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Babel Earbuds

BABEL EARBUDS

In the cult sci-fi classic *The Hitchhiker's Guide to the Galaxy,* you slide a yellow Babel fish into your ear to get translations in an instant. In the real world, Google has come up with an interim solution: a $159 pair of earbuds, called Pixel Buds. These work with its Pixel smart phones and Google Translate app to produce practically real-time translation.

One person wears the earbuds, while the other holds a phone. The earbud wearer speaks in his or her language—English is the default—and the app translates the talking and plays it aloud on the phone. The person holding the phone responds; this response is translated and played through the earbuds.

Clunky hardware can be fixed, though. Pixel Buds show the promise of mutually intelligible communication between languages in close to real time.

DUELING NEURAL NETWORKK

Artificial intelligence is getting very good at identifying things: show it a million pictures, and it can tell you with uncanny accuracy which ones depict a pedestrian crossing a street. But AI is hopeless at generating images of pedestrians by itself. If it could do that, it would be able to create gobs of realistic but synthetic pictures depicting pedestrians in various settings, which a self-driving car could use to train itself without ever going out on the road.

> **Breakthrough** Two AI systems can spar with each other to create ultra-realistic original images or sounds, something machines have never been able to do before.
> **Why It Matters** This gives machines something akin to a sense of imagination, which may help them become less reliant on humans—but also turns them into alarmingly powerful tools for digital fakery.
> **Key Players** Google Brain, Deep Mind,

The problem is, creating something entirely new requires imagination—and until now that has perplexed AIs.

The solution first occurred to Ian Good fellow, then a PhD student at the University of Montreal, during an academic argument in a bar in 2014. The approach, known as a generative adversarial network, or GAN, takes two neural networks—the simplified mathematical models of the human brain that underpin most modern machine learning—and pits them against each other in a digital cat-and-mouse game.

What is Google Duplex?

Google Duplex basically is an artificial intelligence personal chat agent that can carry our certain verbal tasks, such as making a reservation, booking a hotel room or fixing an appointment, over the phone.

Duplex, which uses natural language understanding and natural language generation to carry on a two-way conversation, and pauses in such a lifelike manner that someone listening in couldeasily mistake a human-to-computer transaction for a human-to-human conversation. The Duplex system is designed to carry out tasks autonomously but has the ability to signal ahuman operator should the program not be able to complete the task at hand. Duplex was unveiledat Google I/O 2018 along with the rebranding of Google Research to Google AI. Google also announced it intends to include a built-in disclosure feature that will alert humans when theyare speaking to an artificial intelligence agent and is now describing Duplex as an "automated booking service."

THE VICISSITUDES OF FORTUNE

Deep learning (DL). Machine learning (ML) and more specifically DL are already
on the cusp of revolution.They are widely adopted in datacenters and DL is being explored at the
edge of the network to reduce the amountof data propagated back to datacenters

Digital currencies. Bitcoin, Ethereum, and newcomers Litecoin, Dash, and Ripple have become commonly
traded currencies. They will continue to become a more widely adopted means of trading.
This will trigger improved cybersecurity because the stakes will be ever higher as their values rise
Robotics. Even though robotics research has been performed for many decades, robotics
adoption has not flourished. However, the past few years have seen increased
availability of consumer robots, as well as more sophisticated military and industrial robots.
We predict that this will trigger wider adoption of robotics in the medical space for caregiving and
other healthcare uses. Assisted reality and virtual reality (AR/VR). Gaming and AR/VR gadgets have
grown in adoption in the past year. We anticipate that this trend will grow with modern user
interfaces such as 3D projections and movement detection.

Blockchain. The use of Bitcoin and the revitalization of peer-to-peer computing have been essential for the adoption of blockchain technology in a broader sense. We predict increased expansion of companies delivering blockchain products and even IT heavyweights entering the market and consolidating the products.

Industrial IoT. Empowered by DL at the edge, industrial IoT continues to be the most widely adopted use case for edge computing. It is driven by real needs and requirements. We anticipate that it will continue to be adopted with a broader set of technical offerings enabled by DL, as well as other uses of IoT (see C and E).
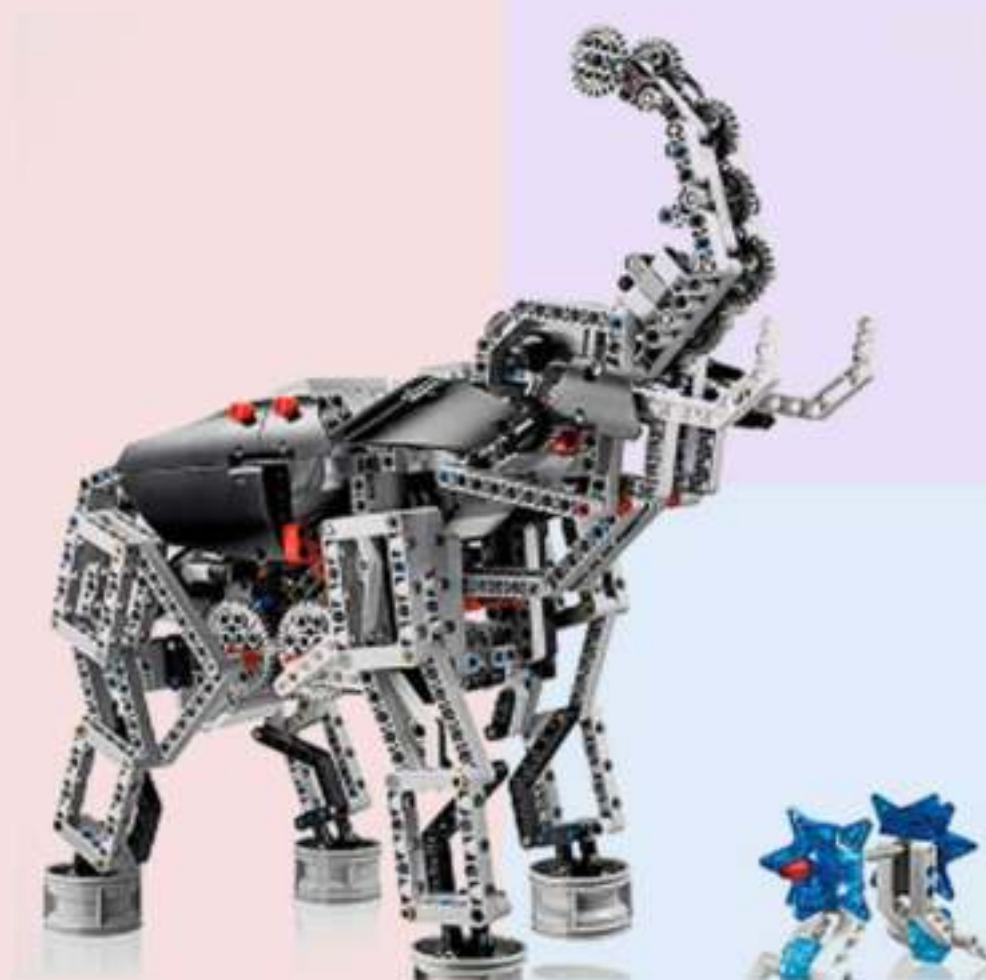
Robotics. Even though robotics research has been performed for many decades, robotics adoption has not flourished. However, the past few years have seen increased market availability of consumer robots, as well as more sophisticated military and industrial robots. We predict that this will trigger wider adoption of robotics in the medical space for caregiving and other healthcare uses. Combined with DL (#1) and

Assisted reality and virtual reality (AR/VR). Gaming and AR/VR gadgets have grown in adoption in the past year. We anticipate that this trend will grow with modern user interfaces such as 3D projections and movement detection. This will allow for associating individuals with metadata that can be viewed subject to privacy configurations, which will continue to drive international policies for cybersecurity and privcy.

Accelerators and 3D. With the end of power scaling and Moore's law and the shift to 3D, accelerators are emerging as a way to continue improving hardware performance and energy efficiency and to reduce costs. There are a number of existing technologies (FPGAs and ASICs) and new ones (such as memristor-based DPE) that hold a lot of promise for accelerating application domains (such as matrix multiplication for the use of DL algorithms). We predict wider diversity and broader applicability of accelerators, leading to more widespread use in 2018.

Cybersecurity and AI. Cybersecurity is becoming essential to everyday life and business, yet it is increasingly hard to manage. Exploits have become extremely sophisticated and it is hard for IT to keep up. Pure automation no longer suffices and AI is required to enhance data analytics and automated scripts. It is expected that humans will still be in the loop of taking actions; hence, the relationship to ethics . But AI itself is not immune to cyberattacks. We will need to make AI/DL techniques more robust in the presence of adversarial traffic in any application area.