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.

Plan to Implementation

It occupies less space and can be shared with different houses. The heighted 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.

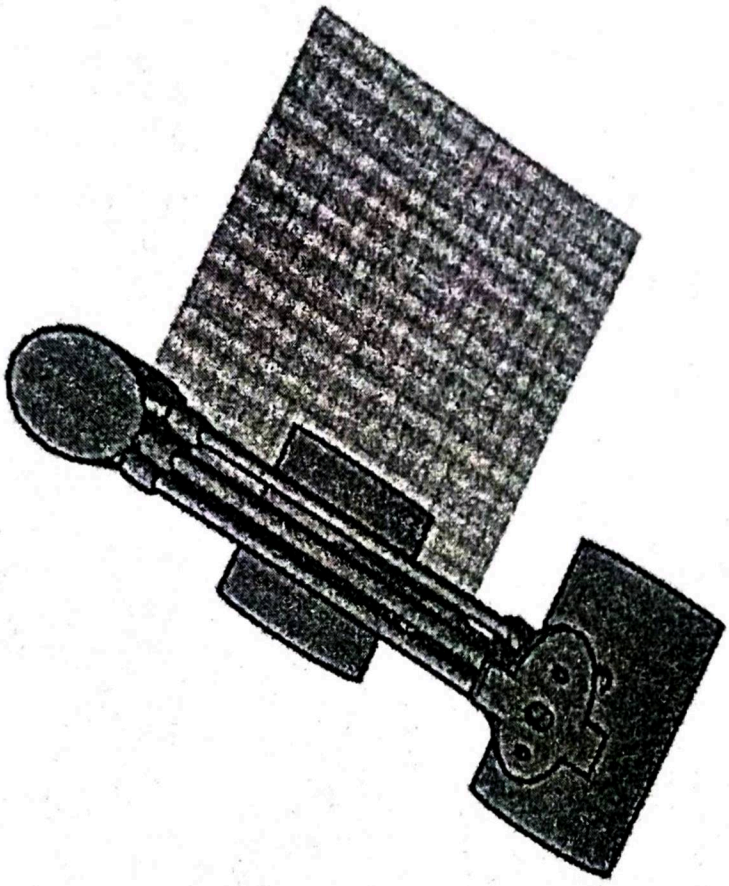
Scope for improvement

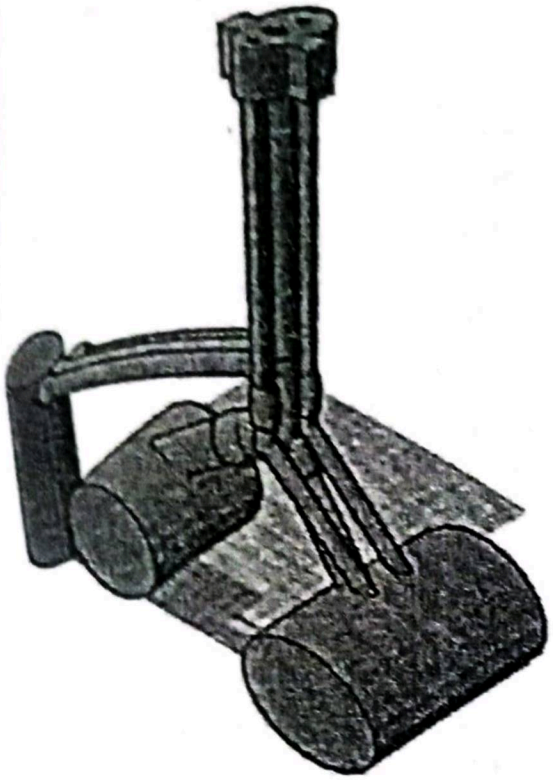
We wish to extend our design so as to make it more handicap friendly. We wish to incorporate a self-raising toilet seats to make it easier for age old people. The waste material so obtained is sent to a biogas plant as a means of sustainable power generation and the water collected from it will recycle and use for other purposes like irrigation of gardens.

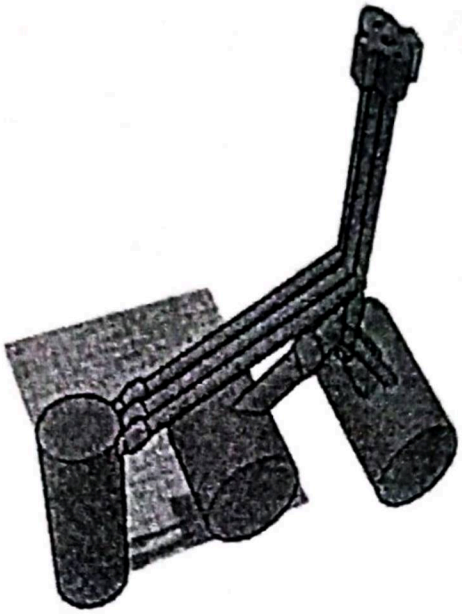
Goals

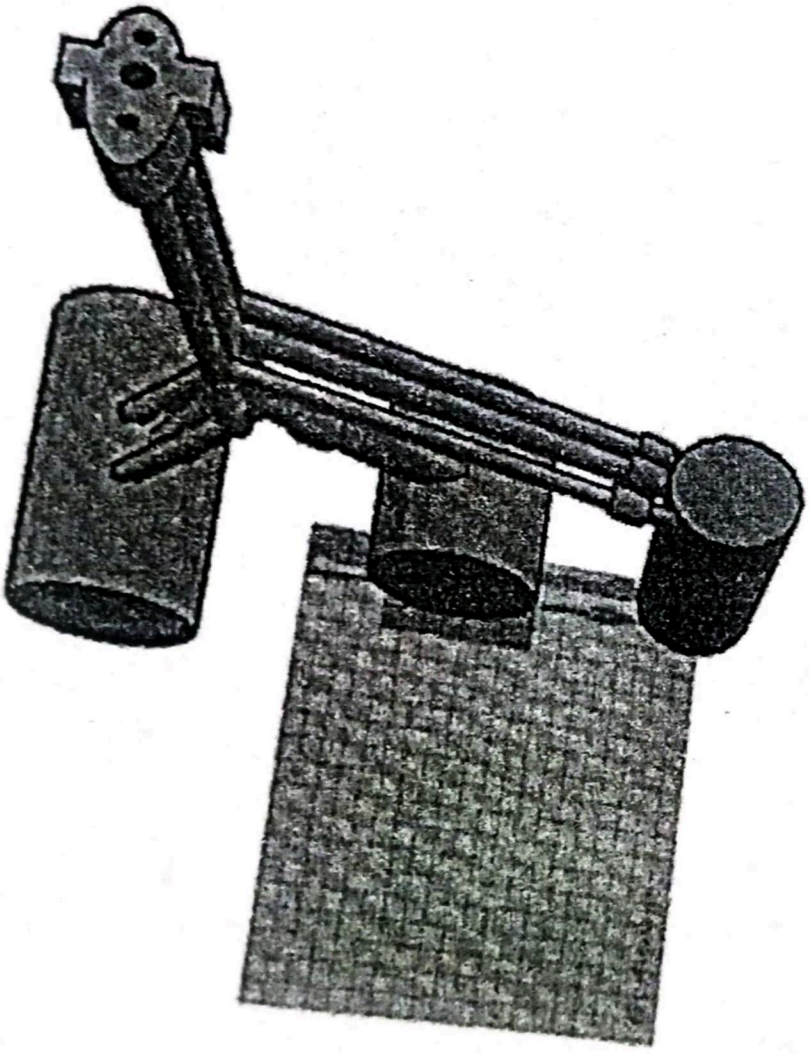
Since our college is in a flood prone area, we would like to initiate the design in our college and hostels. We expect that our product will definitely make sanitation sustainable at least for people in the flood prone area. Even homes without proper sanitation facilities may install our product as we intend to provide affordable and environment friendly toilets.

Design-phase1

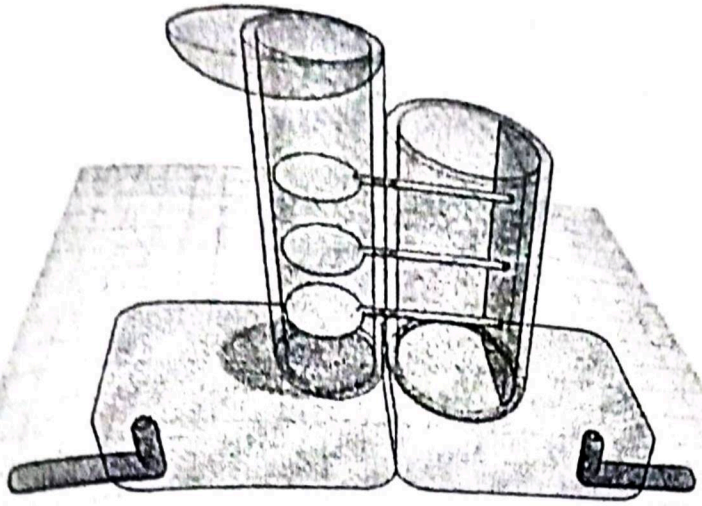


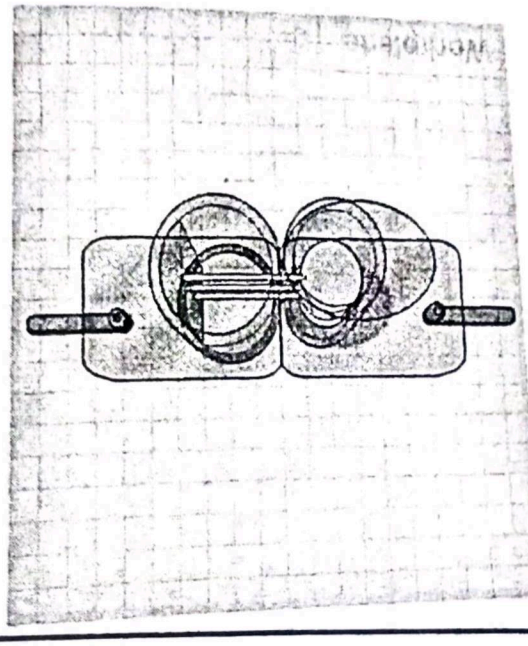


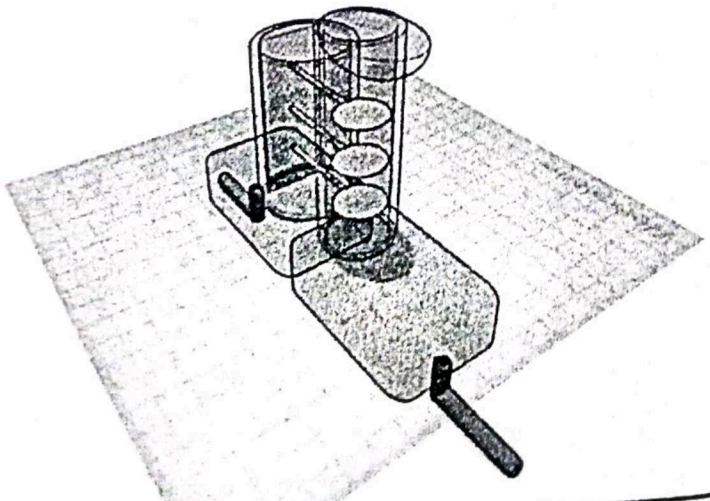


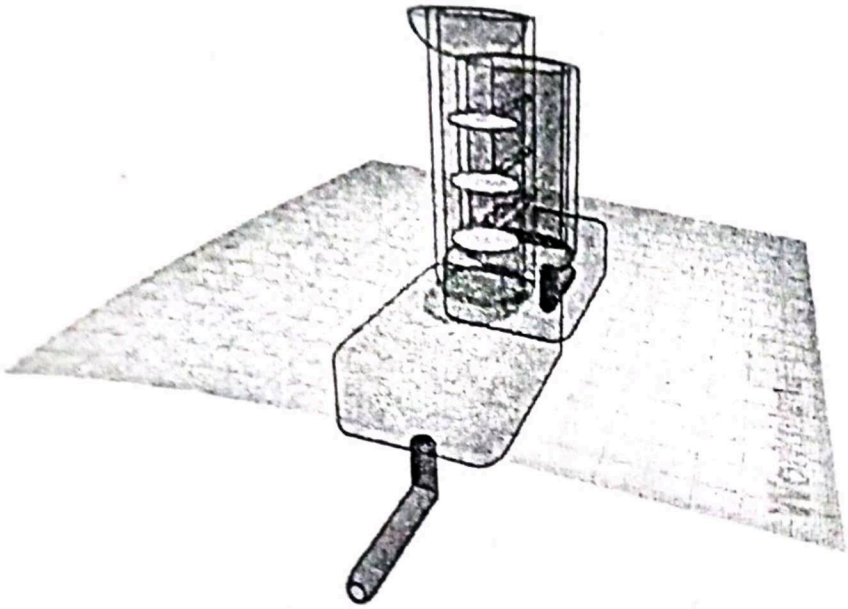


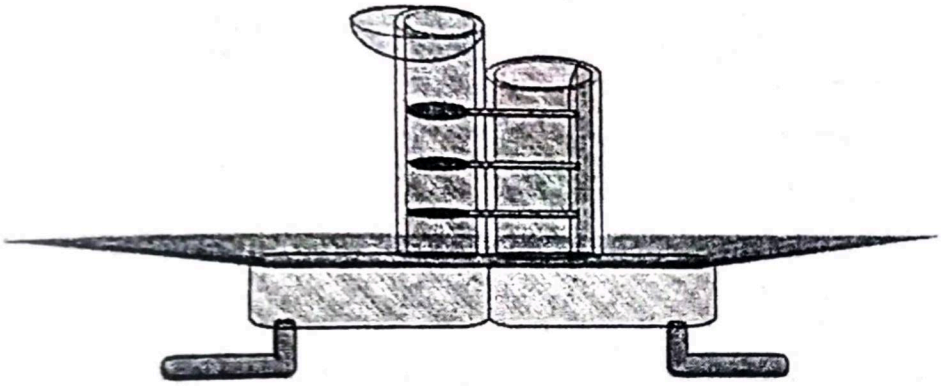
esign-phase2



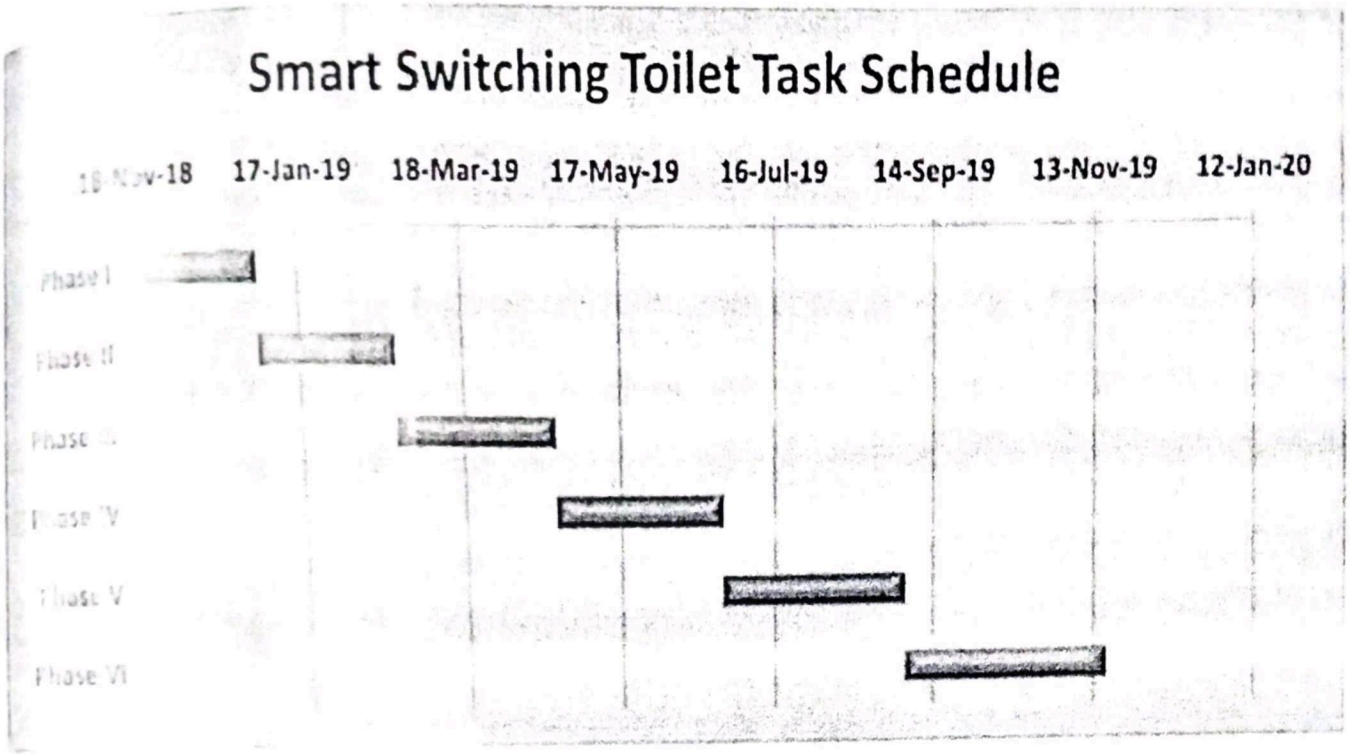








Visual View of Tasks Scheduled for the Project: 'Smart Switching Toilet' Using Gantt Chart



Dr Sunil Jacob

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.

12.10.18

SECRETARY
KARUKUTTY GRAMA PANCHAYAT
PH: 0484-2612231(O)

NATIONAL SERVICE SCHEME (UNIT NO. 182)
SCMS SCHOOL OF ENGINEERING & TECHNOLOGY,
KARUKUTTY, ERNAKULAM - 683544

NSS/2018-19/TC/104

To,

Dr. Sunil Jacob
Professor,
Department of Electronics and Communication Engineering,
SCMS School of Engineering and technology.

Respected Sir,

SUB: SMART SWITCHING TOILET with urine Diversion system

The project"Smart Switching Toilet with urine diversion system for Flood Region" of SCMS School of Engineering under the supervision of Dr. Sunil Jacob. We reviewed and interested the proposal. Once the prototype is ready it will be accepted and implemented through National Service Scheme(NSS) to the flood prone area.

Since it is a socially relevant project, it will be a great and useful project especially to Rebuild Kerala.The prototype will help NSS to provide better sanitation facility during flood.

National Service Scheme (Technical Cell)is interested to support this projects in all kinds.

Thanking You

Yours Sincerely

08/10/2018
Karukutty

SUJAY K
NSS Programme Officer

Phone: +91 484 2450330/2451907, Fax +91 484 2450508
E-mail: nssposcms@gmail.com
www.scmsgroup.org

IEEE SIGHT

Special Interest Group on
Humanitarian Technology

Intellectual Property Policy

Prepared for: "Smart Switching Toilet with urine diversion system for Flood Region" (the "Project")
Reference number: 19-SPC2-01

Grants provided by IEEE SIGHT Steering Committee ("SSC"), a committee of the IEEE Humanitarian Activities Committee ("HAC") may result in the creation of intellectual property ("Grant IP") by the grant funds recipient (the "Grantee"). Grantee and IEEE SIGHT Steering Committee agree to work together to protect and distribute the Grant IP in order to achieve the goals of the Project and for the benefit of humanity.

A. The Grantee shall own all rights in any Grant IP created during the Project. All costs involved in obtaining and maintaining legal protection of Grant IP shall be borne by the Grantee.

B. Grantee will take all reasonable steps to protect the Grant IP and will coordinate with the SSC to ensure the Grant IP is not abused or infringed upon by any third parties.

C. Grantee will take all reasonable steps to make the Grant IP available under license to interested parties in a manner that is consistent with each of IEEE's mission, not-for-profit status and intellectual property policies.

D. The Grantee agrees to grant a worldwide, perpetual, irrevocable and royalty-free license to SSC and HAC to continue to use, reproduce and distribute the Grant IP.

E. The Grantee shall disclose to SSC any Grant IP that is developed during the Project and provide any additional reports or information that may be requested by IEEE SIGHT Steering Committee in IEEE.

F. IEEE is committed to advancing technology for the benefit of humanity and the Grantee understands and agrees that the Grant IP should be used to advance IEEE's mission. Where possible, the Grant IP will be distributed in an open and expedited manner at a rate comparable to the means of production.

G. If immediate release of the Grant IP is impracticable or imprudent given the subject matter of the Project, Grantee will work with SSC to create reasonable restriction periods or limit the distribution channels. Grantee agrees to widely distribute the Grant IP as soon as it becomes practicable to do so. Grantees will take all reasonable steps to determine the best way to distribute the Grant IP in order to allow for maximum impact and dissemination.

H. Grantee shall use its best efforts to ensure that the Grant IP is not used to inhibit the development of additional projects by others organizations or individuals.

By signing below, the Grantee certifies that he/she is a representative of the Project and accepts the terms outlined in this Intellectual Property Policy.

I certify that I accept the terms outlined in this letter:

Signature: DocuSigned by: Sunil Jacob 770164E271EE42F...

Printed Name: Sunil Jacob

Title: Director SCMS Centre for Robotics and Prof ECE Dept

Date: 2019-07-31

Equipment
e to equipment purchased shall be vested in the grantee with the understanding that the equipment be used for the Project, or similar activities, for which it was obtained.

Reversion of Grant Funds
e grantee will return to the IEEE SIGHT Steering Committee any portion of the funds not used for the cified purposes at the close of the grant period. Funds also will be promptly returned if the IEEE SIGHT ering Committee determines that the grantee has not performed in accordance with the Award Letter has not met the specific grant conditions of the Project and its supporting budget.

Special Conditions
ject lead will ensure that every participant in the Project signs (i) the **Waiver and Release of Liability** rm and (ii) the **Publicity Release Form** prior to participating in the Project. The grantee will sign the tellectual **Property Policy** prior to receiving the grant funds and undertaking any work on the Project. The Project lead will keep a copy of all signed documents and submit them to the IEEE SIGHT Steering Committee together with the first and final reports.

Grant Renewal
Unless otherwise stipulated in writing, this grant is made with the understanding that the IEEE SIGHT Steering Committee has no obligation to provide other or additional support to the grantee.

Legal Compliance
The grantee currently complies and will comply with all state and federal laws and regulations, including laws concerning civil and human rights, and will ensure that the Project will be free of any discrimination based on race, color, national origin, physical disability, religion, gender, or age.

Initials: DS Sunil Jacob

Addendum to Award Letter for
"Smart Switching Toilet with urine diversion system for Flood Region"
(the "Project")

Grant Reference number: #19-SPC2-01
Please refer to this number in all communications regarding this grant.

1. Publicity
The grantee shall mention that the Project is sponsored by IEEE SIGHT (the "Sponsorship") in all press releases, news conferences and other media contacts concerning the Project. All materials developed or published by the Project, including brochures, announcements, flyers, manuals and reports, shall mention the Sponsorship. The grantee shall send to the IEEE SIGHT Steering Committee copies of all publicity regarding the grant, including print media and information materials that are related to the project. Copies of the IEEE SIGHT logo suitable for reproduction are included for your convenience.

2. Accounting
The grantee is responsible for the expenditure of the grant funds and for maintaining adequate supporting records consistent with generally accepted accounting procedures.

3. Reports
A complete project and financial report for the Project must be provided within sixty (60) days after the completion of the grant period based on the below schedule. Biannual reports are to be provided every 6 months for any Project lasting longer than 6 months.

Beginning Date	Ending Date	Interim Report Due Date	Final Report Due Date
01-Sep-2019	*31-Aug-2020*	*01-Mar-2020*	*31-Oct-2020* ***or 60 days after Actual Completion Date.***

SIGHT may occasionally reach out to you for updates throughout the term of the project; likewise, SIGHT welcomes periodic updates, including pictures and/or videos, as you have available.

4. Payment Schedule
Unless otherwise agreed in writing by IEEE SIGHT Steering Committee, the grant award shall be paid as indicated below:

- US $2,953.00 will be transferred to IEEE Kerala Section account for disbursement to this project.

The grant award shall be paid to the grantee after the IEEE SIGHT Steering Committee receives an executed copy of the Grant Award Letter.

Initials DS Sunil Jacob

IEEE SIGHT

Special Interest Group on
Humanitarian Technology

30-Jul-2019

Dr. Sunil Jacob <suniljacob@scmsgroup.org>
IEEE Kerala Section SIGHT Group

On behalf of the IEEE SIGHT Steering Committee: *Congratulations!* The IEEE SIGHT Steering Committee, a committee of the IEEE Humanitarian Activities Committee, has approved a grant of **US $2,953.00** for the project named **"Smart Switching Toilet with urine diversion system for Flood Region" (19-SPC2-01)**. Our offer of this grant is subject to your agreement to:

1. Use the grant funds only as specified in the approved grant proposal.
2. Maintain your records to show and account for the uses of grant funds and retain all original receipts.
3. Allow the IEEE SIGHT Steering Committee access to records to verify grant expenditures and activities.
4. Provide written acknowledgement of receipt of grant funds.
5. Repay any portion of the funds not used for the specified purposes.
6. Refrain from use of the funds for any purpose prohibited by law.
7. Cooperate with any efforts of the IEEE SIGHT Steering Committee to publicize the grant award.
8. Comply with reasonable requests for information about program activities.
9. Meet terms and conditions specified in the addendum to this letter.

All grants are made in accordance with current and applicable laws and pursuant to the Internal Revenue Service Code and the regulations issued thereunder.

If you agree to these terms, please sign and return one copy of this letter to sight-projects@ieee.org. We appreciate being able to assist in the success of your project.

Sincerely,
Sampathkumar Veeraraghavan
Chair, IEEE SIGHT Steering Committee
A Committee of the IEEE Humanitarian Activities Committee

I certify that I accept the terms outlined in this letter:

Signature: DocuSigned by: Sunil Jacob

Printed Name: Sunil Jacob

Title: Director SCMS Centre for Robotics and Prof ECE

Date: 2019-07-31