus stuck in the gills are more of concern in small fishes which are used for consumption as dried fish, since dried fish are often processed without any cleaning process and evisceration is difficult in case of small fishes like anchovies. The study of life cycle changes in fishes due to its proximity to microplastics has not been reported in India. Hence a study of this nature is of vital importance for a state like Kerala where majority of people consume both freshwater and seawater fishes including dried fish. Moreover, the order of magnitude of the abundance of microplastics detected in the sediments in river Kadambayyar is quite high when compared to the reported values elsewhere.

Socio-economic and environmental relevance of the project

Studies of microplastics in Kerala, is limited. With its high density of population, solid waste management is one of the challenges faced by the State. The intensity of plastic pollution in Kochi can be assessed by the analysis of soil samples from Brahmapuram, the small village which has become the waste dumping yard of Kochi since 2017. As per reports, Kochi city generates around 380 tonnes of solid waste per day, of which 150 tonnes are biodegradable and 100 tonnes comprise of plastic waste. This subsequently pollutes the rivers of Kadambayyar and Chitrapuzha, which borders the open dumping yard of Brahmapuram. Hence, a long term monitoring and assessment may help in forming an accurate picture of the problems due to the microplastics in the aquatic environment. It may also help in exposing the deficiencies with regard to handling of plastics and formulating/developing an alternate policy.

The river Kadambayyar drains into Lake Vembanad. This results of the preliminary study conducted at the institute by Anupama (2019) coupled with the study conducted by Sruthy et., al 2016 clearly indicates that river Kadambayyar is one of the major pathway of microplastics



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into Lake Vembanad. The River Kadambrayar is the source of water for nearby panchayats and supports a number of freshwater fish species. Several farmers and families of fishermen had depended on Kadambrayar for their livelihood till a few years ago, but the depleted quality of water in the river has made fishing unsustainable. The presence of microplastics would further accentuate the problem and would have far reaching environmental and economic consequences. It has been proven by many studies that microplastics are entering our food web, and as top predators, human beings are exposed to its potential harms.

These factors make it imperative that the studies of presence of microplastics in the fish species in the aquatic environment be carried out to detect its presence and to assess the life cycle changes in the fishes. The fishworker population of the State in 2016-17 is estimated to 10.29 lakh. Out of this, 7.92 lakh fishworkers belong to marine sector while 2.37 lakh fishworkers belong to inland sector. Ernakulam, Alappuzha, and Thrissur are the leading districts in the case of inland fish production occupying the first, second and third positions respectively. The study conducted would throw light on the impact of microplastics on the fisheries industry. Although this study limits itself to fish species in river Kadambrayar and Lake Vembanad, the microplastics found there would eventually find its way into the sea affecting marine fish population also.

Expected and other physical outcomes of the project

The proposal envisages the following outcomes from the study

1. An accurate picture of the abundance, morphology and characterization of microplastics in the top soil at Brahmapuram and in the sediment in river Kadambrayar.
2. Develops better understanding of sources and routes of travel of microplastics
3. Highlights the implications due to the presence of microplastics in river
4. A model which simulates the transport of microplastics from top soil at Brahmapuram into the river.
5. Assessment of presence and abundance of microplastics in the commercially used fish species of river Kadambrayar and Lake Vembanad.
6. Laboratory assessment to assess the lifecycle changes in the fish species due to the microplastics.

Agencies which can utilize the results of the project



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Kochi Municipal Corporation: The Kochi Municipal corporation can make use of the study conducted to reassess their plastic waste management strategies. Sruthy et al.,2016 identified low density polyethylene as the most abundant polymer found in Lake Vembanad. Anupama (2019) also found Polyethelene as the most abundant polymer in sediment samples in river Kadambrayar and in top soil at Brahmapuram. Most of the samples from brahmapuram were from polyethelene bags of thickness less than 50 microns. It was also found that, the low density polyethelene bags are liable to disintegrate easily hence also subject to long distance transport via water or air. If the findings of this study, conducted for longer monitoring period reiterates the findings, then it can help in adopting policies/strategies directed to curbing/reducing the specific polymer.

The Central Marine Fisheries Research Institute (CMFRI): Confirmation of the presence of microplastics in might interfere with the commercial value of fishes in Kerala. Ingestion of microplastics by commercially important species in both Kadambrayar and Lake Vembanad would be determined from field observations. The results of the study can be used by CMFRI to frame suitable preventive measures to ensure that microplastics do not enter the food chain via the fishes consumed.

Techno-commercial feasibility of the project, if any: Nil

Modalities for replication of the outcomes, if any

The study serves as a pioneering effort to link the open dumping area as a source of microplastics into the aquatic ecosystems. The model for transport can be extended to determine the transport of microplastics from top soil to any river body. The study conducted can be used to evaluate new knowledge regarding sources, pathways, loadings, and processes for microplastic in the context of a comprehensive conceptual model to allow prioritization of data gaps. The model predictions would be compared to monitoring results and potential reasons for differences between predicted and measured values would be assessed. The proposed study can be used to predict the modalities of transport of microplastics into the marine environment. The parameters and protocols used in the laboratory experiments can serve a guideline for further work in the area.



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Standardization of the design parameters for technology and preparation of protocols/ prototypes for achieving reliable and replicable processes, if any:

The model for transport can be extended to determine the transport of microplastics from top soil to any river body. It can be used to evaluate new knowledge regarding sources, pathways, loadings, and processes for microplastic in the context of a comprehensive conceptual model to allow prioritization of data gaps. The protocols developed can be used to evaluate available data on the impacts of existing and proposed management actions to reduce microplastics in aquatic and terrestrial environments.

Component-wise justification of the costing of the project

- The project involves extensive sampling and laboratory work and analysis. This would cost approximately Rs. 2.0 lakhs
- JRF will be employed for 24 months period to assist the investigator during the field work, sample collection and analysis. JRF stipend will be around Rs. 6.0 lakhs
- Supporting staff (during field data collection) & Technical staff salaries (as and when needed) - Rs. 1.4 lakhs
- Field analysis and laboratory of sediment samples (Glassware and chemical) Rs.1.0 lakh
- Travel cost (for field visits) - 1.0 lakhs
- Contingency expenses – 0.5 lakhs
- Institutional overhead – 10% of the above

Budget Modification: No changes have been proposed for the budget in the revised proposal since there is no modification of the objectives and the scope. Only changes made are in the work plan. The sampling schedule remains monthly throughout the tenure of the project. The final results of the sampling will be used to validate the developed model. In the previous proposal the JRF was proposed for a period of 24 months to assist in field work, sample collection and analysis. In view of the hectic revised schedule of sampling and monitoring, the same period of 24 months is retained for the JRF.



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References

1. Anupama S. (2019)- “Detection of microplastics at Brahmapuram using ATR-FTIR spectroscopy and modelling its transfer to water sources for risk assessment” .Project Report for the project work in M.Tech submitted to KTU.
2. Chandan Krishna Seth and Amritanshu Shrivastav (2018), Contamination of Indian sea salts with microplastics and a potential prevention strategy, *Environmental Science and Pollution Research*.
3. Luis Carlos De Sa and Miguel Oliveira (2018), Studies of the effects of microplastics on aquatic organisms: What we know and what should we focus our efforts in future, *Science of the Total Environment*, Vol:645, 1029-1039
4. S. A. Naidu, V. Ranga Rao and K. Ramu (2018), Microplastics in the benthic invertebrates from the coastal waters of Kochi, Southeastern Arabian Sea, *Environ Geochem Health Springer Nature*.
5. S Sruthy and E V Ramaswamy (2016) - Microplastic pollution in Vembanad lake, Kerala India: The first report of microplastics in lakes and estuarine sediments in India – *Environmental Pollution*, 1-8.
6. Vigneshwari Easwar Kumar, Geetanjali Ravikumar and K. Immaculate Jeyasanta (2018), Occurrence of microplastics in fishes from two landing sites in Tuticorin, South east coast of India, *Marine Pollution Bulletin*, Volume 135, 889-894.
7. Wei-Min Wu, Jun Yang and Craig S. Criddle (2017), Microplastics pollution and reduction strategies, *Front. Environ. Sci. Eng.*, Vol: 11, 1-6.
8. Wenfeng Wang and Zhen Li (2016), Microplastic pollution in inland fresh waters of China: A case study in urban surface waters of Wuhan, China, *Science of the Total Environment*.
9. Economic review SPCB Kerala 2016.
10. Kerala SPCB Directory 2010
11. Kerala Suchitwa Mission reports 2018



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Part III - Biographical Sketch of the investigator(s) detailing research credentials and research papers published in the area of the proposed research project



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Part IV - Facilities (equipments/instruments) available at institution(s)/organizations for carrying out the project

The Department of Civil Engineering at SCMS School of Engineering and Technology(SSET) has a full-fledged Environmental Engineering laboratory supplemented with modern equipment and research facilities. The Civil Engineering Department also conducts an M.Tech Environmental Engineering programme at SSET since 2013. The Environmental Engineering laboratory is used by both the undergraduate and post graduate students. The laboratory is also utilized by the SCMS Water Institute(SWI) for sponsored research, consultancy and technical services. The preliminary study on detection of microplastics in soil and sediment samples mentioned in the abstract and methodology has been carried out Ms Anupama S, a M.Tech student at SSET as a part of her project work as per KTU norms. The institute also has a Central library with number of online journal subscription. It also has High speed internet facilities and computational facilities to aid research.

Some of the instruments available in the laboratory are as follows.

1. **Water quality analyzer**
2. **UV_VIS digital spectrophotometer**
3. **Compound Laboratory Microscope**

Fourier Transform -Infrared (ATR - FTIR) spectroscopy for the identification and characterization of microplastics will be carried out at either at Department of Civil Engineering, NIT Calicut or Sophisticated Analytical Instruments Facility (SAIF) at Sophisticated Test and Instrumentation Centre.



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Part V - Project budget in the prescribed format

PROJECT BUDGET				
A	Salaries and Wages	I Year	II Year	Total
1	JRF/SRF	3,00,000	3,00,000	6,00,000
2	Supporting technical staff or other personnel , if any	70,000	70,000	1,40,000
Grand Total		3,70,000	3,70,000	7,40,000
B	Permanent Equipment (Please specify various individual items of equipment)			
	Not Applicable			
C	Expendables / Consumables (Chemicals & Glasswares/ Aquariums)			1,00,000
D	Analysis of microplastics			2,00,000
E	Travel and Field work/sample collection			1,00,000
F	Contingencies			50,000
G	Institutional Charges (@ 10%)			1,19,000
	Grand Total (Rs)			13,09,000

Budget Modification: No changes have been proposed for the budget in the revised proposal since there is no modification of the objectives and the scope. Only changes made are in the work plan. The sampling schedule remains monthly throughout the tenure of the project. The final results of the sampling will be used to validate the developed model. In the previous proposal the JRF was proposed for a period of 24 months to assist in field work, sample collection and analysis. In view of the hectic revised schedule of sampling and monitoring, the same period of 24 months is retained for the JRF.

Dr. Nisha.L

Principal Investigator



Name and Signature of

Head of the Institution



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AGREEMENT

DV 916138

This Agreement (Agreement) entered on 15th day of December in Year 2022 at Kochi, between KNITSTART VENTURES LLP, a Limited Liability Partnership formed under section 12(1) of the Limited Liability Partnership Act 2008, having corporate office at, Carnival House, Near Dindoshi Fire Station, Gen.A.K.Vaidya Marg, Off Western Express Highway, Malad(E), Mumbai – 400 097 and registered office at CN10, Church Nagar, Angamaly, Kerala – 683 572 and (hereinafter referred to as “Company” which expression shall, unless it be repugnant to the subject, meaning or context thereof, be deemed to mean and include its successors and permitted assigns) of the First Part;

AND

SCMS School of Engineering & Technology, Kerala (SSET), an educational organisation registered under the relevant rules and regulation of Kerala State, having its office at Vidya Nagar, Palissery, Karukutty, Emakulam, Kerala, Pin - 683 576 (hereinafter referred to as “SSET” which expression shall, unless it be repugnant to the context or meaning thereof, mean and include its successors and assigns) of the Second Part,

(The Company and the SSET are hereinafter individually referred to as “Party” and collectively as “Parties”).

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No: 67973, Date: 15.12.22
 Value of Rs.
 Sold to:
 To be linked with Sl No:

Scms school at Engineering & Technology, Karukutty



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WHEREAS

- 2 -

DV 916139

1. The Company is engaged in business of (i) Neutral Workshop upgradation through productivity enhancement through various means (ii) Supporting through sales and services of Automotive Diagnostic equipment (iii) providing diagnostic back end support and training, (iv) setting up selected partner outlets across various geographies in the country, (v) selling other productivity tools that enhance the working environment of neutral workshops, (vi) provide workshop management system software. Company is desirous to take support from SSET to identify interns, candidates who are desirous to enhance real time knowledge through collaborating and dedicating time in the neutral workshops, as well as having a hands on experience of the industry, both from technical as well as sales standpoint
2. Based on discussions and mutual interest, SSET has agreed to participate in the program and provide interns as well as candidates who are pursuing their career interest in automotive sector in technical enhancement of diagnostics as well as sales and services as mentioned in clause 1.
3. The condition of agreement would be that both parties would not be liable for any of the outcome derived through the activities conducted as a part of the program by participating members, considering that there would be no formal or legal control on them for both parties.

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A. NOW THIS AGREEMENT WITNESSETH AS UNDER

1. As per the mutual agreement Company has agreed to intake specific number of interns from SSET, and give exposure to them on the below aspects of Automotive industry, specifically in Passenger Vehicle Services in Neutral Workshops/Garage in the area of Diagnostics, and related aspects. For avoidance of doubt, the internship would be for minimum 3 [Three] months with specific focus areas as below-
 - a. Technical: Overview of Diagnostics and its relevance – Hands on at our Technical facility at Trivandrum [Maximum of 3 days]
 - b. Technical: Enhance knowledge by spending time at designated neutral workshop, by hands on training [Maximum 2 Weeks]
 - c. Industry Landscape: Identify and testimony the learnings, with knowledge gathering of above information at 150 neutral workshops, assimilate the information, and present a summary at the end of the program. For avoidance of doubt, an intern will meet maximum of 4, and minimum of neutral workshops in a day for a maximum of 45 working days through two months span, in a allocated geography under Company's channel partner/s [Maximum 60 days]
 - d. Concluding Internship: summarising the learnings and presenting a brief synopsis to Company and SSET
 - e. Opportunity Analysis : Upon successful completion of the internship, based on wish from intern/s, if to remain associated with the Company, its channel partners, associates, the same can be actively considered based on then requirements, subject to the terms and conditions put in place, as well as with no geographical restrictions.
2. In order to facilitate the same and the operationalise parties has agreed to perform the roles and responsibilities as herein after appearing.
3. The Parties recognize that discharge of the roles and responsibilities is essential for successful implementation of the project.

B. RESPONSIBILITIES OF COMPANY

The Company hereby agrees and undertakes to comply with the following;

1. The Company will indicate the tentative number of openings that can be kept for internship, in each period, term, for advance planning
2. The Company will clearly define the plan and desired outcome of the program
3. The Company will initiate the technical training and initial onboarding as mentioned in clause A, to equip the interns for market visits
4. The company through its single point of contact, would introduce its local Channel Partner (CP) to the respective branch, who will be the primary point of contact at each location, primarily within Kerala.

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5. The Company through its CP will plan market visits as per the understanding in clause A, enabling the interns to have clarity on the deliverables
6. The Company will help to conduct the work in a structured way, but putting a mechanism for IWS visit and recording of inputs from each location for further use
7. The company will help to get all support as appropriate within feasible limits to have a conducive environment of association of interns with various intermediaries, as applicable from time to time, for a successful completion of the program
8. Upon successful completion, completion certificate with an appreciation would be handed over in presence of SSET authorities to mark the conclusion.

C. RESPONSIBILITIES OF SSET

SSET hereby agrees and undertakes to comply to the following

1. SSET would identify and depute candidates for internship based on the skillsets, and keenness to participate in the program
2. The program can be divided into two parts, 1) Technical 2) Techno Commercial
3. Based on the interest of candidates, the appropriate allocation of any of the two parts can be informed, enabling company to plan appropriately
4. SSET would help to timely monitor the progress, with periodic milestones, where in the same would be done between SPOC from each sides.

D. PROCEDURE

The procedure involved in the entire program would be as below

1. On mutual agreement, both parties would sign the MOU, to roll out the process
2. Parties would decide upon the total number of candidates/interns for the program
3. Candidates would sign the Program terms, for proper understanding, and in case of any clarifications would validate it with Company SPOC
4. The Company shall allocate locations, based on availability to enable candidates / interns to start the program
5. Candidates / Interns would complete the program in the stipulated location within the allocated time lines
6. Candidates / Interns would submit a report on the learnings/conclusions to Company & SSET
7. Upon successful completion and objective attainment, completion certificate would be issued by company

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E. OTHER PROVISIONS

1. Company will not be responsible for any outcome which is not relevant to the program, or conduct, interactions with related parties, and similar. For avoidance of doubt, the candidates/interns have to do the due diligence while or in progress of program, and interactions, to make sure that there are no communications, interactions with any parties, or related which can create any kind of undesired, reverse impact, both for Company and SSET
2. Company will not be responsible for any kind of loss or similar incidents to candidates/interns related to any aspect of safety, financial and others, and it has to be solely taken care by the individuals
3. Company will not be giving any financial assistance to any candidates/interns, during the program, unless and until there is a clear understanding between the parties on any of such terms.
4. Candidates will use their own assets, commuting mechanisms, and similar requisites to make sure that the objectives are being met, based on the program enrolled in.
5. In an event of doubt, candidates/interns, parties would clarify the same through appropriate dialogues to remove the ambiguity and move further

F. REPRESENTATION, WARRANTIES & COVENANTS

The Company hereby represents, warrants and covenants that it has assured, confirmed and undertaken to the SSET, as follows in order to urge and make the SSET to enter into this Agreement and the other documents. These representations and warranties shall survive even after termination of this Agreement and the other documents.

1. Nothing in this Agreement conflicts with any provisions of the Company's constitutional documents
2. The execution and performance of this Agreement does not and shall not violate any provisions of any existing agreement with any party.
3. The Company hereby declare that the information and data furnished by it to the SSET is true and correct, and vice versa
4. The Company agrees and undertakes to provide such co-operations as the SSET reasonably requests in order to give full effect to the provisions of this Agreement.

G. EVENTS OF DEFAULTS & REMEDIES

One or more of the events specified in this section shall be an event of default by the parties for the purpose of this Agreement.

1. Default in allocating candidates/interns by SSET
2. Default in allocation of Program after successful allocation of candidates/interns by SSET, however not deputing them further for the Program by Company

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3. Candidates/Interns not completing the program, in the desired manner of within stipulated conditions

If an agreed number or more of the Events of Default happens, the parties may;

1. Revisit the program, and do due diligence to put the same back to track
2. In case of non cooperation of candidates/interns, either replacement or reduction of desired numbers would be initiated on mutual consent

H. MISCELLANEOUS PROVISIONS

i) Notices

All notices, requests and other communications, which shall be or may be given pursuant to this Agreement shall be sent by registered mail to respective SPOC set forth herein before in this Agreement. Such notices, requests and other communications shall be deemed to be received and made effective when duly arrived at the other party's address. Any alteration or change in the addresses of each of the parties hereto shall be notified in writing to the other party hereto without undue delay.

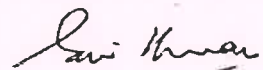
ii) Amendment

No amendment or change hereof or addition hereto shall be effective or binding upon any of the parties hereto unless the same is made in writing with specific reference to this Agreement and executed by the parties hereto.

iii) Severability

If any provision of this Agreement shall be found by any Government or administrative body of competent jurisdiction to be invalid or unenforceable, the invalidity or un-enforceability of such provision shall not affect the other provisions of this Agreement and all provisions not affected by such invalidity or unenforceability shall remain in full force and effect. The parties hereby agree to attempt to substitute for any invalid or unenforceable provision with a valid or enforceable provision which achieves to the greatest extent possible the intended economic, legal and commercial objectives of the invalid or unenforceable provision.

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ERNAKULAM, KERALA-683 576



iv) Effective Date of this Agreement

This Agreement shall become binding on the Company and the SSET on and from the date herein written. It shall be in force till all the monies due and payable under this Agreement are fully paid off by the IWS to the satisfaction of the SSET.

v) Assignment & Novation

Any assignment would be on mutual consent, and would be recorded for future use.

IN WITNESS WHEREOF THE Company has caused its Common Seal to be affixed hereto on the day, month and year first herein written and the SSET has caused the same to be executed by the hand of its authorised official as hereinafter appearing.

Mr. Sasi Menon,
Director,
Carnival Group of Companies.

Date :



Prof. Pramod P Thevannoor,
Vice Chairman,
SCMS Group of Educational Institutions.

Date : ..15/12/2022



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ERNAKULAM, KERALA-683 576



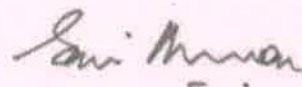
TO WHOME IT MAY CONCERN

This is to certify that **Mr. AMAL A** third year B.tech in Automobile Engineering, student of SCMS SCHOOL OF ENGINEERING & TECHNOLOGY, has successfully completed **7 days of internship** from May 22nd to May 28th at Automotive Diagnostic Centre **partnered between KNITSTART VENTURES LLP & CANDOUR AUTOTECH.**

The insight of program was gaining hands-on experience in automobile mechanism, maintenance & significantly in On-Board Diagnostics (OBD). Received specialized training from industry experts in operating Jumstart Launch scanning tools and other premium OEM scanning tools, enhancing proficiency in advanced diagnostic techniques. The surveys conducted in multiple workshops to gather insights into the application and significance of OBD scanning tools within the automotive industry.

The certificate is awarded in recognition of his dedication, commitment and successful completion of the internship program.

KNITSTART VENTURES LLP



Authorized Signatory



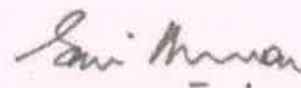

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ERNAKULAM, KERALA-683 576

TO WHOME IT MAY CONCERN

This is to certify that **Mr. JONATHAN C JACOB** third year B.tech in Automobile Engineering, student of SCMS SCHOOL OF ENGINEERING & TECHNOLOGY, has successfully completed **7 days of internship** from May 22nd to May 28th at Automotive Diagnostic Centre **partnered between KNITSTART VENTURES LLP & CANDOUR AUTOTECH.**

The insight of program was gaining hands-on experience in automobile mechanism, maintenance & significantly in On-Board Diagnostics (OBD). Received specialized training from industry experts in operating Jumstart Launch scanning tools and other premium OEM scanning tools, enhancing proficiency in advanced diagnostic techniques. The surveys conducted in multiple workshops to gather insights into the application and significance of OBD scanning tools within the automotive industry.

The certificate is awarded in recognition of his dedication, commitment and successful completion of the internship program.

KNITSTART VENTURES LLP**Authorized Signatory**

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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

CONTRACT

KNITSTART VENTURES LLP
Carnival House, Gen A.K. Vaidya Marg,
Dindoshi, Malad (East)
Mumbai - 400097

”
(The “Company”)

Mr. Kiran Antony
Nellisery House, Koratty
Government Poly, Technic Koratty
Thrissur - 680308

(The “Contractor”)

WHEREAS:

The Contractor has represented to the Company that he is a contractor engaged in the activities assigned by the Company and the Company is desirous of availing the expertise of the contractor on an exclusive basis which the contractor has agreed to provide to the Company on the terms and conditions recorded and contained herein:

NOW IT IS AGREED BY AND BETWEEN THE PARTIES HERETO AS FOLLOWS:

1. Appointment terms & conditions:

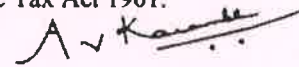
Your appointment will initially be for a period of **6 (Six) Months** i.e. from **29th May 2023 to 30th November 2023** as an **Automotive Engineering trainee** in **Automotive Department** in **Knitstart Ventures LLP**. The said contract may be extended from time to time at the sole discretion and with prior intimation from the management of the company. During this period, you agree to devote minimum 9 hours per day on assignments which is determined by the Company and/or assigned to you by the authority/ies of the company. Work/Assignment will normally be performed at **Angamaly** and work timings will be at the discretion of the Management.

2. Contractor's Fees:

The Company shall pay to the contractor for the expert services rendered by the contractor to the Company during the contract period Fees not exceeding **Rs.12,000 /- (Rupees Twelve Thousand Only)** per month for which he shall raise his monthly bill for the working days by 24th of each month of a Gregorian calendar month, subject to applicable statutory deductions, including Government Tax, if applicable. If the recipient makes a declaration without their PAN, then TDS or tax is to be deducted at higher rates as per Income Tax Act 1961.




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3. Exclusivity:

The contractor shall act exclusively for the Company and shall not act as an advisor or consultant or an employee in any designation whatsoever to any other entity or person/s who has/ having a similar kind of business or working or carrying on any business in the same/ similar industry as that of the Company or any other sector.

4. Termination

Either party may terminate the employment by giving 30 days notice or per the prevailing regulations of the company.

5. Company's Right to Terminate

The services of the contractor is not found satisfactory, the contractor is found guilty either of misappropriation, defalcation, malfeasance, misfeasance or fails to account for any amount; or the contractor misconducts himself or is charged with any criminal offence; or the contractor on his frequent absenteeism from his duties without intimation.

6. Organisation Policies:

It is an essential condition retainer must comply with all existing, reviewed and new Company policies and procedures. Any breach of the Company policies or procedures will lead to strict disciplinary action.

7. Anti-Sexual Harassment:

It is the Company's policy to prohibit in our workplace any conduct, which constitutes sexual harassment. It guarantees to deal with allegations of harassment seriously, promptly and in confidence and undertakes to protect from victimization those employees who complain about sexual harassment.

8. Confidentiality:

The Contractor acknowledges that, during the tenure of this Agreement, the Contractor will or may have access to and become informed of confidential and proprietary information of the Company ("Confidential Information") and the Contractor further acknowledges that all such Confidential Information is and will remain at all times the property of the Company.



Joshi

Prakash A. K...

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SCMS SCHOOL OF ENGINEERING & TECHNOLOGY

9. Intellectual Property Rights:

The Contractor expressly acknowledges that the services provided or work done by the Contractor are performed hereunder on a "work for hire" basis and the ownership of all right, title, and interest in any copyright, patent, trademark, trade secret, invention or other proprietary work, either in whole or part, arising out of the said services shall vest in the Company and the Contractor shall execute (both during and at any time after the termination of this Agreement) all appropriate documents, to perfect the Company's title in the same including but not limited to grant to the Company an unrestricted, royalty-free license to use, practice, copy and create derivatives of, and create products embodying any ideas incorporated therein.

Yours sincerely,

For (Knitstart Ventures LLP)

Name **Mr. Ameya Karambe**

Signature



Designation **Head - Human Resources**

Dated this 29th day of May, 2023.

I have read this Contract agreement and confirm our agreement with the terms mentioned herein.

Mr. Kiran Antony

Signature



Dated this 29th day of May, 2023.



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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

TO WHOME IT MAY CONCERN

This is to certify that **Mr. MELVIN C JOSHY** third year B.tech in Automobile Engineering, student of SCMS SCHOOL OF ENGINEERING & TECHNOLOGY, has successfully completed **7 days of internship** from May 22nd to May 28th at Automotive Diagnostic Centre **partnered between KNITSTART VENTURES LLP & CANDOUR AUTOTECH.**

The insight of program was gaining hands-on experience in automobile mechanism, maintenance & significantly in On-Board Diagnostics (OBD). Received specialized training from industry experts in operating Jumstart Launch scanning tools and other premium OEM scanning tools, enhancing proficiency in advanced diagnostic techniques. The surveys conducted in multiple workshops to gather insights into the application and significance of OBD scanning tools within the automotive industry.

The certificate is awarded in recognition of his dedication, commitment and successful completion of the internship program.

KNITSTART VENTURES LLP



Soni Manan

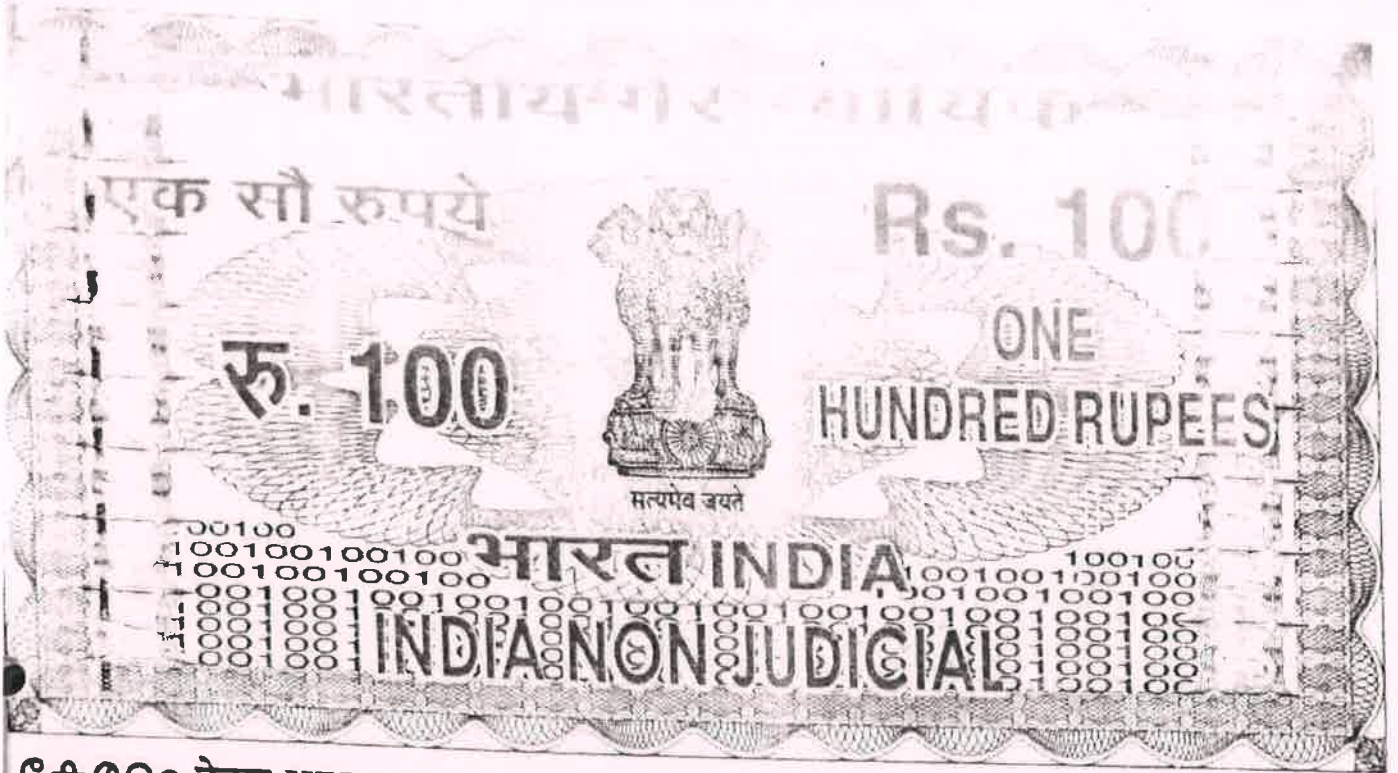
Authorized Signatory



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Memorandum of Understanding

This Memorandum of Understanding is entered into at Thiruvananthapuram on 17th of December 2022.

BETWEEN

SCMS School of Engineering and Technology, herein after referred to as SSET, which expression shall, unless it be repugnant to the context or meaning thereof to be deemed to mean and include their heirs, executors, successors and assigns, represented by The Principal, SCMS School of Engineering and Technology, Vidyanagar, Palissery, Karukutty, Ernakulam-683576 of the ONE PART,

AND

Centre for Development of Advanced Computing, Vellayambalam, Thiruvananthapuram a Constituent Unit of C-DAC, A Scientific Society under the Ministry of Electronics and Information Technology (MeitY), Government of India, registered under the Societies Registration Act of 1860 and Bombay Public Trusts Act of 1950, having its Registered office at Savitribhai Phule, Pune University Campus, Ganesh Khind, Pune-411007 hereinafter referred to as C-DAC(T) which expression shall, unless it be repugnant to or inconsistent with subject or context thereof, include and be deemed to include their heirs, executors, successors or administrators and assigns, represented by The Director, C-DAC(T) of the OTHER PART.

16.17.2022
8/12/2022

[Signature]
C-DAC *[Signature]*

PRINCIPAL
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VIDYANAGAR, PALLISSERY, KARUKUTTY

[Signature]
SINDHU.I.S

24 NOV 2022

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Either one will be referred as "party" and both will be referred as "parties" unless it be repugnant to or inconsistent with subject or context thereof.

1. AREA AND SCOPE OF COOPERATION

The purpose of this Memorandum of Understanding(herein after referred to as MoU) is to formally express the mutual wish of SSET and C-DAC(T) to associate in the studies and research in the subject areas of Cyber Security and Forensics, Cyber Law, Software Technologies, Cloud Computing, GIS Technology, 5G Networks, Power Electronics, Control Systems and Instrumentation, VEGA Processor based Microcontrollers and System-on-Chips and in the efforts of Collaborative Teaching, Research and Development. This is a legally non-binding agreement, which outlines an intention to promote collaboration between the two parties for a socially productive cause. This document would be followed by an Agreement, in future, specifying the areas of collaboration and sharing, which will have the legal binding.

Generally speaking, and within the limits of the financial means of each party, the cooperation will take the following form, as per the mutually agreed terms & conditions, from time to time:

- 1. Expert Lectures: C-DAC (T) nominate its scientists/engineers to deliver expert lectures in the areas of Cyber Security and Forensics, Cyber Law, Cloud Computing, Information Security, Power Electronics, VEGA Processor, Renewable Energy and

10.17.2022
8/12/2022



Handwritten signatures and stamps of SINDHUJS, SCMS School of Engineering & Technology, Sasthamangalam Vendoor, Kerala-683 576. Includes date 24 NOV 2022.

Engineering, Mechanical Engineering, and, Civil Engineering and can take up project modules of C-DAC (T). C-DAC (T) and SSET may also prepare joint project proposals and approach funding agencies for sponsoring the research and development projects.

3. SSET may request C-DAC(T) for setting up facilities in advanced areas on its campus as per the needs of the institution and the cost of these may be worked out on mutually agreeable terms
4. Joint Programmes: take efforts in organising joint conferences, methodology workshops, professional development programmes, training programmes, Hackathons etc. for the benefit of the research community
5. Student Projects: C-DAC (T) may offer the topics for the student projects at the M.Tech level for the students of SSET.
6. Activities: SSET to consult and take approval from CDAC(T) before publishing any information derived as part of the joint activities.
7. Development: CDAC (T) to support SSET by providing evaluation boards and training in the development of technological solutions using the indigenous processor families.
8. Industrial training: C-DAC (T) may make offers for the industrial training (internships) for the students of SSET for the benefit of enhancing the professional development of the students or as part of curriculum requirement of B.Tech Programmes.
9. Preplacement trainings: The students of B. Tech programme may be given preplacement training on relevant domains of technical skills under a programme custom designed as per market requirement.
10. Training: C-DAC (T) may offer training programs to the students and faculty of SSET
11. Faculty Exchange: Wherever possible, parties support each other in different teaching, research, development, and professional training activities.
12. Collaboration: Either party will extend invitation to the teachers/researchers/developers of the other party to participate in seminars, conferences, courses and meetings on research themes of common interest.
13. Joint Guidance: Subject to relevant academic regulations, parties will promote co-direction or co-supervision of master's dissertation works and doctoral researches.
14. Any other project of common interest suggested by either of the two parties.

2. PERIOD

The present Memorandum of Understanding takes effect as from the date of signature of this Memorandum of Understanding by both parties and remains valid for a period of 3 years. It can be renewed, on expiry of this term, for one or several terms, if admissible by both parties. If one party plans to withdraw from the agreement, it must give notice in writing 3 months in advance to the other party, on the understanding that any ongoing actions should be carried through to a successful conclusion. Notwithstanding anything given in this MoU, both parties can together decide to close the MoU if they arrive at conclusions.



[Signature]
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ERNAKULAM, KERALA-683 576

3. INDEMNIFICATION

Either party shall keep other party, its affiliates, shareholders, officers, directors, employees, agents, representatives, and customers indemnified and harmless from and against any and all costs, liabilities, losses, and expenses (including, but not limited to, reasonable attorneys' fees) arising out of any claim, suit, action or proceeding (each, an "Action"), for any act(s) and omissions of such party under any proposal(s) to Prospective client(s) or any resulting contract(s) there from or any incidental matter or in any way arising there from.

4. LIMITATION OF LIABILITY

In no event shall Parties be liable for consequential, special, incidental or punitive loss, damage or expense (including without limitation, lost profits, opportunity costs, etc.) even if the Party has been advised of their possible existence, if the loss, damage or expenses etc. is without mens rea and beyond reasonable control.

5. DISPUTE RESOLUTION AND ARBITRATION

In the event of dispute or a difference of any nature whatsoever, between the parties during the course of performance of the respective obligations arising out of the agreements made pursuant to this MoU, the parties will agree to refer the matter to the Heads of the Institutions to resolve the disputes, keeping in view the best interest of the parties and to maintain the spirit of performance of this agreement. If any dispute still persists, it shall be governed by the provisions of alternate dispute resolution and settled in accordance with the relevant provisions of Arbitration and Reconciliation Act 1996/as amended from time to time. If any judicial proceedings arise, it shall be conducted in English and the same shall be in the appropriate courts in Thiruvananthapuram, Kerala.

6. FORCE MAJEURE

Without prejudice to accrued liabilities and rights, no party shall have any liability, whatsoever, to the other party or be deemed to be in default by reason of delay or failure in performance under this MoU, to the extent that such delay or failure is caused by or arises from acts or circumstance or events beyond the reasonable control of that party, including but not limited to Acts of God, Acts or Regulations of any governmental authority, war or national emergency, accident, flood, fire, riot, strikes, lock-outs, industrial disputes, natural catastrophes or epidemics/pandemics, Court Orders etc. Each Party shall bear its own losses arising from such force majeure event(s), if any.

7. SEVERABILITY

If any part of this Agreement is found by a court of competent jurisdiction or other competent authority to be invalid, unlawful or unenforceable, then such part will be severed from the remainder of this Agreement which will continue to be valid and enforceable to the fullest extent permitted by law.

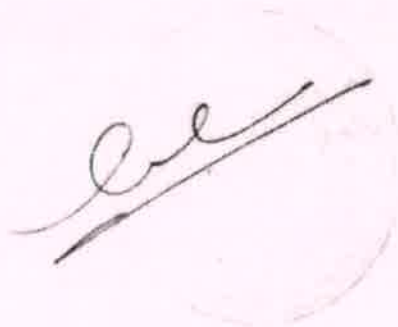


8. INTELLECTUAL PROPERTY

All prior information, Intellectual Properties (IP) such as patents, design and data existing with either party before the signing of this MoU (pre-existing IP) shall be the sole property of the party concerned. All IP including, design information, designs, copyrights, software architecture, framework, source codes and data generated through the collaboration or patents under this MoU shall be held as per the mutually agreed terms, which shall be arrived at before approaching the registering authorities for protection of the IP. This agreement shall be specifically made in writing and shall also contain the terms of joint ownership of the IP as per the guidelines of the funding agency, if such an agency is involved in the implementation of the specific project from which the IP has been generated.

The terms and conditions of this MoU shall not be disclosed to any third parties by any party of this MoU without the prior written consent of the other party. Either party shall, however, allow, without prejudice, other party to cite the existence of the MoU in their official reports.

This Memorandum of Understanding shall be governed by the laws of Union of India and State of Kerala and shall be under the superintendence of the parent bodies of the parties.



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ERNAKULAM, KERALA-683 576

IN WITNESS WHEREOF, the parties hereto have caused this Memorandum of Understanding (MoU) to be executed in duplicate, through their representatives at Thiruvananthapuram in the day and year first above written:

Now the Memorandum of Understanding witnesses as follows

Authorized Signatories:

For and on behalf of C-DAC(T)



Name: Mr. Kalai Selvan A

Designation: Director, C-DAC(T)

Place: Thiruvananthapuram

കാലൈ സേൽവൻ എ. / Kalai Selvan A,
വैज्ञानिक जी / Scientist G
निदेशक / Director
प्रगत संगणन विकास केन्द्र
Centre for Development of Advanced Computing
वेल्लयंबलम, തിരുവനന്തപുരം
Vellayambalam, Thiruvananthapuram - 695 033

For and on behalf of SSET



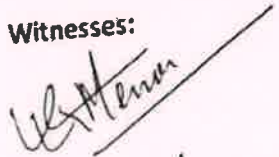
Name: Dr. Anitha G. Pillai

Designation: Principal, SSET

Place: Ernakulam



Witnesses:



Name: Dr. Varun G. Menon

Designation: Professor (CSE)

Witnesses:



Name: S. KRISHNAKUMAR Rao

Designation: SENIOR DIRECTOR





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ERNAKULAM, KERALA-683 576

A Hands-on Workshop by C-DAC Personal on

' DIR-V VEGA Processors '

Venue: Lab 6, Fifth Floor, Administrative Block

Date: 17 December 2022

Time: 09:00AM to 03:30PM

Department of Computer Science & Engineering, SCMS School of Engineering and Technology conducted a hands-on workshop on DIR-V Vega Processors by trained professionals from C-DAC on Saturday, 17 December 2022 from 09:00 AM to 03:30 PM in Lab 6, Fifth Floor, Administrative Block with participants from ECE and CSE. The event coordinated by Dr. Varun G Menon (Professor) and Chief guest for the event is Dr. Suresh Kumar V (Professor & Dean Academics). A total of 31 students from Third and Final Year of ECE and CSE attended the event.

Members from Industry


Neetha Maria
Scientist E
C-DAC, Thiruvananthapuram

Remya B V
Project Engineer
C-DAC , Thiruvananthapuram

Mydhily M R
Project Engineer
C-DAC , Thiruvananthapuram

Himanshu D
Project Engineer
C-DAC , Thiruvananthapuram




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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Photos



Ernakulam, KL, India
Aluva, Ernakulam, 683582, KL, India
Lat 10.269689, Long 76.399674
12/17/2022 01:33 PM GMT+05:30
Note : Captured by GPS Map Camera



Ernakulam, KL, India
Aluva, Ernakulam, 683582, KL, India
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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576





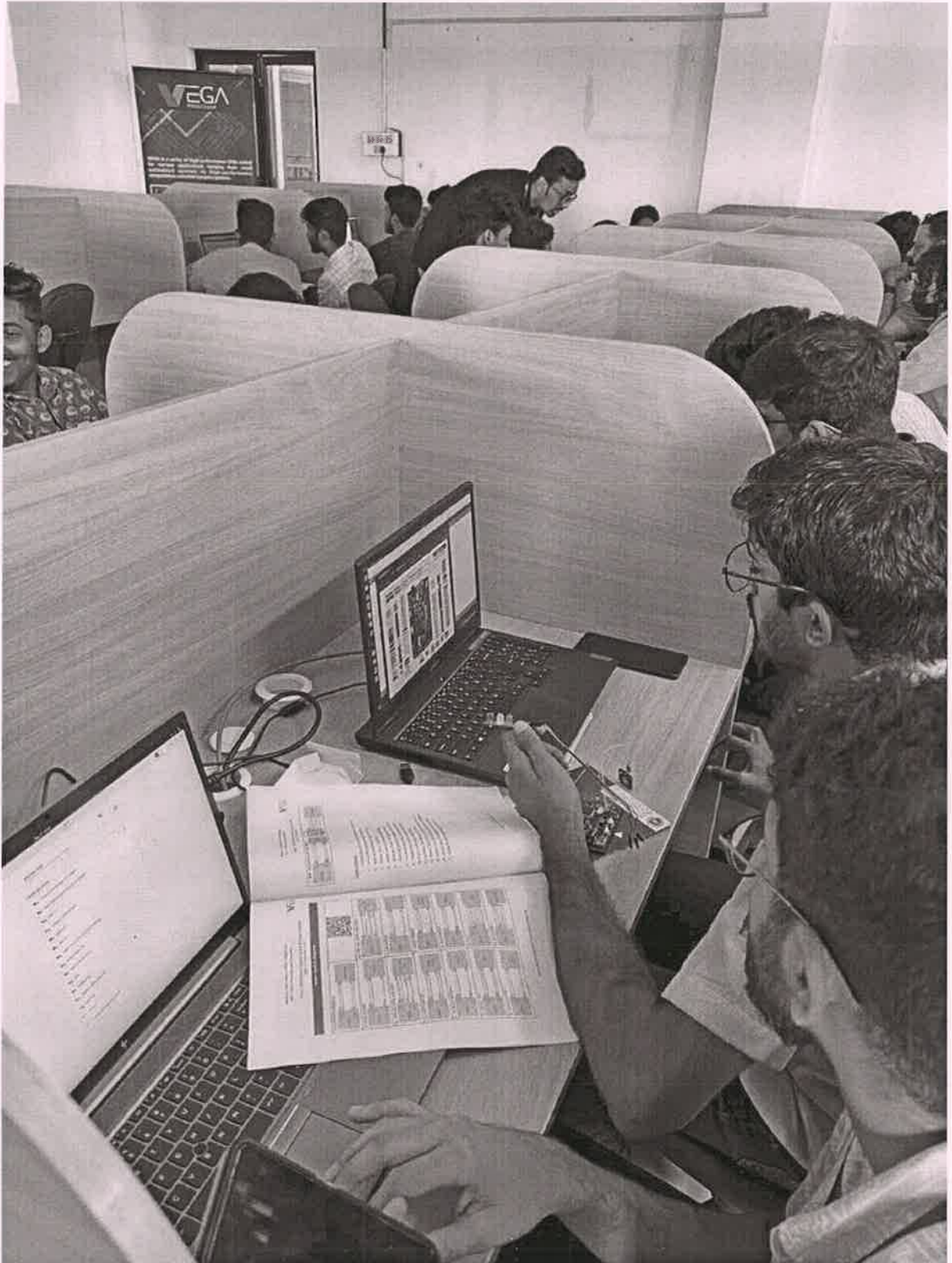
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Aluva, Ernakulam, 683582, KL, India
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Note : Captured by GPS Map Camera



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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576



Joshi

SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYA NAGAR, KARUKUTTY, ERNAKULAM - 683 582

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

List of participants for CDAC workshop

SI No	Name of the Student	Attendance	
		EN	AN
1	Jean Jacob Rajesh	<i>[Signature]</i>	<i>[Signature]</i>
2	MOHAMMED IMRAN GMK	<i>[Signature]</i>	<i>[Signature]</i>
3	RIHAN SAJEER	<i>[Signature]</i>	<i>[Signature]</i>
4	NIKHIL VINAYAN	<i>[Signature]</i>	<i>[Signature]</i>
5	Seethalekshmi KS	<i>[Signature]</i>	<i>[Signature]</i>
6	TS SRIYA	<i>[Signature]</i>	<i>[Signature]</i>
7	Javio Vinu Abraham	<i>[Signature]</i>	<i>[Signature]</i>
8	Prashobh C.P	<i>[Signature]</i>	<i>[Signature]</i>
9	Anandu Suresh	<i>[Signature]</i>	<i>[Signature]</i>
10	Sagar .P Gokul	<i>[Signature]</i>	<i>[Signature]</i>
11	Sayoj M.J	<i>[Signature]</i>	<i>[Signature]</i>
12	Zuhail Nassar	<i>[Signature]</i>	<i>[Signature]</i>
13	Sneha	<i>[Signature]</i>	<i>[Signature]</i>
14	MAHESH S	<i>[Signature]</i>	<i>[Signature]</i>
15	FADIZ LATHEEF PA	<i>[Signature]</i>	<i>[Signature]</i>
16	Aparna Rajeev	<i>[Signature]</i>	<i>[Signature]</i>
17	Alexious K George	<i>[Signature]</i>	<i>[Signature]</i>
18	Haripriya CH	<i>[Signature]</i>	<i>[Signature]</i>
19	Aaravind M V	<i>[Signature]</i>	<i>[Signature]</i>
20	PS Ahy Antony	<i>[Signature]</i>	<i>[Signature]</i>
21	Jhayan S. Krishna	<i>[Signature]</i>	<i>[Signature]</i>
22	Geendutt S Prabhuk	<i>[Signature]</i>	<i>[Signature]</i>
23	Abin Siby	<i>[Signature]</i>	<i>[Signature]</i>
24	AKHINDASIT Prasann	<i>[Signature]</i>	<i>[Signature]</i>
25	Chackochan Sebastian	<i>[Signature]</i>	<i>[Signature]</i>
26	Antoin Sautrosb	<i>[Signature]</i>	<i>[Signature]</i>
27	Ashwin Sivasankaran K	<i>[Signature]</i>	<i>[Signature]</i>
28	Anureoj .k.P.	<i>[Signature]</i>	<i>[Signature]</i>
29	Mohammed ZIYAD	<i>[Signature]</i>	<i>[Signature]</i>
30	SOORAJ S	<i>[Signature]</i>	<i>[Signature]</i>
31	SUSMI JAWB	<i>[Signature]</i>	<i>[Signature]</i>
32			
33			<i>[Signature]</i>

Ph: No:
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 6282560679.
 7356826329
 8891040286
 8089291820
 7736309201
 9688144368
 735648064
 6282794927
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 8281531839
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 VIDYANAGAR, PALLISSERY, KARUKUTTY

SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYA NAGAR, KARUKUTTY, ERNAKULAM - 683 582

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING


List of participants for CDAC workshop

G No	Name of the Student	Class
1	Mahesh S Mahesh V C	S7CS2
2	Sreerag Suhail Nassar	
3	Andrin Santhosh Anurenj	S7CS1
4	Gopika Akinash	
5	Alocious K Jose Chackochan Sebastian	S5CS1
6	Faaz Latheef Ashwin Sivasankaran	
7	Muhammed Irfan NIKHIL VINAYAN	S5CS2
8	Jeen Jacob SAVIO VINU ABRAHAM	
9	RIHAN SAJEER PRASHOBH C P	S7 ECE
10	ANANDU SURESH SAGAR P GOKUL	
11	SAYOOJ M J YUNUS A A	
12	HARIPRIYA C H P S ABY ANTONY	
13	SIDHARTH K S SREELAKSHMI T U	
14	AISWARYA PATHUPPILLIYATH APARNA RAJEEV	
15	BHARATH KRISHNA MURALIDHARAN ROHITH SREENIVASAN	
16	AKSHAY R NIRANJAN SANTHOSH	
17	SAITHYA THOMAS Ms. NITHYA M	
18	Mr. VINOJ P G Dr. Varun G Menon	
19	Dr. Manish T Dr. Scaria Alex	
20	Ms. Susmi Jacob Mr. Mahesh K M	

Volunteers List

Name	Class
1 MOHAMMED ZIYAD	S5 CS2
2 SOORAJ S	
3 GADHA SUDHEER C	S7 EC
4 MIDHUN M NAIR	
5 MINAS K S	




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ERNAKULAM, KERALA-683 576

SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY, KARUKUTTY

Department: CSE

Feedback Form for External Resource Persons
(Invited talks/Workshops/Seminars)

Name of Resource Person : *Remya BV* Contact No: *9961852388* Email id: *remya.bv@cdac.in*

Organization / Institute: *C-DAC, TUM* Designation: *Project Engineer*

Resource Person for (event name) :

Date: *17/12/2022*

1. Do you agree that our Engineering students are capable of solving any complex Engineering problems?

- Strongly agree
 Moderately agree
 Strongly disagree

2. Are the Engineering students capable of applying basic principles of Mathematics and Engineering to solve problems ?

- Yes, they are
 They are moderately good
 No, they are not

3. Will the engineering graduates be able to design solutions for a problem as per a specific need?

- Yes, they can
 They can moderately do
 No, they can't

4. Do you think that the engineering students have the knowledge to Investigate and understand a given engineering phenomenon?

- Yes, they have
 No, they don't have
 I am not sure

5. Do you think that our engineering graduates are capable of handling tools for learning or for designing a solution?

- Yes, they can
 Moderately they can
 No, they can't



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ERNAKULAM, KERALA-683 576

6. Do you think that the present engineering graduates are conscious about Health, Safety, Legal aspects and its consequences when they practice their profession?

- Yes, they are
 They are moderately conscious
 No, they are not

7. Are the Engineering students environmentally sensitive & conscious ?

- Yes, they are
 They are moderately conscious
 No, they don't care

8. Are Engineering graduates good in professional ethics?

- Yes, very much
 Moderately
 No, they are not

9. Do the engineering graduates have the capacity to work independently or as a part of a team?

- They like to work independently
 They like to work in a team
 They are good to work independent as well as in a team


10. Can the young engineers be considered as good communicators and good learners?

- Yes, they are excellent communicators and learners
 They express their ideas satisfactorily
 No, they can't express themselves

Suggestions for improving the quality of the B.Tech Program

SCMS School of Engineering & Technology would like to thank you for your willingness in spending your valuable time to complete this questionnaire.
Your time and effort are much appreciated.




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Signature

SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY, KARUKUTTY

Department: CSE

Feedback Form for External Resource Persons (Invited talks/Workshops/Seminars)

Name of Resource Person : Mydhily M.R Contact No: 7034710672 Email id: mydhily@cdac.in

Organization / Institute : CDAC Trivandrum Designation : Project Engineer

Resource Person for (event name) :

Date : 17-12-2022

1. Do you agree that our Engineering students are capable of solving any complex Engineering problems?

- Strongly agree
 Moderately agree
 Strongly disagree

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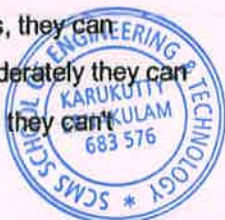
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 No, they can't



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KERALA-683 576

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Suggestions for improving the quality of the B.Tech Program

[Empty box for suggestions]

Joshi



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SCMS School of Engineering & Technology would like to thank you for your willingness in spending your valuable time to complete this questionnaire. Your time and effort are much appreciated.

[Signature]
Signature

SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY, KARUKUTTY

Department: CSE

Feedback Form for External Resource Persons (Invited talks/Workshops/Seminars)

Name of Resource Person : Neetha Maria Contact No: 9895372193 Email id: neetha@edac

Organization / Institute : EDAC Designation : Scientist E

Resource Person for (event name) : VEGA Hands On Workshop. Date: 17/12/2022

1. Do you agree that our Engineering students are capable of solving any complex Engineering problems?

- Strongly agree
 Moderately agree
 Strongly disagree

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ERNAKULAM, KERALA-683 576

A handwritten signature in blue ink, appearing to read "Anitha", written over a horizontal line.

6. Do you think that the present engineering graduates are conscious about Health, Safety, Legal aspects and its consequences when they practice their profession?

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Suggestions for Improving the quality of the B.Tech Program

May include more project based activities and make them industry ready.

SCMS School of Engineering & Technology would like to thank you for your willingness in spending your valuable time to complete this questionnaire.
Your time and effort are much appreciated.



Mithi
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ERNAKULAM, KERALA-683 576

Mithi
Signature

SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY, KARUKUTTY

Department: CSE

Feedback Form for External Resource Persons (Invited talks/Workshops/Seminars)

Name of Resource Person : Himanshu D

Contact No: 7768993493 Email id: kishore.dh@cdac.i

Organization / Institute : CDAC

Designation : Project Engineer

Resource Person for (event name) :

Date :

1. Do you agree that our Engineering students are capable of solving any complex Engineering problems?

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 Moderately agree
 Strongly disagree

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Suggestions for improving the quality of the B.Tech Program

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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Signature



**GJ ECO POWER
PVT LTD**

Door No. X/63, Sarayu Complex, Seaport - Airport Road,
Kakkanad, Kochi, Kerala - 682030, India

Phone: 0484 2979111, 4050884

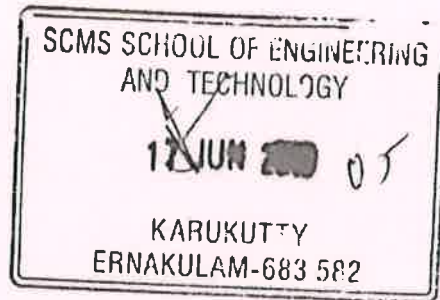
Email: Info@gjecopower.com | web: www.gjecopower.com

CIN: U40108KL2016PTC040055

Document No : K1-AA-BL-D006

Date : 06/11/2019

To,
The Principal,
SCMS College of Science & Technology,
Karukutty,
Ernakulam.



Dear Sir,

First of all we, GJ Eco Power Pvt Ltd wish to thank SCMS faculty and team members for completing a waste study project at Brahmapuram. We also wish to express our sincere gratitude for participating in the public hearing for the Environmental Clearance of the project. It's been a privilege for us to work along with a prestigious organization like yours.

As we are in the stages of plant construction and waste characteristics analysis, we would like to put a request for continuing the waste study analysis for the coming year as well. So it will be a continuation of the previous work done by students. It is of great environmental and educational significance and we would be grateful if you permit Mr. Ratish Menon and his team to continue with the MSW study project. Project participation certificate will be issued to students upon successfully completing the study at the end of each academic year. Looking forward to hear from you at the earliest.

Best regards,

Kabeer B Haroon,

President of Operations,

GJ Eco Power Pvt Ltd.

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MIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576



Dated 16th OCTOBER 2018

BETWEEN

GJ ECO POWER PVT. LTD.

AND

SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY.,

CONFIDENTIALITY AGREEMENT



PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

CONFIDENTIALITY AGREEMENT

THIS AGREEMENT is made on the 16th day of OCTOBER 2018

BETWEEN

GJ ECO POWER PVT. LTD., a company incorporated in India, and in accordance with the Laws applicable in India and whose principal place of business is in 3rd Floor, Sarayu Complex, Seaport Airport Road, Kakkanad, Kochi, Kerala-682 030, India. (here in after referred to as "GJEP")

AND

SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY., a company incorporated in India and in accordance with the Laws applicable in India and whose principal place of business is in Vidya Nagar, Paliserry, Karukutty, Ernakulam, Kerala 683 582, India. (here in after referred to as "SCMS")

Each GJEP and SCMS may hereinafter be referred to as a "Party" or collectively as the "Parties".

WHEREAS:

- A. GJEP wish to enter into discussions with SCMS regarding "Waste Study Project" for GJ Eco Power Ltd referred to as the "Project".
- B. GJEP has agreed to disclose confidential information to SCMS for further development of Consultation related to the Project, GJEP will need, on a non-exclusive basis, to reveal confidential information to SCMS.
- C. The Parties wish to enter into this Agreement to establish the rights and obligations in respect of such confidential information and other matters.



[Handwritten Signature]

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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576



NOW THEREFORE IT IS AGREED AS FOLLOWS:

1. The following expressions shall have the meanings specified in this Clause.

"Confidential Information" means any and all data, reports, drawings, electronic documents, files, spreadsheets, e-mails, records, correspondence, notes, compilations, studies and other information disclosed directly or indirectly by one Party or any of their Representatives, to another Party or any or their Representatives relating to or in any way connected with (a) the Project, (b) either Party or (c) their respective business activities actual or proposed, whether such information is disclosed orally, in writing, in machine readable form or by any other means, regardless of whether such information is identified as confidential, and includes, without limitation, any information ascertainable by inspection by one Party or its Representatives of the premises or business of another Party;

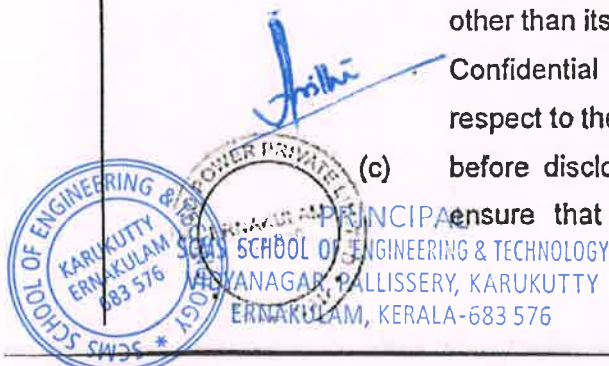
"Disclosing Party" means the Party which discloses Confidential Information to the other Party;

"Receiving Party" means the Party which receives Confidential Information from the other Party;

"Representatives" means directors, officers or employees of a Party.

2. In consideration of disclosure of Confidential Information to the Receiving Party, the Receiving Party undertakes for a period of three (3) years from signature of this Agreement:

- (a) to use the Confidential Information solely for the purpose of the Project and to keep the Confidential Information in strict confidence;
- (b) not to disclose the Confidential Information furnished to it to anyone other than its Representatives, who have a legitimate need to know the Confidential Information in order to participate in or negotiate with respect to the Project;
- (c) before disclosing Confidential Information to its Representatives, to ensure that such person is aware of the discloser's obligations



hereunder and have such person bound by confidentiality obligations no less stringent than those assumed by the Receiving Party;

- (d) to be liable for any unauthorised disclosure of Confidential Information by any person to whom the Receiving Party has disclosed Confidential Information; and
- (e) As far as possible, to keep separate all Confidential Information from all documents and other records of a Party.

3. The undertakings in Clause 2 above shall not apply to any Confidential Information which the Receiving Party can demonstrate,

- (a) at the time of disclosure to the Receiving Party or thereafter is already known to the Receiving Party [has become part of GJEP knowledge or literature];
- (b) was in its possession at the time of disclosure hereunder and was not acquired by such Party under an obligation of confidence;

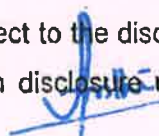
and which in either case is received or obtained by the Receiving Party through no act or omission on the part of the Receiving Party.

4. In the event that the Receiving Party, its Representatives are required or requested by any court or legislative or administrative body to disclose any Confidential Information, such Party will promptly and prior to disclosure use its best endeavours (to the extent permitted by law) to notify the Disclosing Party so that an appropriate protective order and/or other action can be sought and/or other action can be taken if possible. In the event that such protective order is not, or cannot be, obtained, then

- (a) the Party subject to the disclosure requirement or request may disclose to the appropriate body that portion of the Confidential Information which such Party is legally required to disclose and shall use reasonable efforts to obtain assurances that confidential treatment will be accorded to the Confidential Information; and

(b) the party subject to the disclosure requirement or request shall not be liable for such disclosure unless such disclosure was caused by or




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ERNAKULAM, KERALA-683 576

resulted from a previous disclosure by such Party or any of their Representatives, that was not permitted by this Agreement.

5. The Parties agree that Confidential Information shall remain the property of the Disclosing Party who shall retain all right, title and interest thereto, and, upon request by the Disclosing Party, the other Party shall use all reasonable endeavours to promptly:

(a) return or at the option of the Receiving Party, destroy all Confidential Information that is in tangible form furnished to the other Party, together with any copies or extracts thereof; and

(b) destroy all analyses, compilations, studies or other documents which have been prepared by the other Party and which reflect or are based upon any Confidential Information, except to the extent such Confidential Information is incorporated into corporate documents or reports which such Party is required to retain by law or its internal procedures, in which case such Party will take appropriate measures to preserve its continuing confidentiality.

6. The Parties hereto shall not directly or indirectly contact persons or entities related to the Project and disclosed by one Party to the other Party for the purpose of circumventing the other Party concerning the Project. In the event of circumvention by any Party, directly or indirectly, the circumventing Party shall indemnify the other Party against all liabilities, costs, expenses, damages and losses (including but not limited to any direct, indirect or consequential losses, loss of profit, loss of reputation and all interest, penalties and legal costs (calculated on a full indemnity basis) and all other reasonable professional costs and expenses) suffered or incurred by the other Party arising out of or in connection with any breach of this agreement, including this clause 6, by the circumventing Party.

7. The Agreement shall be governed by, and construed in accordance with, the laws of India. Any dispute between the Parties arising out of the formation, performance, interpretation, nullification, termination or invalidation of the Agreement or arising therefrom or related thereto in any manner whatsoever, shall be subject to the exclusive

Joshi
Jurisdiction of the Ernakulam High Court

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8. Any notices to be given here under by either Party to the other shall be in English and sent by registered letter or facsimile to the other Party at the addresses stated below:

(a) **GJ ECO POWER PVT. LTD.,**
3rd Floor, Sarayu Complex,
Seaport Airport Road, Kochi,
Kerala-682 030, India

(b) **SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY.,**
Vidya Nagar, Paliserry
Karukutty, Ernakulam,
Kerala -683 582

Any notices shall be effective only upon actual receipt at the appropriate address.

9. This Agreement constitutes the entire agreement of the Parties with respect to the subject matter thereof and supersedes any and all prior communications understandings, arrangements or agreements between the Parties, whether written, oral, express or implied relating thereto. No amendment or modification to this Agreement shall be valid unless in writing and signed by a duly authorised representative of each of the Parties.

IN WITNESS WHEREOF the Parties have caused this Agreement to be executed as a deed by their respective duly authorized representatives in double originals.




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ERNAKULAM, KERALA-683 576



Executed as a Deed by
GJ Eco Power Pvt Ltd.,

Acting By: 

Name: James Adai

Title: Director
in the presence of:-



Witness Signature 

Witness Name Abraham Tk

Address GI Eco power
kakkanad.

Occupation Project officer.


Executed as a Deed by
SCMS School of Engineering and
Technology.,

Acting By: 

Name: **DR. PRAVEENSAL C.J.**
PRINCIPAL
SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY

Title:
in the presence of:-



Witness Signature 

Witness Name Dr. Ratish Menon

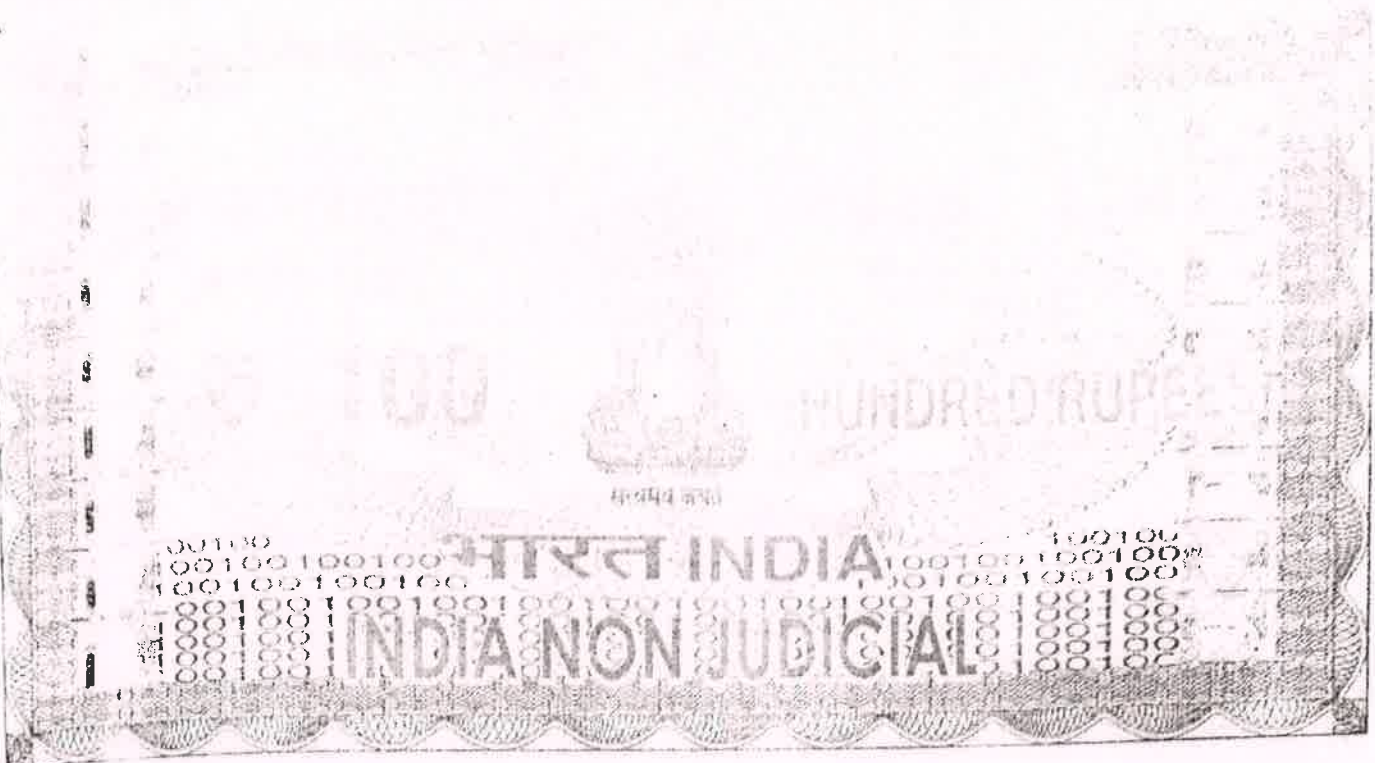
Address SCMS SCHOOL OF ENGINEERING
AND TECHNOLOGY
KARUKUTTY

Occupation Associate Professor





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ERNAKULAM, KERALA-683 576



കേരളം കേരल KERALA

DC 883717

Memorandum of Understanding

between

Waves Electronics (P) Ltd

and

**SCMS School of Engineering and
Technology, Karukutty.**

Dated: 17-08-2021



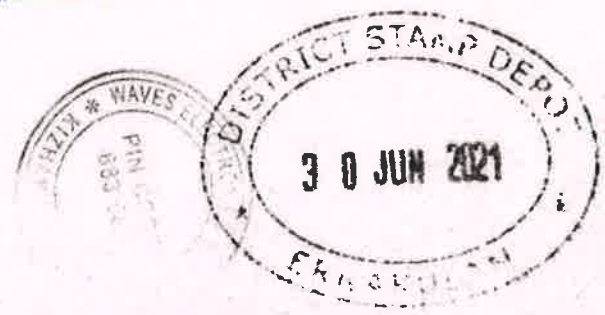
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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

No. 8430 Date 30.06.2021
Value of Rs. 100/-
Sold To Waves Electronics PVT LTD

AYAKUMAR G.
Stamp Vendor
High Court Of Kerala
Ernakulam

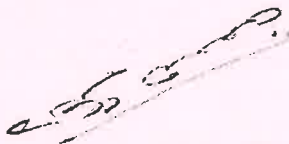
Kizhakkem balam



IN WITNESS, WHEREOF the parties hereto have caused this MoU to be signed in their respective names as of the day and year.

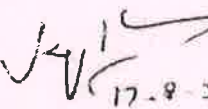


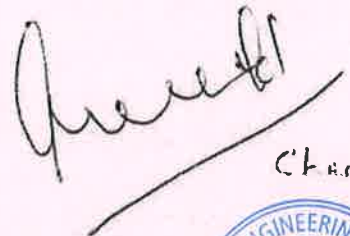
Prof. Pramod P Thevannur, Vice Chairman, SCMS Group of Institutions,
FOR AND ON BEHALF OF SCMS School of Engineering and Technology,
Karukutty, Ernakulam-683 576



Mr Jayan C B, Executive Director, Waves Electronics (P) Ltd.
FOR AND ON BEHALF OF Waves Electronics (P) Ltd., Kizhakkambalam,
Ernakulam-683562

WITNESSES:

1.  Jayanand B
17.8.21

2.  Chacko P L



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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576





WAVES
Quality power
to the point

Waves Electronics (P) Ltd.
X/278 A, Alumchuvadu - Aqueduct Road, Njaralloor
Kizhakkambalam P.O., Ernakulam - 683 562, Kerala, India.

☎ : +91 9847082279, +91 9744755053,

Email, info@waveselectronics.com, waves72@gmail.com. Website: www.waveselectronics.com.



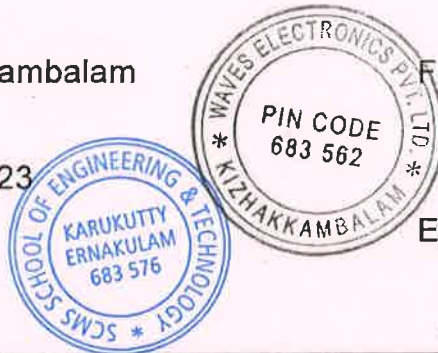
PROJECT ACCOMPLISHMENT CERTIFICATE

This is to certify that the following students *Salman P Y* (SCM19EE008), *Mohammed Adil V A* (SCM19EE007), *Soorya Sathyan* (SCM19EE009), and *Amal Pradeep* (SCM19EE004) of Eight Semester Electrical and Electronics Engineering completed the project entitled "**IGBT Based Battery Charger**" in partial fulfilment of the requirements for the award of the Bachelor of Technology Degree in Electrical and Electronics Engineering under A.P.J Abdul Kalam Technological University for the year 2022-2023 at SCMS School of Engineering and Technology, Karukutty. The project was done in collaboration with Waves Electronics Pvt. Ltd., Kochi during the time period November 2022 to June 2023 and was guided by *Mrs. Bilby Issac*, Assistant Engineer, WAVES Electronics.

Place: Kizhakkambalam

For Waves Electronics Pvt. Ltd.

Date: 12/07/2023



[Signature]

Executive Director
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576



Bank details: Indian Bank, Ernakulam Branch, Cochin - 682031, A/c. 462988312, RTGS/IFS Code No: IDIB000E007, SWIFT: IDIBINBBEKM, GSTIN: 32AAACW2601G1ZY. PAN No: AAACW2601G. MSME UAN: KL02B0004936. CIN:U29299KL1972PTC002411

Manufactures and Exporters of: Battery Chargers, Power Supply, Intelligent MCC (Draw out/Fixed) / PCC, MSB, ESB, NLCP, VFD Panel, Generator Synchronization Panel with PLC, SCADA, ECR/ Bridge Consoles, APFC Panels etc

Our Products are Tested for EMI/EMC, JSS 55555 and Inspected and certified by ABS/ LRS/ IRS, BV, DNV, DQA (Naval) etc....

Registered Office: 155 B, "Alappatt", Toc-H Road, Lane XV, Vyttila, Cochin -682 019

Export Division: First Floor, Plot No. 17/SDF, Cochin Special Economic Zone, Kakkanad, Cochin, Kerala - 682 037, India

Unit Financed by **KSIDC**

In Technical Collaboration with **AGEL**, Alesund, Norway

Consultancy Project

Agreement between

SCMS School of Engineering and Technology, Karukutty

and

UNOTECH Marine Engineering & Services Pvt Limited, Kochi

as of 14-4-2022

This agreement is effective as of 14-4-2022 by and between SCMS School of Engineering and Technology, Karukutty, Kerala, India hereinafter referred to as SSET, of the FIRST PART.

And

UNOTECH Marine Engineering & Services Pvt Limited, a Company incorporated under the Companies Act 1956 and having its registered office at Gandhi Nager, Kochi, India, hereinafter referred to as COMPANY, of the SECOND PART,

The aforesaid institutions are hereinafter referred to individually as Party and collectively as the Parties.

Whereas the COMPANY is engaged in the business of Boat/Barge/Ship construction for Government and private establishments.

Whereas SSET is a prestigious institute engaged in providing quality education in engineering and science and conducting original research of the highest standard.

Whereas Dr Jayanand B , Department of Electrical Engineering, (hereinafter referred to as SSET Principal Investigator) and Dr Divyanath K (Co Investigator) will initiate the project titled "The development of 22HP Electric Propulsion system for Boat/Barge/Ship (hereinafter referred to as Project). He/She and his/her research team at SSET will receive/disclose Confidential Information on behalf of SSET and will be solely responsible for non disclosure of the Confidential Information received from the Company.




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Whereas the Parties desire to record the broad terms and conditions that are jointly accepted and agreed to in this MoU as contained hereunder.

1. Definition:

(a) COMPANY know-how shall mean and include all know-how of methods, material, software, designs, patterns, formats, proprietary technical literature, and information developed, owned and provided by COMPANY, which are required for the Project.

(b) SSET know-how shall mean and include all know-how of methods, material, software, designs, patterns, formats, proprietary technical literature, and information developed, published or otherwise owned and provided by SSET, which are required for the Project.

(c) COMPANY Personnel shall mean the personnel or research and development engineers of the Company deputed for the Project.

(d) Principal Investigator Research Team shall comprise the Principal Investigator and the Co-Investigators participating in the Project under this agreement.

2. Items/areas of collaboration/deliverables:

Technical specifications of the Project are given in Annexure A to this MoU.

3. Activities and Obligations:

(a) COMPANY shall be responsible for providing the funds required for the Project, as identified in Annexure B. COMPANY may depute appropriate COMPANY personnel to participate in the Project, as per mutual agreement. COMPANY will provide its facilities and resources for the execution of the Project.

(b) COMPANY will provide COMPANY know-how, which may be deemed necessary for the Project.

(c) COMPANY shall take reasonable steps to prevent SSET know-how, which are meant only for the purpose of conducting the Project, from unauthorised usage or falling into unauthorised hands.

4. Intellectual Property Rights:

Ownership of any intellectual property (including but not limited to confidential information, know-how, patents, copyrights, design rights, rights relating to computer software, and any other industrial or intellectual property rights) developed jointly during the course of this MOU shall be vested in both parties to this Memorandum.

The Company shall have right to determine the commercial exploitation and disposition of such intellectual property.



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Any publication regarding such intellectual property shall only be possible with the prior notice to the other parties.

SSET shall be free to use the intellectual property developed during the Project for its own internal teaching, further research, educational and publication.

5. Effective date, duration, termination of the MoU:

The MoU shall be effective from the effective date and shall remain in force for a period of 0.5 (Half) year. Parties may extend the term by written agreement signed by both.

The project work may be terminated by either party by giving the other party a written notice of 60 days. However, both parties will ensure that the provisions of this MoU shall continue to apply to all activities in progress until their completion. Clauses relating to Intellectual Property Rights, governing laws shall survive the termination or expiration of this MoU.

6. Payment:

Financial specifications are given in Annexure B to this MoU. All cheques will be drawn in favour of the Registrar, SSET.

7. Confidentiality:

- a. Confidential information includes all communication of information disclosed in documentary or tangible form between the parties, including oral, written and machine-readable form, pertaining to the above which is indicated as confidential. In the case of such information disclosed orally or visually, the disclosing party shall confirm in writing the fact and general nature of each disclosure within (30) days after it is made.
- b. Confidential information includes information:
 1. Disclosed by or on behalf of the disclosing party to the receiving parties,
 2. Otherwise learned or ascertained by the receiving party from inspection and/or evaluation of sample(s) identified by the disclosing party as confidential and provided to the receiving party by or on behalf of the disclosing party (sample(s)) and/or,
 3. Otherwise learned or ascertained by the receiving party from the disclosing party.
- c. The Receiving Party will not disclose confidential information of Disclosing Party to any other person and use at least the same degree of care to maintain the Information confidential as Receiving Party uses in maintaining as confidential its own confidential Information, but always at least a reasonable degree of care; due diligence will be taken by both parties in maintenance of confidential information.
- d. The Receiving Party will use the confidential information only for the above mentioned purpose.



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- e. The Receiving Party will restrict disclosure of the confidential information of the Disclosing Party solely to those employees, subsidiaries, parent and affiliated companies of Receiving Party having a need to know such Information in order to accomplish the purpose stated above.
- f. This MoU imposes no obligations on Receiving Party with respect to any portion of the confidential information received from Disclosing Party which:
1. was known to Receiving Party prior to disclosure by Disclosing Party,
 2. is lawfully obtained by Receiving Party from a third party under no obligation of confidentiality,
 3. is or becomes generally known or publicly available other than by unauthorized disclosure,
 4. is independently developed by Receiving Party or
 5. is disclosed by Disclosing Party to a third party without a duty of confidentiality on the third party.
 6. is required by law or decree.
- g. The confidential information shall remain the sole property of Disclosing Party.
- h. The obligation of non disclosure of confidential information shall survive for 3 years after expiry/termination of this agreement.

8. Conflict Resolution:

This MoU is subject to Indian law. The parties will try to settle all disputes concerning this MoU in an amicable way. Reference made shall be deemed to have been made under the provisions of the Arbitration and Conciliation Act, 1996 or any statutory modification/re-enactment thereof and rules made there under. The award of the arbitrator shall be binding on both the parties. In case, however, the arbitrators are unable to come to a conclusion, then they will appoint an umpire whose decision shall be final and binding on both the parties.

9. Force Majeure:

Each party shall be excused from performance of the MoU only to the extent that the performance is prevented by conditions beyond reasonable control of the affected party. The party claiming excuse for the delayed performance will promptly notify the other party and will resume its performance as soon as performance is possible.

10. ANY INFORMATION, PRODUCTS, MATERIALS, SERVICES, INTELLECTUAL PROPERTY, OTHER PROPERTY OR RIGHTS, GRANTED OR PROVIDED OR GENERATED BY SSET PURSUANT TO THIS MOU ARE ON AN AS IS WHERE IS BASIS.



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11. SSET MAKES NO WARRANTIES OF ANY KIND EITHER EXPRESS OR IMPLIED, TO UNOTECH MARINE ENGINEERING AND SERVICES PVT LTD OR ANY THIRD PARTY, AS TO ANY MATTER INCLUDING, BUT NOT LIMITED TO, WARRANTY OF FITNESS FOR PARTICULAR PURPOSE, OR MERCHANTABILITY, EXCLUSIVITY OR RESULTS OBTAINED FROM USE.

Seal of the parties

In witness thereof, the parties hereto have signed this MoU on the date, month and year mentioned hereinbefore.

For and on behalf of UNOTECH

Signature



Name : Shyam K

Designation: Director

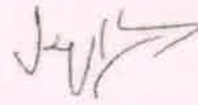
Date: 14-4-2022

In the presence of

Witness

For and on behalf of SSET

Signature



Name : Jayanand B

Designation : Head, EE Dept.

Date: 14-4-2022

In the presence of

Witness



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Annexure A
Technical specifications of the Project

Objective: To develop a 22HP Electric Propulsion System for Boat/Barge/Ship.

Detailed specifications:

Input shall be Lithium Ion Battery in the range of 90-150V. This voltage is to be stepped up to a constant voltage appropriate for the Inverter Drive system of a 22 HP Induction Motor.

Proposed timeline: The project period is four months from the date of signing of MoU.



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Annexure B

Financial Specifications

1. Approximate Cost of Project : Rs 5 Lakhs
2. Purchase of equipment, fabrication, installation and testing will be done at the company premises.
3. One project associate with M Tech qualification will be recruited for carrying out this project with a remuneration of Rs 20,000 per month.
4. Initial simulation, testing etc will be carried out in the laboratories of SSET.
5. An amount of Rs 50,000 shall be paid to SSET as overhead expenses.



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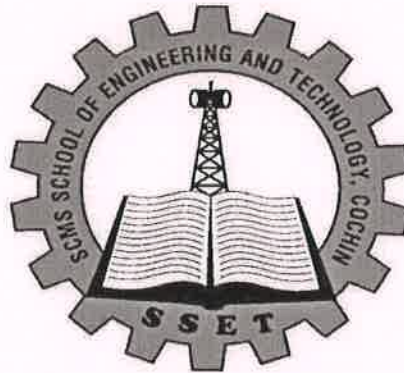
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DESIGN AND DEVELOPMENT OF 22HP ELECTRIC PROPULSION SYSTEM FOR BOAT

A PRODUCT DEVELOPMENT REPORT

FOR

**UNOTECH MARINE ENGINEERING AND SERVICES PVT LIMITED,
KOCHI**



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY

KARUKUTTY

MARCH 2023

SUBMITTED TO :



UNOTECH MARINE ENGINEERING AND SERVICES PVT LIMITED,

38/2394 C, 1st Floor, Vee Jay Towers, Salim Rajan Road
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VISION AND MISSION OF THE INSTITUTE

VISION

To be a center of excellence in providing technical education in harmony with the changing global order.

MISSION

To offer technology related education of exceptional quality to students by developing their total personality with due emphasis on ethical values and preparing them to meet the growing challenges of the industry and human society.



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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS
ENGINEERING**

SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY



CERTIFICATE

*Certified that this is the product development report titled **DESIGN AND DEVELOPMENT OF 22HP ELECTRIC PROPULSION SYSTEM FOR BOAT** is a bonafide record of the work done by Dept. Of Electrical and Electronics Engineering, SSET Karukutty for Unotech marine engineering & services pvt limited .This project developed as part of Memorandum of Understanding signed between SSET karukutty and Unotech marine engineering & services pvt limited.*

Dr.B Jayanand
Head of the Department
Electrical and Electronics Engg
SSET Karukutty

Mr Shyam K
Executive Director
Unotech Marine Engineering
and Services Pvt Limited,
Ernakulam

Date: 27-3-23



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ACKNOWLEDGEMENT

I wish to express heartfelt gratitude and sincere thanks to guide **Dr. B. Jayanand**. Head, Department of Electrical and Electronics Engineering for his invaluable guidance and support from conceptualization to finalization of our project and all its related activities.


I would also like to thank **Dr. Anitha G. Pillai** Principal, SSET Karukutty for her kind support for completion of this venture. We are very much grateful to **Dr. Praveensal C.J** ,Group director , SSET Karukutty

Shyam.k Executive Director and **Nibu Vishwanath** Project Manager of unotech marine engineering & services pvt limited, kochi for their encouragement, inspiration, sponsorship and execution of this project work.

I take this opportunity to thank my beloved parents for their blessings, timely help and moral support. I specially thank all EEE faculties, all teaching and non -teaching staff members of our department .

Last but not the least i would like to thank Lord Almighty for giving perseverance and for enlightening during the course of the project.




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RASIYA AZIZ

ABSTRACT

The global demand to reduce CO₂ emissions requires effort from the shipping industry which currently emits about 2% of anthropogenic global Greenhouse Gases (GHGs) and which is predicted to increase due to growth of world trade. Therefore, it is important to find new ways to reduce CO₂ emissions from shipping using new operational strategies, improved ship designs and new technologies. Battery technologies have been developing rapidly leading the road transport industry into a greener future with hybrid and electric vehicles but such a change is not so apparent in the shipping industry. This work describes a packaging solution to the electric propulsion motor drive of an electric boat. Here, we developed 22 HP electric propulsion system for the boat. The system main parts are a induction motor (IM), a IGBT-based inverter, a DC-DC converter and an onboard control system based on Aurdino.



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CHAPTER 3 Z-SOURCE CONVERTER

CHAPTER 4 BOOST CONVERTER


CHAPTER 5 INVERTER

CHAPTER 6 COMPONENTS

CHAPTER 7 PROTOTYPE IMPLEMENTATION

CHAPTER 8 RESULT AND DISCUSSION




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CHAPTER 1

INTRODUCTION

Large batteries have been used in conventionally powered submarines since the turn of the 20th Century to provide submerged operation and today, with the use of an air independent propulsion plant, they are capable of staying submerged for around 3 weeks operating at speeds of about 5 knots. Whilst many small boats have adopted batteries for propulsion e.g. pleasure craft, the use of batteries in ships has been limited, mostly restricted to acting as an emergency power source with very few battery powered applications. In contrast, there has been significant increased interest in battery powered road vehicles to reduce atmospheric emission to meet increasingly stringent regulations. These vehicle designs have taken advantage of new battery technologies such as Lithium batteries originally developed for the telecommunications industry. All ships require power for two purposes: 1) to provide propulsion power, 2) to provide service power to support hotel/accommodation, cargo and ancillary equipment. Service power depends on many things such as number of crew, cargo type and operational requirement but for most ships is typically a small fraction of the propulsion power. Large intercontinental ships have tens of MW of propulsion power installed and tend to use a large two-stroke low-speed diesel engines coupled directly to the propeller.

Among the various environmental problems faced today, water pollution caused by navigation is a concern, mainly in tourist areas where the traffic is increasing every year, but also in environmentally protected areas. Initiatives to use electrical propulsion systems in transportation represent alternatives to reduce the environment pollution and improve overall life quality standards, among other benefits.

With increasing pollution due to conventional propulsion systems such as marine fuels and marine diesel, the density of polluting agents such as SO_x and NO_x has increased significantly since the past few years. This is one of the prime reasons that is expected to increase the adoptability of electric boats for numerous purposes. Moreover, with the increase in disposable income of the population across the globe, the spending on tourism activities has increased significantly. This is further anticipated to boost the demand for electric boats for tourism and recreational purposes.



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OUTLINE OF THE PROJECT REPORT

This product development report is composed of six chapters. The first chapter includes the introduction.

Chapter 2 presents a detail study about the work.

Chapter 3 presents a detailed study, design and simulation of the Z-source dc-dc converter.

Chapter 4 includes design and simulation of the boost converter.

Chapter 5 gives the brief about the inverter.

Chapter 6 includes the details about the main components.

Chapter 7 illustrates about the prototype implementation.

Chapter 8 concludes the work.



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CHAPTER 2

THE DEVELOPMENT OF 22HP ELECTRIC PROPULSION SYSTEM FOR BOAT/BARGE/SHIP

Electric boats are marine vessels with electric drive as propulsion technology. These boats use battery power for propulsion of rotor to achieve maximum speed. Electric boats can be pure electric, hydrogen fuel cell electric, or hybrid electric. Key components of an electric boat comprise battery bank, controller and electric motor. Battery bank responsible for storing energy to propel electric boats. A motor controller converts direct current into alternating current. Electric motor allows boats to operate, offering enhanced orientation. Batteries used in electric boats are similar to those used in electric vehicle. In addition, electric boats run in clean energy and do not create any pollution.

BLOCK DIAGRAM

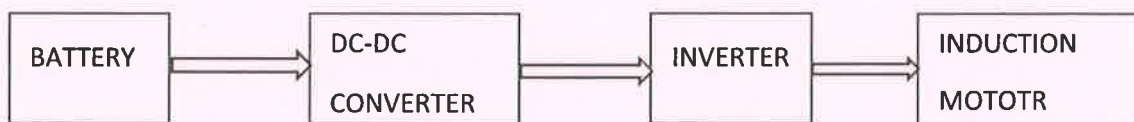
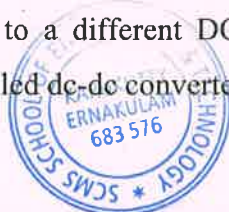


Fig 2.1 Simplified block diagram electric propulsion for boat

Electric boats especially the pure electric category are zero emission vehicles that are fuelled by electric power from large capacity batteries. Pure electric boats are being widely preferred in most of the countries due to their inherent capability to reduce pollution.

The simplified block diagram of the electric propulsion system for boat is shown in fig.2.1. The battery provides energy for the propulsion. The lithium-ion batteries are used in this design, because these batteries have high energy density. The voltage from battery do not stable at all time. Hence, we required a dc-dc converter to stabilize the voltage. A process that changes one DC voltage to a different DC voltage is called ~~DC to DC~~ conversion. This type of converters are called dc-dc converters. More numbers of dc-dc converters are already invented



for stepping up as well as stepping down of voltages. A boost converter is a DC-DC converter with an output voltage greater than the input source voltage. A boost converter is sometimes called a step-up converter since it "steps up" the source voltage. Power for the boost converter can come from any suitable DC source, such as batteries, solar panels, rectifiers, and DC generators. Here a simple boost converter used for serving this function i.e., boosting and regulating the battery voltage. Then a three phase inverter required to convert this DC voltage in to AC for the motor operation. A PI controller is used to provide the necessary control signal to the converter and inverter. While taking the three phase power induction motor rotates, this allows boats to operate.

CIRCUIT DIAGRAM

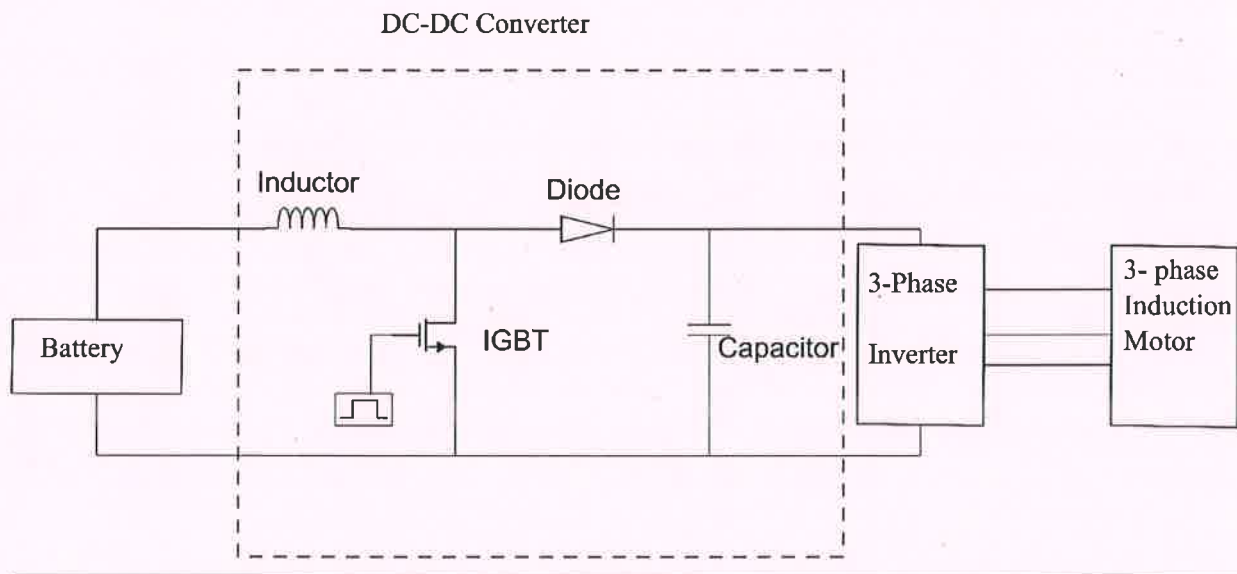
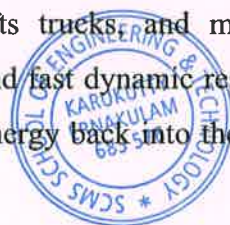


Fig 2.2 Schematic circuit diagram of electric propulsion for boat

In many technical applications, it is required to convert a set voltage DC source into a variable-voltage DC output. A DC-DC switching converter converts voltage directly from DC to DC and is simply known as a DC Converter. A DC converter is equivalent to an AC transformer with a continuously variable turns ratio. It can be used to step down or step up a DC voltage source, as a transformer.

DC converters are widely used for traction motor control in electric automobiles, trolley cars, marine hoists, forklifts trucks and mine haulers. They provide high efficiency, good acceleration control and fast dynamic response. They can be used in regenerative braking of DC motors to return energy back into the supply. This attribute results in energy savings for



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transportation systems with frequent steps. DC converters are used in DC voltage regulators. Here we use a boost converter for this purpose.

A boost converter is usually applied in renewable energy systems as the output voltage of these systems is low and unregulated. Configuration of the boost converter is illustrated in Fig.2.2. In this converter, output voltage is a function of the duty cycle of switch (S), which can be defined by a proper modulation technique. When the switch is on, current flowing through it can charge the capacitor. However, in the next sub interval when the switch is turned off the inductor current will charge the capacitor. Second order LC filter in this configuration can regulate the output voltage and remove the high frequency harmonics. Power supplies are perhaps the most crucial elements of a battery- powered system. Switching converters use an inductor's magnetic field to alternately store energy and release it to the load at a different voltage. With low losses they are a good choice for high efficiency. Capacitors connected to the converter's output reduce output voltage ripple. A switching power supply consists of a power stage and a control circuit. The power stage performs the basic power conversion from the input voltage to the output voltage and includes switches and the output filter. The control circuit monitors the output voltage and controls the power switch. The control circuit comprises of a microcontroller which generates the necessary control signal to turn on the power switch. The duty cycle of the control signal is varied to adjust the output voltage. Boost converters are essentially a step-up converter that take in a low voltage input and provide an output at much higher voltage.




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CHAPTER 3

Z- SOURCE CONVERTER

INTRODUCTION

Z-source dc/dc converter is designed for boosting the input voltage to higher output voltage level. The main circuit diagram of the Z-source dc/dc converter is shown below. Fig3.1:

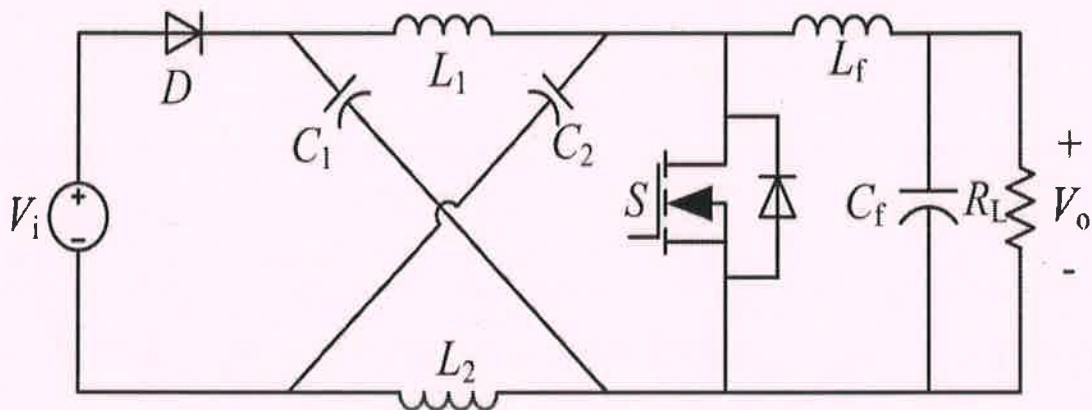


Fig 3.1 Circuit diagram of Z-source dc/dc converter

Z-source dc-dc converter shown in figure consists of a diode D_1 , two identical inductors denoted by L_1 and L_2 and two identical capacitors denoted by C_1 and C_2 connected in a manner to form the Z network, and an active switch S which can be MOSFET, IGBT or GTO. It also consists of a second order low pass filter formed by L_f and C_f .

The Z-source part of the converter is used to boost the voltage across the IGBTs. Boosting of input voltage is achieved by switching the IGBT.

The z-source topology is the converter that converts voltage level to upper or lower levels. It means that is dc to dc boost converter or buck converter. Z shaped inductors and capacitors can couple the system. When it does that, it uses unique inductor-capacitor network that has an Impedance. Thus, the harmonic distortion and inrush current have been reduced to minimal value. Z-source inductors and capacitor have been chosen same value. So, they can be



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used symmetrical. The inductor voltages and capacitor voltages will be equalized due to symmetrical properties. So, the voltages will be following equation. $V_{L1} = V_{L2} = V_L$ and $V_{C1} = V_{C2} = V_C$. Inductor-capacitor (LC) filter used to take down output voltage ripple.

CONVERTER OPERATION

Converter operation includes 2 modes of operation.

Mode 1: (0 < t < DT)

The CCM operation in mode-1 starts when switch S is ON. The Z-source network inductors, "L" are energized by the Z-source network capacitors "C" in this period. The operation of the circuit in mode-1 can be established as suggested in figure below.

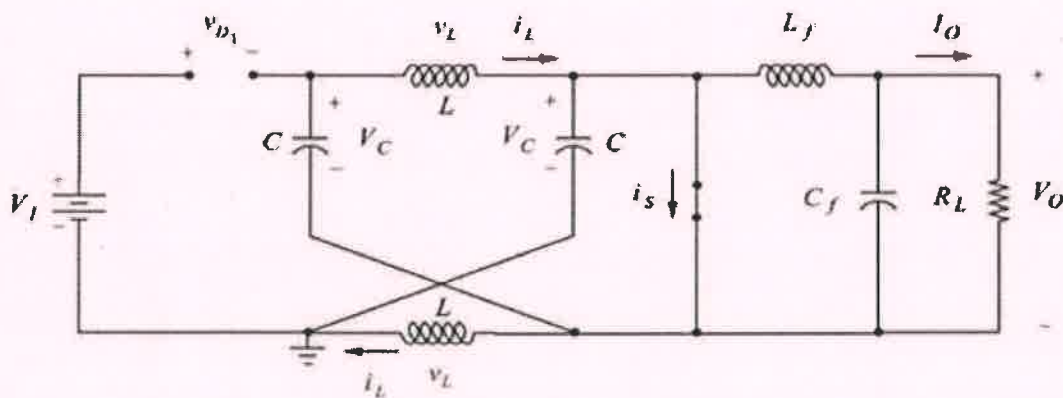


Fig 3.2 Circuit diagram of mode-1 operation of z- source converter

Applying the Kirchhoff's voltage law in the second loop, the voltage across the Z-source network inductor during t_1 time interval yields;

$$V_C - V_L = 0$$

$$V_C = V_L$$

Applying the Kirchhoff's voltage rule in the first loop, the voltage across the input diode D during the time interval yields;

$$V_1 - V_D - V_C - V_L = 0$$

$$V_D = V_1 - 2V_C$$

which is negative.



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The input diode voltage is negative during this mode; hence D is not conducting implying that no current is drawn from the input supply during the period.

Here, the output filter elements L_f and C_f supply the required energy to the load. Since, the energy to the load is supplied via L_f

Applying the Kirchoff's voltage law in the last loop

$$-V_{Lf} - V_O = 0$$

$$V_{Lf} = -V_O$$

Mode 2: ($DT < t < T$)

Let T represent a full switching period for the converter while running at steady state. The CCM operation in mode-2 starts at time DT where D is called as the duty factor applied to S. At that instant, S is turned off and stops conducting.

The loop equations regarding to mode-2 operation can be written referring to the circuit shown below,

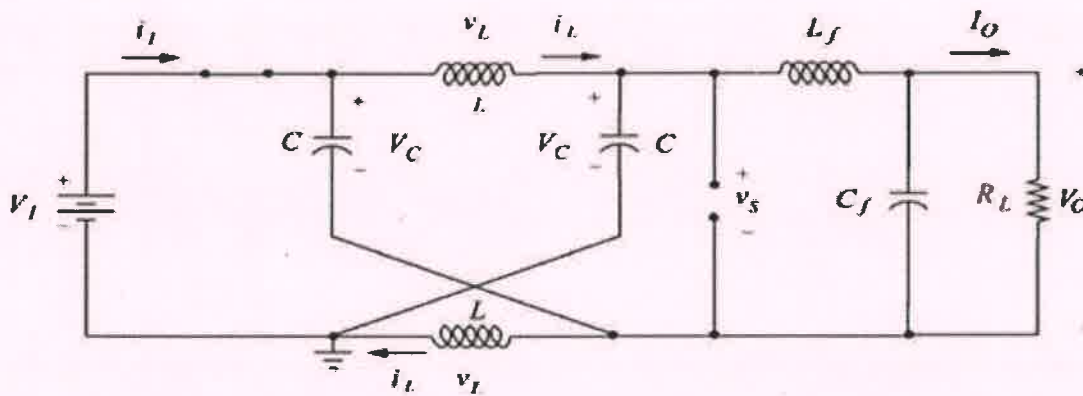


Fig 3.3 Circuit diagram of mode-2 operation of z- source converter

Applying the Kirchoff's voltage law , the voltage across the filter inductor L_f , during mode-2 is found as;

$$-V_{Lf} - V_O + V_C - V_1 + V_C = 0$$

$$V_{Lf} = 2 V_C - V_1 - V_O$$



Prithi

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For the boosting operation of the converter the Z-source network capacitor voltage is equal to output voltage as; $V_O = V_C$

$$V_{Lf} = V_1 - V_O$$

Since, $V_1 < V_O$ for boosting operation, hence the filter inductor voltage in mode-2 for CCM operation is positive implying that it stores energy during this time interval.

Applying the Kirchhoff's voltage law in the first loop, the voltage across L during mode 2 is found as, $V_1 - V_C - V_L = 0$

$$V_L = V_1 - V_C = 0$$

Since, $V_1 < V_O$, As a result, the energy stored in L in mode-1 is transferred to the load in mode-2. The negative polarity of on L forces the input diode D to conduct. Finally the current circulating through diode charges C.

DESIGN

The important parameters of design a z-source converter are the passive components, duty cycle and switching frequency. Low frequency means that the passive components will be increased, and physical dimension of the circuit will increase. On the other hand, to keep low the sizes of passive components, also will decrease the physical dimension of circuit. Therefore, the frequency should be high, however, the losses will be increased and efficiency problem will be emerged. The frequency has been chosen 10 kHz for the following example.

$$V_s = V_{in} = 300 \text{ V}$$

$$V_o = 375.5 \text{ V}$$

$$P_o = 22700 \text{ W}$$

$$R_L = \frac{V_o^2}{P} = 6.2 \Omega$$

$$f = 10 \text{ kHz}$$

$$I_o = \frac{P}{V} = 60.45 \text{ A}$$

To find duty cycle,



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$$D = \frac{(V_o - V_s)}{(2V_o - V_s)}$$

$$D = \frac{(375.5 - 300)}{(2 * 375.5 - 300)} = 0.617$$

Duty cycle, $D = 0.62$

The frequency has been chosen as 10 kHz for the following example. To find inductor value of z source network, inductor current ripple of z-source network should be calculated. To calculate inductor current ripple of z-source network, inductor current of z-source network should be calculated. The following equation for I_L ;

$$I_L = \frac{(1 - D)^2 * V_s}{R_L * (1 - 2D)^2}$$

Then, $I_L = \frac{(1-0.62)^2 * 300}{6 * (1-2*0.62)^2} = 75.57A$

$I_L = 75.57A$ is the current through z-source network inductor. The z-source inductor ripple has been assigned to 20% of I_L .

Then, $\Delta i_L = 15.11A$ for 20%.

To find z-source inductor value;

$$L_z = \frac{D * V_o}{f * \Delta i_L}$$

$$L_z = \frac{0.62 * 375.5}{10 * 10^3 * 15.11} = 0.4mH$$

To find output inductor value of the circuit, output inductor current ripple of the circuit should be calculated. To calculate output inductor current ripple of the circuit, output inductor current of the circuit should be calculated. The following equation for I_{LO} ;

$$I_{LO} = \frac{(1 - D) * V_s}{R_L * (1 - 2D)}$$



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Substituting the values, current through output inductor will be 60.42 A. The output inductor current ripple has been assigned to 20% of I_{LO} . The 20% of the output inductor current ripple is 12.08A.

Then, $\Delta i_{LO} = 12.08A$.

To find output inductor value;

$$L_O = \frac{D * V_O}{f * \Delta i_{LO}}$$

Then,

$L_O = 0.5mH$ is the output inductor value.

Next step is the calculation of capacitor values.

For the z-source network we required 2 identical z- source capacitors.

ΔV_C is the voltage ripple on the z-source capacitors. It is 2% percent of V_O .

$$\Delta V_C = 7.51V$$

To find z-source capacitor value,

$$C_Z = \frac{D * I_L}{f * \Delta V_C} = 168 \mu F$$

$C_Z = 168 \mu F$ is the z – source capacitor value.

The output capacitor value can be found out from,

$$C_O = \frac{V_O * D}{f^2 * 8 * L_O * \Delta V_C}$$

Substituting the values and calculate, we get $C_O = 20 \mu F$



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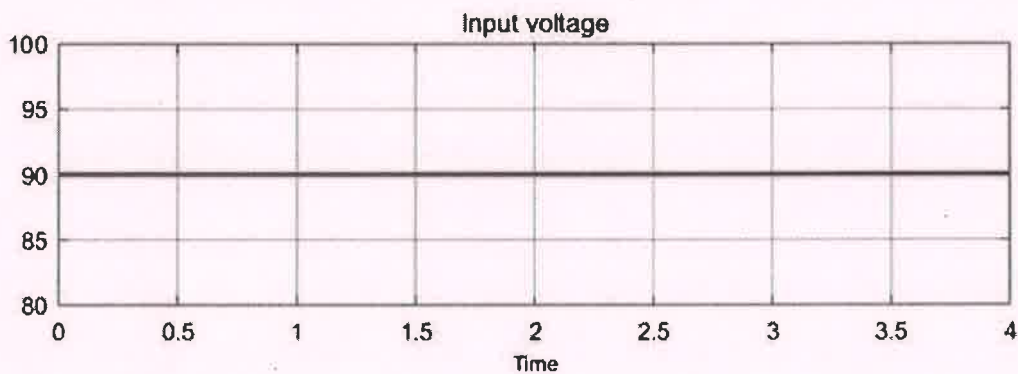
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SIMULATION OF CLOSED LOOP Z- SOURCE CONVERTER

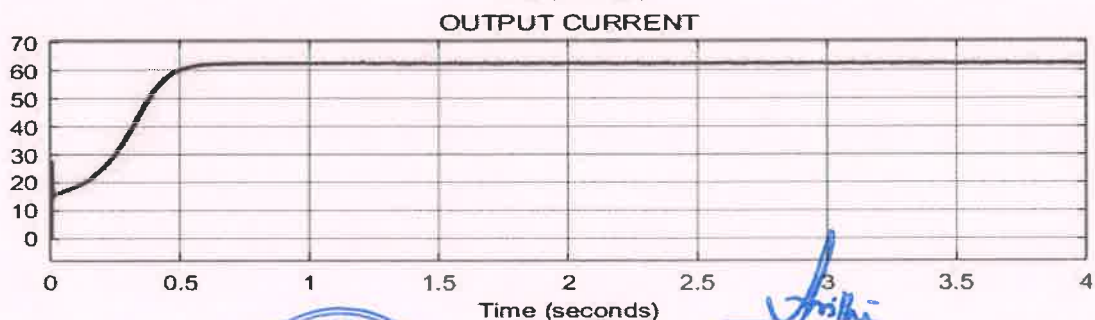
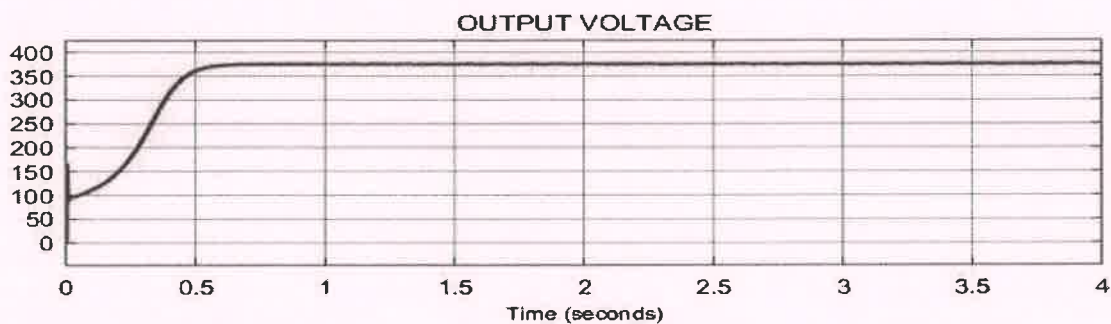
MATLAB SIMULATION DIAGRAM

Given below is a closed loop circuit diagram used for MATLAB simulation of z-source converter under R load and measure voltage and current waveforms across the components . In this simulation standard values of capacitor and inductor is used. Designed the converter for 22700W and frequency of operation is 10 kHz and. Here PI controller is used for simulation. The converter is simulated for 90V input, and purpose of the circuit is to boost that voltage in to 375.5V.

Input voltage waveform

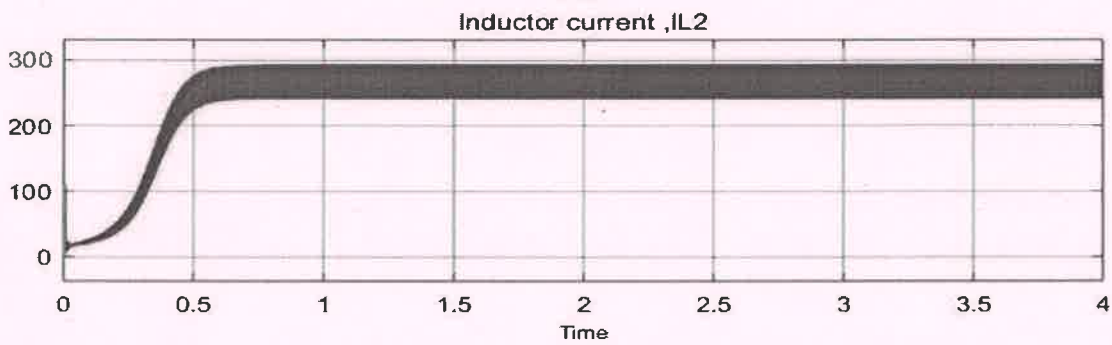
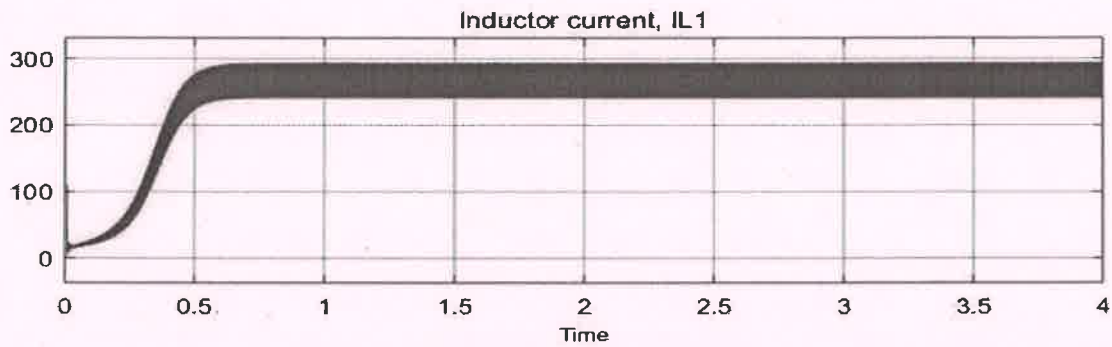


Output voltage waveform

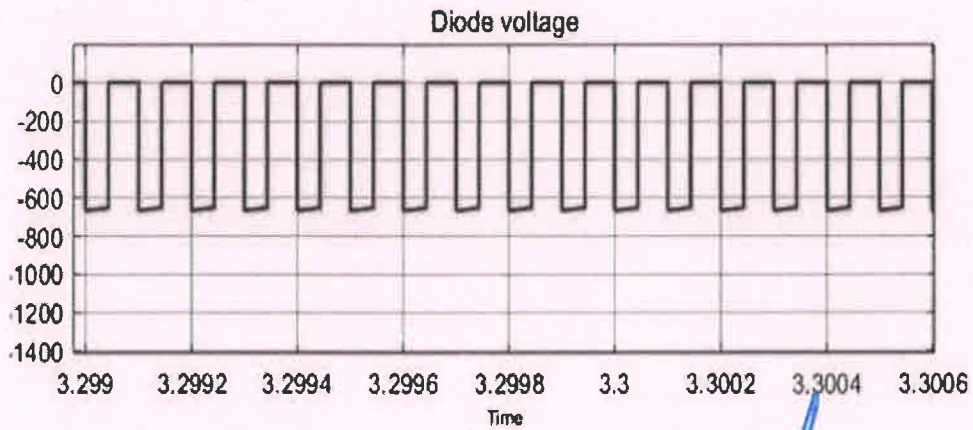


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Inductor currents waveform



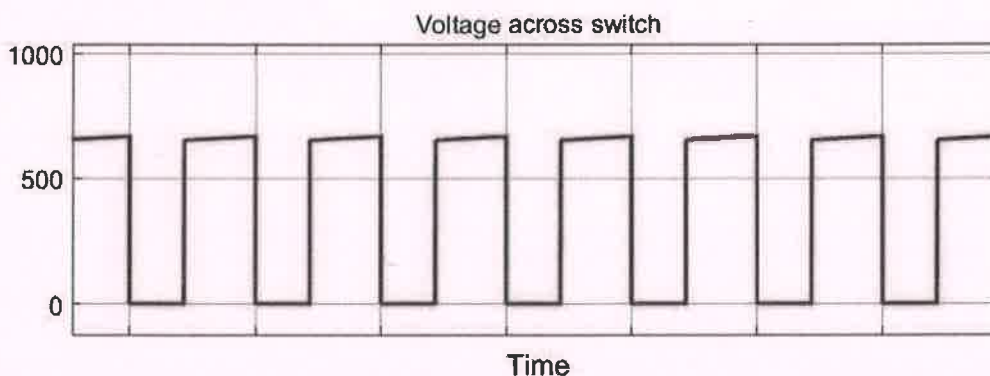
Diode voltage waveform



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Voltage across switch waveform



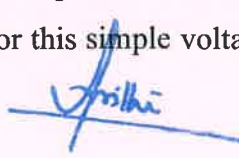
OBSERVATIONS:

The above given waveforms are obtained from MATLAB simulation. Z-source converter is simulated for the input voltage 90V and resistive load of 6 Ω . From the results obtained, it is clearly observed that the z-source converter steps up the voltage from 90V to 375V in accordance with the parameters derived earlier, fulfilling the desired conditions of output current being 62 A respectively at frequency 10kHz.

In inductors waveforms, it can be seen that z-source inductor current is very large and around 300A for the load of 6 Ω . In this conversion gain of the converter is 4.1. For a 22.7kW z-source converter with gain 4 require 2 inductor with high current rate. Hence development of these two inductors with high current rate(350A) require high gauge winding, so it will be huge in size and also costly. Also, availability of inductor core limited. Hence, we conclude that development of z-source converter is much costly for the gain 4.

- Next we decided to increase the voltage range of battery, so gain can be reduced. For high power as well as high gain converter require components with high current rating, hence practical development of such components (inductors) is much difficult and costly.
- While increasing input voltage, gain can be reduced, so inductor current rating for high power converter can be reduced and easily developed.
- For the simulation of 300V to 375.5V, z- source converter require 3 inductors including filter inductor, and 3 capacitors. We decided that for this simple voltage boosting, normal boost converter is enough.
- We changed z-source DC-DC converter to **boost converter**.




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CHAPTER 4

BOOST CONVERTER

A boost converter /step-up converter is a DC-DC power converter that steps up voltage from its input supply to its output load. It is a class of switched mode power supply (SMPS) containing at least two semiconductors i.e., a diode and a transistor and at least one energy storage element: a capacitor, inductor, or the two in combination. To reduce voltage ripple, filters made of capacitors are normally added to such a converter's output load-side filter and input supply-side filter. Boost converters are highly nonlinear systems and a wide variety of linear and nonlinear control techniques for achieving good voltage regulation with large load variations. A typical Boost converter is shown below,

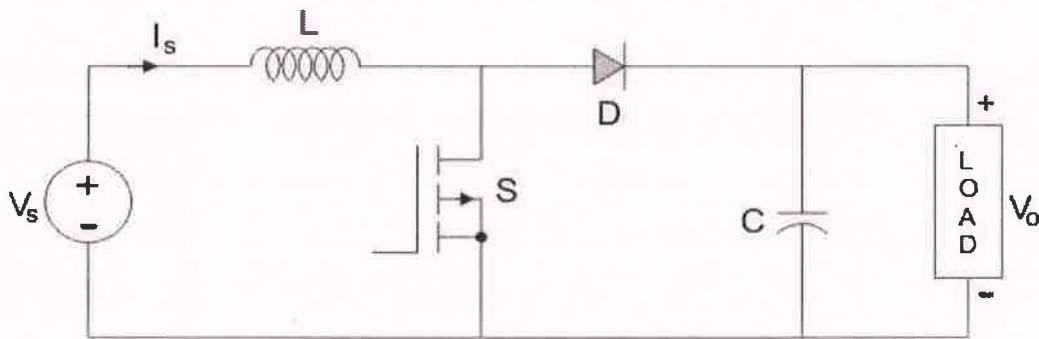


Fig 4.1 Circuit diagram of boost converter

In the above given figure, the input voltage source is connected to an inductor. The solid-state device which operates as a switch is connected across the source. The second switch used is a diode. The diode is connected to a capacitor, and the load and the two are connected in parallel as shown in the figure above.

The inductor connected to input source leads to a constant input current, and thus the Boost converter is seen as the constant current input source. And the load can be seen as a constant voltage source. The controlled switch is turned on and off by using Pulse Width Modulation (PWM). PWM can be time-based or frequency based. Frequency-based modulation has disadvantages like a wide range of frequencies to achieve the desired control of the switch which in turn will give the desired output voltage. Time-based Modulation is mostly used for dc-dc converter. It is simple to construct and use. The frequency remains constant in this type



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of PWM modulation. The boost converter has two modes of operation. The first mode is when the switch is on and conducting.

Mode 1: Switch is ON

The Switch is ON and therefore represents a short circuit ideally offering zero resistance to the flow of current so when the switch is ON all the current will flow through the switch and back to the DC input source.

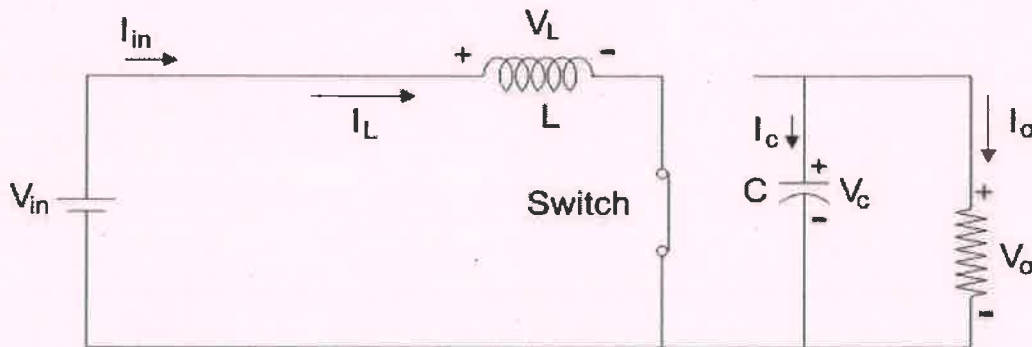


Fig 4.2 Mode-1 operation of boost converter

Let us say the switch is on for a time T_{ON} and is off for a time T_{OFF} . We define the time period, T , as

$$T = T_{ON} + T_{OFF}$$

and the switching frequency,

$$f_{switching} = \frac{1}{T}$$

Let us now define another term, the duty cycle,

$$D = \frac{T_{ON}}{T}$$

Let us analyse the Boost converter in steady state operation for this mode using KVL.

$$V_{in} = V_L$$

$$V_L = L \frac{di_L}{dt} = V_{in}$$

$$\frac{di_L}{dt} = \frac{\Delta i_L}{\Delta t} = \frac{\Delta i_L}{DT} = \frac{V_{in}}{L}$$



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Since the switch is closed for a time $T_{ON} = DT$ we can say that $\Delta t = DT$.

$$(\Delta i_L)_{closed} = \left(\frac{V_{in}}{L}\right)DT$$

While performing the analysis of the Boost converter, we have to keep in mind that, The inductor current is continuous and this is made possible by selecting an appropriate value of L . The inductor current in steady state rises from a value with a positive slope to a maximum value during the ON state and then drops back down to the initial value with a negative slope. Therefore, the net change of the inductor current over anyone complete cycle is zero.

Mode 2 :Switch is OFF

In this mode, the polarity of the inductor is reversed. The energy stored in the inductor is released and is ultimately dissipated in the load resistance, and this helps to maintain the flow of current in the same direction through the load and also step-up the output voltage as the inductor is now also acting as a source in conjunction with the input source. But for analysis, we keep the original conventions to analyse the circuit using KVL.

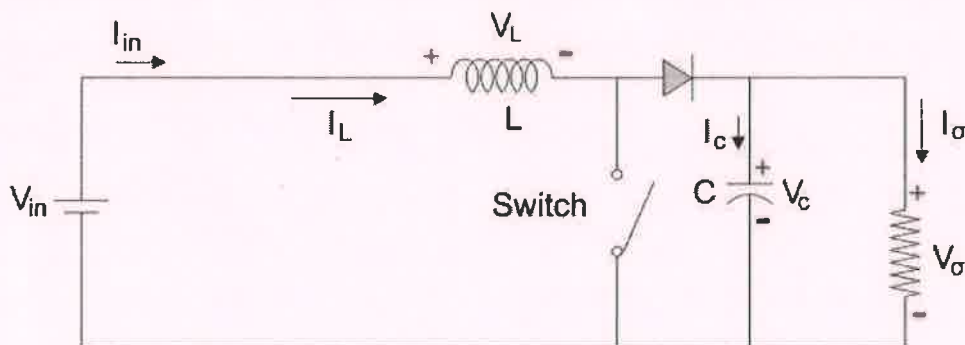


Fig 4.3 Mode-2 operation of boost converter

Let us now analyse the boost converter in steady state operation for Mode 2 using KVL.

$$V_{in} = V_L + V_o$$

$$V_L = L \frac{di_L}{dt} = V_{in} - V_o$$

$$\frac{di_L}{dt} = \frac{\Delta i_L}{\Delta t} = \frac{\Delta i_L}{(1-D)T} = \frac{V_{in} - V_o}{L}$$



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Since the switch is open for a time

$$T_{OFF} = T - T_{ON} = T - DT = (1 - D)T$$

we can say that $\Delta t = (1-D)T$.

$$(\Delta i_L)_{open} = \left(\frac{V_{in} - V_o}{L}\right)(1 - D)T$$

It is already established that the net change of the inductor current over any one complete cycle is zero.

$$(\Delta i_L)_{closed} + (\Delta i_L)_{open} = 0$$

$$\left(\frac{V_{in} - V_o}{L}\right)(1 - D)T + \left(\frac{-V_o}{L}\right)DT = 0$$

$$\frac{V_o}{V_{in}} = \frac{1}{(1 - D)}$$

This is the gain equation for the boost converter. D is the duty cycle and it varies between 0 and 1. But as we can see from the equation above that if $D = 1$ then the ratio of output voltage to input voltage at steady state goes to infinity, which is not physically possible. In fact as the boost converter is a non-linear circuit, in a practical Boost converter the duty cycle, D, if kept at a value greater than 0.7 will lead to instability. While designing the boost converter we should care about the duty cycle value.

DESIGN OF BOOST CONVERTER

In this section the function of the main components of the boost converter are discussed and the individual component values are determined to meet the project specifications. Our aim is to develop a boost converter of 22.7kW output power and 375.5V output voltage to boost and stabilize 300V from battery.

$$V_{in} = 300V$$

$$V_o = 375.5V$$

Duty cycle D for converting 300V to 375.5V can be found out from,



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$$D = 1 - \frac{V_{in}}{V_o} = 1 - \frac{300}{375.5} = 0.20$$

Output power $P_o = V_o * I_o$

Load current is :

$$I_o = \frac{P_o}{V_o} = \frac{22700}{375.5} = 60.45 \text{ A}$$

Load resistance is : $V_o = R_o * I_o$

$$R_o = \frac{V_o}{I_o} = \frac{375.5}{60.45} = 6.21 \Omega$$

The switching frequency is 10kHz. $f_s = 10 \text{ kHz}$. Inductor value is the only design parameter to maintain continuous conduction mode. To solve for the minimum value of inductor, calculate the inductor current.

$$I_L = \frac{V_{in}}{(1-D)^2 R_o} = 75.48 \text{ A}$$

$$\Delta i_L = 20 \% \text{ of } I_L = 20 \% 75.48 \text{ A} = 15.09 \text{ A}$$

The value of inductor is :

$$L = \frac{V_{in} * D}{f_s * \Delta i_L} = .4 \text{ mH}$$

The functionality of the output capacitance is to store energy and maintain a constant voltage. In a boost converter the output capacitance is selected to limit the output voltage ripple to meet the project specifications. The output voltage ripple is determined by the series impedance of the capacitor and the output current.

The following equation is used to determine the output capacitance

$$C = \frac{I_o * D}{f_s * \Delta V_C}$$

ΔV_C is the output voltage ripple and is taken 2% of $V_o = 2 \% \text{ of } 375.5 \text{ V} = 7.51 \text{ V}$.

Then,

$$C = \frac{I_o * D}{f_s * \Delta V_C} = 160 \mu\text{F}$$

For the output power of 22.7kW and 10kHz switching frequency, inductor value is .4mH and capacitor value is 160μF.

The power switch is used to control energy flow from the input to the output source. When the switch is on it must conduct current in the inductor. And when it is off, it must prevent the



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output voltage from flowing. Furthermore, the switch must change from the on and off states rapidly in order to prevent a large amount of power dissipation.

The most common switch that is used is a metal oxide semiconductor field effect transistor, a.k.a. MOSFET and Insulated Gate Bipolar Transistor a.k.a. IGBT. IGBTs are mainly used in power electronics applications, such as inverters, converters and power supplies, where the demands of the solid state switching device are not fully met by power bipolars and power MOSFETs.

Switching loss occurs when the IGBT changes states. During the switching time, typically micro or nanoseconds in duration, power can be lost. Even the short periods of power loss that occur are added together to form an average. This average can add up to be quite devastating on a circuit.

Another form of loss that occurs is conduction loss. Conduction loss occurs as the current is fed through resistors. Conduction loss affects the inductor, diode, and IGBT the most. The inductor is heavily affected by it as it is comprised of wires, which, in and of itself, has a resistance.

When the power switch is off, the output diode will conduct. When the output diode is conducting, it is creating a path for the inductor current to flow. The breakdown voltage that the diode must have should be greater than the max output voltage. The losses in the diode can be attributed to the conducting state.

SIMULATION OF CLOSED LOOP BOOST CONVERTER

MATLAB SIMULATION DIAGRAM

Given below is a closed loop circuit diagram used for MATLAB simulation of boost converter under R load. The purpose of this circuit is to measure voltage and current waveforms across the components, and output waveforms. In this simulation standard values of capacitor and inductor is used. The frequency of operation is 10 kHz. Here PI controller is used for simulation.



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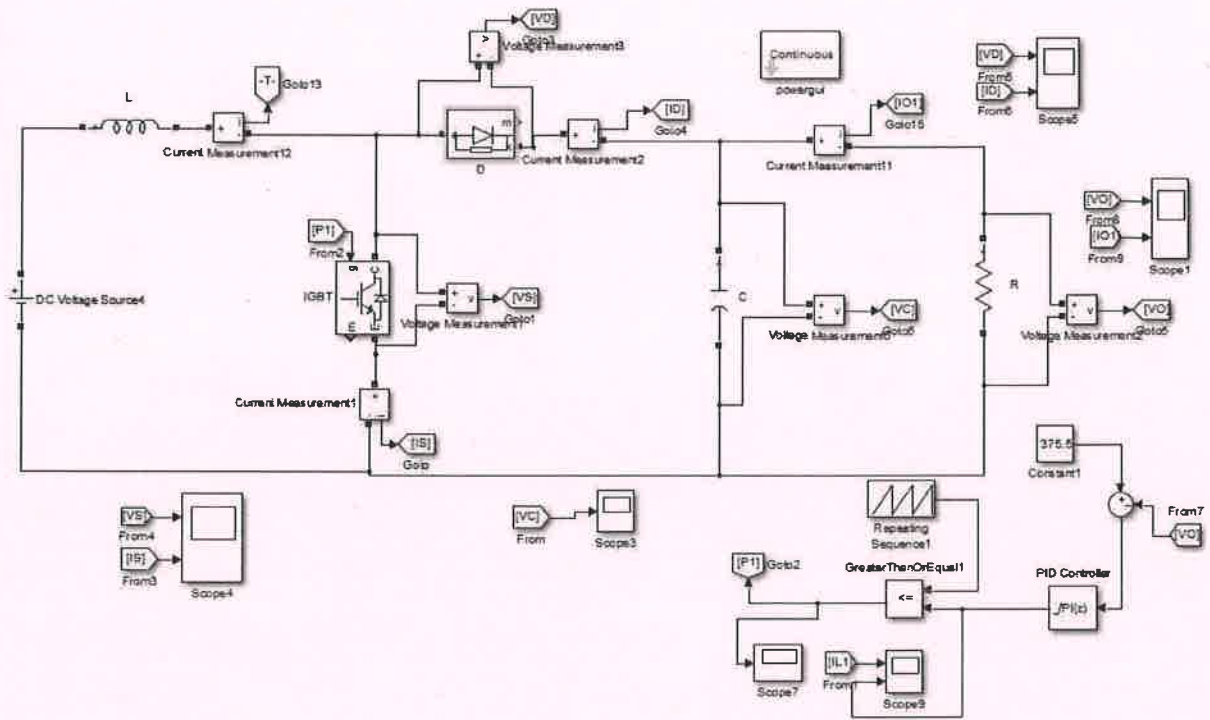


Fig 4.4 Closed loop simulation diagram of boost converter

The output will be compared along with a reference voltage, this error signal then given to the PI controller. The output signal from PI controller is compared with a reference wave and generate gate pulse and given to the switch. Values of PI controller is found by using trial and error method to get the exact signal where $K_p = 0.0001$ and $K_i = 0.0.5$.

SIMULATION RESULTS:

Inductor current waveform:

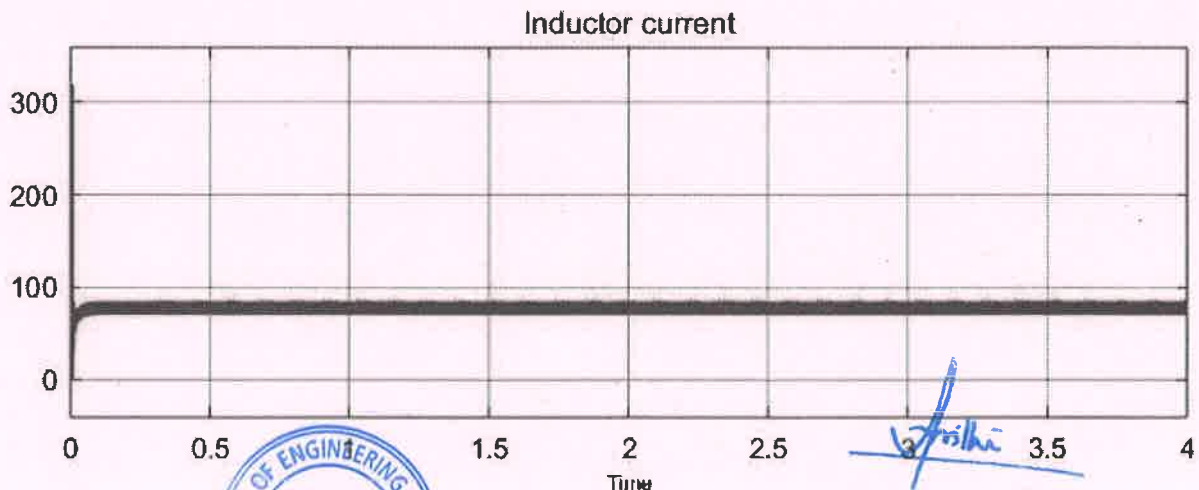


Fig 4.5 Inductor current waveform

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Output voltage and output current waveform

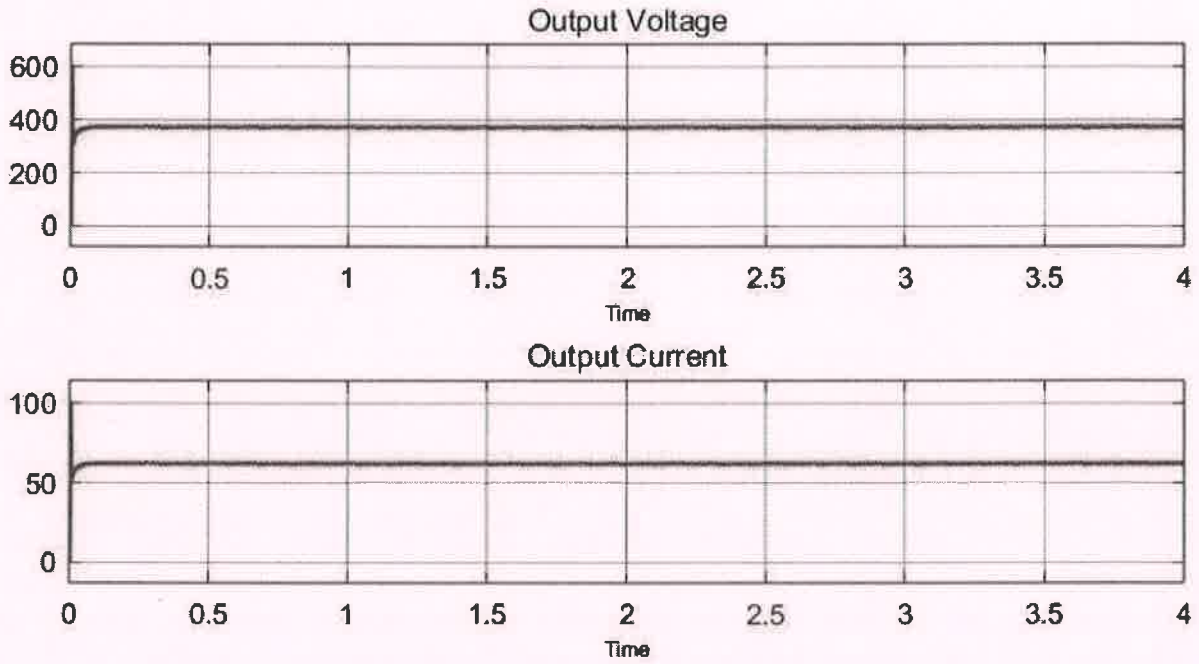


Fig 4.6 Output voltage and output current waveform

Voltage and current waveform across switch :

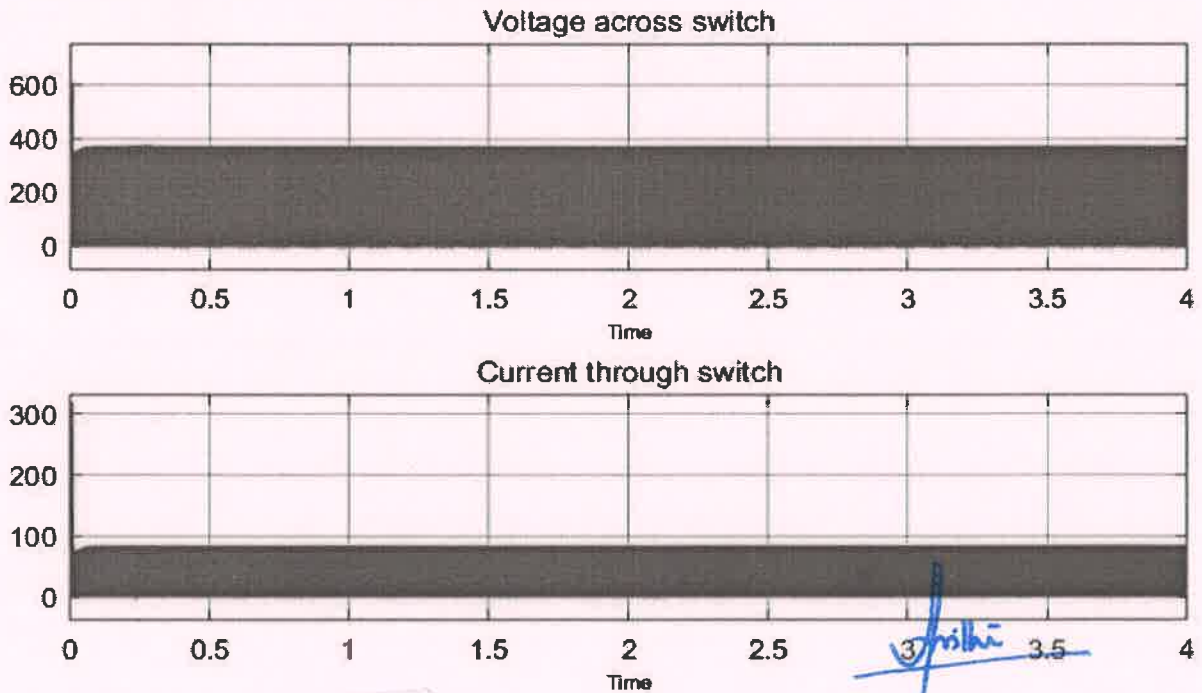


Fig 4.7 Voltage and current waveform across switch



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Voltage and current waveform across diode:

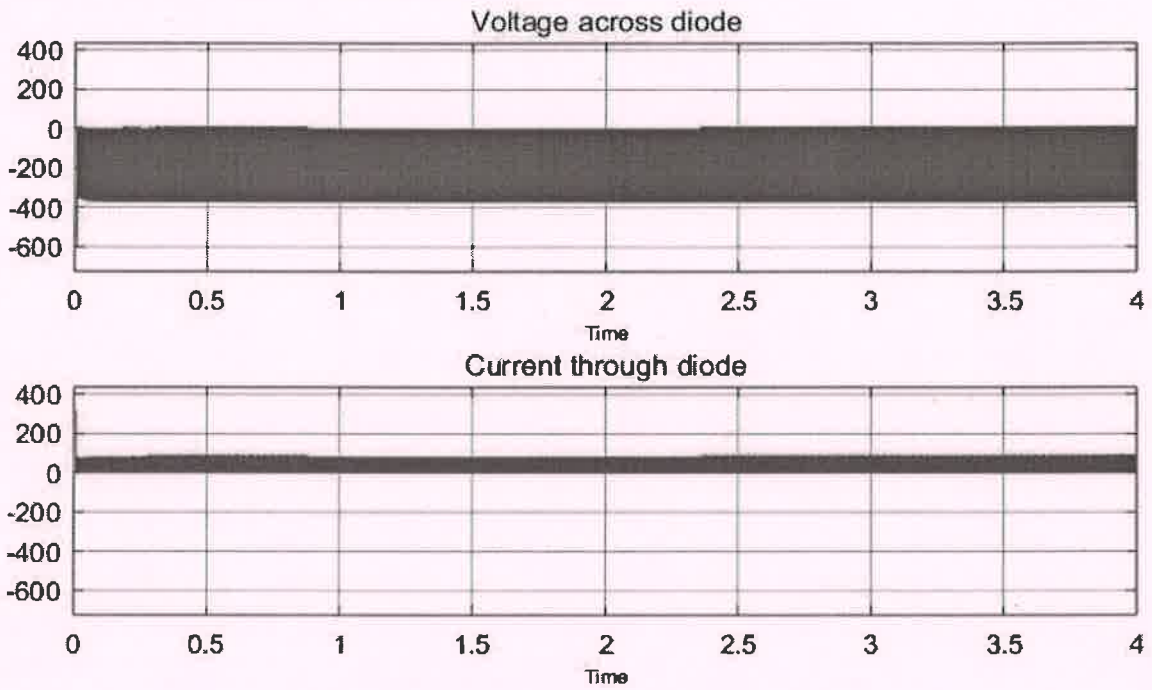


Fig 4.8 Voltage and current waveform across diode

Voltage waveform across the capacitor:

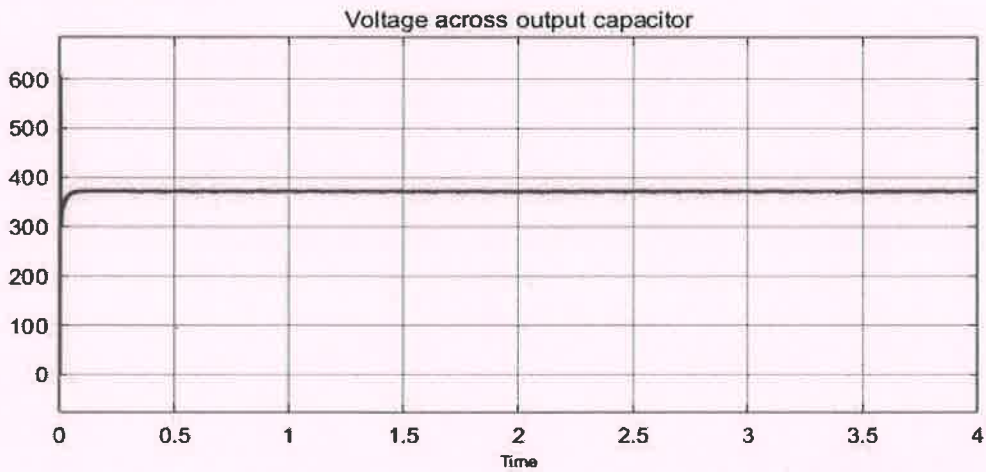


Fig 4.9 Voltage waveform across the capacitor



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The above given waveforms are obtained from MATLAB simulation. For the input voltage 300V and 6 Ω resistive load inductor current is 70A. But it has high initial current around 300A. Inductor current ripple is 20A. Output voltage was found to be 375V and output current was found to be settled around 60A as shown in fig.4.6.

The voltage and current waveforms across switch and diode illustrated in fig.4.7. The voltage stress across the semiconductor devices is almost equal and it has high inrush current at the turn on time.

The converter is simulated for the load of $R= 700\Omega$, the simulated waveforms are given below,

Inductor current waveform:

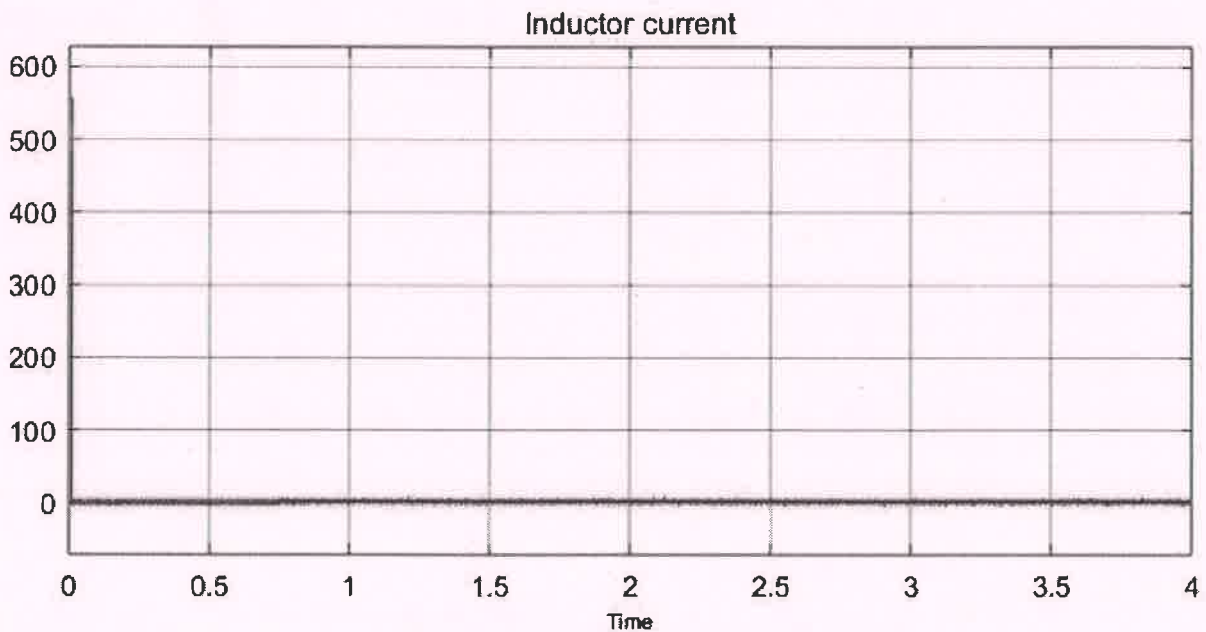


Fig 4.10 Inductor current waveform



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Output voltage and output current waveform:

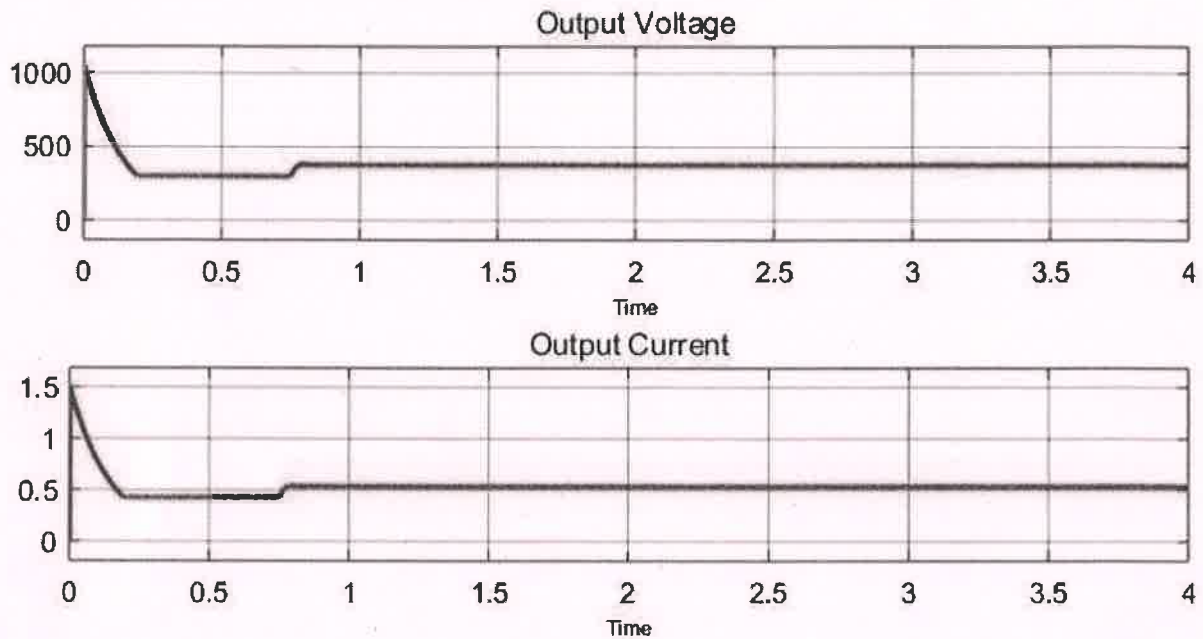


Fig 4.11 Output voltage and output current waveform

OBSERVATIONS

The above given waveforms are obtained from MATLAB simulation. Boost converter is simulated for the input voltage 300V and resistive load of 6 Ω ,700 Ω respectively. From the results obtained, it is clearly observed that the boost converter steps up the voltage from 300V to 375V in accordance with the parameters derived earlier, fulfilling the desired conditions of output current being 60 A, 0.56A respectively at frequency 10kHz.

In those waveforms, it can be seen that a surge in inductor current, output voltage, Etc. Inrush current/surge current is the maximal instantaneous current drawn by an electrical device when first turned on. In a boost converter, the output dc bus capacitor is the cause of inrush current as it charges up from zero voltage to the input value through the diode upon connection to the supply, even if the shunt switch is turned off. Hence, soft start will not help. So, a circuitry change should be applied to limit the inrush current.




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SIMULATION DIAGRAM TO REDUCE INRUSH CURRENT

Inrush current is the peak current which flows into the power converter when input voltage is applied or at turn on. In order to limit the inrush current, connect a current limiting resistor in series with the input. Connect the resistor through a diode to the output capacitor. Then the output capacitor has charged up close to the input voltage. The simulation diagram of the modified boost converter can be seen in fig.12, that is given below.

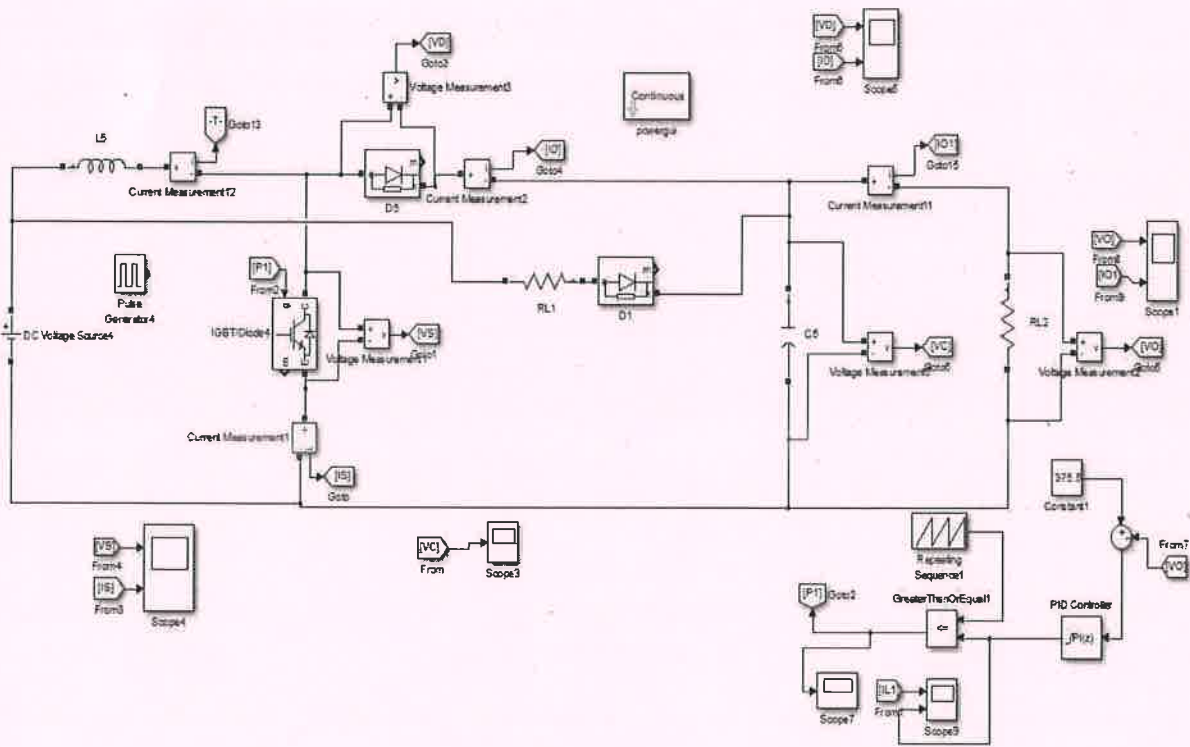


Fig 4.12 Closed loop simulation diagram to reduce inrush current



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Inductor current waveform:

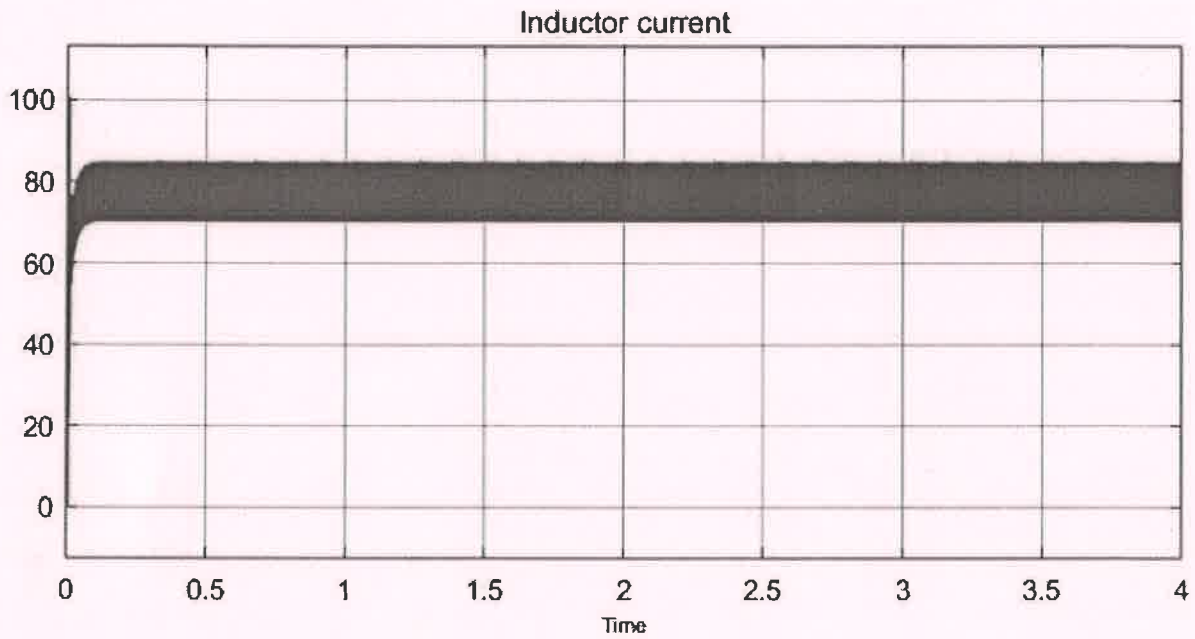


Fig 4.13 Inductor current waveform

Output voltage and output current waveform

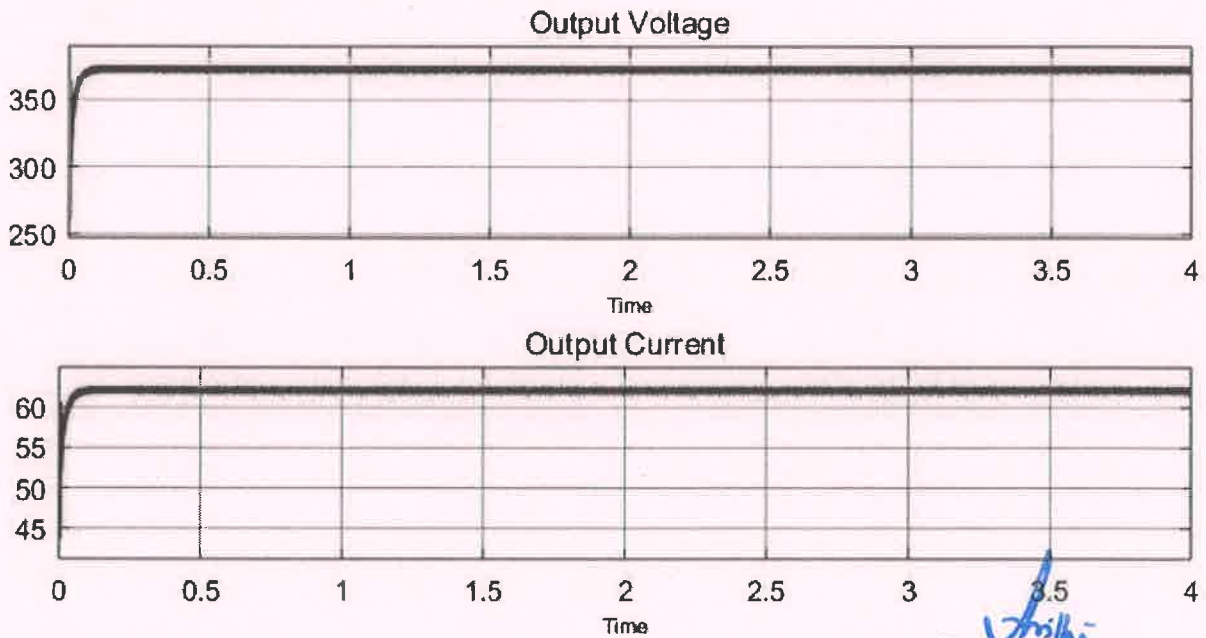


Fig 4.14 Output voltage and output current waveform



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OBSERVATION:

The above given waveforms are obtained from MATLAB simulation. The modified boost converter is simulated for the input voltage 300V and resistive load of 6 Ω . From the results obtained, it is clearly observed that the boost converter steps up the voltage from 300V to 375.5V in accordance with the parameters derived earlier. It can be observed from the waveforms that, value of inrush current can be limited to a safe value by charging the output capacitor to input voltage through a resistor and diode.



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CHAPTER 5

INVERTER

INTRODUCTION

In this chapter the three-phase inverter and its functional operation are discussed. In order to realize the three-phase output from a circuit employing dc as the input voltage a three-phase inverter has to be used. The inverter is built of switching devices, thus the way in which the switching takes place in the inverter gives the required output.

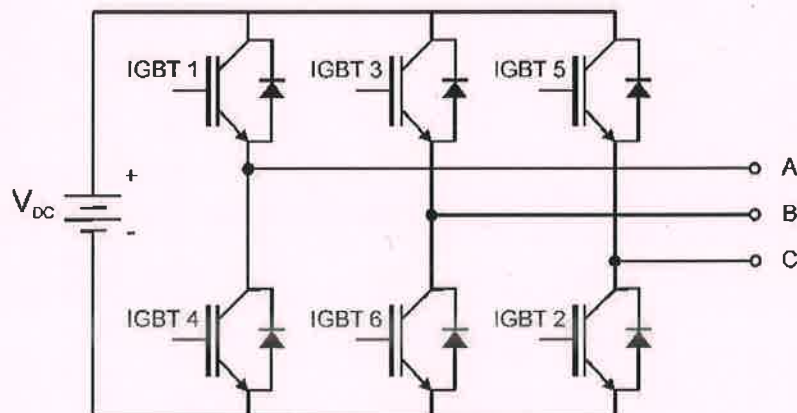


Fig.5.1 Circuit diagram of three phase inverter

The DC to AC converters more commonly known as inverters, depending on the type of the supply source and the related topology of the power circuit, are classified as voltage source inverters (VSIs) and current source inverters (CSIs). Single-phase VSIs cover low-range power applications and three-phase VSIs cover medium to high power applications. The main purpose of these topologies is to provide a three-phase voltage source, where the amplitude, phase and frequency of the voltages can be controlled. The three-phase dc/ac voltage source inverters are extensively being used in motor drives, active filters and unified power flow controllers in power systems and uninterruptible power supplies to generate controllable frequency and ac voltage magnitudes using various pulse width modulation (PWM) strategies. The standard three-phase inverter shown in Figure.5.1 has six switches the switching of which



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depends on the modulation scheme. The input dc is usually obtained from a single-phase or three phase utility power supply through a diode-bridge rectifier and LC or C filter

Sinusoidal PWM in Three-Phase Voltage Source Inverter

Sinusoidal PWM in Three-Phase Voltage Source Inverters As in the single phase voltage source inverters PWM technique can be used in three-phase inverters, in which three sine waves phase shifted by 120° with the frequency of the desired output voltage is compared with a very high frequency carrier triangle, the two signals are mixed in a comparator whose output is high when the sine wave is greater than the triangle and the comparator output is low when the sine wave or typically called the modulation signal is smaller than the triangle. This phenomenon is shown in Figure 5.2.

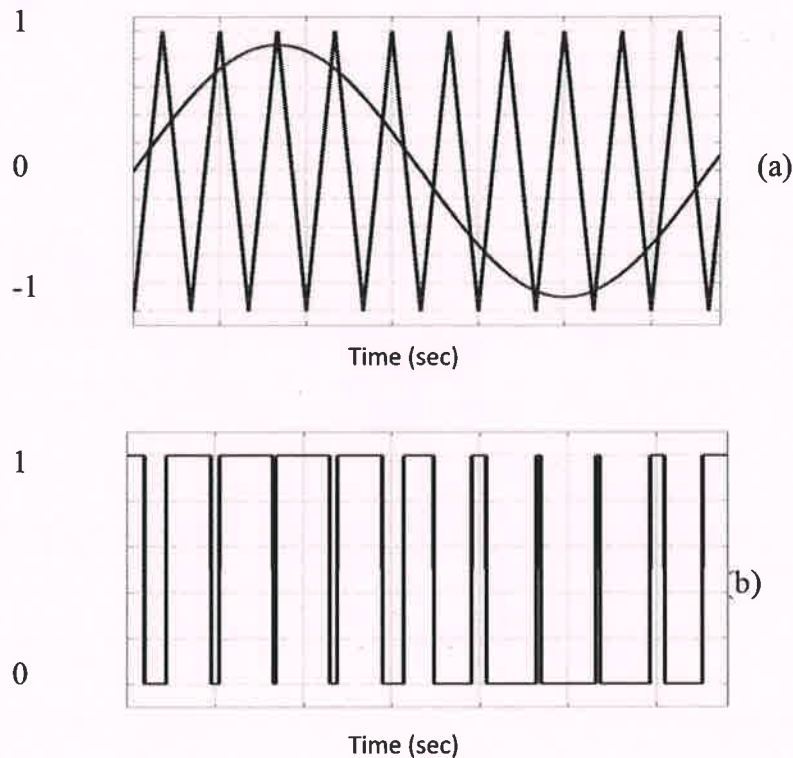


Fig.5.2 PWM illustration by the sine-triangle comparison method (a) sine-triangle comparison (b) switching pulses.



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CHAPTER 6

COMPONENTS

NDD701N160

Diode Modules consist of 1 or 2 diodes in a combination of 4 types of circuits. The diodes can be arranged in Single, Series, Common Anode or Common Cathode configuration, depending on the requirement. These modules have compact packaging, low thermal resistance, high stability at high temperatures & high di/dt and dv/dt capabilities.

The Diode Modules are used in, battery chargers, power supplies, motor drives, single and three phase bridge circuits, industrial welders & heat/temperature control circuits.

- The current range starts from 25A up to 700A, with voltages up to 2400V.
- Devices are available in Module Packaging (M1, M3, M4, M5)



CM1000HA-24H-IGBT

IGBT Modules are designed for use in switching applications. Each module consists of one IGBT in a single configuration with a reverse-connected super-fast recovery free-wheel diode.

Current Rating : 1000AMP

Voltage - Collector Emitter Breakdown (Max) : 1200 V



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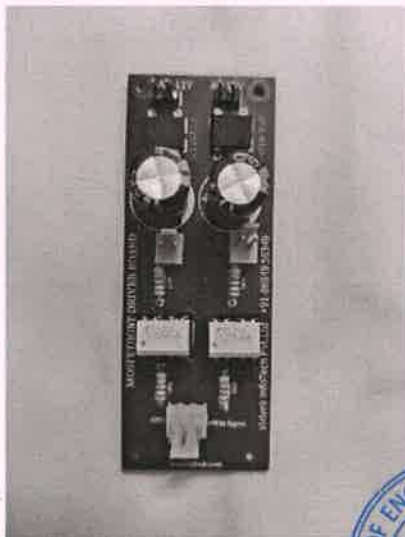
Capacitor



270 μ F 600 V Aluminum Electrolytic Capacitor is used for boost converter.

TLP 250 IGBT/Mosfet Driver

It is 2 channel - Gate Driver. Opto coupler - TLP250. TLP250 is an isolated IGBT/Mosfet driver IC. The main feature is electrical isolation between low and high power circuits. It transfers electrical signals optically via light. Driver board has two channel and trigger two switch at time.




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GD200HFY120C8S IGBT SWITCH

Starpower GD200HFY120C8S IGBT Modules and Arrays provide ultra-low conduction loss as well as short circuit ruggedness. They are designed for the applications such as general inverters and UPS. DC Collector Current:155A, Collector Emitter Voltage Max: 1.2kV




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CHAPTER 7

PROTOTYPE IMPLEMENTATION

Controlling circuit for converter as well as inverter should be evaluated for the efficient working of them. Hence, with the components explained in the chapter 6 we developed a prototype at SSET, Electrical workshop lab. Here maximum available DC supply is 200V. The system was tested for the power range of 100W-150W. Applying DC first we evaluated boost converter working, it is controlled by Aurdino Uno. Then turn on the inverter circuit, hence the Induction motor rotated. For the speed controlling of induction motor we used v by f method of speed controlling, using Aurdino Duemilanove.

SIMULATION FOR PROTOTYPE

Simulation of converter for the prototype was done and results are given below.

Converter is simulated for the power rang of 100-150W.

Inductor current waveform:

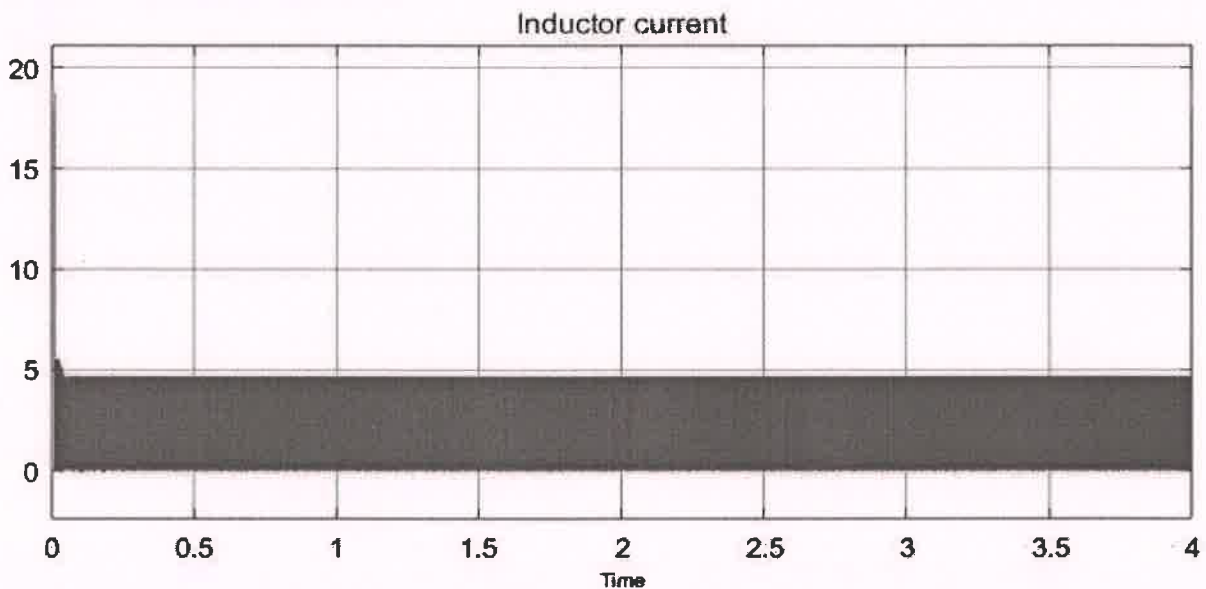


Fig 7.1 Inductor current waveform



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Output voltage and output current waveform:

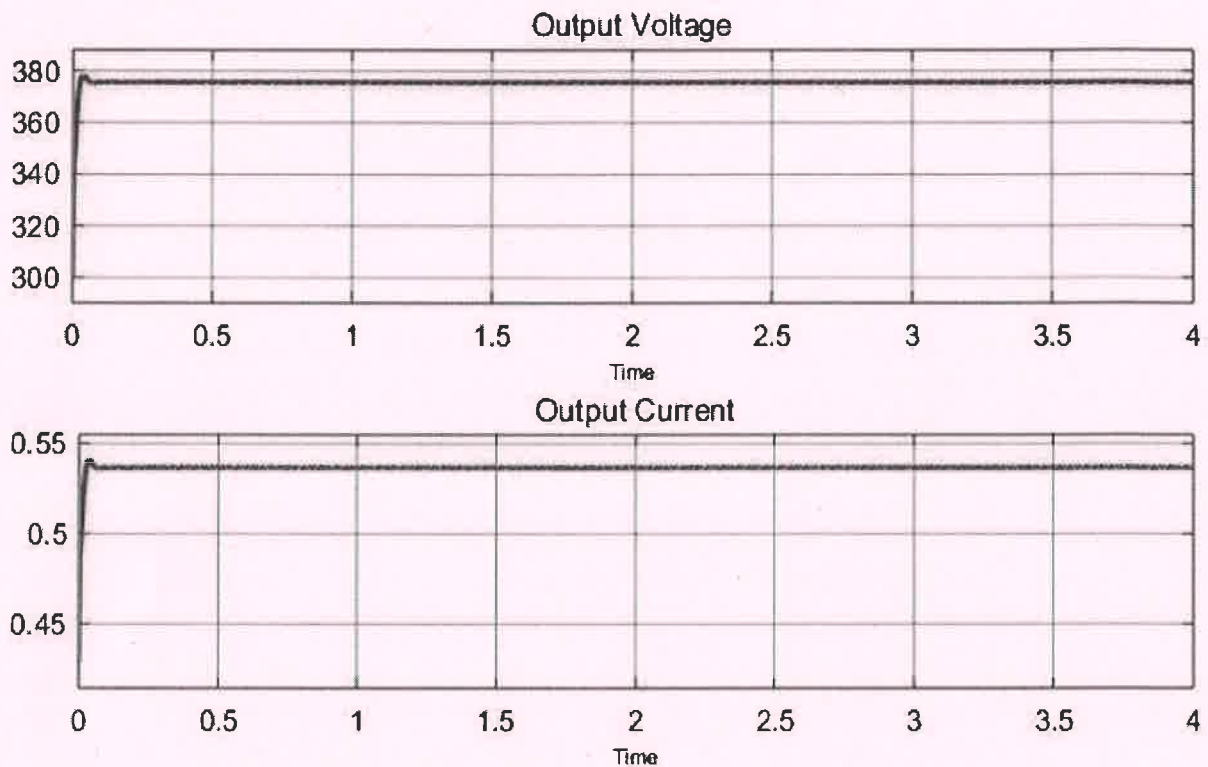


Fig 7.2 Output voltage and output current waveform

Prototype implementation

Prototype for the design and development of 22hp electric propulsion system for boat was developed and tested at SSET, karukutty electrical lab. We used induction motor of the lab 4.7KW. The maximum available DC at there was 200V DC. Hence, we tested the system for 200V. We get the result as per our design. Fig 7.3 denotes the prototype implementation.



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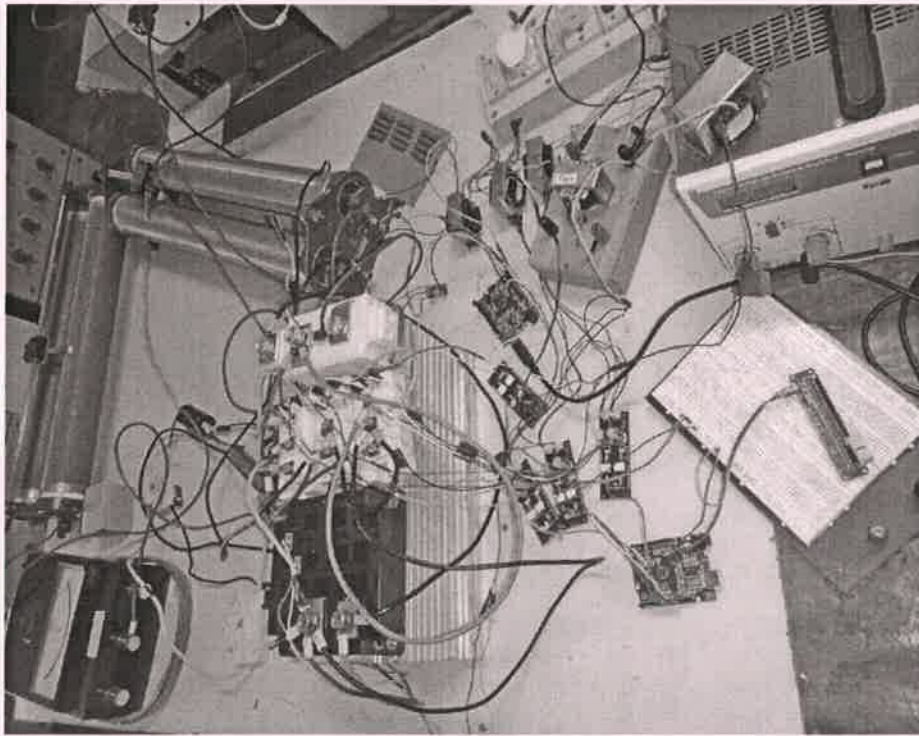


Fig 7.3 Prototype implementation at SSET, Electrical Workshop




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CHAPTER 8

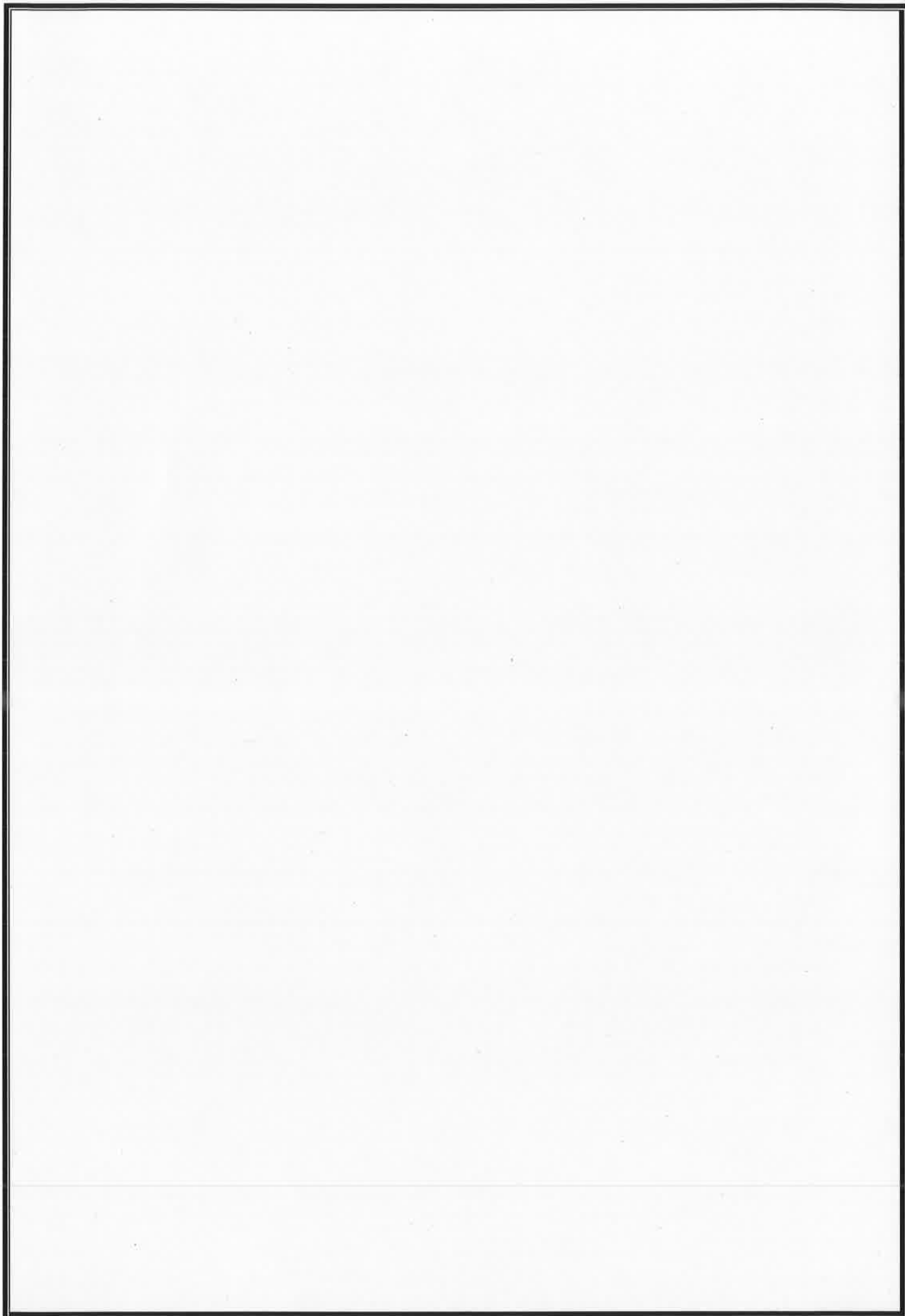
RESULTS AND CONCLUSIONS

The aim of this project was to develop an induction motor drive fed from a battery. Stabilize the battery voltage, here we developed a simple boost converter, to convert this DC to three phase AC we developed a voltage source inverter, then it fed to 22kW induction motor. Study and simulation works on Z-source dc-dc converter and boost converter was done. Finally, it was decided that boost converter will be used. Here separate control for DC-DC converter and inverter. MATLAB simulations using calculated parameters were performed and corresponding waveforms were obtained. The hardware equipment is tested and result is obtained. Prototype were realized and tested. Prototype were worked according to the designed condition, this project cost is effective.



A handwritten signature in blue ink, appearing to read "Joshi".

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Transaction Type

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GOVERNMENT OF KERALA
KARUKUTTY GRAMA PANCHAYAT

From

Secretary

Gram Panchayat

Karukutty

To

Dr. Sunil Jacob

Director

Centre for Robotics

SSET, Karukutty

Respected Sir,

Subject: Implementation of MEDICOS with the support of Karukutty Grama
Panchayat

The project MEDICOS(A Mini Virtual Hospital for Villages) of SCMS School of Engineering and Technology done under the supervision of Dr. Sunil Jacob, Director, Centre for Robotics is supported by Karukutty Grama Panchayat. We have reviewed and is interested in supporting your proposal. The prototype on completion will be implemented through the panchayat.

This project for sure, will be a great invention in the field of rural medicine.

Secy

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12.10.18

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SECRETARY
KARUKUTTY GRAMA PANCHAYAT
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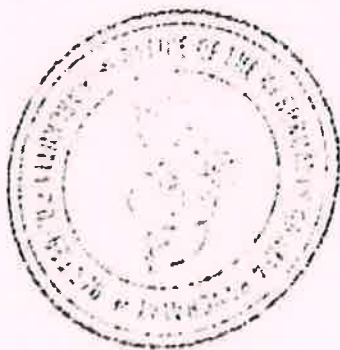
The project MEDICOS KIOSK (a mini virtual hospital for villagers) of SCMS School of Engineering and Technology under the supervision of Dr. Sunil Jacob, director SCMS centre for Robotics is supported by Karukutty Grama Panchayat. They reviewed and liked the proposal. Once the prototype is ready they are ready to accept and implement to this rural world. Since it is a socially relevant project , will be a great and immense useful to the people who are in need especially in the villages. The main attraction of this project is nothing but without going to a hospital we can cure our diseases. This prototype will help us to check our health related issues , at the same time we will get the required medicines without going to any pharmacies. They will also show the availability of doctors in hospital. They can have an individual account so that their information are secured. This project will be implemented through several schemes like NGOs.

See

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AICTE-ECI-ISTE CHHATRA VISHWAKARMA AWARDS

‘ Empowerment of Villages through Technologies ‘

PROJECT SUMMARY

Project Name : **MEDICOS (Medical Kiosk: A Mini Virtual Hospital for Villages)**

Team Name : **SIDRA**

Team Lead & Members : **Darsana K.C., Elsa Antony K, Haritha T.P., Manju Davis**

Mentor’s Name : **Dr. Sunil Jacob**

Institute Name & Address : **SCMS School of Engineering & Technology
Vidya Nagar, Palissery,
Karukutty, Kerala-683582**

Sub-Theme : **Rural Infrastructure**

A. Title of the Innovation Proposal: **MEDICOS (Medical Kiosk: A Mini Virtual Hospital for Villages)**

B. Project Description:

PROBLEM

Post conducting the survey among the villagers of Pallissery and Karukutty and reading through several articles, it was observed that, in most of the villages, the native people have to travel long distances for their basic health needs. It was also discerned that most of the villagers lack knowledge regarding live health updates. This at times, have even resulted in death of many people including pregnant women and children. The growing concern on health care includes:

*** Rural verses Urban Divide:**

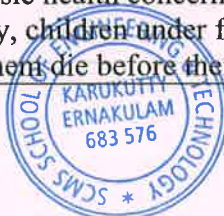
Urban centres have numerous private hospitals and clinics which provide quality healthcare. These centres have better doctors, access to preventive medicine, and quality clinics which are a result of better profitability for investors compared to the not-so-profitable rural areas. The rural population mostly relies on alternative medicine and government programmes in rural health clinics. However these have proven ineffective to date.

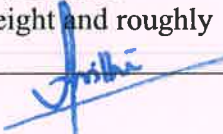
*** Need for Effective Payment Mechanisms**

Most Indian patients pay for their hospital visits and doctors’ appointments with straight up cash after care with no payment arrangements. Only less than 1 percentage of Indian village population are aware of health insurance policies

*** Demand for Basic Primary healthcare and infrastructure**

India faces a growing need to fix its basic health concerns in the areas of HIV, malaria, tuberculosis, and diarrhea. Additionally, children under five are born underweight and roughly 7% (compared to 0.8% in the US) of them die before their fifth birthday.




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✘ Lack of standardized drugs

Although, India proclaims itself as the third largest producer of drugs, it is a major concern that most of the medicines are of abnormal composition, out of date and unavailable to most of the villagers.

SOLUTION

Contemplating the problem statements, our thought process ended up with the idea of a cubicle machine. The machine will provide an integrated environment offering various medical services, which includes:

- ✓ Notifications regarding medical camps, mobile medical help, important dates for vaccinations, child care, insurance policies etc., and other live medical updates
- ✓ Basic facilities for measurement of body parameters like height, weight, BMI, blood pressure, and heartbeat.
- ✓ Live consultation facilities with specialized doctors through video and voice chats.
- ✓ Instant check for availability of doctors in nearby hospitals.
- ✓ Options to find out the best hospitals for each disease.
- ✓ Information regarding subsidies from government.
- ✓ Instant emergency medical services like ambulance, and mobile hospitals if needed.
- ✓ Vending of tablets post consulting a doctor.
- ✓ User friendly environment, that supports almost all regional languages and can be accessed through fingerprint and RFID in ration cards.

TECHNOLOGY

The implementation of the above mentioned solution has both hardware and software requirements. The idea is to create GUI and integrate all the required components into a single system. Connecting all systems together to user and vice versa is done by means of IoT technology.

Hardware

It involves various components like pressure sensor for measuring blood pressure, temperature sensor for measuring body temperature, pulse-rate sensor for measuring heartbeat, weight detection sensor and load cells for measuring body mass, methyl sensor for measuring blood sugar levels & ultrasonic sensor for measuring height. An Arduino controller is used and we make use of an LCD display for viewing.

Software

We make use of various software aspects for each and every above mentioned functionalities. This ranges from android environment that brings out the feature of providing notifications, video and voice chats, to a simple programming language that could implement the functionality of a vending machine.




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LEVEL OF ACCEPTANCE

66.46% percentage of the entire Indian population resides in rural areas. Unlike urban centres that have access to better doctors and quality clinics, the rural population is still grappling to find basic medical facilities. This machine will be an efficient solution to this beneficiary group. Although, it may take a while for them to get used to the system, on a longer run, they will no longer have to travel long distances to satisfy their health care needs. This can be for sure a great advancement in rural medicine especially for a country like India..

IMPLEMENTATION

The kiosks are computer terminals that can guide the patients to access the right medicine and treatment at the time of need. Patients can also get notifications regarding medical camps, mobile medical help, important dates for vaccination, child care, insurance policies etc. It serve the patients to fulfil their basic needs such as measurement of height, weight, BMI, blood pressure and heart beat. Furthermore, live consultation facilities with specialized doctors through video and voice chats can improve the living standards of the rural society. The prescribed medicines can be instantly vended out from the kiosk. The machine completely eliminates the need for man power which in turn increases its working efficiency and effectiveness

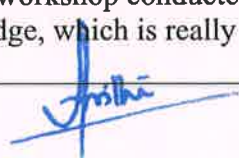
TEAM

Our team under the guidance of Dr.Sunil Jacob can create a tint of wonder. Serving as the Director of 'Centre for Robotics', SSET, he has inspired and motivated the young budding engineering students of SSET through his inventions, dedication and hard work. He is the custodian of many patents and awards like,

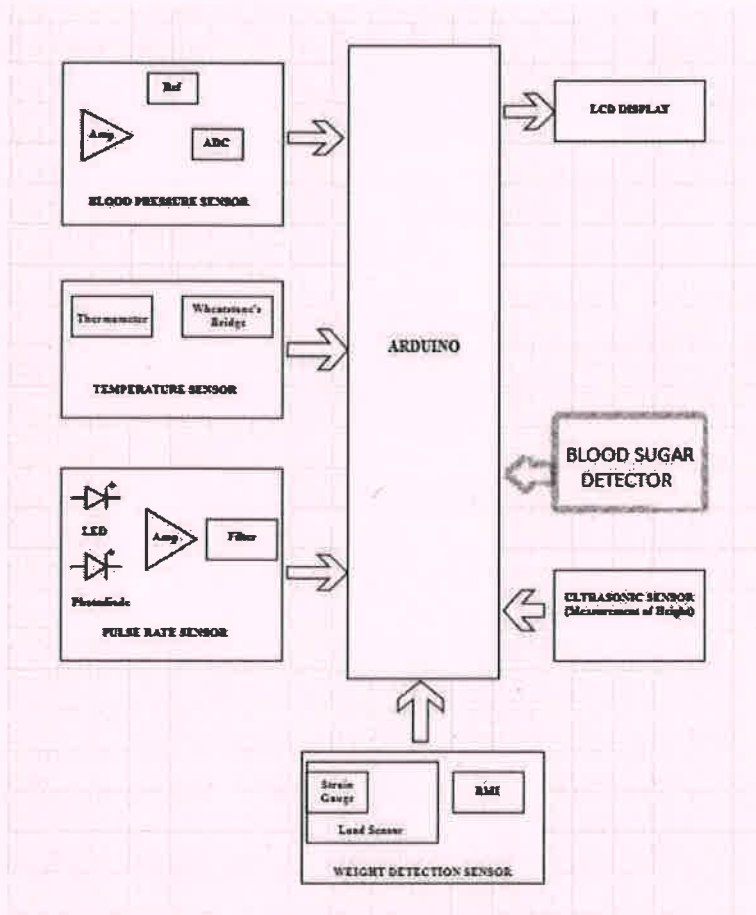
- Won 'Young Gandhian Technological Innovation Appreciation Award 2018' for the project titled 'Brain wave nerve excitation for physically disabled'
- Won 'AICTE Chhatra Vishwakarma Award 2017 in Electronics' for project titled 'A DE addictive coil for drug addicts'
- Won 3rd prize in 'Third Dialogue India Academia Conclave (IIT, DELHI), 2017'.

Each and every team member are competent enough and adds up tremendous charisma to the team. Darsana having a flair of writing can be supportive in case of documentation. Elsa and Manju being students of great interests in Electronics can help in hardware sections. Software sections can be well handled by Haritha. All of us are active in social works and have served as volunteers for many socially relevant activities like "GREEN PROTOCOL" organized by government of kerala. Also, we had the opportunity to be a part of many activities like distribution of medicines for the poor from which we got struck with the idea of having a medical kiosk in rural areas. Manju, also has served as volunteer secretary of NSS Unit, and her experience of working for the rural people has helped us in thinking about working on such a social cause. We also had the opportunity to become a part of a technical workshop conducted by IIT, Madras and Lema labs at Chennai, which added on immense knowledge, which is really beneficial for us in moving ahead with our idea.

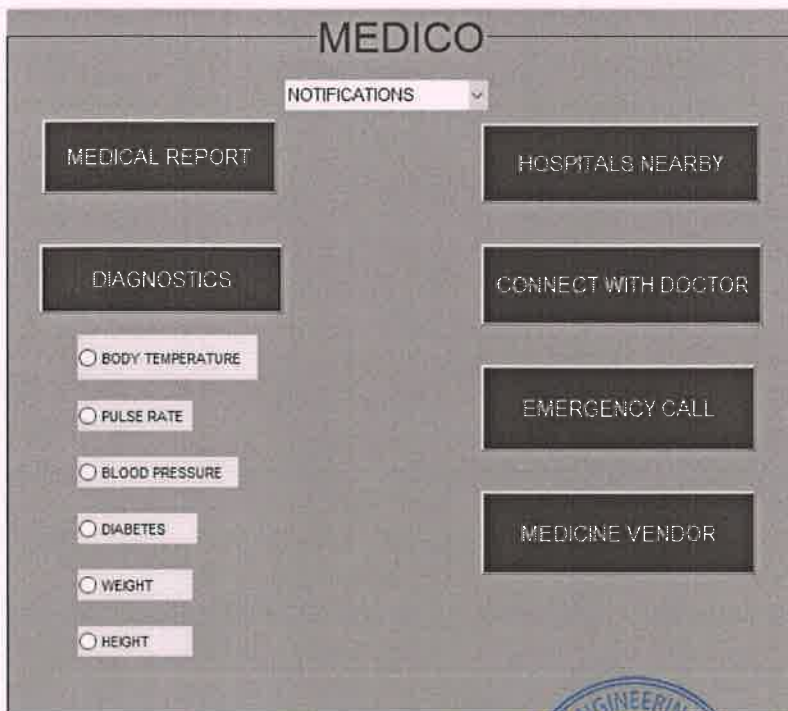



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BLOCK DIAGRAM



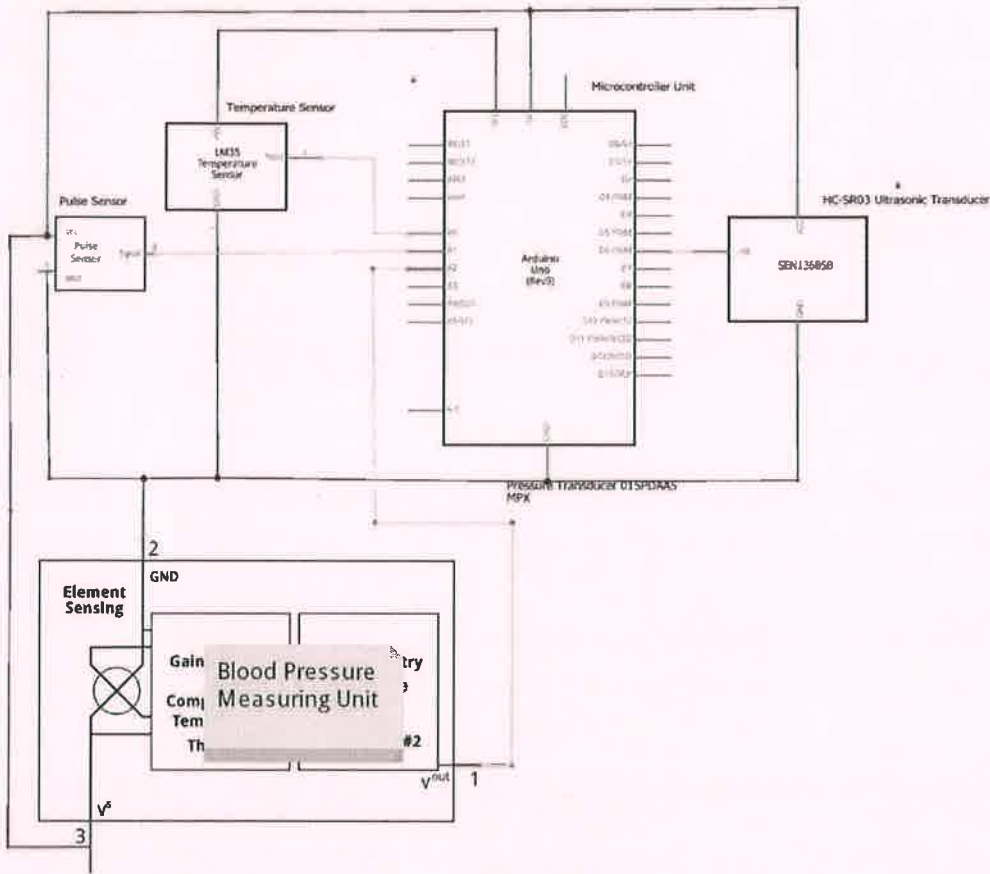
FRONT END VIEW



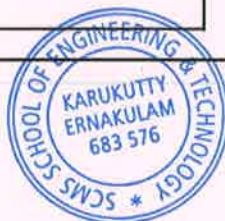
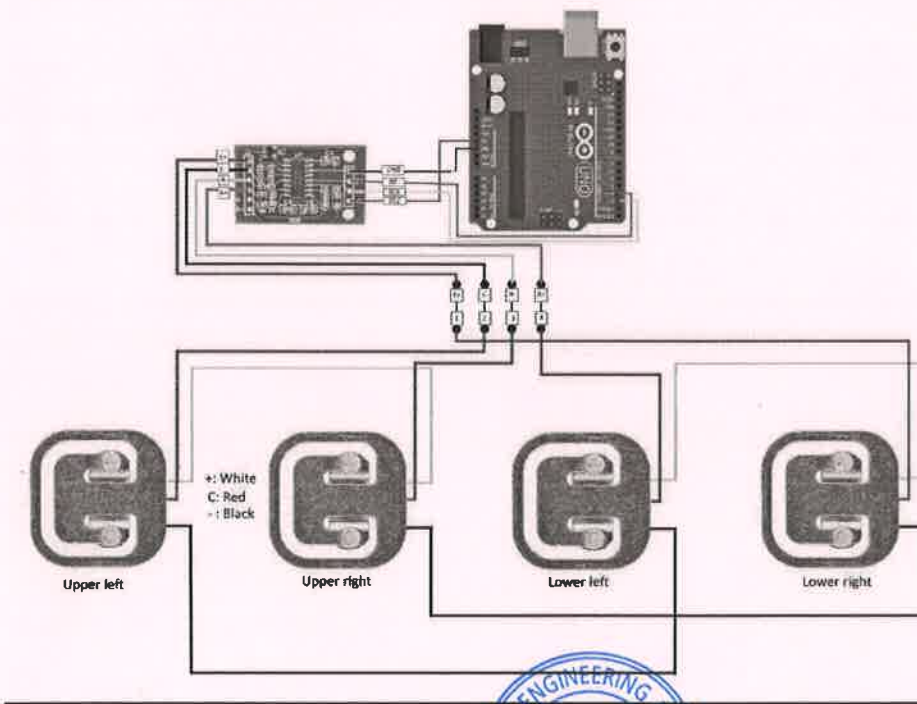
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CIRCUIT DIAGRAM



fritzing



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C. Conclusion:

The above proposed project will be a great innovation in the field of medicine in rural areas. The machine can be placed at any accessible point within the village so that the villagers will no longer have to travel long distances for medical aid. Since all updated information and medical facilities are readily available, this can definitely put an end to crisis faced, especially during emergency situations. This can also avoid fraud malpractices in the name of health care to a great extent. Ultimately, the culminated result can offer a new panorama in the field of rural medicine, proffering self-empowerment to the Indian villages.

Signature:

(Team Leader)

(Team Member 01)

(Team Member 01)

(Team Member 01)

Declaration: I hereby declare that all the above information furnished herein by the team is true to the best of my knowledge. I understand and accept that our application for the contest may be cancelled in case the above declaration is found to be false.

Date: 9/08/18
Place: KARUKUTTY



(Name & Signature of Mentor)

Dr sunil Jacob
[Signature]



[Signature]

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e, Sep 18, 2018 at 9:52 AM RECS CHENNAI <recschennai.jp@nic.in> wrote:

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Agent Number:

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RALA, INDIA. suniljacob@cmagroup.org

No.	CBR No.	Reference Number /Application Type	Application Number	Title/Remarks	Amount Paid
26134		ORDINARY APPLICATION	201841034922	MEDICOS (MEDICAL KIOSK: A MINI VIRTUAL HOSPITAL FOR VILLAGES	1750
		E-2/2769/2018-CHE	201841034922	Form2	0
		E-3/24655/2018-CHE	201841034922	Form3	0
		E-5/1511/2018-CHE	201841034922	Form5	0
26134		E-12/910/2018-CHE	201841034922	Form9	2750
26134		R20184027497	201841034922	Form18	4400
Total :					8900

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Payment Mode	Bank Name	Cheque/Draft Number	Cheque/Draft Date	Amount in Rs
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KARUKUTTY, ERNAKULAM, KERALA, INDIA.



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E-mail: sset@scmsgroup.org • Website: www.scmsgroup.org/sset

Memorandum of Understanding

This Memorandum of Understanding ("MOU") is between Infosys Ltd, a company incorporated under the laws of India with its registered office at Electronics City, Hosur Road, Bangalore – 560 100, India (hereafter referred to as "Infosys"); and **SCMS School of Engineering & Technology** a university / engineering college committed to educational excellence having its office **Vidya Nagar, Palissery, Karukutty, Ernakulam, Kerala - 683582**(hereafter referred to as "Partner").

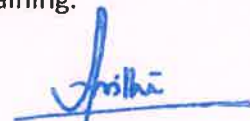
RECITALS:

- A. WHEREAS Partner has been established for the purpose of enriching the technical education process and to jointly work for enhancing the quality of education imparted to students of all the engineering disciplines in the field of Information Technology (IT).
- B. AND WHEREAS Infosys wishes to collaborate with the Partner for the purpose of enriching the technical education in new subject areas, learning-teaching process and to jointly work for enhancing the quality of education imparted to students of all the Information Technology ("IT") disciplines.
- C. AND WHEREAS Partner with assistance from Infosys has goals for enhancing the quality of the technical education for students thereby enabling them to meet the industry needs and to be recognized globally.

NOW THEREFORE THE PARTIES HEREBY ACKNOWLEDGE AND AGREE AS FOLLOWS:

1. This MOU is for collaboration between both parties, for mutual benefit, to enhance the quality of the educational experience of students of the Partner and for the specific purposes detailed in Annexure I of this MOU
2. Intentionally Omitted
3. The Partner shall be responsible for providing the requisite infrastructure, network and internet access and any other facility required for the education and training.





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E-mail: sset@scmsgroup.org • Website: www.scmsgroup.org/sset

4. It is agreed that the terms and conditions of any agreed cooperative project (s) as outlined in Annexure I of this MOU shall be the subject matter of separate definitive agreements to be negotiated and agreed upon by the Parties and/or any third parties, wherever applicable, provided always the decision whether to initiate and/or implement any proposed cooperative projects shall be subject to the availability of funds and human resources on the part of each Party.
5. The parties, their representatives, and/or assignees, following the execution of this MOU, desire to maintain close contacts with each other to achieve the goals and objectives of, and to develop the ideas acknowledged in this MOU.
6. Both parties hereby agree to designate a representative from its side who will be the primary point of contact on behalf of that party.
7. Any expenses incurred by the parties for the purpose of this MOU shall be agreed upon and shall be borne as per the mutual agreement.
8. Notwithstanding any other provision of this MOU, neither party shall have any right to use any trademarks or trade name of the other party, nor to refer to this MOU or the obligations performed hereunder directly or indirectly, in connection with any product, promotion, or publication without the prior written approval of the other party
9. All information which has been disclosed to or obtained by either party at any time during the implementation of this MOU, is confidential information. For this purpose, the parties agree to sign the binding non-disclosure agreement in Annexure II.
10. The terms and conditions mentioned herein shall commence on the execution of this MOU and shall continue for a period of two (2) years from the date thereof or for such period as may be determined or extended by the parties from time to time by written notice, unless terminated by either party in accordance with this MOU. Either party may terminate this MOU at any time by providing three (3) months written notice to the other party.
11. Any notice required to be given hereunder shall be in writing and shall be deemed to be sufficiently served on the party if sent by hand or by registered post to the addresses of the party as stated in this MOU. Notices shall be deemed received: -
 - (i) If sent by registered mail, three (3) days after posting;
 - (ii) If by hand, on the day of delivery; and



PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576



SCMS SCHOOL OF ENGINEERING & TECHNOLOGY

Accredited by NAAC, Affiliated to APJ Abdul Kalam Technological University, Kerala and Approved by AICTE, Govt. of India
An ISO 9001:2015 Certified Institution

CAMPUS: VIDYA NAGAR, KARUKUTTY, ERNAKULAM-683576 PHONE: 0484-2882900, 2450330
E-mail: sset@scmsgroup.org • Website: www.scmsgroup.org/sset

- (iii) If sent by telex or facsimile to the correct number or designated address within seventy-two (72) working hours.
12. Both parties agree to take all reasonable steps to ensure the successful completion of the collaboration, and co-operate with each other in duly carrying out the obligation agreed upon.
 13. The expiration and termination of this MOU will not affect the terms of those activities, which are in progress at the time of notification of expiry or termination of the MOU.
 14. On the termination or expiry of this MOU or when requested by Infosys, the Partner undertakes to return all materials to Infosys without any delay.
 15. Except as otherwise expressly agreed to by Partner in writing, during the period of their involvement with the provision of the MOU and a further period of one (1) year thereafter, Partner agrees not to directly or indirectly or through third parties solicit or hire for employment any of Infosys's current or previous employees.
 16. Both the parties agree that Infosys is not obliged on account of this MOU to recruit any fixed number of students from the Partner.
 17. This MOU is an indication of good faith and intent on the part of both parties and does not create any legal obligations between them. In the event of any differences or disputes arising from the implementation of the provisions of this MOU, the parties shall as far as possible settle such differences or disputes in good faith by consultation or negotiation between the parties.
 18. Indemnity:
Partner agrees to defend, indemnify, and hold harmless Infosys, its affiliates, directors, officers, employees, representatives, and agents from and against any and all claims, actions, demands, legal proceedings, liabilities, damages, losses, judgments, authorized settlements, costs or expenses, including without limitation reasonable attorneys' fees, arising out of or in connection with any alleged or actual:
 - a. any negligence, willful misconduct, fraud, misrepresentation, and or violation by Partner of any governmental laws, rules, ordinances, or regulations;
 - b. breach of confidentiality and/or data privacy obligations under this MOU, by Partner;
 19. Except for claims arising due to any gross negligence, willful misconduct, fraud, misrepresentation by Infosys, Infosys shall not be liable to the Partner for any direct damages, regardless of the form or nature of the action giving rise to such liability (whether in contract, tort or otherwise) arising out of or in connection with this MOU.



Joshi
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CAMPUS: VIDYA NAGAR, KARUKUTTY, ERNAKULAM-683576 PHONE: 0484-2882900, 2450330
E-mail: sset@scmsgroup.org • Website: www.scmsgroup.org/sset

20. In no event shall either Party be liable for any indirect, special, incidental, consequential, punitive, tort or other damages, however caused, including, without limitation, any damages resulting from loss of use, loss of data, loss of profits or loss of business arising out of or in connection with this MOU, or of any other obligations relating to this MOU, whether or not the Party has been advised of the possibility of such damages.
21. Save and except for Clause 6, Clause 7 and Clause 8, this MOU is not a legally binding contract and under no circumstances does this MOU subject either of the parties to liability for breach, whether material or minor, of contract or any other liability under international law or the laws of the country of the respective parties or any other applicable law.
22. The parties hereby agree that they are not bound exclusively by this MOU and are at liberty to enter into any separate agreements or arrangements with any third party without reference to the other party.
23. This MOU, and any dispute arising from the relationship between the parties to this MOU, shall be governed by laws of India and courts in Bangalore, excluding any laws that direct the application of another jurisdiction's laws.

In written whereof both parties put their hard seal on the day, month and year herein mentioned.

Date: _____
Place: _____
Name: Sundar K S

Designation: Associate Vice President & Head-,
Campus Connect Education, Training &
Assessment Dept., Infosys Ltd.

Signature:

Authorized Signatory
For Infosys

Seal:

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ERNAKULAM, KERALA-683 576

Date: 14.12.2021
Place: Karukutty
Name: Dr. Praveensal C. J.

Designation: Principal

Institute: SCMS School of Engineering
and Technology

Signature:

Authorized Signatory
For Partner

Seal:



SPoC, Campus Connect Core Team **Role/Selection Guidelines**

Based on our experience with our Campus Connect partner colleges, please find a set of guidelines for identifying the Single Point of Contact (SPoC) and for forming the Core Team in your college. This will help in forming a team at your college that will drive the Campus Connect program successfully.

Single Point of Contact (SPoC)

Role

- Interfaces with the college core-team, college management and administration to run the program efficiently
- Sends/Receives updates on different activities under Campus Connect regularly
- Prepares and executes the action plan along with the core team
- Reviews the progress of the program with core-team and Infosys periodically
- Bottom-line responsibility

Broad Selection Guidelines

- Training Officer/Head of Department of IT,Comp. Sci. or related departments
- 5+ Years of teaching experience in the college
- Passion to take the program forward in the college

Campus Connect Core Team

Role

- Updates the College Mgmt. on the activities happening under Campus Connect
- Plans and executes the Foundation Program Rollout in the college

Broad Selection Guidelines

- 3-5 Members
- Senior faculty from IT/Comp. Sci. or related departments
- Able to take decisions and show value to the college



Information Sheet

A handwritten signature in blue ink, appearing to be "Joshi", written over a horizontal line.

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ERNAKULAM, KERALA-683 576

Name and Address of the College (in Capital Letters: SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY

VIDYA NAGAR, PALISSERY, KARUKUTTY, ERNAKULAM

Pin 683576

Phone: 0484 2882900/2450330

MOU Signed By:

Name	Role\Designation	E-mail ID	Landline Phone	Cell
Dr. Praveensal C. J	Principal	praveensal@scmsgroup.org	0484 2882901	9446763487

Single Point Of Contact (SPOC):

Name	Dept\Role\Designation	E-mail ID	Landline Phone	Cell
Prof(Dr)Jayanand B	Placement-in-charge	jayanand@scmsgroup.org	0484 2882900	9447442427

Campus Connect Core Team:

Name	Dept\Role\Designation	E-mail ID	Landline Phone	Cell
Dr. Varun G. Menon	HOD Computer Science Dept	varunmenon@scmsgroup.org	0484 2882900	8714504684
Ms. Deepasree	Asst. Professor, CSE Dept	deepasree@scmsgroup.org	0484 2882900	9400901317
Ms. Blessy Antony	Asst. Professor, CSE Dept	blessyantony@scmsgroup.org	0484 2882900	8129103394
Ms. Jane Theresa	Asst. Professor, English,Basic Science and Humanities Dept.	jane@scmsgroup.org	0484 2882900	7356887678
Ms.Febini M. Joseph	Asst. Professor, English,Basic Science and Humanities Dept.	febini@scmsgroup.org	0484 2882900	9400670824

The Campus Connect Program has been briefed and discussed with all the above faculty members.

Yours Sincerely

(Name)

DR. PRAVEENSAL C.J.
PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY



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SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALISSERY, KARUKUTTY
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Memorandum of Understanding

This Memorandum of Understanding (“MOU”) is between Infosys Ltd, a company incorporated under the laws of India with its registered office at Electronics City, Hosur Road, Bangalore – 560 100, India (hereafter referred to as “Infosys”); and SCMS School of Engineering & Technology an university / engineering college committed to educational excellence having its office Vidya Nagar, Palissery, Karukutty, Ernakulam, Kerala - 683582 (Hereafter referred to as “Partner”).

RECITALS:

- A. WHEREAS Partner has been established for the purpose of enriching the technical education process and to jointly work for enhancing the quality of education imparted to students of all the engineering disciplines in the field of Information Technology (IT).
- B. AND WHEREAS Infosys wishes to collaborate with the Partner for the purpose of enriching the technical education in new subject areas, learning-teaching process and to jointly work for enhancing the quality of education imparted to students of all the Information Technology (“IT”) disciplines.
- C. AND WHEREAS Partner with assistance from Infosys has goals for enhancing the quality of the technical education for students thereby enabling them to meet the industry needs and to be recognized globally.



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NOW THEREFORE THE PARTIES HEREBY ACKNOWLEDGE AND AGREE AS FOLLOWS:

1. This MOU is for collaboration between both parties, for mutual benefit, to enhance the quality of the educational experience of students of the Partner and for the specific purposes detailed in Annexure I of this MOU
2. Infosys shall be responsible for providing the requisite course material, publicity material such as handouts, information brochures and posters and conducting faculty enablement programmes as agreed between the parties.
3. The Partner shall be responsible for providing the requisite infrastructure, network and internet access and any other facility required for the education and training.
4. It is agreed that the terms and conditions of any agreed cooperative project (s) as outlined in Annexure 1 of this MOU shall be the subject matter of separate definitive agreements to be negotiated and agreed upon by the Parties and/or any third parties, wherever applicable, provided always the decision whether to initiate and/or implement any proposed cooperative projects shall be subject to the availability of funds and human resources on the part of each Party.
5. The parties, their representatives, and/or assignees, following the execution of this MOU, desire to maintain close contacts with each other to achieve the goals and objectives of, and to develop the ideas acknowledged in this MOU.
6. Both parties hereby agree to designate a representative from its side who will be the primary point of contact on behalf of that party.
7. Any expenses incurred by the parties for the purpose of this MOU shall be agreed upon and shall be borne as per the mutual agreement.
8. Notwithstanding any other provision of this MOU, neither party shall have any right to use any trademarks or trade name of the other party, nor to refer to this MOU or the obligations performed hereunder directly or indirectly, in connection with any product, promotion, or publication without the prior written approval of the other party
9. All information which has been disclosed to or obtained by either party at any time during the implementation of this MOU, is confidential information. For this purpose, the parties agree to sign the binding non-disclosure agreement in Annexure II.




A handwritten signature in blue ink, appearing to read "Joshi".

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ERNAKULAM, KERALA-683 576

10. The terms and conditions mentioned herein shall commence on the execution of this MOU and shall continue for a period of two (2) years from the date thereof or for such period as may be determined or extended by the parties from time to time by written notice, unless terminated by either party in accordance with this MOU. Either party may terminate this MOU at any time by providing three (3) months written notice to the other party.
11. Any notice required to be given hereunder shall be in writing and shall be deemed to be sufficiently served on the party if sent by hand or by registered post to the addresses of the party as stated in this MOU. Notices shall be deemed received: -
 - (i) If sent by registered mail, three (3) days after posting;
 - (ii) If by hand, on the day of delivery; and
 - (iii) If sent by telex or facsimile to the correct number or designated address within seventy-two (72) working hours.
12. Both parties agree to take all reasonable steps to ensure the successful completion of the collaboration, and co-operate with each other in duly carrying out the obligation agreed upon.
13. The expiration and termination of this MOU will not affect the terms of those activities, which are in progress at the time of notification of expiry or termination of the MOU.
14. On the termination or expiry of this MOU or when requested by Infosys, the Partner undertakes to return all materials to Infosys without any delay.
15. Each party shall ensure that they do not actively solicit the faculty of the other party who is involved in the implementation of this MOU during the period of such faculty's involvement with the program and for six (6) months thereafter.
16. Both the parties agree that Infosys is not obliged on account of this MOU to recruit any fixed number of students from the Partner.
17. This MOU is an indication of good faith and intent on the part of both parties and does not create any legal obligations between them. In the event of any differences or disputes arising from the implementation of the provisions of this MOU, the parties shall as far as possible settle such differences or disputes in good faith by consultation or negotiation between the parties.
18. Save and except for Clause 6, Clause 7 and Clause 8, this MOU is not a legally binding contract and under no circumstances does this MOU subject either of the parties to liability for breach, whether material or minor, of contract or any other liability under international law or the laws of the country of the respective parties or any other applicable law.




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19. The parties hereby agree that they are not bound exclusively by this MOU and are at liberty to enter into any separate agreements or arrangements with any third party without reference to the other party.

In written whereof both parties put their hard seal on the day, month and year herein mentioned.

Date: _____

Date: **11-12-2018**

Place: _____

Place: **Palissery, Ernakulam**

Name: **Sundar K S**

Name: **Dr. PRAVEENSAL C. J.**

Designation: **Associate Vice President & Head-
Campus connect Education Training & Assessment
Infosys Ltd.**

Designation: **PRINCIPAL**

Institute: **SCMS School of Engineering &
Technology**

Signature: _____

Signature: _____



**DR. PRAVEENSAL C.J.
PRINCIPAL
SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY**

Authorized Signatory
For Infosys

Authorized Signatory
For Partner

Seal: _____

Seal: _____



**PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576**

ANNEXURE I

PURPOSE / SCOPE OF THE COLLABORATION:

Infosys shall facilitate and share inputs with University / College for imparting technical and soft skills training to the students. The content of the training programs and the Faculty Enablement will be done by Infosys. The details shown in Annexure I are only indicative guidelines, and Infosys may change the following at short notice at its discretion.

There will not be any cash incentive for the faculty members involved in the training programs (Technical / Soft Skills) at the institution. However, value-added offerings will be there to motivate the faculty members.

Student / Education

1. Create a project bank for final year students
2. Publish Infosys courseware On the Web and provide access
3. Conducting special lectures for students at campuses
4. Participate in Conferences at the national/international level in the college / Seminars/ Contests
5. Increase employability by providing technical and soft skills training
6. Encouraging the students to visit Infosys Campuses


Faculty

1. Sharing Industry oriented-courseware and Technology
2. Faculty Enablement Program
3. Sabbaticals at Infosys
4. Interaction with subject matter experts

University / College

1. Share best-in-class standards (a) College-college (b) Industry-college
2. Books / CDs / DVDs etc for the library
3. Strengthen relationship with Universities / Colleges
4. Work with education bodies / universities to align the industry requirements into the college curriculum




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ANNEXURE II

MUTUAL NON-DISCLOSURE AND CONFIDENTIALITY AGREEMENT

This is an **agreement** ("Agreement" hereafter) between:

INFOSYS LIMITED, with its registered office at Electronics City, Hosur Road, Bangalore 560 100 ("Infosys") including its successors; and **SCMS School of Engineering & Technology operating out Vidya Nagar, Palissery, Karukutty, Ernakulam, Kerala – 683582.** ("Partner") including the Partner's employees, affiliates and successors at the time of the entering the agreement and during the tenure of the engagement, that is effective **05-Jan-19** .

The parties possess competitively valuable Confidential Information (as hereinafter defined) regarding their past, current and future services and products, research and development, customers, business plans, software, listings, holdings, alliances, investments, transactions, intellectual property and rights associated thereto and general business operations. The parties wish to enter into a mutually beneficial relationship, and as such, wish to share their Confidential Information with the other party, including its authorized employees and agents. For the purposes of this Agreement, the party that discloses Confidential Information to the other party shall be referred to as the "Disclosing Party", and the party that receives such Confidential Information from the other party shall be referred to as the "Recipient".

The Recipient may be given access to the Disclosing Party's Confidential Information or to create new Confidential Information for the Disclosing Party.


In view of the above, the parties agree as follows:

1. Confidential Information

"*Confidential Information*" includes any information:

- specifically indicated by the Disclosing Party, either verbally or in writing, as confidential;
- under the circumstances of the disclosure, that are to be treated as confidential; or
- the Recipient creates or produces while performing its obligations under this Agreement, regardless of the media that contains the information.




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Confidential Information does not include information, which:

- is generally available to the public at the time of its disclosure to the Recipient;
- becomes known to the public through no fault/action of the Recipient in violation of the terms herein;
- is legally known to the Recipient at the time of disclosure by the Disclosing Party;
- is furnished by the Disclosing Party to third parties without restriction; or
- is furnished to the Recipient by a third party who to the Recipient's knowledge legally obtained said information and the right to its disclosure.
- is developed independently by Recipient without use of or reference to the Disclosing Party's information.

2. Restrictions on Use

- (a) The Recipient will not disclose any Confidential Information to third parties for any purpose without the prior written consent of the Disclosing Party. However, where the Recipient is required to disclose Confidential Information in accordance with judicial or other governmental action, the Recipient will give the Disclosing Party reasonable prior notice unless such notice is prohibited by applicable law.
- (b) The Recipient will not use any Confidential Information for any purposes except those expressly contemplated or authorized by the Disclosing Party.
- (c) The Recipient will take the same reasonable security precautions as it takes to safeguard its own confidential information, but in no case less than reasonable care.
- (d) The Recipient undertakes to impose the confidentially obligations on all directors, officers and employees or other persons who work for the Recipient or under its direction and control, and who will have access to the Confidential Information.
- (e) The Recipient will return all originals, copies, reproductions and summaries of Confidential Information in its control, or confirm its destruction as requested by the Disclosing Party.




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3. Action on Breach

- (a) The Recipient will notify the Disclosing Party immediately upon discovery of any breach of this Agreement by the Recipient, and will cooperate in every reasonable way to help the Disclosing Party regain possession of the Confidential Information and prevent further breach.
- (b) The Disclosing Party will be entitled, without waiving any other rights or remedies, to seek such injunctive or equitable relief as may be deemed proper by a court of competent jurisdiction.

4. Ownership and Warranties

- (a) All Confidential Information, including the inherent intellectual properties, remains the sole and exclusive property of the Disclosing Party and the Recipient shall no right, title or interest in the same. Similarly, the Disclosing Party does not own any of the intellectual property of the Recipient, including any proprietary methodologies, tools or practices, unless otherwise agreed.
- (b) The Disclosing Party, unless expressly confirmed, makes no warranty regarding the accuracy or reliability of Confidential Information.

5. Applicability of Provisions

- (a) The provisions of this Agreement are jointly and severally applicable and will not be considered waived by any act or acquiescence, except by a specific prior written confirmation. Accordingly, both parties will expressly agree in writing to any changes in the Agreement.
- (b) If any provision of this Agreement is held illegal, invalid or unenforceable by law, the remaining provisions will remain in effect. Moreover, should any of the obligations of this Agreement be found illegal or unenforceable for any reasons, such obligations will be deemed to be reduced to the maximum duration, scope or subject matter allowed by law.
- (c) If any action at law or in equity is necessary to enforce or interpret the rights arising out of or relating to this Agreement, the prevailing party shall be entitled to recover reasonable attorney's fees, costs and necessary disbursements in addition to any other relief to which it may be entitled.

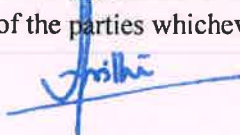
6. Jurisdiction

This Agreement will be governed by the laws of India on all substantive aspects, and both parties consent to the jurisdiction of the courts in Bangalore.

7. Tenure and Survival

All obligations created by this Agreement shall survive change or termination of the parties' business relationship for a period of two years from the date of the disclosure of the Confidential Information or the change in/termination of the business relationship of the parties whichever is later.




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IN WITNESS WHEREOF, the parties hereto have executed this Agreement by their duly authorized representatives as of the date first set forth above.

Infosys Limited

By: _____

Name: Sundar K S

Title: Associate Vice President & Head-
Campus connect Education Training & Assessment
Infosys Ltd.

Date: _____

Seal:

M/s SCMS School of Engineering & Technology

Name: DR. PRAVEENSAL C. J.

Title: PRINCIPAL


Date: 11-12-2018

Sign: _____

Seal:

DR. PRAVEENSAL C.J.
PRINCIPAL
SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY




PRINCIPAL
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ERNAKULAM, KERALA-683 576



SCMS SCHOOL OF ENGINEERING & TECHNOLOGY

Affiliated to Mahatma Gandhi University, Kottayam and Approved by AICTE, Govt. of India
An ISO 9001:2008 Certified Institution

CAMPUS: VIDYA NAGAR, KARUKUTTY, ERNAKULAM-683582 PHONE: 0484-2450330, 2451907 FAX: 91-484-2450508
E-mail: sset@scmsgroup.org Website: www.scmsgroup.org

Renewal of Memorandum of Understanding (MOU)

Of Campus Connect Program

Infosys and SCMS School of Engineering & Technology had entered into a Memorandum of Understanding (MOU) on **09-Jan-08** with respect to enriching the technical education process and to jointly work for enhancing the quality of education imparted to students, faculty and management of selected colleges of the University related to the field of Information Technology (IT). This MoU was subsequently renewed on **09-Jan-11, 08-Jan-13, 07-Jan-15 & 06-Jan-17**. The term of MOU will be expiring on **05-Jan-19**. The parties wish to extend this MOU for further period of Two (2) Years, and therefore agree the term of the MOU till **04-Jan-21**.

The Campus Connect MoU has undergone some modifications. The modified version is given along with this. The terms and conditions of the partnership are detailed out in the MoU.

Date: 09/Jan/19

Place: Bangalore

Name: Sundar K S

Designation: Associate Vice President & Head
Campus connect Education Training & Assessment
Infosys Ltd.

Signature:

Infosys Limited

Electronic City, Hosur Road,

Bangalore - 560 100

Associate Vice President
Infosys Limited
Head Campus Connect Education
Training & Assessment
Infosys Limited
Electronic City, Hosur Road
Bangalore - 560 100, India.



Date: 11-12-2018

Place: Palissery, Ernakulam

Name: DR. PRAVEENSAL C. J.

PRINCIPAL,
SCMS School of Engineering
and Technology

Authorized Signatory:

Institute Name: SCMS School of

Engineering and Technology

Institute Seal:



PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Memorandum of Understanding

This Memorandum of Understanding ("MOU") is between Infosys Ltd, a company incorporated under the laws of India with its registered office at Electronics City, Hosur Road, Bangalore – 560 100, India (hereafter referred to as "Infosys"); and SCMS School of Engineering & Technology an university / engineering college committed to educational excellence having its office Vidya Nagar, Palissery, Karukuttu, Ernakulam, Kerala - 683582 (Hereafter referred to as "Partner").

RECITALS:

- A. WHEREAS Partner has been established for the purpose of enriching the technical education process and to jointly work for enhancing the quality of education imparted to students of all the engineering disciplines in the field of Information Technology (IT).
- B. AND WHEREAS Infosys wishes to collaborate with the Partner for the purpose of enriching the technical education in new subject areas, learning-teaching process and to jointly work for enhancing the quality of education imparted to students of all the Information Technology ("IT") disciplines.
- C. AND WHEREAS Partner with assistance from Infosys has goals for enhancing the quality of the technical education for students thereby enabling them to meet the industry needs and to be recognized globally.




A handwritten signature in blue ink, appearing to be "Joshi", written over a horizontal line.

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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

NOW THEREFORE THE PARTIES HEREBY ACKNOWLEDGE AND AGREE AS FOLLOWS:

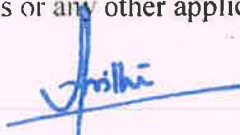
1. This MOU is for collaboration between both parties, for mutual benefit, to enhance the quality of the educational experience of students of the Partner and for the specific purposes detailed in Annexure I of this MOU
2. Infosys shall be responsible for providing the requisite course material, publicity material such as handouts, information brochures and posters and conducting faculty enablement programmes as agreed between the parties.
3. The Partner shall be responsible for providing the requisite infrastructure, network and internet access and any other facility required for the education and training.
4. It is agreed that the terms and conditions of any agreed cooperative project (s) as outlined in Annexure I of this MOU shall be the subject matter of separate definitive agreements to be negotiated and agreed upon by the Parties and/or any third parties, wherever applicable, provided always the decision whether to initiate and/or implement any proposed cooperative projects shall be subject to the availability of funds and human resources on the part of each Party.
5. The parties, their representatives, and/or assignees, following the execution of this MOU, desire to maintain close contacts with each other to achieve the goals and objectives of, and to develop the ideas acknowledged in this MOU.
6. Both parties hereby agree to designate a representative from its side who will be the primary point of contact on behalf of that party.
7. Any expenses incurred by the parties for the purpose of this MOU shall be agreed upon and shall be borne as per the mutual agreement.
8. Notwithstanding any other provision of this MOU, neither party shall have any right to use any trademarks or trade name of the other party, nor to refer to this MOU or the obligations performed hereunder directly or indirectly, in connection with any product, promotion, or publication without the prior written approval of the other party
9. All information which has been disclosed to or obtained by either party at any time during the implementation of this MOU, is confidential information. For this purpose, the parties agree to sign the binding non-disclosure agreement in Annexure II.




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ERNAKULAM, KERALA-683 576

10. The terms and conditions mentioned herein shall commence on the execution of this MOU and shall continue for a period of two (2) years from the date thereof or for such period as may be determined or extended by the parties from time to time by written notice, unless terminated by either party in accordance with this MOU. Either party may terminate this MOU at any time by providing three (3) months written notice to the other party.
11. Any notice required to be given hereunder shall be in writing and shall be deemed to be sufficiently served on the party if sent by hand or by registered post to the addresses of the party as stated in this MOU. Notices shall be deemed received: -
 - (i) If sent by registered mail, three (3) days after posting;
 - (ii) If by hand, on the day of delivery; and
 - (iii) If sent by telex or facsimile to the correct number or designated address within seventy-two (72) working hours.
12. Both parties agree to take all reasonable steps to ensure the successful completion of the collaboration, and co-operate with each other in duly carrying out the obligation agreed upon.
13. The expiration and termination of this MOU will not affect the terms of those activities, which are in progress at the time of notification of expiry or termination of the MOU.
14. On the termination or expiry of this MOU or when requested by Infosys, the Partner undertakes to return all materials to Infosys without any delay.
15. Each party shall ensure that they do not actively solicit the faculty of the other party who is involved in the implementation of this MOU during the period of such faculty's involvement with the program and for six (6) months thereafter.
16. Both the parties agree that Infosys is not obliged on account of this MOU to recruit any fixed number of students from the Partner.
17. This MOU is an indication of good faith and intent on the part of both parties and does not create any legal obligations between them. In the event of any differences or disputes arising from the implementation of the provisions of this MOU, the parties shall as far as possible settle such differences or disputes in good faith by consultation or negotiation between the parties.
18. Save and except for Clause 6, Clause 7 and Clause 8, this MOU is not a legally binding contract and under no circumstances does this MOU subject either of the parties to liability for breach, whether material or minor, of contract or any other liability under international law or the laws of the country of the respective parties or any other applicable law.




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19. The parties hereby agree that they are not bound exclusively by this MOU and are at liberty to enter into any separate agreements or arrangements with any third party without reference to the other party.

In written whereof both parties put their hard seal on the day, month and year herein mentioned.

Date: 09 Jan 19

Date: 11-12-2018

Place: Bangalore

Place: Palissery, Ernakulam

Name: Sundar K S

Name: Dr. PRAVEENSAL C. J.

Designation: Associate Vice President & Head-Campus connect Education Training & Assessment Infosys Ltd.

Designation: PRINCIPAL

Institute SCMS School of Engineering & Technology

Signature:



Authorized Signatory
For Infosys

Signature:



DR. PRAVEENSAL C.J.
PRINCIPAL
SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY

Authorized Signatory
For Partner

Seal:

Associate Vice President
Infosys Limited
Head Campus Connect Education
Training & Assessment
44, Electronic City, Hosur Road
Bangalore - 560 100, India

Seal:



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E-mail: sset@scmsgroup.org • Website: www.scmsgroup.org/sset

Memorandum of Understanding

This Memorandum of Understanding ("MOU") is between Infosys Ltd, a company incorporated under the laws of India with its registered office at Electronics City, Hosur Road, Bangalore – 560 100, India (hereafter referred to as "Infosys"); and **SCMS School of Engineering & Technology** a university / engineering college committed to educational excellence having its office **Vidya Nagar, Palissery, Karukutty, Ernakulam, Kerala - 683582** (hereafter referred to as "Partner").

RECITALS:

- A. WHEREAS Partner has been established for the purpose of enriching the technical education process and to jointly work for enhancing the quality of education imparted to students of all the engineering disciplines in the field of Information Technology (IT).
- B. AND WHEREAS Infosys wishes to collaborate with the Partner for the purpose of enriching the technical education in new subject areas, learning-teaching process and to jointly work for enhancing the quality of education imparted to students of all the Information Technology ("IT") disciplines.
- C. AND WHEREAS Partner with assistance from Infosys has goals for enhancing the quality of the technical education for students thereby enabling them to meet the industry needs and to be recognized globally.

NOW THEREFORE THE PARTIES HEREBY ACKNOWLEDGE AND AGREE AS FOLLOWS:

1. This MOU is for collaboration between both parties, for mutual benefit, to enhance the quality of the educational experience of students of the Partner and for the specific purposes detailed in Annexure I of this MOU
2. Intentionally Omitted
3. The Partner shall be responsible for providing the requisite infrastructure, network and internet access and any other facility required for the education and training.



Joshi
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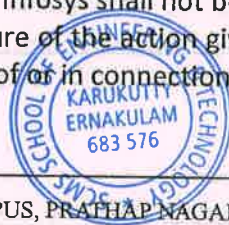


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E-mail: sset@scmsgroup.org • Website: www.scmsgroup.org/sset

- (iii) If sent by telex or facsimile to the correct number or designated address within seventy-two (72) working hours.
12. Both parties agree to take all reasonable steps to ensure the successful completion of the collaboration, and co-operate with each other in duly carrying out the obligation agreed upon.
 13. The expiration and termination of this MOU will not affect the terms of those activities, which are in progress at the time of notification of expiry or termination of the MOU.
 14. On the termination or expiry of this MOU or when requested by Infosys, the Partner undertakes to return all materials to Infosys without any delay.
 15. Except as otherwise expressly agreed to by Partner in writing, during the period of their involvement with the provision of the MOU and a further period of one (1) year thereafter, Partner agrees not to directly or indirectly or through third parties solicit or hire for employment any of Infosys's current or previous employees.
 16. Both the parties agree that Infosys is not obliged on account of this MOU to recruit any fixed number of students from the Partner.
 17. This MOU is an indication of good faith and intent on the part of both parties and does not create any legal obligations between them. In the event of any differences or disputes arising from the implementation of the provisions of this MOU, the parties shall as far as possible settle such differences or disputes in good faith by consultation or negotiation between the parties.
 18. Indemnity:
Partner agrees to defend, indemnify, and hold harmless Infosys, its affiliates, directors, officers, employees, representatives, and agents from and against any and all claims, actions, demands, legal proceedings, liabilities, damages, losses, judgments, authorized settlements, costs or expenses, including without limitation reasonable attorneys' fees, arising out of or in connection with any alleged or actual:
 - a. any negligence, willful misconduct, fraud, misrepresentation, and or violation by Partner of any governmental laws, rules, ordinances, or regulations;
 - b. breach of confidentiality and/or data privacy obligations under this MOU, by Partner;
 19. Except for claims arising due to any gross negligence, willful misconduct, fraud, misrepresentation by Infosys, Infosys shall not be liable to the Partner for any direct damages, regardless of the form or nature of the action giving rise to such liability (whether in contract, tort or otherwise) arising out of or in connection with this MOU.



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20. In no event shall either Party be liable for any indirect, special, incidental, consequential, punitive, tort or other damages, however caused, including, without limitation, any damages resulting from loss of use, loss of data, loss of profits or loss of business arising out of or in connection with this MOU, or of any other obligations relating to this MOU, whether or not the Party has been advised of the possibility of such damages.
21. Save and except for Clause 6, Clause 7 and Clause 8, this MOU is not a legally binding contract and under no circumstances does this MOU subject either of the parties to liability for breach, whether material or minor, of contract or any other liability under international law or the laws of the country of the respective parties or any other applicable law.
22. The parties hereby agree that they are not bound exclusively by this MOU and are at liberty to enter into any separate agreements or arrangements with any third party without reference to the other party.
23. This MOU, and any dispute arising from the relationship between the parties to this MOU, shall be governed by laws of India and courts in Bangalore, excluding any laws that direct the application of another jurisdiction's laws.

In written whereof both parties put their hard seal on the day, month and year herein mentioned.

Date: 04/12/2021

Place: Bangalore

Name: Sundar K S

Designation: Associate Vice President & Head-,
Campus Connect Education, Training &
Assessment Dept., Infosys Ltd.

Signature:

Authorized Signatory
For Infosys

Associate Vice President
Seal: Infosys Limited
Head Campus Connect Education
Training & Assessment
44, Electronic City, Hosur Road
Bangalore - 560 100, India



Date: 14.12.2021

Place: Karukutty

Name: Dr. Praveensal C. J.

Designation: Principal

Institute: SCMS School of Engineering
and Technology

Signature:

Authorized Signatory
For Partner

Seal:



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ANNEXURE I

PURPOSE / SCOPE OF THE COLLABORATION:

Infosys shall facilitate and share inputs with University / College for imparting technical and soft skills / professional skill training to the students. The scope and contents of courses / training programs will be decided by Infosys. The details shown in Annexure I are only indicative guidelines, and Infosys may change the following at short notice at its discretion.

Student / Education

1. Publish Infosys courseware on the digital platform and provide access
2. Offer Infosys certifications
3. Technical seminar/webinar for students on niche technology areas
4. Provide SME to deliver sessions in conferences at the national/ international level in the college / Seminars/ Contests based on availability
5. Increase employability by providing technical and soft skills training
 - a. Foundation program course(Covering Programming and Database fundamentals)
 - b. Make available Online content Digital basics on niche technology areas and soft/professional skills
 - c. Student webinars/workshops/events aimed at preparation to Infosys certifications subject to demand and availability of Infosys SME
6. Visit to Infosys Development Centres based on availability and guidelines prescribed by the respective development centers of Infosys.

Faculty

1. Sharing of Industry oriented-courseware
 - a. Foundation program course(Covering Programming and Database fundamentals)
 - b. Make available Online content Digital basics on niche technology areas and soft skills
2. Faculty Enablement Programs
 - a. Foundation program course(Covering Programming and Database fundamentals)
 - b. Elective subjects/trending IT areas
3. Provide SME sessions for selected niche technology areas subject to demand and availability of SME from Infosys



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University / College

1. Infosys electives/microcredit courses for educational institutions will be provided by Infosys wherever applicable. The list will be updated as per latest technology trends and needs of colleges.

Note: Colleges can choose from among the provided elective/microcredit course area

2. Strengthen relationship with Universities / Colleges through collaborative meetings and events
3. Work with education bodies / universities to induct the industry relevant curriculum into the college curriculum through BOS or academic council meeting.

Metrics for MoU Renewal:


Note : Weightages are attached to each of the activities.

Sl No	Item	Minimum Number / Volume (in two years)	Weightage
1	Infosys certification / completion of courses on Infosys digital platform	Active learning with considerable learning time by students and faculty members on the Infosys digital platform	30
2	Infosys suggested Industry Elective / microcredit / professional skills programs	Students and faculty to adopt the mentioned courses/certifications and clear them	30
3	Faculty Enablement Program (FEP) / Industry Visits / Seminars / Webinars / Student Workshops / SPOC meetings	Active participation in events conducted by Infosys	20
4	Consumption of Digital content on Infosys digital platform	Active consumption of content by learners of educational institutions	20
			100

MOU Renewal Criteria:

The actual weightage for a college would be decided by Infosys team based on the participation of the colleges in the given activities. Institutes should achieve a minimum of 65% to qualify for renewal of the RMOU.




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ANNEXURE II

NON-DISCLOSURE AND CONFIDENTIALITY AGREEMENT

This Nondisclosure Agreement ("Agreement") is formed between SCMS School of Engineering and Technology ("Recipient/Vendor") and Infosys Limited ("Discloser") to share Confidential Information for the purpose of assessing information and documents shared by Infosys for enhancing quality of the educational experience of students ("Purpose")

AGREEMENT

1. Infosys shall be a Discloser of Confidential Information under this Agreement.
2. Confidential Information means information of Infosys that is not generally known to the public, identified with either a restrictive legend, or where the circumstances surrounding disclosure indicate the information is confidential. Confidential Information includes information relating to financing strategies, organizational strategies, trade secret information, financial information, pricing policies, operational methods, marketing information and other business affairs of Discloser relating to the Business. Oral, visual or written communication made to each other shall be considered to be Confidential.
3. The Recipient may disclose Confidential Information only to (1) its employees, agents, subcontractors; (2) entities controlled by, under common control or controlling it; (3) those having a need to know the Confidential Information for the Purpose or otherwise for the benefit of the Discloser and (4) those who have an obligation not to further disclose the Confidential Information.
4. The term of this Agreement shall be co-terminus with MOU. The obligations stated in this Agreement shall survive for perpetuity post termination or expiration of this Agreement. Upon the request of the Discloser all records, any compositions, articles, documents and other items which contain, disclose and/or embody any Confidential Information (including, without limitation, all copies, reproductions, summaries and notes of the contents thereof), regardless of the person causing the same to be in such form, shall be returned to Discloser or destroyed by the Recipient, and the Recipient will certify that the provisions of this paragraph have been complied with.



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5. The Recipient will use at least the same care, but no less than reasonable care, to avoid disclosure of the Discloser's Confidential Information as it uses with its own Confidential Information and will use the Discloser's Information only for the purpose for which it was disclosed.
6. This Agreement will not apply to any information that (i) is or becomes publicly available without breach of this Agreement; (ii) is known by the Recipient without any confidentiality obligation, (iii) is rightfully received from a third party who did not acquire such information by a wrongful or tortuous act; is (iv) is independently developed by the Recipient or (vi) is authorized by the Discloser for release.
7. If a governmental entity or legal authority requires the Recipient to disclose Confidential Information, the Recipient will give the Discloser prompt written notice sufficient to allow the Discloser to seek a protective order. The Recipient will also use reasonable efforts to obtain confidential treatment for any such Confidential Information.
8. No rights are granted to use the Confidential Information except for the express limited rights stated in this Agreement. The Confidential Information remains the exclusive property of the Discloser.
9. This Agreement shall be governed by the laws of India, and both parties further consent to jurisdiction by the courts in Bangalore, India.
10. Discloser may terminate this Agreement by providing thirty (30) days written notice to the Recipient. Any terms of this Agreement, which by their nature extend beyond its termination remain in effect until fulfilled, and apply to respective successors and assignees.
11. The parties will comply with all applicable export and import laws and regulations to the extent they apply to the Confidential Information.
12. The receipt of Confidential Information under this Agreement will not limit the Recipient from providing or developing products or services which may be competitive with products or services of the Discloser or assigning responsibilities to its employees, agents or subcontractors.




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E-mail: sset@scmsgroup.org • Website: www.scmsgroup.org/sset

This Agreement is the entire agreement regarding the use and disclosure of Confidential Information, and replaces any prior oral or written communications between us regarding these disclosures. By signing below, each party agrees to the terms of this Agreement. This Agreement may only be altered or modified by written instrument duly executed by both parties. Once signed, any reproduction of this Agreement made by reliable means (for example, photocopy facsimile or digital image) is considered an original.

The undersigned represent that they are duly authorized representatives of the parties and have full authority to bind the parties. This Agreement will be effective as of the Effective Date listed below.

EFFECTIVE DATE: 08 Dec 2021

Vendor:

Signature

Name Dr. Praveensal C. J.

Title Principal

Date 5th March 2022

Infosys Limited

Signature

Name Sundar K.S.

Title Associate Vice President

Infosys Limited

Date Head Campus Connect Education
Training & Assessment

44, Electronic City, Hosur Road
Bangalore - 560 100. India



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sset last name <sset@scmsgroup.org>

Infosys Campus Recruitment Program: Students selected for Systems Engineer role

9 messages

Abraham Ettumanookaran <abraham.e@infosys.com>

Fri, Dec 24, 2021 at 3:32 AM

To: "sset@scmsgroup.org" <sset@scmsgroup.org>

Cc: Sudhir Kumar Mishra <Sudhir_Mishra01@infosys.com>, Shaan Vats <Shaan_Vats@infosys.com>, Gautham Premkumar <gautham.premkumar@infosys.com>



Dear Prof Jayanand.

We are delighted to share the list of students from your institute who have cleared the interview round to receive a final job offer for Systems Engineer role through Infosys Campus Recruitment Program 2021-22. Please refer to the attached excel sheet to see the list.

Kindly communicate the results with the selected students and confirm the offer acceptance status for each student immediately. We will share the joining process with you in the due course of time. Over the next few days, we will be sending the selection confirmation to all students through email.

Please note, this is a conditional job offer subject to background verification of the candidate. If falsification of data is detected during the background verification process, Infosys will revoke the job offer made to the candidate.

Thank you partnering with us for Infosys Campus Recruitment Program this year.

In case of any queries, please reach out to me.

We are looking forward to a good participation and conversions from your institute.

Best regards,

Abraham John

Talent Acquisition

Infosys



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 SCMS.xlsx
11K

SSET <sset@scmsgroup.org>

Fri, Dec 24, 2021 at 2:13 PM

To: johnjoy8656@gmail.com, suhailahmed223@gmail.com, swethajs29@gmail.com, aswathypm@gmail.com, silpapt2015@gmail.com, kirantm24@gmail.com, araavindsub@gmail.com, anitamartin0811@gmail.com, sananthkc12@gmail.com, mohammedfayaz132676@gmail.com, abhiani032@gmail.com, sree.sreeparu14@gmail.com, jithinkv2000@gmail.com, kajalct23@gmail.com, bhavyajinaraj@gmail.com, rachnamathews6@gmail.com, vaibhavnair008@gmail.com, nimishakuriachan@gmail.com, joshvvinjosy@gmail.com, telvinten7@gmail.com, rohith771416@gmail.com, joechirayath3009@gmail.com, nishabcalcutta@gmail.com, nivuantony@gmail.com, sanjanavarghese47120@gmail.com, abhishekpsuresh@gmail.com, yadhukrishnanr4@gmail.com, rohitbineesh007@gmail.com, shonsaji15@gmail.com, sagamjr2255@gmail.com, aryaprakash097@gmail.com, vanikalangara@gmail.com, yedhups@yahoo.com, akshayviswam99@gmail.com, ibrahim.shehzad7@gmail.com, agheelnk@gmail.com, raheela1822@gmail.com, danielatwork311@gmail.com, gautham.salim.16@gmail.com, neerajmallisseri@gmail.com, Karthik Saju <20karthik00@gmail.com>

Cc: Jayanand B <jayanand@scmsgroup.org>

Dear all,
 Congratulations to all those placed with Infy. Please check the attachment.
 Thanks
 Placements
 SSET
 [Quoted text hidden]

 SCMS.xlsx
 11K

Shehzad Ibrahim <ibrahim.shehzad7@gmail.com>

Fri, Dec 24, 2021 at 2:35 PM

To: SSET <sset@scmsgroup.org>

Cc: Jayanand B <jayanand@scmsgroup.org>, Karthik Saju <20karthik00@gmail.com>, abhiani032@gmail.com, abhishekpsuresh@gmail.com, agheelnk@gmail.com, akshayviswam99@gmail.com, anitamartin0811@gmail.com, araavindsub@gmail.com, aryaprakash097@gmail.com, aswathypm@gmail.com, bhavyajinaraj@gmail.com, danielatwork311@gmail.com, gautham.salim.16@gmail.com, jithinkv2000@gmail.com, joechirayath3009@gmail.com, johnjoy8656@gmail.com, joshvvinjosy@gmail.com, kajalct23@gmail.com, kirantm24@gmail.com, mohammedfayaz132676@gmail.com, neerajmallisseri@gmail.com, nimishakuriachan@gmail.com, nishabcalcutta@gmail.com, nivuantony@gmail.com, rachnamathews6@gmail.com, raheela1822@gmail.com, rohitbineesh007@gmail.com, rohith771416@gmail.com, sagamjr2255@gmail.com, sananthkc12@gmail.com, sanjanavarghese47120@gmail.com, shonsaji15@gmail.com, silpapt2015@gmail.com, sree.sreeparu14@gmail.com, suhailahmed223@gmail.com, swethajs29@gmail.com, telvinten7@gmail.com, vaibhavnair008@gmail.com, vanikalangara@gmail.com, yadhukrishnanr4@gmail.com, yedhups@yahoo.com

[Quoted text hidden]
 Respected Sir,

I got a mail a day before my interview from Infosys saying that my interview has been rescheduled but now in the final list it says that I did not show up for the interview. Hoping to find a solution.

Shehzad Ibrahim
 S7- CS2

SSET <sset@scmsgroup.org>

Fri, Dec 24, 2021 at 2:46 PM

To: Jayanand B <jayanand@scmsgroup.org>

[Quoted text hidden]

SSET <sset@scmsgroup.org>

Fri, Dec 24, 2021 at 2:48 PM

To: Shehzad Ibrahim <ibrahim.shehzad7@gmail.com>

Dear shehzad,

Your mail has been fwded to placement officer. I think you should write to Infosys too and keep a cc to jayanand@scmsgroup.org.

Thanks
 Placements
 SSET
 [Quoted text hidden]

Karthik Saju <20karthik00@gmail.com>

Fri, Dec 24, 2021 at 3:03 PM

To: SSET <sset@scmsgroup.org>, jayanand@scmsgroup.org

Respected Sir,
 I am writing this mail to inform a concern regarding the interview that was scheduled on 02/12/21 at 9.40 am for me. I was not able to join the meeting through the link that was provided to me. I was waiting in the lobby for the interview from 9.40 am but was not accepted to join the meeting. Kindly help me out. I hope you will do the needful.

Yours Sincerely
 Karthik Saju
 S7CE
 SSET
 [Quoted text hidden]



image002.png
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SSET <sset@scmsgroup.org>
To: Jayanand B <jayanand@scmsgroup.org>

Fri, Dec 24, 2021 at 7:44 PM

[Quoted text hidden]



image002.png
121K

SSET <sset@scmsgroup.org>
To: Varun Menon G <varunmenon@scmsgroup.org>

Fri, Dec 24, 2021 at 9:15 PM

----- Forwarded message -----

From: Abraham Ettumanookaran <abraham.e@infosys.com>
Date: Friday, December 24, 2021
Subject: Infosys Campus Recruitment Program: Students selected for Systems Engineer role
To: "sset@scmsgroup.org" <sset@scmsgroup.org>
Cc: Sudhir Kumar Mishra <Sudhir_Mishra01@infosys.com>, Shaan Vats <Shaan_Vats@infosys.com>, Gautham Premkumar <gautham.premkumar@infosys.com>

[Quoted text hidden]



SSET <sset@scmsgroup.org>
To: Abraham Ettumanookaran <abraham.e@infosys.com>
Cc: Sudhir Kumar Mishra <Sudhir_Mishra01@infosys.com>, Shaan Vats <Shaan_Vats@infosys.com>, Gautham Premkumar <gautham.premkumar@infosys.com>

Sun, Dec 26, 2021 at 6:12 PM

Dear Sir,

Greetings!

Thank you very much for sharing the list of candidates who got selected in your esteemed organization.

The following students who are branded as "NO SHOW" in the list have reported that they could not attend the interview due to technical reasons:

1. Shehzad Ibrahim
2. Raheela N A
3. Karthik Saju

I request your kind selves to arrange an interview for them once again, if possible.

Thanks and Regards,

Jayanand B,
Placement in Charge,
SCMS School of Engineering and Technology,
Emakulam

[Quoted text hidden]



A handwritten signature in blue ink, appearing to read 'Arishi'.

PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Candidate Name	Candidate Email	College	Region	New Result
John	johnjoy8656@gmail.com	SCMS	Kerala	SELECT
Suhail	suhailahmed223@gmail.com	SCMS	Kerala	SELECT
Swetha	swethajs29@gmail.com	SCMS	Kerala	SELECT
Aswathy	aswathyprn@gmail.com	SCMS	Kerala	SELECT
Silpa	silpapt2015@gmail.com	SCMS	Kerala	SELECT
Kiran	kirantm24@gmail.com	SCMS	Kerala	SELECT
Araavind	araavindsub@gmail.com	SCMS	Kerala	SELECT
Anita	anitamartin0811@gmail.com	SCMS	Kerala	SELECT
Sananth	sananthkc12@gmail.com	SCMS	Kerala	SELECT
Mohammed	mohammedfayaz132676@gmail.com	SCMS	Kerala	SELECT
Abhirami	abhianil032@gmail.com	SCMS	Kerala	SELECT
Sreeparvathi	sree.sreeparu14@gmail.com	SCMS	Kerala	SELECT
Jithin	jithinkv2000@gmail.com	SCMS	Kerala	SELECT
Kajal	kajalct23@gmail.com	SCMS	Kerala	SELECT
Bhavya	bhavyajinaraj@gmail.com	SCMS	Kerala	SELECT
Rachna	rachnamathews6@gmail.com	SCMS	Kerala	SELECT
Vaibhav	vaibhavnair008@gmail.com	SCMS	Kerala	SELECT
Nimisha	nimishakuriachan@gmail.com	SCMS	Kerala	SELECT
Joshvvin	joshvvinjoshy@gmail.com	SCMS	Kerala	SELECT
Telvin	telvinten7@gmail.com	SCMS	Kerala	SELECT
Rohith	rohith771416@gmail.com	SCMS	Kerala	SELECT
Joemon	joechirayath3009@gmail.com	SCMS	Kerala	SELECT
Nisha	nishabcalcutta@gmail.com	SCMS	Kerala	SELECT



Joshi
 PRINCIPAL
 SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
 VIDYANAGAR, PALLISSERY, KARUKUTTY
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Suhail	suhailahmed223@gmail.com	SCMS	Kerala	SELECT
Swetha	swethajs29@gmail.com	SCMS	Kerala	SELECT
Aswathy	aswathyprn@gmail.com	SCMS	Kerala	SELECT
Silpa	silpapt2015@gmail.com	SCMS	Kerala	SELECT
Kiran	kirantm24@gmail.com	SCMS	Kerala	SELECT
Araavind	araavindsub@gmail.com	SCMS	Kerala	SELECT
Anita	anitamartin0811@gmail.com	SCMS	Kerala	SELECT
Sananth	sananthkc12@gmail.com	SCMS	Kerala	SELECT
Mohammed	mohammedfayaz132676@gmail.com	SCMS	Kerala	SELECT
Abhirami	abhianil032@gmail.com	SCMS	Kerala	SELECT
Sreeparvathi	sree.sreeparu14@gmail.com	SCMS	Kerala	SELECT
Jithin	jithinkv2000@gmail.com	SCMS	Kerala	SELECT
Kajal	kajalct23@gmail.com	SCMS	Kerala	SELECT
Bhavya	bhavyajinaraj@gmail.com	SCMS	Kerala	SELECT
Rachna	rachnamathews6@gmail.com	SCMS	Kerala	SELECT
Vaibhav	vaibhavnair008@gmail.com	SCMS	Kerala	SELECT
Nimisha	nimishakuriachan@gmail.com	SCMS	Kerala	SELECT
Joshvvin	joshvvinjoshy@gmail.com	SCMS	Kerala	SELECT
Telvin	telvinten7@gmail.com	SCMS	Kerala	SELECT
Rohith	rohith771416@gmail.com	SCMS	Kerala	SELECT
Joemon	joechirayath3009@gmail.com	SCMS	Kerala	SELECT
Nisha	nishabcalcutta@gmail.com	SCMS	Kerala	SELECT



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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576



sset last name <sset@scmsgroup.org>

Infosys HackWithInfy is here! Registrations open on InfyTQ

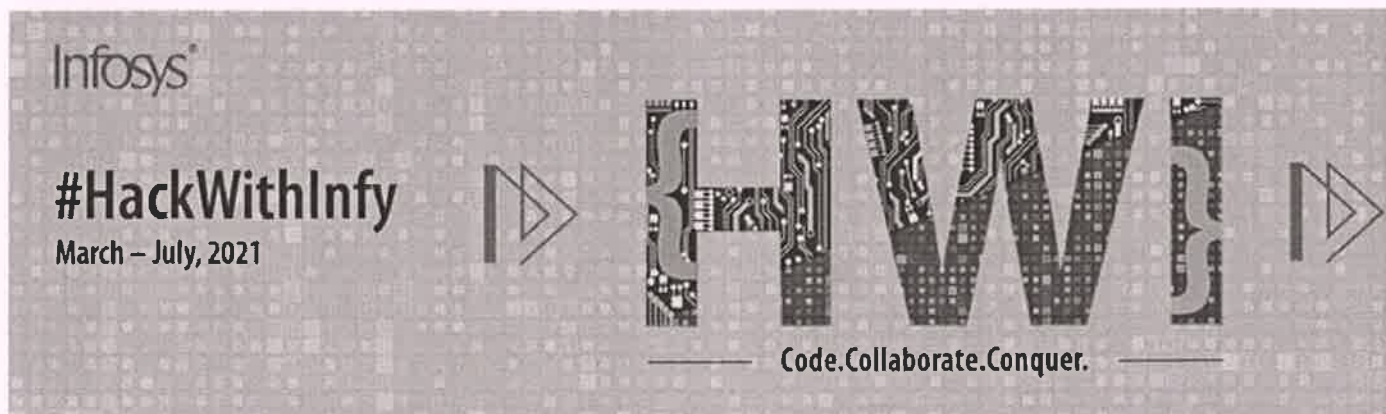
2 messages

Abraham Ettumanookaran <abraham.e@infosys.com>

Mon, Mar 15, 2021 at 2:29 PM

To: "sset@scmsgroup.org" <sset@scmsgroup.org>

Cc: Sudhir Kumar Mishra <Sudhir_Mishra01@infosys.com>, Pramod_MV <Pramod_MV@infosys.com>



Dear Professor Varun,

Greetings from Infosys!

The wait is finally over as we are back with the fourth edition of HackWithInfy in India.

Hackwithinfy is a coding competition for B.E./ B.Tech/ M.E./ M.Tech students graduating in the year 2022 across India. The program is specially designed to inculcate the culture of rapid problem-solving and innovative thinking early in academic life.

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- A chance to compete with top programmers in India
- Cash prizes worth INR 350,000 to the winners
- Pre-placement interview opportunities for **Power Programmer and System Engineer Specialist** roles at Infosys.

We are thankful for all the support and collaboration you provided for HackWithInfy in 2020 amid the pandemic. The competition witnessed over **167,000+** registrations from students all over India last year and Infosys offered over **3,200+** pre-placement interview opportunities to the top performers of the competition.

This year, HackWithInfy comprises only **two rounds** –

- **Round 1: May 5, 7, and 9, 2021**

An online individual participation round on Infosys platform.

- **Final round (virtual Grand Finale): July 2 – July 5, 2021**

In this round, top 100 participants from Round 1 will be divided into teams for a 48-hour online hackathon. A grand finale ceremony will be organized virtually on July 5, 2021.

Please visit HackWithInfy website for more details about the program. We have also attached posters for HackWithInfy in this mail. Kindly share them with your students.

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1. To register for HackWithInfy, students need to first become a registered user on InfyTQ, our learning and engagement platform
2. Once registered, go to 'HackWithInfy' page under 'Programs' tab OR click on the HackWithInfy banner at the top of their InfyTQ homepage
3. Carefully read the instructions shared on the page and select 'REGISTER NOW'.

The last date to register for HackWithInfy 2021 through InfyTQ is **Friday, April 16, 2021.**

We expect all the students to carefully read the Terms and Conditions and the Privacy Notice for HackWithInfy 2021 before they register. Infosys will consider registration on InfyTQ by a student as an acceptance of these terms and conditions.

Please feel free to write to us at HackWithInfy@infosys.com for any clarifications.

We look forward to discover the top programmers in India through HackWithInfy with your continued support.

Best regards,

Abraham John
Talent Acquisition
Infosys

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 HackWithInfy 2021 - poster.pdf
1687K

SSET <sset@scmsgroup.org>
To: Varun Menon G <varunmenon@scmsgroup.org>

Mon, Mar 15, 2021 at 2:52 PM

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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576



sset last name <sset@scmsgroup.org>

Pre Placement Interview Results - Infosys

2 messages

Abraham Ettumanookaran <abraham.e@infosys.com>

Wed, Aug 4, 2021 at 8:08 PM

To: "sset@scmsgroup.org" <sset@scmsgroup.org>

Cc: Sudhir Kumar Mishra <Sudhir_Mishra01@infosys.com>, Shaan Vats <Shaan_Vats@infosys.com>, Gautham Premkumar <gautham.premkumar@infosys.com>

Dear Professor,

Hope you and your loved ones are doing well.

We are happy to share the list of students from your institute who have cleared the pre-placement interviews that were conducted based on a student's performance. Please refer to the attached excel sheet for the list.

These students have been offered one of the three entry-level roles at Infosys: Systems Engineer (SE)/ Digital Specialist Engineer (DSE)/ Specialist Programmer (SP).

Students who have been offered Specialist Programmer role will not be considered for Power Programmer/Digital Specialist Engineer Campus event which is going to be held on 8th & 9th August as they have already received the top role on offer.

We will share the results for the Digital Specialist Engineer (DSE) and Specialist Programmer (SP) roles with the students on 5th August. Kindly let us know by end of day, in case there are any reservations with the release of offer communication.

This list is inclusive of students who might have appeared in the PPI for a higher role (SP/DSE) but were offered a role that is at par with the assessment of their skills during the interview.


The results of HackWithInfy 2021 – Finalists, will be declared on the Grand Finale scheduled on 23rd August, 2021

Please note, this is a conditional job offer subject to background verification of the candidate.

For any queries, please reach out to me.

We look forward to your continued support.




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SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Best regards,
Abraham John
Talent Acquisition
Infosys

 **SCMS.xlsx**
11K

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To: Jayanand B <jayanand@scmsgroup.org>, Varun Menon G <varunmenon@scmsgroup.org>

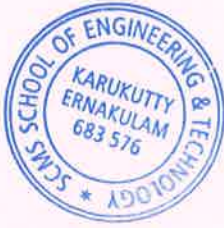
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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Candidate Name	Email Id	Offer Status	Source
Rahul Mohan	rahulmohan190@gmail.com	DSE	HWI



Joshi
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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

College Name - Interview data	State	Region
SCMS School of Engineering and Technology	Kerala	Kerala



Joshi

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VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576



sset last name <sset@scmsgroup.org>

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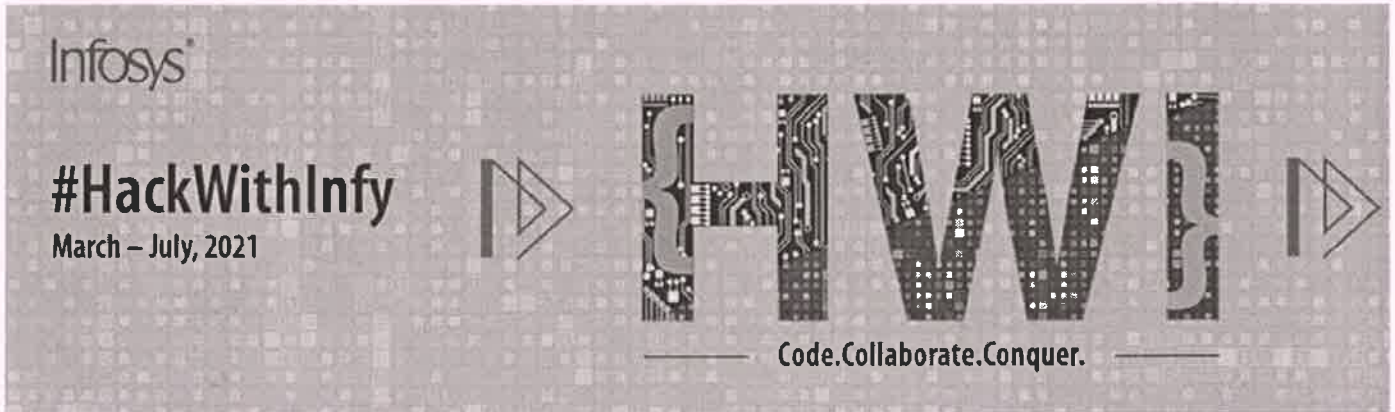
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Joshi
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 VIDYANAGAR, PALLISSERY, KARUKUTTY
 ERNAKULAM, KERALA-683 576

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Talent Acquisition
Infosys


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 HackWithInfy 2021 - poster.pdf
1687K

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To: Varun Menon G <varunmenon@scmsgroup.org>

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SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576



sset last name <sset@scmsgroup.org>

Pre Placement Interview Results - Infosys

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Cc: Sudhir Kumar Mishra <Sudhir_Mishra01@infosys.com>, Shaan Vats <Shaan_Vats@infosys.com>, Gautham Premkumar <gautham.premkumar@infosys.com>

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SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
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ERNAKULAM, KERALA-683 576

Best regards,
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 **SCMS.xlsx**
11K

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[Quoted text hidden]

 **SCMS.xlsx**
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A handwritten signature in blue ink, appearing to be "A. John", written over a horizontal line.

PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Candidate Name	Email Id	Offer Status	Source
Rahul Mohan	rahulmohan190@gmail.com	DSE	HWI



A handwritten signature in blue ink, appearing to be "Joshi", written over a horizontal line.

PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

College Name - Interview data	State	Region
SCMS School of Engineering and Technology	Kerala	Kerala



[Handwritten signature]

PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

From,

Dr Nisha L
Head of the Department
Department of Civil Engineering
SCMS School of Engineering and Technology
Karukutty, Ernakulam

To

The District Officer
Ground Water Department
Alappuzha district

Sub: Request for availing data for M.Tech thesis work – reg.

Respected Sir/Madam

The following student of SCMS School of Engineering and Technology, Karukutty, Ernakulam, requires the following data for Pattanakad and Aryad blocks of Alapuzha dist. for the years 2018 to 2022.

1. water quality data
2. water level data
- . lithology
- . hydrogeological data
- . geological data

The data is required as a part of a thesis work for our S3 M.Tech student, Rose Mary Jojo, reg No.SCM21CEEE11 S3 M.Tech, Environmental Engineering, in order to identify the regions affected by sea water intrusion. The data will truly be only used for academic purposes. I kindly request the District Officer to provide the data to the students for the same.

Thanking you.



Dr. Nisha L

Head of the Department (CE)

DEPARTMENT OF CIVIL ENGINEERING
SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY

Vidya Nagar, Karukutty, Kerala - 683 576



CERTIFICATE

This is to certify that the project report entitled **“NUMERICAL MODELLING OF SEAWATER INTRUSION IN COASTAL AREAS OF ALAPPUZHA”** was submitted by **ROSE MARY JOJO**, Reg No. **SCM21CEEE11**, to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of Degree of Master of Technology in Civil Engineering (Environmental Engineering), is a bonafide record of the work carried out by her under my guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

Internal Guide
Dr. Praseeja A V
Assistant Professor
Civil Engg. Dept. , SSET

Head of the Dept.
Dr. Nisha L
Associate Professor
Civil Engg. Dept. , SSET

PG Coordinator
Ms. Roshni K R
Assistant Professor
Civil Engg. Dept. , SSET



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SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
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ERNAKULAM, KERALA-683 576

17.02.2023

SSET/PC71.12/2023/202

From Dr Nisha L
Head of the Department
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SCMS School of Engineering and Technology
Karukutty, Ernakulam

To
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Alappuzha district

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4. hydrogeological data
5. geological data

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Thanking you



Nisha
PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Nisha
17/2/23

Dr Nisha L

Head of the Department (CE)


DEPARTMENT OF CIVIL ENGINEERING
SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY

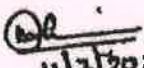
Vidya Nagar, Karukutty, Kerala - 683 576



CERTIFICATE

This is to certify that the report entitled '**MODELLING OF SEAWATER INTRUSION IN THE SELECTED COASTAL AREAS OF ALAPPUZHA DISTRICT**' submitted by '**Gopika Krishnan**' to the APJ Abdul Kalam Technological University in partial fulfilment of the requirements for the award of the Degree of Master of Technology in (Civil Engineering, Environmental Engineering) is a bonafide record of the project work carried out by her under my guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.


Internal Supervisor
Ms. Meera Varghese
Assistant Professor
CED, SSET


PG Coordinator
Ms. Roshni K.R.
Assistant Professor
CED, SSET





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SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576


11/7/23

HEAD OF THE DEPT.
Dr. Nisha L
Associate Professor
CED, SSET



DEPARTMENT OF CIVIL ENGINEERING
SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY

Vidya Nagar, Karukutty, Kerala - 683 576



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SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

20th April 2021

To Whom It May Concern

This letter is to certify that a collaborative research project proposal titled "Artificial Intelligent based alarm to predict the sudden deterioration of health in COVID-19 patients" submitted by Dr. Venkatakrisnan Balasubramanian, School of Engineering, Information Technology and Physical Sciences, Federation University, Australia and Dr. Varun G Menon, Department of Computer Science and Engineering, SCMS School of Engineering and Technology, India has been approved for the Regional Collaborations Programme COVID-19 Digital Grants funding of \$10,000 (GST exclusive) by the Australian Academy of Science and the Department of Industry, Science, Energy and Resources, Australia.

Reference link: https://twitter.com/Science_Academy/status/1379642040607068164

The project will commence in April 2021. The Project Lead Investigator Dr. Balasubramanian along with the Indian Co-Investigator Dr. Menon will work on the real-time data streams from IoMT and design and develop an AI-based algorithm to raise an alarm for COVID-19 patients. A novel AI-based predictive algorithm will be developed using machine learning techniques with vital signs collected from patients to predict the deterioration of health due to COVID-19. The project will end by 31st January 2022.

Yours Sincerely



Dr Venki Balasubramanian

Senior Lecturer
School of Engineering, Information Technology & Physical Sciences
Federation University Australia
Mt. Helen Campus, Ballarat VIC 3353
Telephone +61 3 5327 6407
v.balasubramanian@federation.edu.au



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SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Regional Collaborations Programme COVID-19 Digital Grants project summary template

Outline the project and discuss how the project directly or indirectly contributes to the response to or recovery from the COVID-19 pandemic in the Asia-Pacific region. *No more than two pages*

A) Problem Statement: Coronavirus disease (COVID-19) is a transferable illness that has infected millions of people. As of December 2020, there have been over 65.8 million cases and over 1.5 million deaths reported since the start of the pandemic in Wuhan, China, in December 2019 [1]. Due to this, the current COVID-19 pandemic has imposed significant stress on medical facilities worldwide. No country have envisioned such a need during the early stage of the pandemic. The lack of medical facilities has adversely threatened the quality of COVID-19 patient care monitoring in the hospitals around the world.

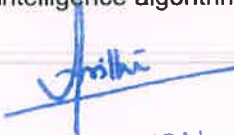
B) Proposed Solution: Remote monitoring offers the opportunity to carefully monitor confirmed or suspected COVID-19 cases from an isolated place or at home with minimal clinician intervention. Remote monitoring also allows for the timely identification of worsening symptoms through intelligent predictive alarms. The project will develop an Artificial Intelligent (AI)-based alarm that can predict the sudden deterioration of health due to COVID-19 disease by deploying a remote continuous monitoring setup using Internet of Medical Things (IoMT) that will stream data from a range of biophysical markers to Cloud.

C) Background: Remote isolated monitoring using IoMT helps to reduce the workload and the risk to the healthcare workers in hospitals. Additionally, it may decrease the number of hospital visits and admissions during COVID-19 times, thereby reducing the use of scarce resources, optimizing health care capacity, and minimizing the risk of viral transmission. Continuous monitoring show lower mortality rates in Jiangsu province, China, where an early warning system based on monitoring of respiratory rate (>30 bpm), SpO₂ ($<93\%$) and heart rate (>120 bpm) was deployed. A cure rate of 96.67% was attributed to the early warning system [2]. During this pandemic, the Department of Health and Human Services in Victoria, Australia recommended elderly patients in residential care facilities be monitored 4/24 for temperature (>38.5), persistent tachycardia, respiratory rate (>30 bpm), BP (< 90 mmHg systolic, < 60 diastolic) and SpO₂ ($< 90\%$) in the isolated room to detect any risk of sudden health deterioration [3].

However, an effective deployment of remote isolated monitoring depends heavy on the generation of smart alarms. Studies have demonstrated that the generation of smart alarms during the monitoring of patients is critical for the early detection of deterioration in patients' health that leads to proactive treatments to reduce the risk of mortality [4]. Although there are a considerable number of existing methods identified in the literature for clinical alarm generation, they typically raise alarms depending on the pre-set values results in frequent alarms and not designed for current COVID-19 and real-time remote monitoring. In most cases, the majority of these alarms are non-actionable because they may have crossed the pre-set parameter limits but have minimal clinical significance – these alarms are known as false positives or false alarms [5]. Due to frequent false alarms, clinicians become less sensitive towards patients' alarms, and neglect any possible dangerous situations resulting in "alarm fatigue" at times [4,5]. In the current pandemic situation, frequent false alarms are more dangerous because they require frequent manual intervention of clinicians that might risk their safety and any neglect of alarms by clinicians can cause sudden deterioration in patients' health or even death. The main focus of the project is to design and implement clinical alarms for confirmed or suspected COVID-19 cases that is triggered 'right on time' and accurate so that treatment can be started promptly.

D) Project Description: According to the World Health Organisation, most people with COVID-19 develop only mild (40%) or moderate (40%) disease, approximately 15% develop severe disease that requires oxygen support, and 5% have critical disease with other medical complications [6]. This project will establish a trial in India for data collection and a novel artificial intelligence algorithm will be developed in collaboration, by following the following activities:




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1. The project will commence in April 2021. Ethics applications will be prepared and submitted prior to commencement. In the first 2 months, a pilot monitoring of suspected or confirmed mild COVID-19 patients will be established in India with an existing remote monitoring kit.
2. The pilot will have the implementation of the software to automate data collection, embed the pre-set algorithms with the baseline value as recommended in [6] (respiratory rate > 30 breaths/min, SpO₂ < 90% and temperature > 38.5oC), and generate reports.
3. The lead CI Balasubramanian has immense expertise in real-time data streams from IoMT work along with the Indian CI Menon to design and develop an AI-based algorithm to raise an alarm.
4. A novel AI-based predictive algorithm will be developed using machine learning techniques with vital signs samples collected from 1 and 2 to predict the deterioration of health due to COVID-19.
5. The novel AI-based algorithms will be used to predict COVID-19 by setting up extended monitoring in India with confirmed moderate COVID-19 patients thereby building up a unique dataset for AI training and performing a much-needed public health service to raise 'right on time' alarm for deteriorating COVID-19 patients.
6. The last month will be devoted to the write-up of papers, analyzing quantitative and qualitative data collected during the trials.

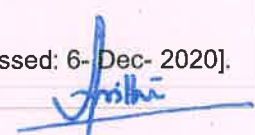
While India has strictly imposed lockdown rules to avoid the spread of COVID-19 they have had to relax the rules to sustain her economy. The spread of COVID-19 is inevitable but minimising the number of deaths is possible by monitoring suspected or confirmed COVID-19 cases at home or for those in isolation. The current pandemic has overburdened the Indian government hospital setup and the community considerably, the average cost of a hospital bed per day for COVID-19 monitoring in India is reported to be 150 AUD compared to the average salary of 70% of Indians is less than 200 AUD per month. The existing healthcare setup requires novel, alternative COVID-19 monitoring opportunities with early smart intervention. The deployed remote monitoring with AI-based alarms can influence the clinicians to shift the patients to hospitals only based on their deteriorating health condition and can drastically reduce the hospitalization cost not only in India but in the growing economic countries across the Asia-Pacific region.

E) Project Team: CI Balasubramanian has expertise in the development of a scalable IoT architecture for the secure transmission of IoMT data that led to the Anidra spin-out he founded. CI Menon has expertise in IoMT, genetic algorithms, machine learning techniques and mobile health applications. The CIs have already established collaborations through joint publications and clinical approval/development of a smart, remote patient monitoring in Australia and in India. The CI Balasubramanian has applied the IoMT architecture to remote vital signs monitoring in one of the private hospitals in India with AI-based early warning scores. Both Australian and Indian CIs have the right combination of expertise ranging from IoMT, Cloud and AI to complete the project. The team have established clinical partners in India to carry out the trial. The Project funds will be used to develop code to train the AI algorithms and for the cloud infrastructure for the project.

References:

1. WHO, 'COVID-19 Weekly Epidemiological Update', 2020. [Online]. Available: <https://www.who.int/publications/m/item/weekly-epidemiological-update-8-december-2020>. [Accessed: 8- Dec- 2020].
2. Sun Q, Qiu H, Huang M, Yang Y. Lower mortality of COVID-19 by early recognition and intervention: experience from Jiangsu Province. *Ann Intensive Care*. 2020 Mar 18;10(1):33. doi: 10.1186/s13613-020-00650-2. PMID: 32189136; PMCID: PMC7080931.
3. State Government of Victoria. (2020). [Online]. Available: <https://www.dhhs.vic.gov.au/aged-care-sector-coronavirus-disease-covid-19>. [Accessed: 6- Dec- 2020].
4. Bell, L., Monitor alarm fatigue. *American Journal of Critical Care*, 2010. 19(1): p. 38.
5. Christensen, M., et al., Alarm setting for the critically ill patient: a descriptive pilot survey of nurses' perceptions of current practice in an Australian Regional Critical Care Unit. *Intensive and Critical Care Nursing*, 2014. 30(4): p. 204-10.
6. WHO, 'Clinical management of COVID-19', 2020. [Online]. Available: <https://www.who.int/publications/i/item/clinical-management-of-covid-19>. [Accessed: 6- Dec- 2020].




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Describe how the activity will contribute to building linkages in the Asia-Pacific region, and facilitate greater science, research, and innovation collaboration.

No more than 300 words

Firstly, the early career researchers CI Balasubramanian & Menon are already collaborating informally in wireless body sensors research. The team proposed and implemented an adaptive and flexible Brain Energized Full Body Exoskeleton (BFBE) for assisting paralysed people using the brain signals captured by the Electroencephalogram (EEG) sensors. CI Balasubramanian has a decade of experience in solving real-time issues in remote patient monitoring using body sensors through hospital trial and research, while CI Menon's work in Center of Robotics in machine learning techniques on wireless sensor data has the potential to facilitate greater research and innovation. Any support and seed funding would formalize their collaboration and enable them to establish an Australia-India Healthcare Data Acquisition and Analytics Research Lab (AIDaAL). As both have exhibited potential to bring in researchers, grants and industries collaboration for innovative applied research.

Secondly, the research outcome will facilitate greater science in India as well as in Australia because there is evidence in Australia that the general public have engaged in using remote monitoring to manage the mild to moderate COVID-19 diseases in the community. However, these patients are kept track off using a mobile application that asks them to self-report their symptoms each day. The report is fed into a dashboard monitored by the practice's nurses, who can see whether individual patients are stable or if their symptoms are getting worse and they need to be contacted. The research of AI-based smart alarms to predict the worsening condition of COVID-19 patients will facilitate greater science by automating the detection process with minimal human intervention.

Finally, the provision of COVID-19 disease monitoring in the highly dense populations (in India) will enhance the use of remote monitoring in developing economies in Asia-Pacific by reducing the hospitalization cost.




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Describe how intellectual property (IP) may be used and managed in your project and any proposed ownership of IP resulting from the project will be managed.

No more than 300 words

It has been agreed that all background intellectual property (IP) will be owned by the respective parties and the new foreground IP will be shared according to respective monitored contributions from partners. Any extension made to partners background IP (by any partner) will be owned by its original IP contributing partner.

Agreements will be reached amongst partners prior to commencement so that background IP is retained by each partner and commercialization of IP developed during the project is shared on the basis of contribution. Wherever possible IP will remain accessible for the public good.



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EASTERN UNIVERSITY SRI LANKA (EUSL)

DEPARTMENT OF CHEMISTRY

Chenkalady, Sri Lanka

TEL: +94 652240755, Fax: +94 652240758

17.01.2024

CERTIFICATE

This is to certify that Dr. Nithya Mohan, Assistant Professor, Basic Science and Humanities department, SCMS School of Engineering and Technology is collaborated with the project "Comprehensive EPR investigation of copper(II) chelates based on thiosemicarbazones and salen Schiff bases" by Dr. M Sithambaresan, Professor, Department of Chemistry, Eastern University, Sri Lanka from 01/04/2023.

Dr.M. Sithambaresan
Professor in Chemistry
Department of Chemistry
Eastern University, Sri Lanka

.....
Dr. M. Sithambaresan *B.Sc. Special (Hons) (Jaffna), M.Phil. (Peradeniya), Ph.D (CUSAT, Kerala)*
Professor in Chemistry
Faculty of Science
Eastern University, Sri Lanka
Chenkalady
Sri Lanka
Email: sithambaresanm@esn.ac.lk



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Report of the collaborative work with Dr. M Sithambaresan, Professor, Department of Chemistry, Eastern University, Sri Lanka

We have collaborated with Dr. M Sithambaresan, Professor, Department of Chemistry, Eastern University, Sri Lanka for a research work entitled 'Comprehensive EPR investigation of copper(II) chelates based on thiosemicarbazones and Schiff bases'. The work mainly focuses on the synthesis, characterization of different novel copper complexes and their application studies. One of the important characterization techniques for the copper complexes are EPR studies and their simulation to get exact structure. The EPR studies and the simulation part were done at Eastern University, Sri Lanka. The research work has been communicated to Journal of Molecular Structure (Elsevier) and the paper is currently under review.

Head of The Department


Dr. Nuja M Unnikrishnan





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21.06.2022

From
Dr. Nisha L
Head of Department
Department of Civil Engineering

To
The District Medical Officer
Ernakulam

Sir/Madam

Ms Anupama George, Semester 4, MTech Environmental Engineering student of SCMS School of Engineering and Technology, Karukutty, Ernakulam, require the block-wise data on waterborne diseases in the District of Ernakulam. The data will truly be only used for academic purposes as a supporting document for her thesis which includes an exposure assessment of faecal contamination and a behavioural survey of the selected location. Water from the selected location will be taken for bacteriological analysis. The following survey format will be used for behavioural surveys. The thesis work has to be completed by this June. I kindly request the District Medical Officer to provide her with the same.

Thanking you

Nisha

Dr. Nisha L

Head of the Department:



Joshi

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**DEPARTMENT OF CIVIL ENGINEERING
SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY
KARUKUTTY**



CERTIFICATE

This is to certify that the project report entitled **"SANITARY INSPECTION AND MICROBIAL ANALYSIS OF POSSIBLE EXPOSURE PATHWAYS OF THE COASTAL AREA"** submitted by **ANUPAMA GEORGE**, Reg No. SCM20CEEE07, to the APJ Abdul Kalam Technological University in partial fulfilment of the requirements for the award of Degree of Master of Technology in Civil Engineering (Environmental Engineering) is a bonafide record of the work carried out by her under my guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

Internal supervisor

Dr. Praseeja A V
Assistant Professor
Department of Civil Engineering.
SCMS School of Engineering
& Technology, Karukutty

Head of the Department

Dr. Nisha L
Associate Professor and Head
Department of Civil Engineering.
SCMS School of Engineering
& Technology, Karukutty

PG Coordinator

Dr. Sanju Sreedharan
Associate Professor
Department of Civil Engineering
SCMS School of Engineering
& Technology, Karukutty



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01/06/2023

From

Dr Nisha L
Head of the Department
Department of Civil Engineering
SCMS School of Engineering and Technology
Karukutty, Ernakulam

To

HOD
Department of Nano Science and Technology
University of Calicut
Malappuram

Sub: Request for DLS testing of water sample

Respected Sir/Madam,

Ms. Arathi Sreekumar (SCM21CEEE04) second year M.Tech, SCMS School of Engineering and Technology, Karukutty, Ernakulam, has to analyse water sample particle size distribution using DLS (dynamic light scattering) test. The test is required as a part of a thesis work for M.Tech thesis, I kindly request the department of Nano Science and Technology, University of Calicut please make the necessary arrangements for the student to conduct DLS test of the samples as soon as possible.

Thanking you



Dr Nisha L

Head of the Department (CE)



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DEPARTMENT OF CIVIL ENGINEERING
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
KARUKUTTY



CERTIFICATE

This is to certify that the project report entitled **“MITIGATION AND ANALYSIS OF SCALING IN IRRIGATION PIPELINES AT CHITTUR”** was submitted by **ARATHI SREEKUMAR**, Reg No. **SCM21CEEE04**, to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of Degree of Master of Technology in Civil Engineering (Environmental Engineering), is a Bonafide record of the work carried out by her under my guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

Internal Guide

Ms. Roshni K R

Assistant Professor

Department of Civil Engg.

SCMS School of Engineering

& Technology, Karukutty

PG Coordinator

Ms. Roshni K R

Assistant Professor

Department of Civil Engg.

SCMS School of Engineering

& Technology, Karukutty

Head of the Department

Dr. Nisha L

Associate Professor and Head

Department of Civil Engg.

SCMS School of Engineering

& Technology, Karukutty



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SUNRISE HOSPITAL

(A unit of Sunrise Institute of Medical Sciences (P) Ltd. - Kakkanad)

Certificate no: 1.0

Issued in compliance with:

SUNRISE HOSPITAL, Seaport - Airport Rd, Thrikkakara, Kakkanad, Kerala 682030

For clinical certification of the below stated medical device:

De-Addicto (EM De-addiction Stimulator for alcohol addicts and severely depressed)

Developed by:

Dr. Sunil Jacob

Director

Centre for Robotics

SCMS School of Engineering and Technology

Karukutty-683 582, Kerala

Along with his team comprising of:

1. **Akhil M S**
Electronics and Communication Department
SCMS School of Engineering and Technology
2. **Jibin Lukose**
Electronics and Communication Department
SCMS School of Engineering and Technology

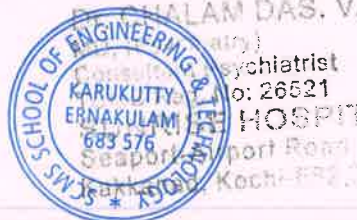
This is to certify that the clinical trials of the above mentioned device **De-Addicto** (working and principle specified in the attached certificate number 2.0) has been successfully completed over a period from 07/12/2017 to 19/01/2018 under the expert guidance of:

Dr. Chalam Das,

MD (Psychiatry)

Consultant Mental Health, Sunrise Hospital

Sign:



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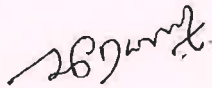


The quality and effectiveness of the above mentioned device has been continually assessed and monitored and is subject to continuous surveillance under an expert medical guidance.

This Certificate is issued under the following conditions:

1. The device was tested on severe alcohol addicts along with prescribed routine medication and has found to be showing positive improvement in comparison to the scenario with prescribed medication alone.
2. The device was tested on patients suffering from various forms of depression along with prescribed routine medication and has found to be showing positive improvement.
3. The stated clinical trials of the above mentioned device has not shown any form of side effects/harm to the patient on whom it has been tested.
4. Possible improvement of the patient's mental and physical state has been noted with regular usage of the above mentioned device.

The above mentioned device is further approved for advanced clinical trials since it is found to be effective under normal clinical standard trials.

Sign: 
Dr. Chalam Das

Dr. CHALAM DAS. V.
MD. (Psychiatry)
Consultant Psychiatrist
TCMC Reg. No. 26521
SUNRISE HOSPITAL
Seaport-Airport Road
Kakkanad, Kochi-682 030





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Akhil M S
Jibin Lukose

 eanlabscochin@gmail.com

De-Adicto

Non-invasive Anti-Depression and
Drug/Alcohol-Rehab E-M Device



A handwritten signature in blue ink, appearing to read 'Jibin', is written over a grey wavy background element.

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PURPOSE

To establish an addiction free society thereby securing the future of the youth and nation.



A handwritten signature in blue ink, appearing to be "S. S. S.", written over a horizontal line.

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Problem Statement

The current youth are suffering with different type of addiction E.g. Nicotine, Alcohol, Cocaine, METH etc. The prototype will help the addicted person to come out of addiction.

This is achieved by controlling the dopamine level in the synapse region of the neurons.

The De-addiction centre equipped with our device under the supervision of medical professionals will make the society free of drug addicts.



A handwritten signature in blue ink, appearing to read "Anil K", written over a horizontal line.

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Scenario Description

In the society the youngster are influenced by different types of addiction. The youngster will have more inclination to experience it. This initial consumption for fun and anxiety will finally lead to addiction.

This in turn ruins their carrier and life. To make them come out of this disastrous situation and lead a normal life we propose “De-Addictive Device for the Drug Addicts”.




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Solution

For the survival of the human being there is a rewarding system in the brain controlled by the limbic region. This rewarding system is hijacked by the drugs which in turn leads to addiction.

We are using the device which can stimulate the neuron which secretes the dopamine.



A handwritten signature in blue ink, appearing to read "Anil".

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Why now?

According to National Institute of Drug addict NIDA 45% of the College Age and Young Adult in the campus are addicted to different type of drugs. The prospective impact and the College status we have mentioned in the table below.

College Status	Number of Students	Boys	Girls
Addicted due to Drugs	20%	14%	6%
Willingness	19%	13%	6%
Non Willing	1%	1%	0%
2 Years Span DE addictive student	19%	13%	6%



A handwritten signature in blue ink, appearing to be "Ajith", written over a horizontal line.

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Methodology

The Depressed and drug addicts are treated by different type of Depression and De-addictive medicine. These medicines usually do have a lot of side effects.

The proposed Anti depression and De-Addictive device is completely noninvasive. The human body is completely transparent to magnetic field. The magnetic field previously was used for massage and relaxation. The same concept with a controlled pulse generation and intensity control will serve the purpose of controlling the dopamine level in the neuron.

The same concept can be used by electrical stimulation. In our device, the magnetic pulses can be controlled, its intensity and the position can be changed depending on the different type of addiction.

The dopamine level is maintained by the external device ,giving the same Euphoria affect as the drugs. This depth of influence can be reduced slowly and the dopamine level can be maintained normal. This will help the person come out of the addiction.



A handwritten signature in blue ink, appearing to read "A. J. K. K.", written over a horizontal line.

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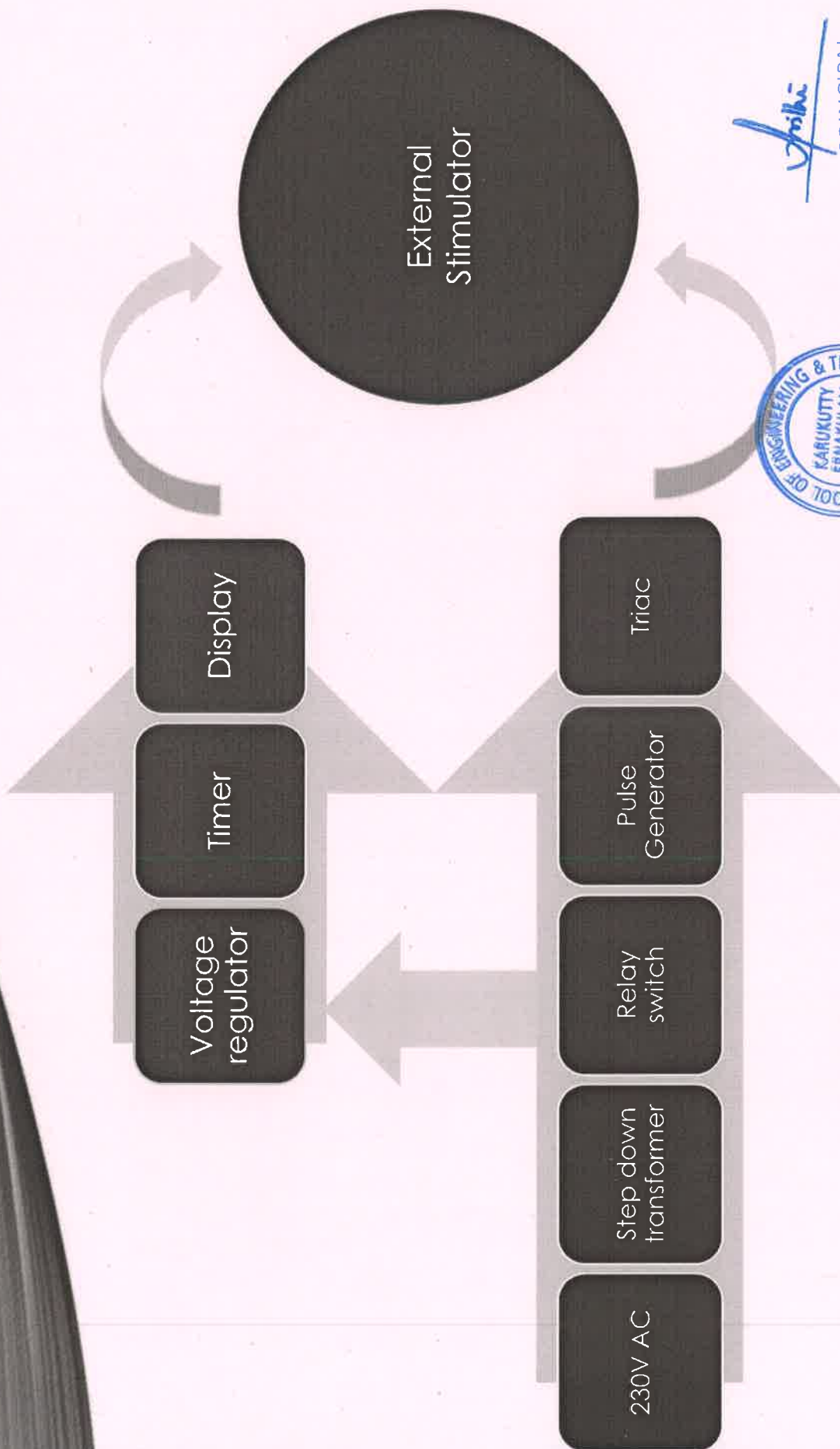
- The three modules are used**
- 1) Power and switching module**
 - 2) Display module**
 - 3) EM coil module.**

The relay will help in switching between different modules. Initially the buzzer is on indicating that the time for EM stimulation is not being set.

- The pre-settable up-down counter will set the timing for the stimulation.**
- The buzzer will be off and an LED will turn ON and OFF indicating the status of the pulse duration of the stimulation.**
- The high current will pass thru the device creating the magnetic field.**
- The magnetic field influences the part of the brain which is exposed to it, controlling the action potential responsible for Dopamine secretion in synapse region.**



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John

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Roadmap to Market

With collective efforts from hospitals and de-addiction centres across the world we would like to establish a drug free society with the help of our device.

Within the next year, we are planning to reach out experts in the field of neuro science to make the device more effective.



A handwritten signature in blue ink, appearing to read "Anil".

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BUSINESS MODEL

Key Partners <ul style="list-style-type: none"> • State Government • Hospitals • De-addiction Centers 	Key Activities <ul style="list-style-type: none"> • Control to drug addiction • Enhancing the mental state of an individual 	Value Propositions <ul style="list-style-type: none"> • To built a better society • A better future for our youth • Nation's morale and development 	Relationships <ul style="list-style-type: none"> • Hospitals • Campus • National Service Schemes • De-addiction centers 	Customer Segments <ul style="list-style-type: none"> • Hospitals • De-addiction treatment centers • Drug addicts • Alcohol addicts • Campuses
Key Resources <ul style="list-style-type: none"> • Social media • NGO 		Channels <ul style="list-style-type: none"> • Social media • Digital media • Drug impact awareness classes 		



[Signature]

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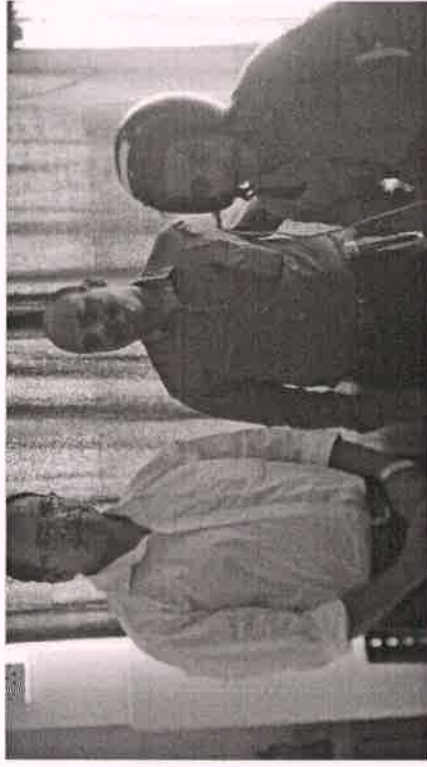
COMPETITORS

Since the concept that we have brought into light has never been taken into consideration before, the existence of competitors would be questionable.

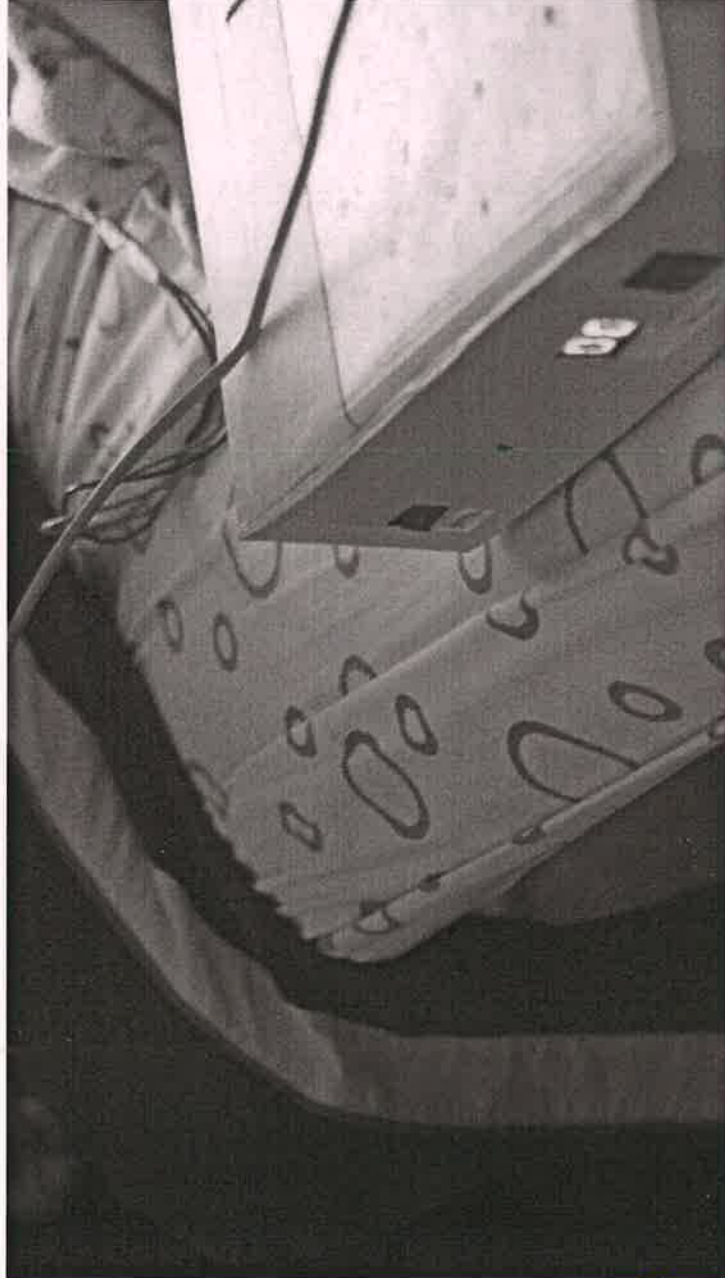


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PHOTOS



Photos taken during first clinical trials of prototype.



De-Addicto (Prototype)

A handwritten signature in blue ink, appearing to read 'Arshika', written over a horizontal line.

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TEAM

Name	Designation	Contact Number	E-Mail
Akhil M S	Project Lead	+91-9961978366	akhilmskelan@gmail.com
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Vinoj P G	Chief Adviser	+91-9446276238	
Dr. Chalam Das Sunrise Hospital Kakanad	Chief Medical Adviser	+91-9447661215	



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പ്രയുക്ത രസതന്ത്ര വിഭാഗം
DEPARTMENT OF APPLIED CHEMISTRY
കൊച്ചി ശാസ്ത്ര സാങ്കേതിക സർവ്വകലാശാല
COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY
KOCHI - 682 022, KERALA, INDIA



23/03/2023

CERTIFICATE

This is to certify that Dr. Nithya Mohan, Assistant Professor, Basic Science and Humanities department, SCMS School of Engineering and Technology is associated with one of my project "Salen Schiff base complexes: Synthesis and applications" from 01/11/2022.

Dr. P.V. Mohanan
Professor



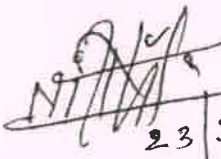
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Work Report of the collaborative work

Third order NLO studies on Schiff base complexes with aliphatic diamine spacer groups

We have synthesized novel symmetrical salen schiff base complexes and the third order linear and nonlinear optical properties were studied. The experimental results revealed that the synthesized compounds are good NLO active materials and the third order nonlinear property arises from two photon absorption (TPA). Materials having such two photon absorption (TPA) have wide range of application in the field of optical storage memory, photodynamic therapy¹ etc. The optical limiting values show that the reported compounds are good optical limiters. The experimental results were substantiated with theoretical calculations carried out using DFT at B3LYP/6-31G* level of theory. The system with the highest π -delocalisation exhibited the highest activity. The total dipole moment, polarizability and first hyperpolarizability were also calculated at the same level of theory which are also in line with the experimentally observed results.


23/3/23

Dr. NITHYA MOHAN
Asst. Professor
BSH, SSET


23/3/23

Dr. Sreelekha Menon
HOD, Basic Science & Maths
SCMS, SSET





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17.11.2022

From

Dr. Nisha L
Head of the Department
Department of Civil Engineering
SCMS School of Engineering and Technology
Karukutty, Ernakulam

To

The District Officer
Groundwater Department
Palakkad

Sub: Request for availing data for M. Tech thesis work – reg.

Respected Sir/Madam

The following students (Arathi Sreekumar SCM21CE004, Shahana Younus SCM21CEEE12), of SCMS School of Engineering and Technology, Karukutty, Ernakulam, require the observation well location details and general water characteristics of Chittur block in the District of Palakkad. The data is required as a part of their thesis work for the M. Tech course, I kindly request the District Ground Water Officer to provide the data to the students for the same.

Thanking you

NLS

Dr Nisha L

Head of the Department (CE)

Received



Prithi

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DEPARTMENT OF CIVIL ENGINEERING
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
KARUKUTTY



CERTIFICATE

This is to certify that the project report entitled "**MITIGATION AND ANALYSIS OF SCALING IN IRRIGATION PIPELINES AT CHITTUR**" was submitted by **ARATHI SREEKUMAR**, Reg No. **SCM21CEEE04**, to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of Degree of Master of Technology in Civil Engineering (Environmental Engineering), is a Bonafide record of the work carried out by her under my guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

Internal Guide

Ms. Roshni K R

Assistant Professor

Department of Civil Engg.

SCMS School of Engineering

& Technology, Karukutty

PG Coordinator

Ms. Roshni K R

Assistant Professor

Department of Civil Engg.

SCMS School of Engineering

& Technology, Karukutty

Head of the Department

Dr. Nisha L

Associate Professor and Head

Department of Civil Engg.

SCMS School of Engineering

& Technology, Karukutty



Nisha

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ERNAKULAM, KERALA-683 576

DEPARTMENT OF CIVIL ENGINEERING
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
KARUKUTTY



CERTIFICATE

This is to certify that the project report entitled **“MODELLING OF GROUND WATER FLUCTUATIONS IN CHITTUR”** was submitted by **SHAHANA YOUNUS**, Reg No. **SCM21CEEE12**, to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of Degree of Master of Technology in Civil Engineering (Environmental Engineering), is a bonafide record of the work carried out by her under my guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

Internal Guide

Dr. Praseeja A V

Assistant Professor

Department of Civil Engg.

SCMS School of Engineering

& Technology, Karukutty

Head of the Department

Dr. Nisha L

Head of the Department and

Associate Professor

SCMS School of Engineering

& Technology, Karukutty

PG Coordinator

Ms. Roshini K R

Assistant Professor

Department of Civil Engg.

SCMS School of Engineering

& Technology, karukutty

4/5/2023



Nisha
4/5/23

Joshi

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ERNAKULAM, KERALA-683 576

13/03/2023

From

Dr Nisha L
Head of the Department
Department of Civil Engineering
SCMS School of Engineering and Technology
Karukutty, Ernakulam

To

The District Ground Water Officer
Palakkad

Sub: Request for availing data for M.Tech thesis work

Respected Sir/Madam

Ms. Shahana Younus (SCM21CEEE12) second year M.Tech, SCMS School of Engineering and Technology, Karukutty, Ernakulam, require the data of wells (location, depth, pumping rate) in Chittur block of District of Palakkad. The data is required as a part of thesis work for M.Tech thesis, I kindly request the District Ground Water Officer to provide the data to the students for the same.

Thanking you

Nisha

Dr Nisha L

Head of the Department (CE)

Nisha



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DEPARTMENT OF CIVIL ENGINEERING
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
KARUKUTTY



CERTIFICATE

This is to certify that the project report entitled **“MODELLING OF GROUND WATER FLUCTUATIONS IN CHITTUR”** was submitted by **SHAHANA YOUNUS**, Reg No. **SCM21CEEE12**, to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of Degree of Master of Technology in Civil Engineering (Environmental Engineering), is a bonafide record of the work carried out by her under my guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

Internal Guide

Dr. Praseeja A V

Assistant Professor

Department of Civil Engg.

SCMS School of Engineering

& Technology, Karukutty

Head of the Department

Dr. Nisha L

Head of the Department and

Associate Professor

SCMS School of Engineering

& Technology, Karukutty

PG Coordinator

Ms. Roshini K R

Assistant Professor

Department of Civil Engg.

SCMS School of Engineering

& Technology, karukutty

4/5/2023



[Signature]

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vps Lakeshore

Global Lifecare

Lakeshore Hospital & Research Centre Ltd
NH-47 By-pass, Maradu, Nettoor PO, Kochi - 682 040, Kerala, India. Tel. 91-484-2701032/2701033
Fax - 0484 - 2701996. E-mail : info@lakeshorehospital.com Web: www.lakeshorehospital.com
CIN No U85110KL1996PLC010260

Dr. Arun Oommen

MS, MCh (Neuro), MRCS Ed, MBA

Consultant - Neurosurgeon

May 14th, 2018

Dr. Sunil Jacob

Director, SCMS centre for Robotics

SCMS School of Eng and Tech

Karukutty, Angamaly, Kerala , India

Re: Support for Brain to muscle interface for paralysed person

Dear, Dr. Jacob

I am pleased to offer my full support for the collaboration included in your proposal " Brain to muscle interface for paralysed person ". Should your proposal be selected for funding, it is my intent to collaborate and/or commit resources as detailed in the Project Description.

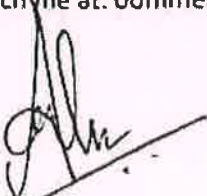
My Hospital VPS Lakeshore is one of the leading Hospitals in India and is part of the VPS health care group with a global reach. We are a fore runner as far as Neuroscience is concerned. We have a large team who do all sorts of work related to neuroscience including OP patient care and diagnosis, surgeries, Rehabilitary care, publications and research.

We are excited to be able to support the technical and implementation process, subject to availability of time and resources. We will provide necessary scientific input (and mentoring) but will not have any duties associated with programmatic stewardship, which will be performed by Dr. Sunil Jacob, Director, an extramural program official. Further, in keeping with the mission of SCMS School of Engineering and Technology to promote and facilitate Neuroscience research and the dissemination of new knowledge, we would supply requested research materials and technical expertise to Dr. Sunil Jacob for research purposes.

I am looking forward to working with you.

You can reach me at: oommenarun@yahoo.co.in

Regards



Dr Arun Oommen
Consultant neurosurgeon
VPS Lakeshore Hospital
Kochi, India



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PG Vinoj, Sunil Jacob, Varun G Menon. “Hybrid brain actuated muscle interface for the physically disabled”, <https://onlinelibrary.wiley.com/doi/10.1111/bcpt.13100>, BCPT Volume 123, Issue S3, IERI International Conference on Medical Physics, Medical Engineering and Informatics (ICMMI 2018), 7–9 September 2018, Macau

010

Hybrid brainactuated muscle interface for the physically disabled

P.G. Vinoj¹, Sunil Jacob², Varun G. Menon³

¹Electronics and Communication Engineering Department, APJ Abdul Kalam Technological University, India; ²Centre for Robotics, SCMS School of Engineering and Technology, India; ³Computer Science Engineering Department, SCMS School of Engineering and Technology, India

Objectives: According to Reeve Foundation 29% of paralysis is due to stroke followed by injury in the spinal cord. Sometimes it may be difficult for a person to move the paralyzed person's body part as it may be too stiff. Our research focuses on actuating the paralyzed person's body part through his own thought process using Brain-Muscle Interface. The system uses Novel Technique which avoids the use of Exo-Skeleton.

Methods: In our current work, we propose a Hybrid Brain-Muscle Interface (HBMI) for the paralyzed person. The HBMI interface should have the provision for pre-processing, classifying, recording and training multidimensional EEG signals. The classifier module and the pre-processor module were implemented separately for easy testing and modification of different phases. The electrical signal from brain is captured using EEG and must be recorded during voluntary movement. When the brain does real time activities it must be detected and categorized into two dimensional movements. The non-invasive technique of recording EEG from the scalp is used for analyzing brain activity. This technique reduces the human mental workload and cost compared to invasive Technique. The excitation of the neurons is done using External audio and video feedback. The accuracy of the system is improved by combining Steady State Visually Evoked Potential (SSVEP) and Event Related Desynchronization (ERD) signals.

Results: The person suffering with Amyotrophic Lateral Sclerosis (ALS) is interfaced with HBMI. The HBMI generate electrical stimulation based on the subject's thought processing and in response to the stimulus the subject under test perform the desired movements of his/her body part. During the operation, the HBMI record the EEG signals, process it and classify it to different desired movements. The recorded operation is compared with the actual operations. The performance accuracy is measured. The performance accuracy is the number of correct classification divided by number of physical operations. A pair of EMG Electrodes must be



A handwritten signature in blue ink, appearing to read "Joshi".

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placed on the identified body part. If the result is not satisfactory a Bio-feedback is given and the process is repeated till the performance accuracy is achieved.

Conclusions: The Hybrid brain muscle Interface (HBMI) will bypass the brain clotting and help the paralyzed person to move their paralyzed parts using brain stimulation without any Exo-skeleton. It is non-invasive and it does not require any exoskeleton for the motion. In it there is wireless connection between the brain and the controlled parts. Hybridization helps to classify the brain signals more accurately. Our findings will assist paralyzed person, and provide a better interface for the families, friends, and caretaker of the paralyzed person.

Acknowledgements: The part of the research was funded by EPICS in IEEE (Grant No. 2016-12).



A handwritten signature in blue ink, appearing to be "Joshi", written over a horizontal line.

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POST GRADUATE AND RESEARCH DEPARTMENT OF CHEMISTRY
BHARATA MATA COLLEGE

(Affiliated to Mahatma Gandhi University Kottayam)
(Re-accredited by NAAC with 'A+' Grade, ISO 9001-2015 Certified)
Thrikkakara P. O, Kochi – 682021, Kerala, India

07-08-2023

Certificate for Collaboration

This is to certify that Dr. Jinsa Mary Jacob, Assistant Professor, Department of Chemistry, Bharata Mata College, Thrikkakara has collaborated with the Department of Basic Science and Humanities, SCMS School of Engineering and Technology, Karukutty, 683 576, for the project entitled "Multi-faceted investigation of copper (II) chelates based on an ONS donor thiosemicarbazone: Crystal structures, spectral aspects, DNA binding and computational studies" from 01/03/2023.

Dr. SINDHU JOSEPH
Head of the Department of Chemistry
Bharata Mata College
Thrikkakara, Kochi - 682 021



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Work Report of the collaborative work with Bharata Mata College, Thrikkakara

This study unveils the synthesis and characterization of a new binuclear copper(II) chelate $[(Cu_2bmt)_2]$ (1) and four mixed ligand copper(II) chelates $[Cu(bmpt)(phen)]$ (2), $[Cu(bmpt)(bipy)]$ (3), $[Cu(bmpt)(4,4'-dmbipy)]$ (4) and $[Cu(bmpt)(5,5'-dmbipy)]$ (5) based on an ONS donor thiosemicarbazone ligand, 5-bromo-3-methoxysalicylaldehyde-N'-phenylthiosemicarbazone (H_2bmpt) and 1,10-phenanthroline, 2,2'-bipyridine, 4,4'-dimethylbipyridine, 5,5'-dimethylbipyridine as coligands. The complexes were characterized by various physicochemical methods like CHNS analysis, molar conductivity measurements, magnetic investigations, and an array of spectroscopic techniques including FT-IR, UV-Vis, and EPR. The crystal structures of complexes 3 and 5 were ascertained by single crystal X-ray diffraction method and it was observed that they crystallize as solvates in triclinic P and monoclinic $P2_1/c$ space groups respectively. In both the complexes, copper(II) ion exhibits a distorted square pyramidal arrangement with oxygen, nitrogen, and sulfur atoms of the thiosemicarbazone ligand, along with one of the nitrogen atoms from the heterocyclic base, occupying the square plane while the other nitrogen atom of base occupies the axial position. DNA interactions of the prepared complexes were checked with CT-DNA in Tris-HCl buffer. The absorption titration was performed by the incremental addition of DNA and the complexes exhibit hyperchromism which suggests a groove binding mechanism. Among the complexes, complex 4 exhibits the highest binding value. The FMO analysis of the complexes revealed that the lowest HOMO-LUMO energy gap is exhibited by complex 1 (1.97 eV) indicating that the dimeric complex is the softest and has high chemical reactivity, low stability and high polarizability. Additionally, 3D mapping of the electron density of all the complexes as MEP surfaces were plotted, shedding light on the reactivity of the complexes. The different functions were mapped on the Hirshfeld surface to decipher the underlying reasons for the difference in noncovalent interactions among complexes (3a and 5a) and the results corroborate the crystal structure studies. It also explains the difference in the degree of $\pi \cdots \pi$ interactions among the complexes especially those having involvement of Cu containing metallocycle.

Dr. Nithya Mohan
Assistant Professor

BSH Department



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Dr. Sreelekha Menon
Head of the department
BSH Department



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☎ : +91 9847082279, +91 9744755053,

Email, info@waveselectronics.com, waves72@gmail.com. Website: www.waveselectronics.com.



PROJECT ACCOMPLISHMENT CERTIFICATE

This is to certify that the following students *Salman P Y* (SCM19EE008), *Mohammed Adil V A* (SCM19EE007), *Soorya Sathyan* (SCM19EE009), and *Amal Pradeep* (SCM19EE004) of Eight Semester Electrical and Electronics Engineering completed the project entitled "**IGBT Based Battery Charger**" in partial fulfilment of the requirements for the award of the Bachelor of Technology Degree in Electrical and Electronics Engineering under A.P.J Abdul Kalam Technological University for the year 2022-2023 at SCMS School of Engineering and Technology, Karukutty. The project was done in collaboration with Waves Electronics Pvt. Ltd., Kochi during the time period November 2022 to June 2023 and was guided by *Mrs. Bilby Issac*, Assistant Engineer, WAVES Electronics.

Place: Kizhakkambalam

Date: 12/07/2023



For Waves Electronics Pvt. Ltd.

Executive Director

[Handwritten signatures]



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Unit Financed by **KSIDC**

In Technical Collaboration with **ACEL**, Alesund, Norway

Project name:

Smart Switching Toilet with urine diversion system for Flood Region

Recently Kerala experienced a devastating flood that affected more than half the population of Kerala. Hence our project focuses on eliminating the problems of latrine facility during these times. We intend on creating a sustainable sanitation facility in which a four layered filter system along with separate tanks to collect faeces and urine.

The project can be introduced in the flood prone areas as well as congested areas like cities where providing individual septic tanks is not feasible.

The idea is to create sanitation facility that can be used continuously during and after flood. It can provide increased pit life using filtration system.

Phase-1

The idea is to create sanitation facility that can be used continuously during and after flood. It can provide increase pit life. It is assisted by desludging pump for automated cleaning of the composite faeces pit.

Working and Implementation

The design is basically a raised pit latrine. The cement and sand is used to coat the raised plinth.

The latrine is having two chambers with one roof and two pits. Each chamber is having three partitions. The first partition is to collect the urine the centre partition is to collect the faeces and the third partition is for washing. The washing partition and the urine partition are connected. The centre partition is connected to the urine partition while flushing. Again, as the flush tank is filling the water slowly the sliding system will open. It is ready to use.

The excreta are decomposed by adding clay or lime.

The separation of urine from excreta will increase the life of the pit. It will allow the excreta to decompose fast.

The valve is connected to the basin. If the water level is more the valve will get open to the tank created for the flood.

If the water level decreases the valve will get open in the normal septic tank.



Joshi

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Plan to Implementation

It occupies less space and can be shared with different houses. The heightened area can be the appropriate site for the implementation of it. The project can be pushed through the Flood control NGO and Sanitary society.

Scope for the improvement

The pit can be improved by connecting parallel connection and collection pit. The septic tank covering can be made of transparent glass to penetrate the sunlight for the fast decomposition of the excreta.

Phase-2

Phase-2 is friendlier to the women than phase-1. Phase 2 is an add on feature of phase-1.

Working and implementation

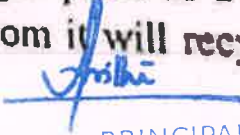
Design of smart toilet is same as that of the ordinary toilet except for the waste disposal mechanism. There are two partitions at the base. One for faeces and other for urine and flush water collection. Separation of waste is done by filtering mechanism. The separation of urine from excreta will increase the life of the pit. It will allow the excreta to decompose fast.

There are four layers of filtration. Here instead of flush handle we are using a flush puller. When we pull the flush puller, the beam connecting the filter will move to the first partition and turns 90 degree. Thus the faeces that collected in the filters will be collect at the base part of the first partition. When the flush puller goes to the resting position flush water will come and clean the filters. This will prevent the clogging. Thus there will be no overflow during the flood.

Scope for improvement

We wish to extend our design so as to make it more handicap friendly. We wish to incorporate a self-raising toilet seats to make it easier for age old people. The waste material so obtained is sent to a biogas plant as a means of sustainable power generation and the water collected from it will recycle and use for other purposes like irrigation of gardens.

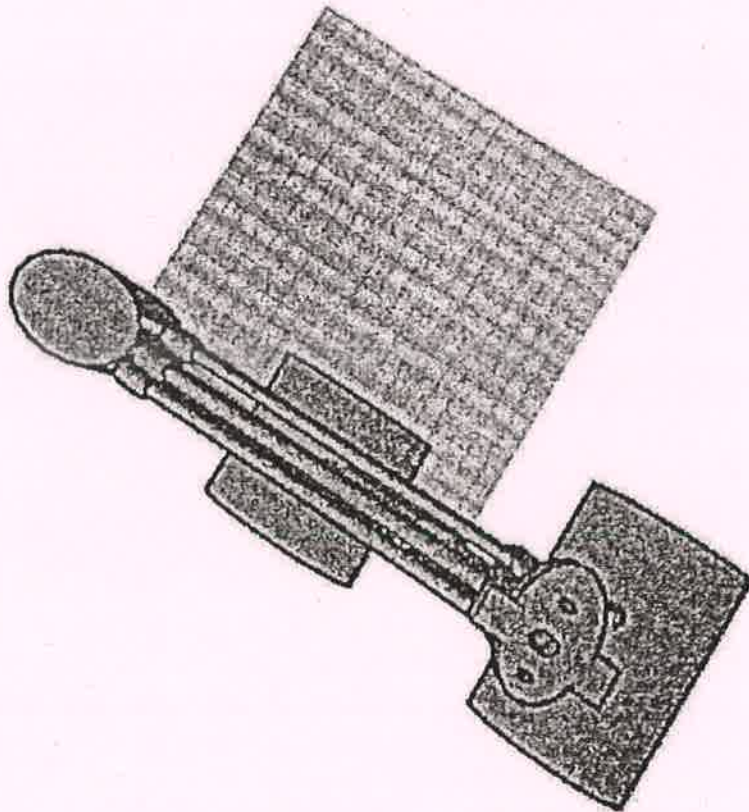



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Goals

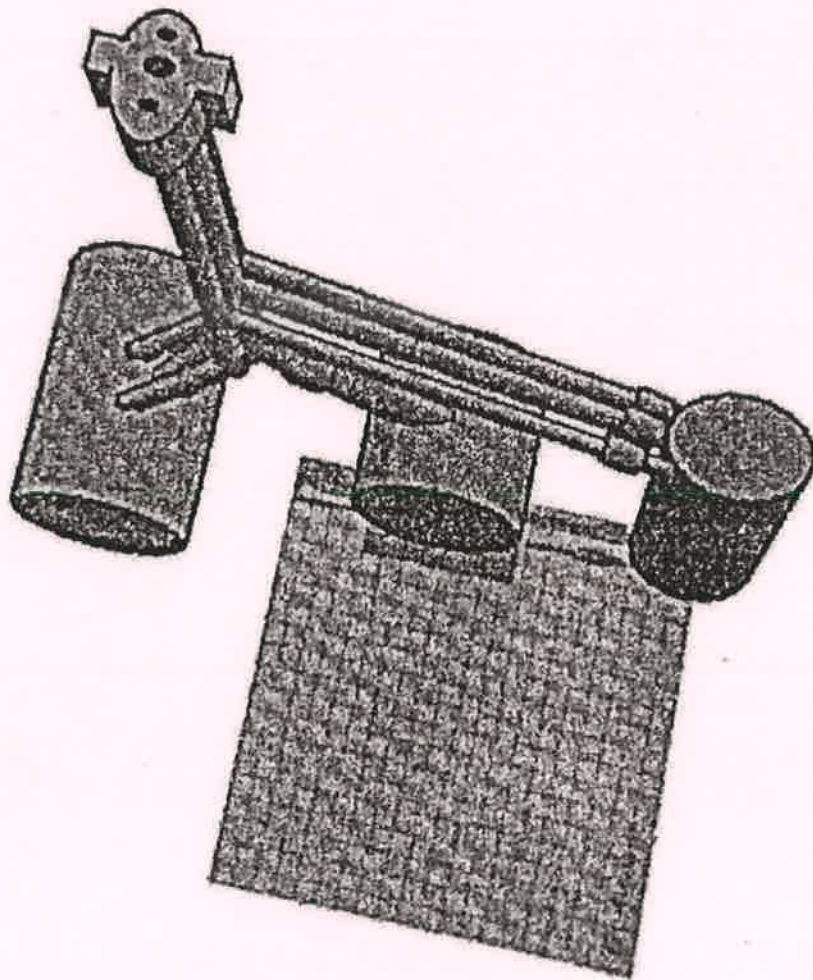
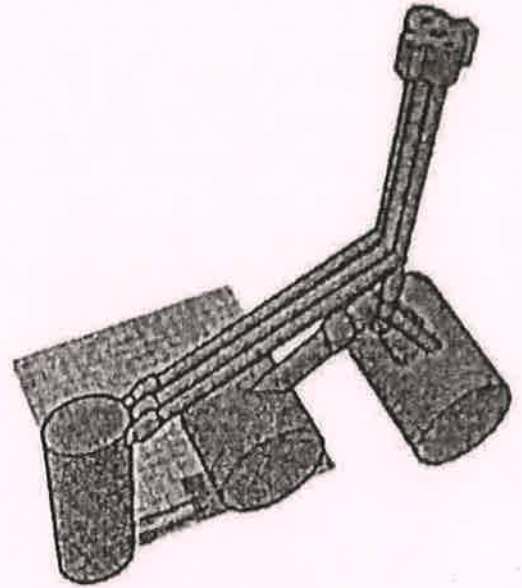
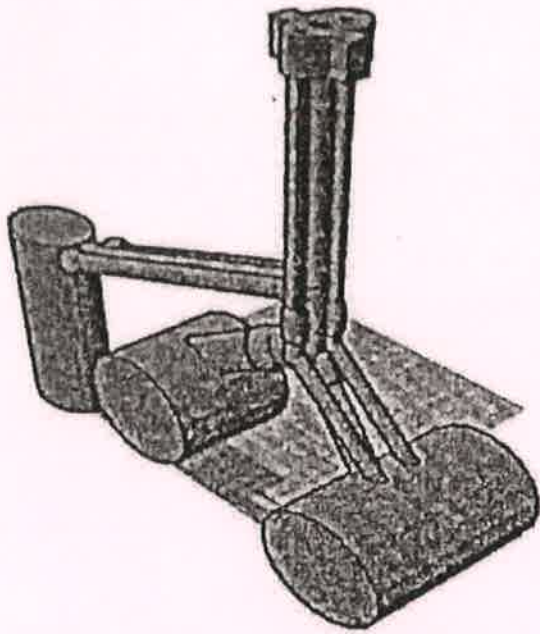
Since our college is in a flood prone area, we would like to initiate the design in our college and hostels. We expect that our product will definitely make sanitation sustainable at least for people in the flood prone area. Even homes without proper sanitation facilities may install our product as we intend to provide affordable and environment friendly toilets.

Design-phase1



Joshi

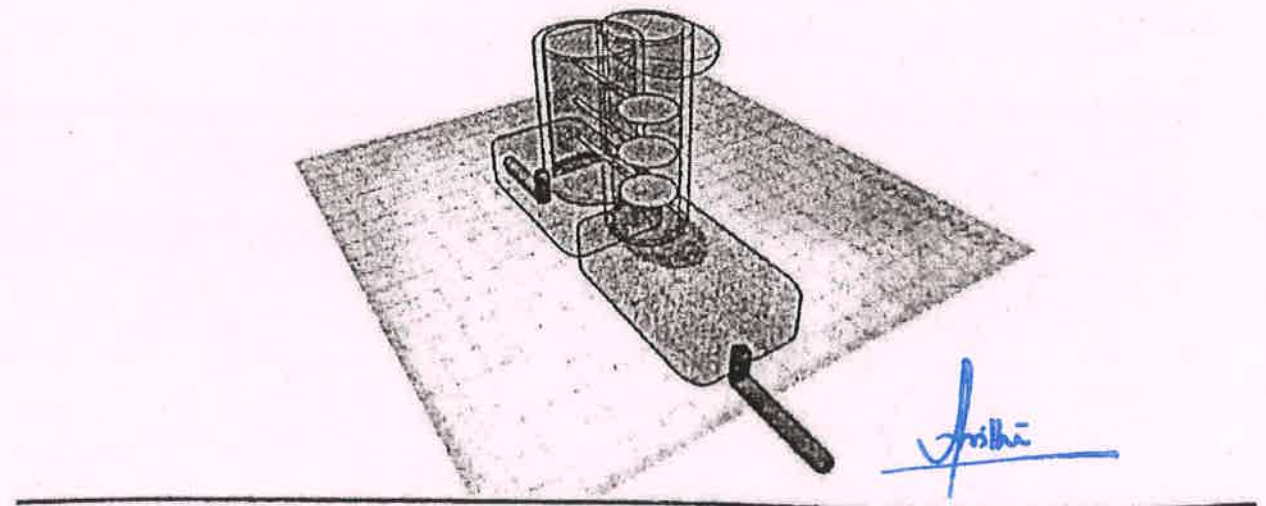
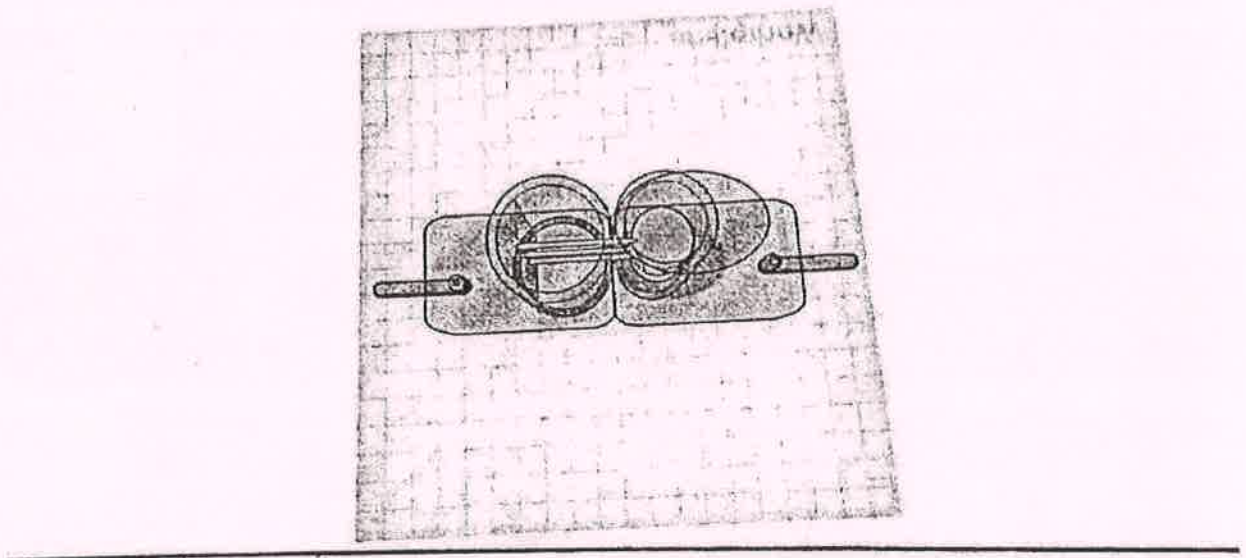
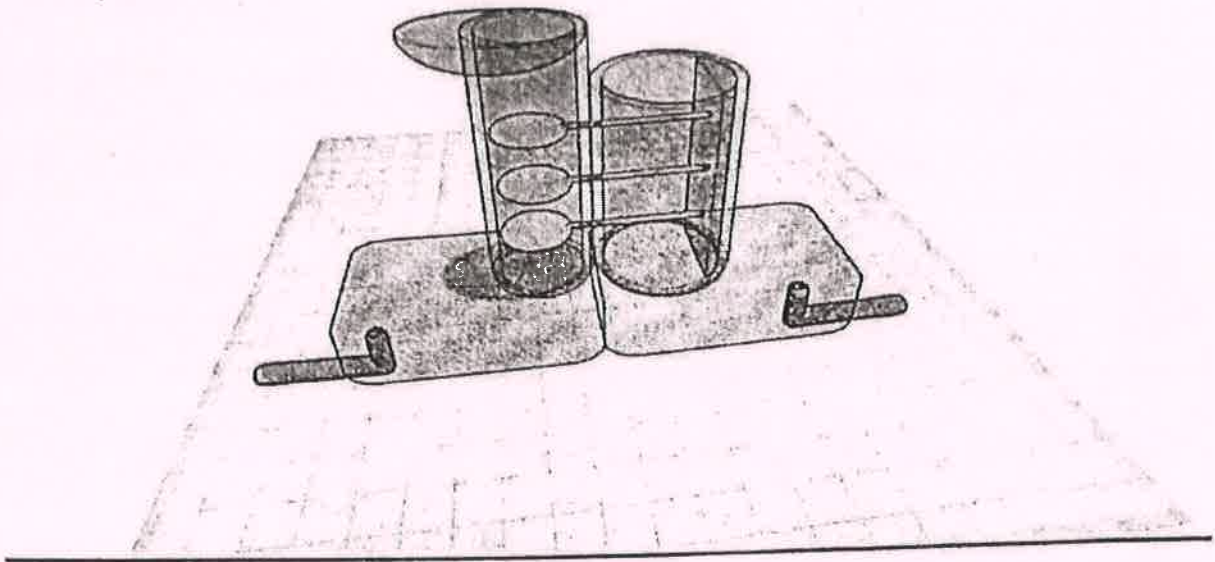
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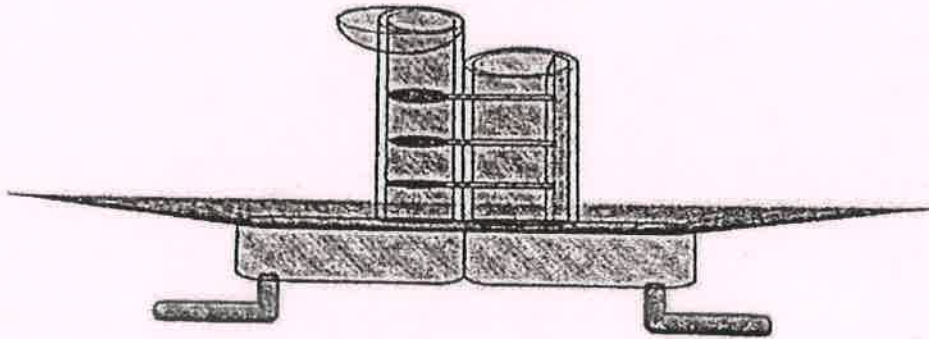
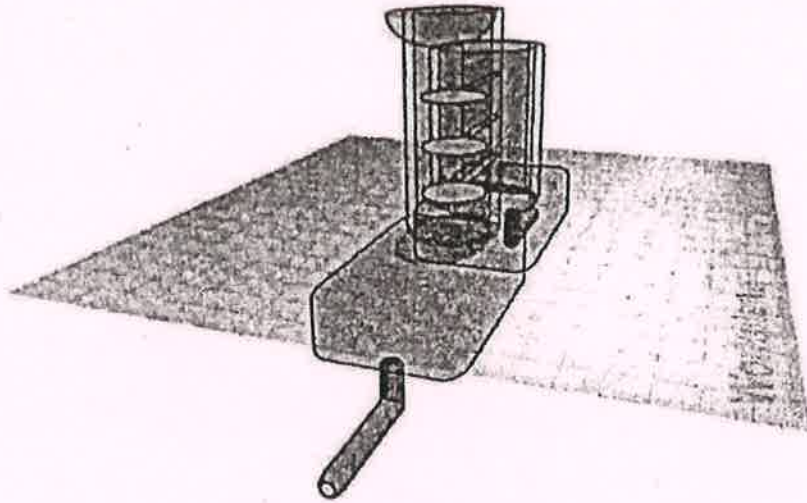
Joshi

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Design-phase2



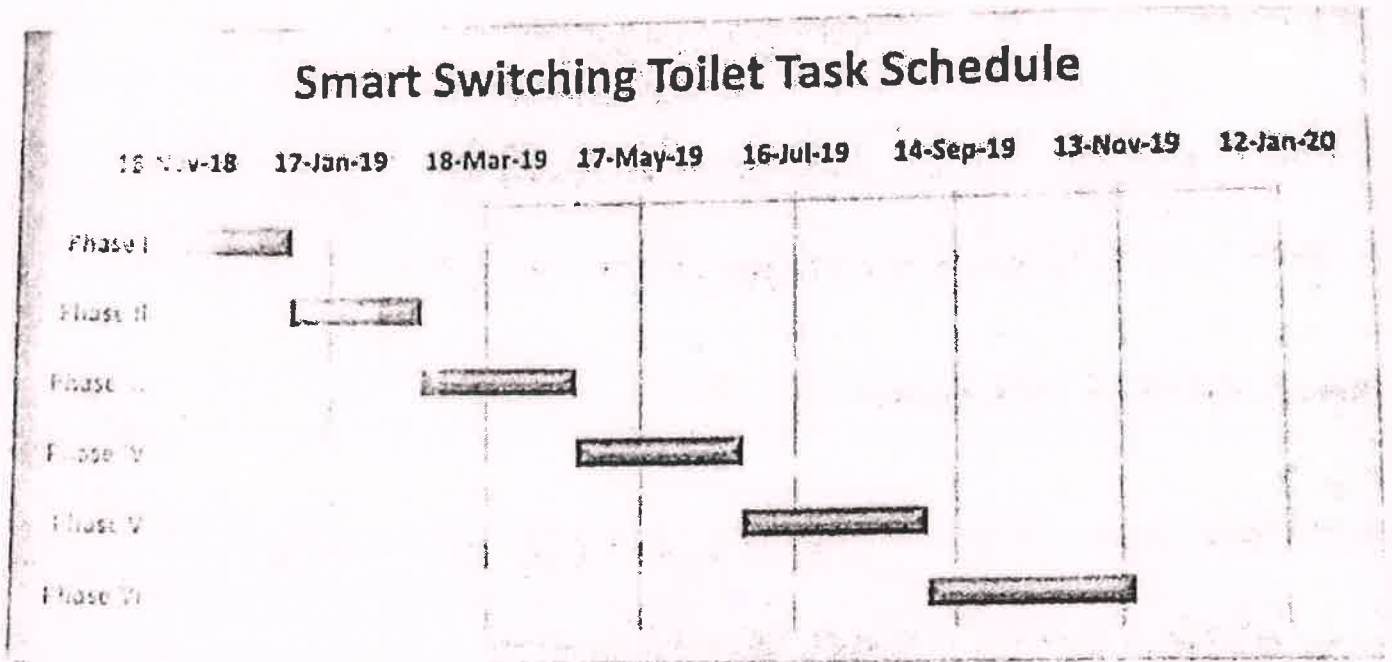
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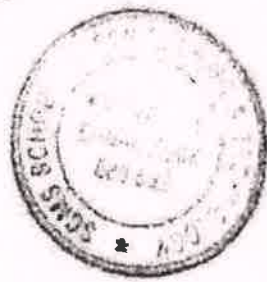
Joshi

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ERNAKULAM, KERALA-683 576

Visual View of Tasks Scheduled for the Project: 'Smart Switching Toilet'
Using Gantt Chart



Handwritten signature
A. Sunil Jacob



Handwritten signature



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GOVERNMENT OF KERALA
KARUKUTTY GRAMA PANCHAYAT

From
Secretary
Gram Panchayat
Karukutty

To
Dr. Sunil Jacob
Director
Centre for Robotics
SSET, Karukutty

Respected Sir.

Subject: Implementation of Smart Switching Toilet with urine diversion system for Flood Region, with the support of Karukutty Grama Panchayat

The project Smart Switching Toilet with urine diversion system for Flood Region, of SCMS School of Engineering and Technology done under the supervision of Dr. Sunil Jacob, Director Centre for Robotics is supported by Karukutty Grama Panchayat. We have reviewed and is interested in supporting your proposal. The prototype on completion will be implemented through the Karukutty Grama Panchayat, Angamaly, Kerala, India. It will be implemented with the involvement and support of Karukutty community affected with flood.

This project for sure, will be a great invention in the field of rural development.

Secretary

[Signature]
SECRETARY
KARUKUTTY GRAMA PANCHAYAT
PH: 0484-2612231(O)



[Signature]

PRINCIPAL
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY
VIDYANAGAR, PALLISSERY, KARUKUTTY
ERNAKULAM, KERALA-683 576

Publishing Agreement

SPRINGER NATURE

This Publishing Agreement (this "Agreement") has been approved by and entered into between

Shahid Mumtaz, Nottingham Trent University, Nottingham NG1 4FQ, United Kingdom

Danda B. Rawat, Howard University, Data Science and Cybersecurity Center, Washington, 20059, USA

Varun G. Menon, SCMS School of Engineering and Technology, Computer Science, 683576 Ernakulam, India
(ORCID: 0000-0002-3055-9900)

(the "Editor")

whereas, in the event that the Editor is more than one person,

Varun G. Menon (ORCID: 0000-0002-3055-9900)

serves as corresponding editor (the "Corresponding Editor")

on the one part and

Springer Nature Singapore Pte Ltd., 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore
(the "Publisher")

on the other part

together hereinafter referred to as the "Parties".

§1 Contracting Editors

When the Editor is more than one person then, unless otherwise indicated in this Agreement or agreed in writing by the Publisher:

- the expression "Editor" as used in this Agreement will apply collectively for all such persons (each a "co-editor");
- each co-editor is jointly and severally responsible for the Editor's obligations under this Agreement which apply to each co-editor individually and to the co-editors collectively and the Publisher shall not be bound by any separate agreement or legal relationship as between the co-editors; and
- each co-editor hereby warrants and represents that the Corresponding Editor has full right, power and authority to act on their behalf, and that they shall be bound by the Corresponding Editor, with respect to all matters, notices and communications related to this Agreement.

§2 Subject of the Agreement

2.1 The Editor undertakes to prepare a work provisionally entitled:

Proceedings of the Second International Conference on Computing, Communication, Security and Intelligent Systems - IC3SIS 2023

comprising approximately 400 pages, including approximately 120 illustrations.

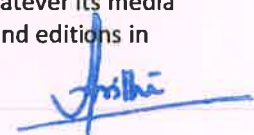
2.2 The Publisher intends to publish the Work under the imprint Springer.

2.3 The expression "Work" as used in this Agreement means the work as identified above consisting of a certain number of individual chapters (the "Contributions") written by the contributing authors to the Work (the "Authors") and selected by the Editor for publication in the Work. The Work includes without limitation all related material delivered to the Publisher by or on behalf of the Editor whatever its media and form (including text, graphical elements, tables, videos and/or links) in all versions and editions in whole or in part.

2.4 The Work may be published in the book series Algorithms for Intelligent Systems.

10 April 2023




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- 2.5 The Work may contain links (e.g. frames or in-line links) to media enhancements (e.g. additional documents, tables, diagrams, charts, graphics, illustrations, animations, pictures, videos and/or software) or to social or functional enhancements, complementing the Work, either provided by the Editor or the Author(s). These enhancements may be provided on the Editor's or one of the Authors' own website(s) or on a third party website or repository (e.g. maintained by an institution). The Editor is responsible for ensuring that the Publisher is provided with, at the latest at the delivery date of the manuscript for the Work, an accurate description of each media enhancement and its respective website or repository, including its/their owner, nature and the URL. The Publisher is entitled to reject the inclusion of, or suspend, or delete links to all or any individual media enhancements.

§3 Rights Granted

- 3.1 The Editor, if and insofar as the Editor holds rights to the Work or parts of the Work, hereby grants to the Publisher the perpetual, sole and exclusive, worldwide, transferable, sub-licensable and unlimited right to:

publish, produce, copy, distribute, communicate, display publicly, sell, rent and/or otherwise make available the Work in any language, in any versions or editions in any and all forms and/or media of expression (including without limitation in connection with any and all end-user devices), whether now known or developed in the future, in each case with the right to grant further time-limited or permanent rights. The above rights are granted in relation to the Work as a whole or any part and with or in relation to any other works.

Without limitation, the above grant includes:

- (a) the right to edit, alter, adapt, adjust and prepare derivative works;
- (b) all advertising and marketing rights including without limitation in relation to social media;
- (c) rights for any training, educational and/or instructional purposes; and
- (d) the right to add and/or remove links or combinations with other media/works.

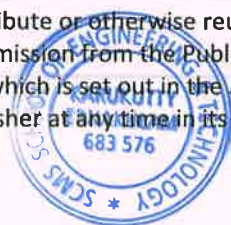
The Editor hereby grants to the Publisher the right to create, use and/or license and/or sub-license content data or metadata of any kind in relation to the Work or parts thereof (including abstracts and summaries) without restriction.

The Publisher also has the right to commission completion of the Work in accordance with the Clause "**Editor's Responsibilities – Delivery and Acceptance of the Manuscript**" and of new editions of the Work in accordance with the Clause "**New Editions**".

- 3.2 The copyright in the Work shall be vested in the name of the **Editor and the Authors**. The Editor has asserted their right(s) to be identified as the originator of the Work in all editions and versions of the Work and parts thereof, published in all forms and media. The Publisher agrees to insert a copyright notice into all editions of the Work according to the provisions of the Universal Copyright Convention (UCC). The Editor agrees that all editing, alterations or amendments to the Work made by or on behalf of the Publisher or its licensees for the purpose of fulfilling this Agreement or as otherwise allowed by the above rights shall not require the approval of the Editor and will not infringe the Editor's "moral rights" (or any equivalent rights). This includes changes made in the course of dealing with retractions or other legal issues.
- 3.3 The Publisher and the Editor acknowledge the existence of applicable accessibility law and regulation including without limitation an exception to copyright legislation under which charitable bodies and other organisations providing for print-disabled people such as, but not limited to, blind, dyslexic or other reading-impaired people ("**Print Disabled Persons**") have the right to create accessible format copies of the Work for example, but without limitation, Braille and Daisy-format audio ("**Accessible Versions**") and to supply Accessible Versions for use by Print Disabled Persons on a non-profit basis. The Publisher may provide copies or production files of the Work to such organisations to facilitate the creation and use of Accessible Versions.

§4 Reuse

- 4.1 The Publisher permits the Editor to copy, distribute or otherwise reuse the Work, without the requirement to seek specific prior written permission from the Publisher, in accordance with the Publisher's guidelines, the current version of which is set out in the **Appendix "Editor's Reuse Rights"**. These guidelines may be updated by the Publisher at any time in its sole discretion.



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- 4.2 The Editor agrees and acknowledges that the Editor must obtain the specific prior written permission of the Publisher (to be granted, withheld or conditioned at the Publisher's sole discretion) for any other use of any version of the Work in whole or in part.

§5 The Publisher's Responsibilities

- 5.1 Subject always to the other provisions of this Clause below, the Publisher will undertake the production, publication and distribution of the Work in print and/or electronic form at its own expense and risk within a reasonable time after it has given notice of its acceptance of the Work to the Editor in writing unless the Publisher is prevented from or delayed in doing so due to any circumstances beyond its reasonable control. The Publisher shall have the entire control of such production, publication and distribution determined in its sole discretion in relation to any and all editions and versions of the Work, including in respect of all the following matters:
- distribution channels, including determination of markets;
 - determination of the range and functions of electronic formats and/or the number of print copies produced;
 - publication and distribution of the Work or parts of the Work as individual content elements including in instalments, individual chapters, contributions or otherwise, in accordance with market demand or other factors;
 - determination of layout and style as well as the standards for production;
 - setting or altering the list price, and allowing for deviations from the list price (if permitted under applicable jurisdiction);
 - promotion and marketing of the Work as the Publisher considers most appropriate.

- 5.2 If, at the sole discretion of the Publisher, the Work is stored in physical stock the Publisher is also entitled to pulp all or any print run or any portion thereof without previously notifying the Editor. The Publisher shall continue to promote the Work and to retain a sufficient number of physical copies unless the Work is available in electronic form or on the basis of a print-to-order offer.

- 5.3 All rights, title and interest, including all intellectual property or related rights in the typography, design and/or look-and-feel of the Work shall remain the exclusive property of and are reserved to the Publisher. All illustrations and any other material or tangible or intangible property prepared at the expense of the Publisher including any marketing materials remain, as between the Parties, the exclusive property of the Publisher. The provisions of this subclause shall continue to apply notwithstanding any termination of, and/or any reversion of rights in the Work to the Editor, under this Agreement.

- 5.4 Without prejudice to the Publisher's termination and other rights hereunder including under the Clause "**The Editor's Responsibilities**", it is agreed and acknowledged by the Parties that nothing in this Agreement shall constitute an undertaking on the part of the Publisher to publish the Work unless and until: (i) any and all issues in relation to the Work (including all necessary revisions, consents and permissions) raised by the Publisher have been resolved to the Publisher's satisfaction in accordance with this Agreement and under any agreement with the Authors, and (ii) the Publisher has given written notice of acceptance in writing of the final manuscript of the entire Work. If following (i) and (ii) above the Publisher has not published the Work in any form within a reasonable period and the Editor has given written notice to the Publisher requiring it to publish within a further reasonable period and the Publisher has failed to publish in any form, then the Editor may terminate this Agreement by one month's written notice to the Publisher and:

- the Editor shall be entitled to retain all amounts (if any) received in respect of the Work previously paid to the Editor by the Publisher at the date of termination; and
- all rights granted by the Editor to the Publisher under this Agreement shall revert to the Editor (subject to the provisions regarding any third party rights and payments under any subsisting licence or sub-licence in accordance with the Clause "**Termination**").

The Editor may also give such written notice requiring publication on the same terms as above if the Publisher has published the Work but subsequently ceases publishing the Work in all forms so that it is no longer available.

This shall be the Editor's sole right and remedy in relation to such non-publication and is subject always to the Editor's continuing obligations hereunder including the Clause "**Warranty**".



§6 The Editor's Responsibilities

6.1 Editorial Supervision

- 6.1.1 The Editor is responsible for the editorial and academic supervision and the overall coherence of the Work. The Editor's core duties include in particular:
- (a) determining the concept, structure and general idea of the Work and the individual Contributions;
 - (b) ensuring that the editorial standards and principles set by the Publisher for the Work are met and establishing further editorial standards and principles for the Work in agreement with the Publisher;
 - (c) the selection of suitable Authors of Contributions to the Work, as well as communication and negotiations with these Authors on relevant specifics of the Work including the title of the Contribution(s), scope, number of illustrations, academic level and content and timelines; bundling of questions from the Authors;
 - (d) cooperating and supporting the Publisher in its relations with the Authors. This includes requesting the Authors to enter into the Publisher's standard author publishing agreement with the Publisher, tracking the progress of such agreement/signature, and facilitating the communication process and assisting with open questions;
 - (e) instructing the Authors of their respective obligations under the Publisher's publishing agreements, in particular adhering to the deadlines agreed therein;
 - (f) informing the Publisher about the selected Authors (with name, address, email), about the Contributions (each with title, scope, submission date), and - in the case of co-authored Contributions - determining the respective corresponding author responsible for communication with the Publisher;
 - (g) the collection of manuscripts and the review of the Contributions with regard to their academic scope and the number of illustrations as well as making any necessary editorial changes, additions or reductions to the manuscripts and illustrations if the Authors are not willing or able to do so, provided the Authors confirm such changes prior to the Delivery Date of the manuscript (as defined below);
 - (h) the acceptance or rejection of the Contributions; in the case of existing publishing agreements between the respective Author(s) and the Publisher subject to prior consultation with the Publisher;
 - (i) diligently reading the Contributions to ensure that they do not contain any apparent violations of any third party rights and/or anything that is likely to cause religious or racial hatred or encourage terrorism or be defamatory (or contain malicious falsehoods);
 - (j) providing the Publisher regularly with comprehensive information on the status of the Work as well as informing the Publisher in writing about any material developments such as delays or other interruptions.
- 6.1.2 Further academic responsibilities of the Editor include:
- (a) in the event of co-authored Contributions, instructing the corresponding author to send the page proofs of the Contribution to his co-authors, to consolidate their corrections and to provide them to the Editor and/or the Publisher;
 - (b) ensuring uniformity of terminology, spelling and didactic elements, use of heading levels and mark-ups as well as style of literature and citation;
 - (c) creating a foreword and/or epilogue subject to signing the Publisher's standard author publishing agreement; and
 - (d) ensuring that each Contribution is fully peer reviewed prior to its acceptance for publication in the Work.

6.2 Delivery and Acceptance of the Manuscript

- 6.2.1 The Editor is responsible for ensuring that the Publisher receives the final and complete manuscript for the Work on or before 30 September 2023 (the "Delivery Date") electronically in the Publisher's standard requested format or in such other form as may be agreed in writing with the Publisher. The Editor shall retain a duplicate copy of the Work. The Work shall be in a form acceptable to the Publisher (acting reasonably) and in line with the instructions contained in the Publisher's guidelines as provided to the Editor by the Publisher. The Publisher's guidelines may be updated by the Publisher from time to time (provided that in the event of material changes the Publisher shall notify the Editor by email or other written form and if requested the Parties shall discuss these in good faith). The Editor shall provide all the same time, or earlier if the Publisher reasonably requests, any editorial, publicity or other information (and in such form or format) reasonably required by the Publisher. The Publisher may exercise such additional quality control of the manuscript as it may decide at its sole discretion including through the



use of plagiarism checking systems and/or peer review by internal or external reviewers of its choice. If the Publisher decides at its sole discretion that the final manuscript does not conform in quality, content, structure, level or form to the stated requirements of the Publisher, the Publisher shall be entitled to terminate this Agreement in accordance with the provisions of this Clause.

- 6.2.2 The Editor must inform the Publisher at the latest on the Delivery Date if the sequence of the naming of any co-editors entering into this Agreement shall be changed. If there are any changes in the editorship (e.g. a co-editor joining or leaving), then the Publisher must be notified by the Editor in writing immediately and the Parties will amend this Agreement accordingly. The Publisher shall have no obligation to consider publication under this Agreement in the absence of such agreed amendment.
- 6.2.3 If the Editor fails to deliver the Work in accordance with the provisions of this Clause above by the Delivery Date (or within any extension period given by the Publisher at its sole discretion) or if the Editor (or any co-editor) dies or becomes incapacitated or otherwise incapable of performing the Editor's obligations under this Agreement, the Publisher shall be entitled to either:
- (a) elect to continue to perform this Agreement in accordance with its terms and the Publisher shall be entitled to be given copies of all notes, manuscripts or other materials created by the Editor or such co-editors relating to the Work and the Publisher may commission an appropriate and competent person (who, in the case of co-editors having entered into this Agreement, may be a co-editor) to complete the Work and any fees payable to the competent person shall be deducted by the Publisher, acting reasonably, from any sums due to the Editor or the Editor's successors under this Agreement; or
 - (b) terminate this Agreement with immediate effect by written notice to the Editor or the Editor's successors, in which case all advance payments (if any) paid to the Editor under or in connection with this Agreement shall be repaid to the Publisher within 28 days of said notice and (subject to such repayment) all rights granted by the Editor to the Publisher under this Agreement shall revert to the Editor/Editor's successors (subject to the provisions regarding any third party rights and payments under any subsisting licence or sub-licence in accordance with the Clause "Termination") and the Editor/Editor's successors will not in any event be entitled to any further payments (if any) due after the date of termination in respect to the Work.
- 6.2.4 The Editor agrees, at the request of the Publisher, to execute all documents and do all things reasonably required by the Publisher in order to confer to the Publisher all rights intended to be granted under this Agreement.
- 6.2.5 The Editor warrants that the Work is original except for any excerpts from other works including pre-published chapters of other publications, illustrations, tables, animations, text quotations, photographs, diagrams, graphs or maps, and whether reproduced from print or electronic or other sources ("**Third Party Material**"). Any such Third Party Material may be in the public domain (or otherwise unprotected by copyright/other rights), may be otherwise used in accordance with applicable law, or it may be included in the Work if the Editor has ensured that the Editor or all Authors have obtained written permission(s) from or on behalf of the respective rights holder (and if requested in a form prescribed or approved by the Publisher) at the Editor's or the respective Author's expense, unless otherwise agreed in writing. On request from the Publisher, the Editor shall in writing indicate the precise sources of these excerpts and their location in the manuscript. The Editor shall also retain the written permissions and make them available to the Publisher on request.

6.3 **Approval for Publishing**

- 6.3.1 The Editor shall proofread the page proofs for the Work provided by or on behalf of the Publisher, including checking the illustrations as well as any media, social or functional enhancements and give approval for publishing, if and when requested by the Publisher. The Publisher may, at its discretion, request the Editor to coordinate the Editor's corrections with those of the Authors. The Editor's approval for publishing is deemed to have been given if the Editor does not respond within 5 days after receiving the proofs nor contacts the Publisher within three days after receipt of the last of three reminders sent by the Publisher via email. The Publisher shall not be required to send a second set of corrected proofs unless specifically requested by the Editor in writing but in any event no further amendments may be made or requested by the Editor.

In the event of co-editors having entered into this Agreement the Publisher shall send the page proofs to



the Corresponding Editor only and all persons entering into this Agreement as Editor agree that the Corresponding Editor shall correct and approve the page proofs on their behalf.

- 6.3.2 Proofs are sent to enable the Editor to check that the manuscript has been properly set in type and to allow the Editor to correct any typesetter's or illustrator's errors. No alterations or corrections may be made by the Editor other than for the purpose of correcting typographical errors without the Publisher's prior written consent. If the Editor makes further changes that lead to additional costs for the Publisher, and if such costs exceed 10% of the total cost of typesetting (or reproduction in the case of illustrations) they will be borne by the Editor. The Publisher shall have the right to charge and invoice these costs through its affiliated company Springer Nature Customer Service Center GmbH or Springer Nature Customer Service Center LLC, respectively, to the Editor, payable within 14 days of receipt of the invoice.

6.4 **Cooperation**

- 6.4.1 Without prejudice to the warranties and representations given by the Editor in this Agreement, the Editor shall cooperate fully with the Publisher in relation to any legal action that might arise from the publication or intended publication of the Work and the Editor shall give the Publisher access at reasonable times to any relevant accounts, documents and records within the power or control of the Editor.
- 6.4.2 The Editor authorises the Publisher and its licensees to take such steps as it or they consider necessary at its or their own expense as exclusive licensee of the Editor or (where lawful and necessary) in the Editor's name and on the Editor's behalf if the Publisher believes that a third party is infringing or is likely to infringe copyright or other intellectual property or related rights in the Work including but not limited to initiating legal proceedings.

§7 **Warranty**

- 7.1 The Editor warrants and represents that:
- the Editor has full right, power and authority to enter into and perform its obligations under this Agreement; and
 - the Editor is the sole legal owner of (and/or has been fully authorised by any additional rights owner to grant) the rights licensed in the Clause "**Rights Granted**"; and
 - the Work does not contain any apparent violations of any third party rights and/or anything that is likely to cause religious or racial hatred or encourage terrorism or be defamatory (or contain malicious falsehoods); and
 - the Work has not been previously licensed, published or exploited and use of the Work shall not infringe or violate any contract, express or implied, to which the Editor, or any co-editor, who had entered into this Agreement, is a party.

- 7.2 The Editor warrants and represents that the Editor, and each co-editor who has entered into this Agreement, shall at all times comply in full with:
- all applicable anti-bribery and corruption laws; and
 - all applicable data protection and electronic privacy and marketing laws and regulations; and
 - the Publisher's ethic rules as laid down in **Appendix "Ethic Rules"** enclosed with this Agreement, as may be updated by the Publisher from time to time (provided that in the event of material changes the Publisher shall notify the Editor by email and if requested the Parties shall discuss these in good faith)
- (the "**Applicable Laws**").

If the Editor is in material breach of any of the Applicable Laws or otherwise in material breach of accepted ethical standards in research and scholarship, or becomes the subject of any comprehensive or selective sanctions issued in any applicable jurisdiction (e.g. being subject to the OFAC sanctions list) or if, in the opinion of the Publisher, at any time any act, allegation or conduct of or about the Editor prejudices the production or successful exploitation of the Work or brings the name and/or reputation of the Publisher or the Work into disrepute, or is likely to do so, then the Publisher may terminate this Agreement in accordance with the Clause "**Termination**".

- 7.3 The Publisher reserves the right to amend and/or require the Editor to amend the Work at any time to remove any actual or potential breach of the above warranties and representations or otherwise unlawful part(s) which the Publisher or its internal or external legal advisers identify at any time. Any



such amendment or removal shall not affect the warranties and representations given by the Editor in this Agreement.

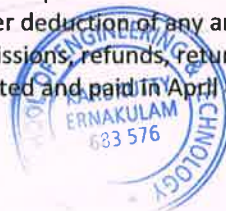
- 7.4 If the Work links to media, social or functional enhancements provided on the Editor's, on one of the Authors' or on any third party's websites or repositories, the Editor shall ensure that neither the enhancements themselves nor the fact that the Work is linked to or refers to such material shall breach the Editor's warranties and representations above, and the content of the enhancements shall be deemed to be part of the Work for the purposes of this Clause. The Editor warrants and represents that the media, social or functional enhancements, or (with prior written notice to the Publisher) reasonable replacements thereof, shall be hosted and maintained for so long as the Work is published under this Agreement to the fullest extent legally and practically possible.

§8 Complimentary Copies, Editor's Discount and Electronic Access

- 8.1 The Editor or, if co-editors have entered into this Agreement, each of the co-editors, is entitled to receive 2 (two) printed copies of the Work free of charge. The Editor, or each co-editor, may obtain additional copies of the Work for personal use at a discount of 40% off the list price, for as long as there is a contractual arrangement between the Editor and the Publisher and subject to any applicable book price law or regulation. The copies must be ordered from the affiliated entity of the Publisher (Springer Nature Customer Service Center GmbH or Springer Nature Customer Service Center LLC, respectively). Resale of such copies or of free copies of the Work is not permitted.
- 8.2 Furthermore, the Editor, or each co-editor, is entitled to purchase for their personal use other books published by the Publisher at a discount of 40% off the list price, for as long as there is a contractual arrangement between the Editor and the Publisher and subject to any applicable book price law or regulation. The copies must be ordered from the affiliated entity of the Publisher (Springer Nature Customer Service Center GmbH or Springer Nature Customer Service Center LLC, respectively). Resale of such copies is not permitted.
- 8.3 The Publisher shall provide the electronic final published version of the Work to the Editor, provided that the Editor has included their email address in the manuscript of the Work.
- 8.4 The Editor receives time-limited free online access to the final published e-book on the Publisher's portal for all participants of the conference IC3SIS 2023. The Editor and the participants shall have access to the Work for a period of four weeks after it becomes available on the Publisher's portal, subject to registration requirements and/or the portal's terms of use. The Editor shall ensure that all participants are informed about such free access together with the following stipulation
"Access to this book is for private and personal use only and access details must not be disclosed to third parties. Please note that you are not allowed to make the published e-book or parts of it available on the Internet via an institutional repository or private website or in any other way. Any kind of reproduction or dissemination is not permitted."

§9 Remuneration

- 9.1 The Parties agree that the Publisher's agreement to its contractual obligations in this Agreement in respect of its efforts in considering publishing and promoting the Work is good and valuable consideration for the rights granted and obligations undertaken by the Editor under this Agreement, the receipt, validity and sufficiency of which is hereby acknowledged by the Editor. The Parties expressly agree that no royalty, remuneration, licence fee, costs or other moneys whatsoever shall be payable to the Editor, subject to the following provisions of this Clause.
- 9.2 If the Publisher grants rights to another publisher or other third party, to enable their use of the Work or derivative works thereof or parts of either in an own edition or own product published or produced by that other publisher or party (but excluding co-editions) for example by a licence to translate the Work and to publish and distribute the translation ("**Subsidiary Rights**"), the Publisher shall pay to the Editor an amount equal to fifty percent (50%) of the Net Receipts.
"Net Receipts" is defined as realised revenue from exploitation of the Subsidiary Rights actually received by the Publisher in cleared funds in each case after deduction of any and all applicable taxes (such as VAT and/or withholding tax), charges and fees, commissions, refunds, returns, rebates and/or discounts.
 The Editor's share of Net Receipts shall be calculated and paid in April each year for the preceding year.



For the avoidance of doubt, any rights or licences that the Publisher grants to a third party with regard to the distribution or making available of the Work or derivative works thereof or parts of either in an edition, product or service published or produced by or on behalf of the Publisher, or an affiliate of the Publisher, itself (for example distribution rights or licences granted to Amazon, EBSCO, ProQuest or an entity affiliated with the Publisher with regard to their platforms or channels) are not Subsidiary Rights and shall be treated as covered by the consideration under the first subclause above.

- 9.3 The Publisher shall be entitled to retain any payments due to the Editor (and in respect of which the Publisher shall have no liability for non-payment including to pay any interest to the Editor):
- (a) in the event and for so long as the Editor has not provided the following necessary data in order to enable the Publisher to execute the payment: (i) Editor's entrepreneurial status including but not limited to Value Added Tax Identification Number ("VAT ID"), if applicable, or Editor's confirmation that they do not hold a VAT ID; (ii) the Editor's bank details; and (iii) the Editor's private address; or
 - (b) in the event that the amount of any payments due to the Editor is below the minimum payment threshold Euro 100, in which case the payments due will be automatically carried forward to the following payment period until the threshold has been met. If the minimum threshold is not met, the Editor shall always have the right to request for the outstanding balance to be paid out by electronic transfer provided that the details in (a) have been provided.
- 9.4 All applicable remuneration set out above will be paid as a total to the joint group of co-editors. Accordingly, each co-editor will receive an equal share of any such payment by the Publisher.
- 9.5 The Publisher and the Editor each have the right to authorise collective management organisations ("CMOs") of their choice to manage some of their rights. Reprographic and other collectively managed rights in the Work ("**Collective Rights**") have been or may be licensed on a non-exclusive basis by each of the Publisher and the Editor to their respective CMOs to administer the Collective Rights under their reprographic and other collective licensing schemes ("**Collective Licences**"). Notwithstanding the other provisions of this Clause, the Publisher and the Editor shall each receive and retain their share of revenue from use of the Work under Collective Licences from, and in accordance with, the distribution terms of their respective CMOs. To the fullest extent permitted by law, any such revenue is the sole property of the Publisher and the Editor respectively and, if applicable, the registration and taxation of that revenue is the sole responsibility of the respective recipient party. The Publisher and the Editor shall cooperate as necessary in the event of any change to the licensing arrangements set out in this Clause.
- 9.6 In the event that the Work contains or links (e.g. through frames or in-line links) to media, social or functional enhancements, the aforesaid remuneration shall also cover the use of such material. No additional royalty, remuneration, licence fee, costs or other moneys shall be payable to the Editor in respect of such material.
- 9.7 Upon publication of new editions of the Work, the Editor shall continue to receive the same applicable payments in consideration as set out in this Clause above. If the Editor, or if the Editor comprises several co-editors any of the co-editors who are a party to this Agreement, is unwilling or unable (including due to death or incapacity) to prepare a new edition of the Work (see the Clause "**New Editions**"), the respective withdrawing Editor or co-editor or their successors shall receive an amount equal to fifty per cent (50%) of any applicable payments as set out above for the first following edition but shall receive no royalty, remuneration, licence fee, costs or other moneys and have no right or claim in respect of any subsequent further editions of the Work.

§ 10 Competing Works

During the term of this Agreement, the Editor agrees not to write, edit or contribute to a Competing Work.

For the purposes of this Clause, a "**Competing Work**" is any work which may reasonably be considered by the Publisher to prejudice sales of, or the exploitation of the rights in, the Work by the nature of its similar content, themes, target audience and/or common authors and/or editors.

§11 New Editions

- 11.1 The Publisher has the sole right to determine whether to publish any subsequent edition of the Work but only after reasonable consultation with the Editor. Once notified by the Publisher that a new edition of



the Work is deemed necessary, the Editor agrees to deliver an updated manuscript, together with the material for any new illustrations and any other supporting content including media enhancements, in accordance with this Agreement within 9 months of such notification. Changes to existing Contributions are always subject to the existing Authors' agreement and/or new authors entering into standard author publishing agreements with the Publisher. New Contributions shall only be added if the respective author(s) enter(s) into standard author publishing agreements with the Publisher. Substantial changes in the nature or size of the Work require the written approval of the Publisher at its sole discretion. Upon publication of such new edition, the Editor's consideration shall be as set out in the Clause "Remuneration" or as otherwise agreed by the Parties at that time in a written amendment to or in a new written agreement replacing this Publishing Agreement. Subject to any such written amendment or new written agreement the terms of this Agreement shall apply to any new edition of the Work that is published under this "New Editions" Clause.

- 11.2 If the Editor, for whatever reason, is unwilling, unable or fails (including as a result of death or incapacity) to submit an updated manuscript that meets the terms of this Agreement within the above stated period, then the Publisher is entitled to revise, update and publish the content of the existing edition or to designate one or more individuals (which, where co-editors have entered into this Agreement, may be one or more of the co-editors) to prepare this and any future editions, provided that the new editions shall not contain anything that is a derogatory use of the Editor's work that demonstrably damages the Editor's academic reputation. In such case, the Editor shall not participate in preparing any subsequent editions. The Editor agrees that the Publisher shall be entitled but not obliged to continue to use the name of the Editor on any new editions of the Work together with the names of the person or persons who contributed to the new editions. Should the Editor or the Editor's successors object to such continuing use of the name of the Editor then they must notify the Publisher in writing when first contacted by the Publisher in connection with any new edition.

§12 Termination

- 12.1 In addition to the specific rights of termination set out in the Clause "The Publisher's Responsibilities" and the Clause "The Editor's Responsibilities", either Party shall be entitled to terminate this Agreement forthwith by notice in writing to the other Party if the other Party:
- commits a material breach of the terms of the Agreement which cannot be remedied or, if such breach can be remedied, fails to remedy such breach within 90 days of being given written notice to do so; or
 - as applicable, is made bankrupt or personally insolvent, or goes into liquidation other than voluntary liquidation for the purpose of reconstruction, or has a receiver or an administrative receiver appointed over the whole or any substantial part of its assets.
- 12.2 If the Publisher, acting reasonably, decides that the Work is not suitable for publication in the intended market place and/or community or that there is no substantial market for the Work, or the economic circumstances of publication have substantially changed (in each case other than due to the Work not being of a suitable quality to justify publication) then the Publisher may at any time terminate this Agreement by giving one month's notice to the Editor in writing. In the event of such termination:
- the Editor shall be entitled to retain all amounts (if any) previously paid to the Editor by the Publisher in respect of the Work at the date of termination, and
 - all rights granted by the Editor to the Publisher under this Agreement shall revert to the Editor (subject to the provisions regarding any third party rights and payments under any subsisting licence or sub-licence in the subclause below) and this shall be the Editor's sole right and remedy in relation to such non-publication.
- The Editor will not in any event be entitled to any further payments (if any) due after the date of termination in respect to the Work.
- 12.3 Termination of this Agreement, howsoever caused, shall not affect:
- any subsisting rights of any third party under any licence or sub-licence validly granted by the Publisher prior to termination and the Publisher shall be entitled to retain its share of any sum payable by any third party under any such licence or sub-licence;
 - the rights of the Editor to any payments (if any) due in respect of exploitation of the Work by a third party pursuant to any licence granted by the Publisher prior to the date of termination; or



(c) except where stated otherwise in this Agreement, any claim which either Party may have against the other for damages or otherwise in respect of any rights or liabilities arising prior to the date of termination.

12.4 Subject to the foregoing, on termination of this Agreement in accordance with its terms, all rights and obligations of the Publisher and the Editor under this Agreement will cease immediately, except that the Editor's continuing obligations hereunder including under the Clause "**Warranty**" and any other terms of this Agreement that expressly or by implication survive termination of this Agreement shall remain in full force and effect. Without limitation of any of the foregoing provisions of this Clause, on termination of this Agreement the Publisher may continue to sell any copies of the Work which are in its power, possession or control as at the date of expiry or termination of this Agreement for a period of six months on a non-exclusive basis subject to the payment of royalties due (if any) hereunder.

§13 Taxation

13.1 All amounts mentioned in this Agreement are expressed exclusive of any value added or similar taxes ("**VAT**"), government fees or levies or other assessments (together hereinafter referred to as "**taxes**"). Reporting, collection and/or remittance of such taxes to the relevant tax authority shall be the responsibility of the Party who has the legal obligation to do so subject to the following provisions. If VAT is chargeable/due, the Publisher shall pay to the Editor and/or the Editor shall pay to the Publisher or its affiliated company Springer Nature Customer Service Center GmbH or Springer Nature Customer Service Center LLC, respectively (in addition to and at the same time as paying the principal amounts) an amount equal to the amount of such VAT. Appropriate invoices as required by law shall be issued. The Editor is obliged to inform the Publisher about the Editor's entrepreneurial status (including but not limited to their VAT ID) and any change to that immediately. The Editor is responsible for paying their own social security contributions.

13.2 If there is a legal requirement for the Publisher to withhold any taxes ("**withholding taxes**"), the withholding taxes will be deducted by the Publisher from the payments to the Editor. The Publisher shall remit these withholding taxes to the competent tax authority and shall provide the Editor with appropriate evidence of remittance. In the event that a reduction/exemption of withholding taxes can be claimed pursuant to a relevant double taxation agreement, the Editor shall provide the Publisher with sufficient proof thereof that enables the Publisher to take into consideration the reduction or exemption. The Editor and the Publisher will cooperate to arrange for such a reduction/exemption. The Publisher is entitled to report related information (including personal and financial data) to the respective authorities.

13.3 The Editor is responsible for the correct taxation of the payments received from the Publisher as well as any other consideration mentioned in this Agreement. If payments are made to a third party at the request of the Editor, the Editor will still be responsible for the taxation of the payment, unless local tax legislation determines otherwise.

§14 General Provisions

14.1 This Agreement, and the documents referred to within it, constitute the entire agreement between the Parties with respect to the subject matter hereof and supersede any previous agreements, warranties, representations, undertakings or understandings. Each Party acknowledges that it is not relying on, and shall have no remedies in respect of, any undertakings, representations, warranties, promises or assurances that are not set forth in this Agreement. Nothing in this Agreement shall exclude any liability for or remedy in respect of fraud, including fraudulent misrepresentation. This Agreement may be modified or amended only by agreement of the Parties in writing. For the purposes of modifying or amending this Agreement, "in writing" requires either a written document signed by both the Parties or an electronic confirmation by both the Parties with DocuSign or a similar e-signature solution. Any notice of termination and/or reversion and, where applicable, any preceding notices (including any requesting remediable action under the Clause "**Termination**") must be provided in writing and delivered by post, courier or personal delivery addressed to the physical address of the relevant Party as set out at the beginning of this Agreement or any replacement address notified to the other Party for this purpose. All such notices shall become effective upon receipt by the other Party. Receipt is deemed to have taken



place five working days after the respective notice was sent by post or left at the address by courier or personal delivery. If the Publisher is the terminating Party the notice need only be provided to the address of the Corresponding Editor. If the Editor is the terminating Party a copy of the notice must also be sent to the Publisher's Legal Department located at Heidelberger Platz 3, 14197 Berlin, Germany.

- 14.2 No failure or delay by either Party to exercise or enforce any term, right or remedy provided under or in connection with this Agreement shall constitute a waiver of that or any other term, right or remedy, nor shall it prevent or restrict the further exercise or enforcement of that or any other term, right or remedy. No single or partial exercise or enforcement of such term, right or remedy shall prevent or restrict the further exercise or enforcement of that or any other term, right or remedy.
- 14.3 The Editor will not, without the prior written consent of Publisher, disclose the terms of this Agreement to any third party, except to the Editor's respective professional advisors or as required by a court, regulatory body or other authority of competent jurisdiction.
- 14.4 Nothing contained in this Agreement shall constitute or shall be construed as constituting a partnership, joint venture or contract of employment between the Publisher and the Editor. No Party may assign this Agreement to third parties but the Publisher may assign this Agreement or the rights received hereunder to its affiliated companies. In this Agreement, any words following the terms "include", "including", "in particular", "for example", "e.g." or any similar expression shall be construed as illustrative and shall not limit the sense of the words preceding those terms.
- 14.5 If any difference shall arise between the Editor and the Publisher concerning the meaning of this Agreement or the rights and liabilities of the Parties, the Parties shall engage in good faith discussions to attempt to seek a mutually satisfactory resolution of the dispute. This Agreement shall be governed by, and shall be construed in accordance with, the laws of the Republic of Singapore. The courts of Singapore, Singapore shall have the exclusive jurisdiction.
- 14.6 A person who is not a Party to this Agreement (other than an affiliate of the Publisher) has no right to enforce any terms or conditions of this Agreement. This Agreement shall be binding upon and inure to the benefit of the successors and assigns of the Publisher. If one or more provisions of this Agreement are held to be unenforceable (in whole or in part) under applicable law, each such provision shall be deemed excluded from this Agreement and the balance of the Agreement shall remain valid and enforceable but shall be interpreted as if that provision were so excluded. If one or more provisions are so excluded under this Clause then the Parties shall negotiate in good faith to agree an enforceable replacement provision that, to the greatest extent possible under applicable law, achieves the Parties' original commercial intention.

To indicate their agreement to the terms outlined herein, all Parties have signed and exchanged this Agreement.


Editor(s)

Publisher

Springer Nature Singapore Pte Ltd.

DocuSigned by:


 Shahid Muntas - D80D1E2B33AC4FC...

DocuSigned by:


 William Achauer - D5033D91EF19455...
 Director

Date 20 April 2023

Date 20 April 2023





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 VIDYANAGAR, PALLISSERY, KARUKUTTY
 ERNAKULAM, PIN 6883576



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Danda B. Rawat

Danda B. Rawat

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Date

14 April 2023

DocuSigned by:

Anil Chandy

Anil Chandy

Managing Director

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Date

29 April 2023

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Varun G. Menon

Varun G. Menon

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Date

11 April 2023

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Appendix "Ethic Rules"

1 **Code of Conduct for Book Editors**

Research is important to confirm, change or advance knowledge. Intellectual honesty and (research) integrity are essential in all scholarly work. These guidelines set the standards of proper ethical behaviour and responsibilities for book editors (including proceedings, encyclopedia, handbook and textbook editors).

Submitting a Proposal for a Volume

- (a) The submitted book proposal must be original and must not contain any plagiarism.
- (b) The decision to move forward is decided by (peer) review of the proposal to establish its intended appeal to a certain audience as well as other considerations such as market potential, fit with the publishing portfolio in that specific field, related publications, previous experiences (amongst others).
- (c) Editors may suggest (or request to exclude) reviewers. It is at the sole discretion of Publisher (whether or not) to use them.

2 **Editors**

The Tasks of Editors Include the Following:

- (a) organise and structure the work as a whole (when there are multiple book Editors it is understood that all contributed sufficiently to this process),
- (b) select the appropriate contributing Authors and/or Contributions,
- (c) ensure the contributing Authors (including the Editors, if they also serve as contributing Authors) are aware of and compliant with the expectations as set out in the Code of Conduct for Book Authors <https://www.springernature.com/gp/authors>,
- (d) ensure that the list of contributing Authors including who is acting as Corresponding Author (names, affiliations and sequence) as well as the Editor names, affiliations and sequence are correct and final when the manuscript is submitted. Once the manuscript has been delivered to production, changes to the author- or editorship are no longer possible,
- (e) critically review, approve and accept responsibility for the final manuscript,
- (f) support the Publisher in clarifying any doubt or misunderstanding with contributing Authors in relation to any of the topics specified below,
- (g) deal with the Publisher and its staff in a professional and courteous manner, ensuring their communications are appropriate in both volume and tone, and address all queries received relating to the work in a timely manner.

(Peer) Review of the Contracted Work

This Code describes best practices regarding (peer) review of Contributions that make up a book. Springer Nature endorses (peer) review as a key factor in developing and validating high quality scholarly publications. It is understood that readership differs per book type (edited volumes, reference works, textbooks, professional books, and conference proceedings (amongst others)) and that the approach to assess the merit of the Contribution should be aligned with both the expectations of the intended audience and norms within a specific discipline. Best practice is to solicit constructive feedback from an appropriate number of independent experts.

Reviewers should be made aware of the expectations as set out in the Guidelines for Book Reviewers <https://www.springernature.com/gp/reviewers>.

The decision to include a Contribution in the final work is the responsibility of the Editor.

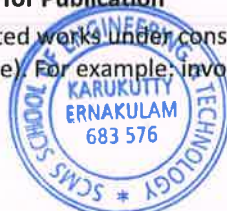
Originality

The submitted work must not contain any plagiarism and should not have been published elsewhere in any form or language (unless the work is a translation of an original work; it is a new iteration of the same work with some degree of change ("revised edition"); and/or permission has been granted for reuse and/or is allowed under the Publisher's reuse policy).

Important note: The Publisher may use software to screen for plagiarism.

Related Manuscripts under Consideration for Publication

Editors should inform the Publisher of related works under consideration for publication and provide details of these relevant works (if applicable). For example, involvement with a major reference work as



well as developing an edited volume on a similar topic. This ensures transparency and allows for proper citation of the first reported work.

Conflict of Interest

Editors are requested to disclose interests that are directly or indirectly related to the work submitted for publication.

Disclosure of interests provides a more complete and transparent process and helps readers form their own judgements of potential bias. This is not meant to imply that a financial relationship with an organisation that sponsored the research or compensation received for consultancy work is inappropriate. Interests may include but are not limited to the following: funding (grants, other forms of research support such as salaries, equipment, supplies, reimbursement for attending symposia, and other expenses), employment, financial interests (stocks, shares, consultation fees, patents and patent applications) and non-financial interests (professional interests, personal relationships or personal beliefs such as a position on an editorial board, advisory board or board of directors or other type of management relationships; writing and/or consulting for educational purposes; expert witness; mentoring relations).

Fundamental Errors

Editors have an obligation to share with the Publisher any significant error or inaccuracy in the published work either discovered by themselves or of which they are informed by an Author. A decision on how to correct the literature depends on the nature of the error. This may be a correction or retraction and will be the decision of the Publisher following the Committee on Publication Ethics (COPE) guidelines. The retraction note must provide transparency as to which parts of the work are impacted by the error.

Confidentiality

Editors should treat the following as confidential:

- (a) Correspondence with direct representatives from the Publisher about the contract and contractual details of the work;
- (b) Contributions under review;
- (c) Reviewers' reports.

If Editors are asked for information, for example, to help out a hiring or tenure and promotion committee they should only share information about the project's current status: out for review or in press.

Suspected Transgression of Ethical Standards

Editors should take ethical complaints concerning a published work seriously. If there is a suspicion of misbehaviour or alleged fraud the Publisher, in cooperation with the Editor, will carry out an investigation following the Committee on Publication Ethics (COPE) guidelines. If, after investigation, there are valid concerns, the accused Author (or Editor) will be contacted under their given e-mail address and given an opportunity to address the issue. Dependent on the situation, this may result in the Publisher's implementation of the following measures, including, but not limited to:

- (a) If the book proposal or work is still under consideration, it may be rejected and returned to the Author (or Editor(s)).
- (b) If the Work has already been published online, depending on the nature and severity of the infraction: (i) an erratum/corrigendum may be placed with the online version of the Work and be inserted in the printed editions of the Work (hardbound, MyCopy, paperback), or (ii) in severe cases retraction of the Work may occur. The reason must be given in the published erratum/corrigendum or retraction note. Please note that retraction means that the electronic edition of the Work is maintained on the platform, watermarked "retracted" and explanation for the retraction is provided in a note linked to the watermarked typescript. The printed editions of the Work then are no longer available. Or (dependent on the transgression) the electronic version of the Work is completely removed and an explanation for the retraction is provided in a note linked to the metadata of the Work.
- (c) The Author's (or Editor's) institution may be informed.
- (d) A notice of suspected transgression of ethical standards may be included as part of the Author's (or Editor's) and book's or chapter's bibliographic record.



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Appendix "Editor's Reuse Rights"

- 1 The Editor may copy, distribute or otherwise reuse the Work, without the requirement to seek specific prior written permission from the Publisher, ("**Reuse**") subject to and in accordance with the following provisions:
 - (a) Reuse of the Work is permitted only to the extent and in so far as is reasonably necessary: (i) to share the Work as a whole to no more than 10 research colleagues engaged by the same institution or employer as the Editor for each colleague's personal and private use only; (ii) for classroom teaching use by the Editor in their respective academic institution by making available up to one Contribution from the Work provided that the Work or any part of it is not included in course packs for sale or wider distribution to any students, institutions or other persons nor any other form of commercial or systematic exploitation; or (iii) for the Editor to use parts of the Work in the further development of the Editor's scientific and/or academic career, for private use and research or within a strictly limited circulation which does not allow the Work to become publicly accessible nor prejudice sales of, or the exploitation of the Publisher's rights in, the Work (e.g. attaching a copy of a chapter to a job or grant application); and
 - (b) any Reuse of the Work in a new book, book chapter or journal article, whether published by the Publisher or by any third party, is limited to three figures (including tables) or a single text extract of less than 400 words from an individual chapter of the Work, but not more than five figures (including tables) or a total of 800 words from the whole Work.

Any Reuse must be based on the Version of Record only, and the original source of publication must be cited according to current citation standards. The "**Version of Record**" is defined as the final version of the Work as originally published, and as may be subsequently amended following publication in a contractually compliant manner, by or on behalf of the Publisher.
- 2 In each case where the Editor has Reuse rights or the Publisher grants specific use rights to the Editor according to the above provisions, this shall be subject always to the Editor obtaining at the Editors sole responsibility, cost and expense the prior consent of any co-editor(s), the Author(s) of the respective Contribution(s) and/or any relevant third party.



A handwritten signature in blue ink, appearing to read "Joshi".

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