Vidya Vikas Education Trust's

Universal College of Engineering

Accredited with B+ Grade by NAAC

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Current Wave

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College Profile:

Everything you need to know about us:

Embraced by lush greenery and scenic beauty, Universal College of Engineering is a treasured place for aspiring engineers to leave their imprints on success.

As a college within the wider network frame, we are one of the fastest- growing institutions in India. Our institute has been accredited by the National Assessment and Accreditation Council (NAAC) with a B+ grade in the first cycle of accreditation. Times of India Survey Ranked No.1 in India among Top Emerging Private Engineering Institutes for 6 consecutive years 2015, 2016, 2017, 2018, 2019, and 2020 and the saga of accolades still continues.

In response to the expectations of quality technical education, our college is approved by the All-India Council for Technical Education (AICTE), New Delhi; Recognized by the Directorate of Technical Education (DTE), Government of Maharashtra; affiliated to Mumbai University. Our college is also associated with professional bodies like IEEE, IETE, ISA, and CSI to update the revolutionary technological advancements.

We offer 4 years of full-time Bachelor of engineering programs in Computer Engineering, Civil Engineering, Artificial Intelligence & Machine Learning, Information Technology and Data Engineering.

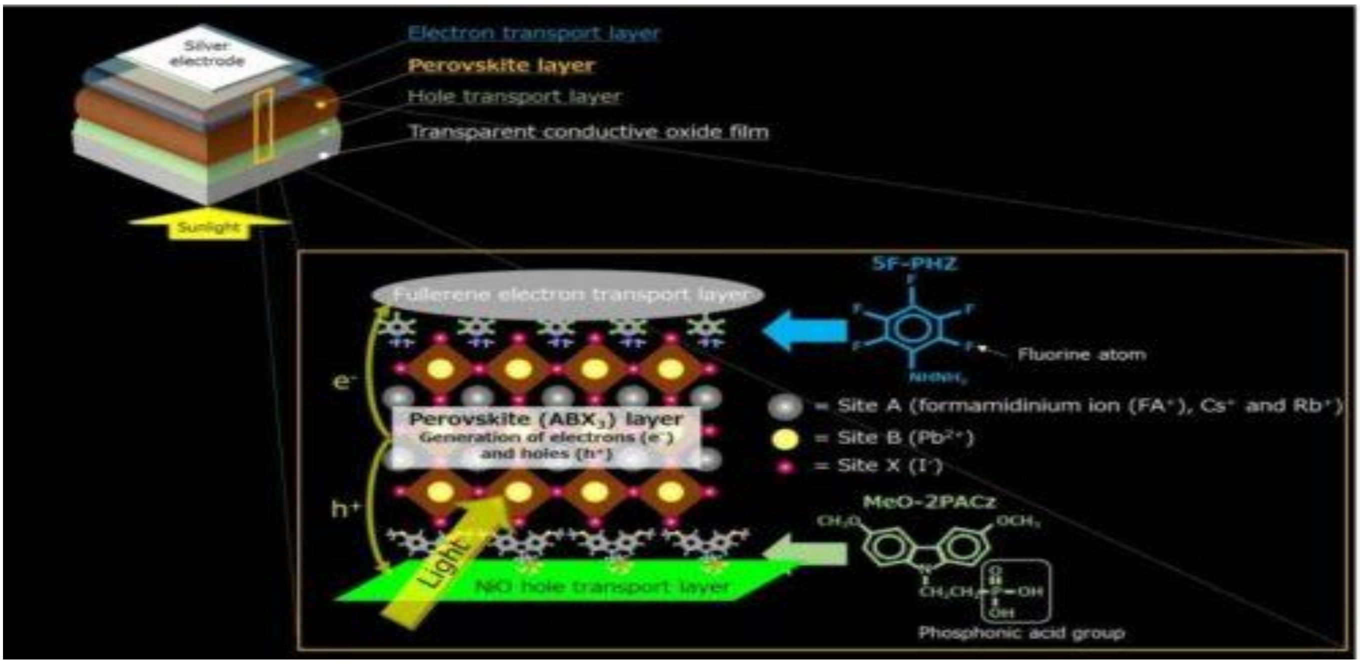
The unique state-of-the-art facility of the institute has been carefully designed to accommodate the needs of the students. Laboratories are equipped with world-class facilities based on the latest technology of different sectors. Our smart classrooms are well ventilated, spacious, and equipped with overhead and LCD projectors along with the public address system. The Collegelibrary provides a rich collection of specialist library resources and services to support student's academic work and enrich their research skills.


We are obliged to equip our students to get placed in highly reputed companies by mentoring their necessary skill set for cutting-edge technologies. The core highlighted areas are helping students with their technical competency, communication skills along with career guidance and counseling.

Universal College of Engineering has produced a large number of successful alumni who are working in reputed organizations in India and abroad and have contributed immensely to the cause of nation- building and society. We welcome all engineering aspirants to create an incredible legacy in the field of engineering.

Researchers Show How We Can Improve Efficiency Of A Perovskite Solar Cell

Researchers from National Institute for Materials Science (NIMS) have developed durable perovskite solar cell with an area of 1-cm2 that can generate electricity for more than 1,000 hours continuously. Solar panels are useful in generating clean and green electricity as there are no greenhouse gas emissions.



Perovskite is the most promising material used for manufacturing reliable solar cells. The only drawback of perovskite solar cells is that they are sensitive to water and degrade when they react with water molecules. This affects their durability and efficiency. Hence, researchers have invented a perovskite cell that could prevent water molecules from coming into contact perovskite layer, improving the durability of the solar cell.

The perovskite layer absorbs sunlight which produces electrons and holes. These electrons and holes flow separately into the adjacent electron transport layer and hole transport layer which results in an electric current. For enhancing the efficiency and durability of perovskite solar cells, these layers and the interfaces between them need to allow electrons and holes to move through them more freely while making the interfaces impermeable to water molecules. This research team included a hydrazine derivative containing water-repellent fluorine atoms (5F-PHZ) to the interface between the electron transport layer and the perovskite layer (composed of a crystalline structure, FA0.84Cs0.12Rb0.04PbI3, which can be expressed simply by ABX3, where A = a combination of formamidinium ions (FA+), Cs+ and Rb+; B = Pb2+; and X = I-). The above interface successfully obstructed water molecules that have penetrated the electron transport layer from coming into contact with the perovskite layer. Further, this also reduced the number of crystalline defects that formed on the surface of the perovskite layer, a cause of decreased power generation efficiency. The team also included phosphonic acid derivative (MeO-2PACz) in the interface between the hole transport layer and the perovskite layer, which curtailed defect formation in the hole transport layer and upgraded the power generation efficiency of the solar cell.

Can AI Models Process Things Like Human Brains?

Researchers from the University of Glasgow’s School of Psychology and Neuroscience have developed a novel approach to understanding whether the human brain and its DNN models recognize things in the same way.

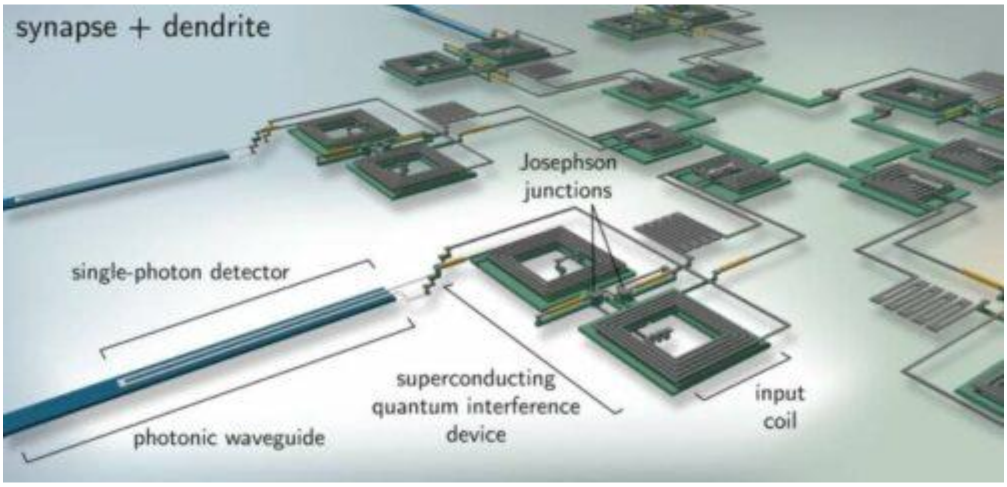
Deep Neural Networks have become very significant in everyday real-world applications such as automated face recognition systems and self-driving cars. Deep Neural Network is used by researchers to model the processing of information and examine how this processing is equivalent to that of humans. While how DNNs perform computations can be very different from the human brain. Hence, researchers have invented a unique approach to understanding whether the human brain and its DNN models recognize things in the same way, using similar steps of computations.

Prof Philippe Schyns, Dean of Research Technology at the University of Glasgow, said: “Having a better understanding of whether the human brain and its DNN models recognize things the same way would allow for more accurate real-world applications using DNNs.

This article defines a new approach to better this understanding of how the process works: first, researchers must show that both the brain and the DNNs recognize the same things – such as a face – using the same face features; and, secondly, that the brain and the DNN must process these features in the same way, with the same steps of computations. This research would overcome the main hurdle in AI development i.e. understanding the process of machine learning, which matches how humans process information.

“Creating human-like AI is about more than mimicking human behavior – technology must also be able to process information, or ‘think’, like or better than humans if it is to be fully relied upon. We want to make sure AI models are using the same process to recognize things as a human would, so we don’t just have the illusion that the system is working.” This research would provide us with more accurate and reliable AI technology that will process information similar to the human brain

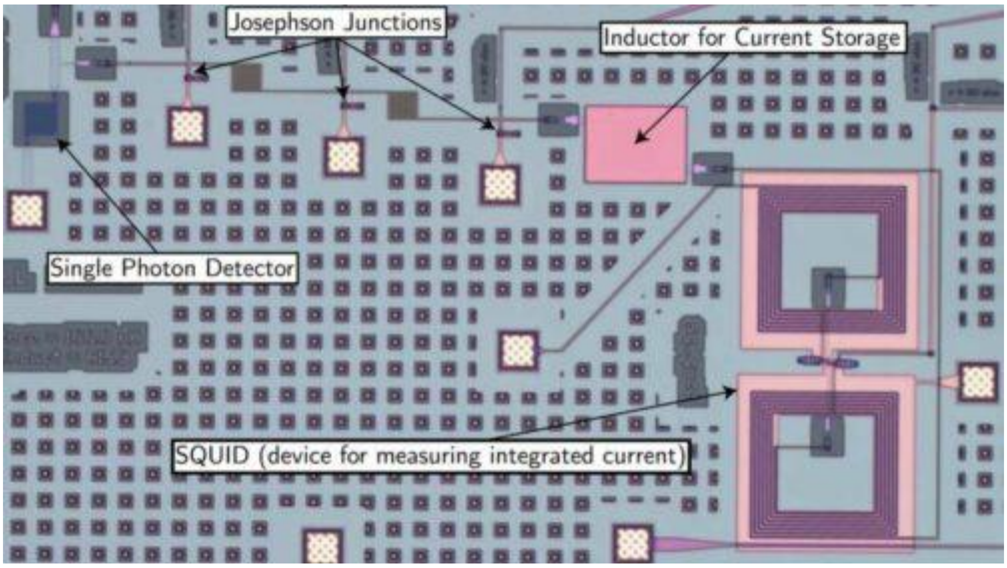
Superconducting Circuits That Mimics Brain Cells



Artistic rendering of how superconducting circuits that mimic synapses (connections between neurons in the brain) might be used to create artificial optoelectronic neurons of the future. Credit: J. Chiles and J. Shainline/NIST

The brain has been an inspiration for designing computing systems. Researchers have even tried mimicking the brain structure into computer hardwares. They were called "neuromorphic chips" which showed great promise, but they have used conventional digital electronics, limiting their complexity and speed. As the chips become larger and more complex, the signals between their individual components become backed up like cars on a gridlocked highway and reduce computation to a crawl.

A team of researchers at the National Institute of Standards and Technology (NIST) has demonstrated a solution to these communication challenges. Researchers have designed a circuit that behaves much like a biological synapse yet uses just single photons to transmit and receive signals. Such a feat is possible using superconducting single-photon detectors. The computation in the NIST circuit occurs where a single-photon detector meets a superconducting circuit element called a Josephson junction.



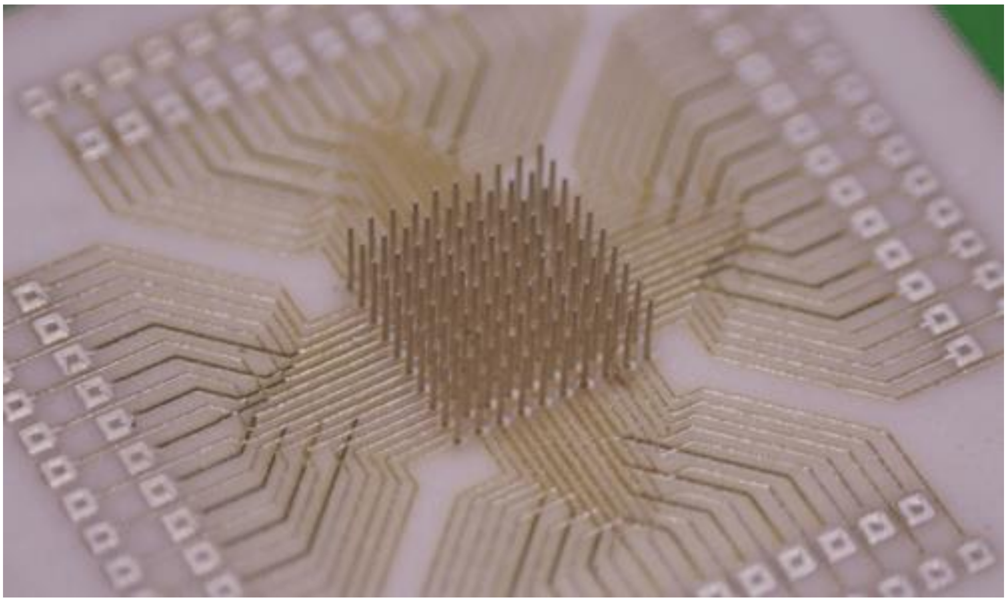
Photograph of a NIST superconducting circuit that behaves like an artificial version of a synapse, a connection between nerve cells (neurons) in the brain. The labels show various components of the circuit and their functions. Credit: S. Khan and B. Primavera/NIST

A Josephson junction is a sandwich of superconducting materials separated by a thin insulating film. If the current through the sandwich exceeds a certain threshold value, the Josephson junction begins to produce small voltage pulses called fluxons. Upon detecting a photon, the single-photon detector pushes the Josephson junction over this threshold and fluxons are accumulated as current in a superconducting loop. Researchers can tune the amount of current added to the loop per photon by applying a bias (an external current source powering the circuits) to one of the junctions. This is called the synaptic weight.

This behavior is similar to that of biological synapses. The stored current serves as a form of short-term memory.The duration of this memory is set by the time it takes for the electric current to decay in the superconducting loops which can vary from hundreds of nanoseconds to milliseconds, and likely beyond.

"We could use what we've demonstrated here to solve computational problems, but the scale would be limited," NIST project leader Jeff Shainline said. "Our next goal is to combine this advance in superconducting electronics with semiconductor light sources. That will allow us to achieve communication between many more elements and solve large, consequential problems."

3D Printed Microelectrode Array That Could Revolutionise Brain-Computer Interface



The two most popular kind of BCI devices is the Utah array, developed at the University of Utah (silicone-based array), and the Michigan array (printed on flat, delicate silicone chips). But both the arrays could only record on a two-dimensional plane and were not customizable to meet the needs of each patient and application. Hence, researchers have developed CMU Array- a new type of microelectrode array for brain-computer interface platforms.

CMU Array is customizable and capable to transform how doctors can treat neurological disorders. The team implemented the newest microfabrication technique, Aerosol Jet 3D printing, to fabricate arrays that solved the major design barriers of other brain-computer interface (BCI) arrays. CMU Array is the densest BCI, about one order of magnitude denser than Utah Array BCIs.

"Aerosol Jet 3D printing offered three major advantages," explained Panat, associate professor of mechanical engineering. "Users can customize their MEAs to fit particular needs; the MEAs can work in three dimensions in the brain, and the density of the MEA is increased and therefore more robust."

A-based BCIs connect neurons in the brain with external electronics to monitor or stimulate brain activity. They are often used in applications like neuroprosthetic devices, artificial limbs, and visual implants to transport information from the brain to extremities that have lost functionality. BCIs also have potential applications in treating various neurological diseases. However, conventional devices have limitations such as density issues of microelectrodes. Modern MEA manufacturing techniques have made tremendous advances regarding the density of these microelectrode arrays. Adding the third dimension significantly increases the sampling ability of the arrays. In addition, custom-made MEAs for each specific application allow for more accurate and higher-fidelity readings.

"Within a matter of days, we can now produce a precision medicine device tailored to a patient or experimenter's needs," says Yttri, co-senior author of the study. Technologies like visual cortex stimulation and artificial limb control are used successfully by the public, and being able to personalize the control system in the brain could pave the way for enormous advances in the field.

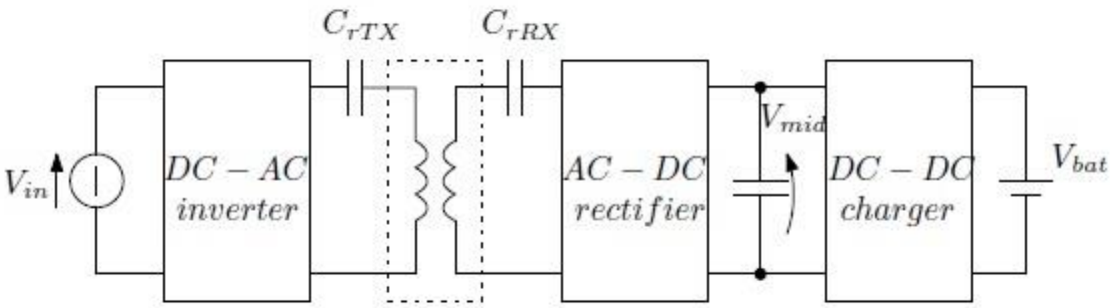
Panat predicts that it may take five years to see human testing, and even longer to see commercial use. The team is excited to get this successful process out to other researchers in the field to begin testing a wide variety of applications.

A Software-Based Approach to Wireless Power Transfer Modeling

Wireless power transfer (WPT) is a process that has been known for quite some time, dating back to the invention of the Tesla coil. Due to some valuable benefits (lack of cables and connectors, as well as high isolation between power transmitter and receiver), this technology plays a relevant role today in applications such as EV charging, phone charging, medical devices, and more.[1,2] Based on the standard or on the inductive coupling process, WPT needs to achieve a high level of efficiency, minimizing the power losses.

This article suggests an innovative software-based approach to the modeling of WPT circuits. By extracting the equivalent circuit for a given positioning of the coils, an accurate estimation of the power losses can be provided. In particular, the model can estimate the type of loss (conduction, eddy current, or core) and where it has originated (TX/RX winding or TX/RX core). Loss analysis is essential for designing the shape and structure of the coils and for predicting which parts of the system will produce more heat during the charge. The software model will represent all power losses as power dissipated by resistors belonging to the modeled circuit. The results of the proposed approach have been validated by comparing the predicted loss with the measurements conducted on a 10-W WPT system, considering both alignment and misalignment condition of the coils. Read the original article here.

The block diagram of a classical WPT system for phone-battery charging is shown in Figure 1. The transmitter includes the DC/AC inverter and the TX coil, whereas the receiver includes the RX coil, the AC/DC rectifier, and other conversion systems for the battery charger. Capacitors C_{rTX} and C_{rRX} maximize the power transfer in the range of the switching frequency by introducing a negative reactance. The intermediate voltage V_{mid} is usually regulated through a low-bandwidth control loop, which wirelessly transmits the feedback signal to the transmitter. This, in turn, can adjust the target voltage by changing the switching frequency or the phase shift of the TX full-bridge. In this circuit, losses are mainly due to the copper and core losses of the TX and RX coils.



The losses present in the circuit of Figure 1 are mainly due to eddy-current copper losses concentrated on the receiver side. In the circuit model of Figure 3, eddy-current losses are represented by resistors. FEM software can predict the losses in different positions, applying the three above-mentioned conditions. For coils, FEM simulation is usually conducted using either Litz wires (which involve high-complexity geometry with a lot of parameters to be considered) or tools like FastHenry[3] (wherein the geometry is approximated by a set of current wires).

In our case, a hybrid approach has been chosen,[4] providing a clear circuit interpretation but also exploiting the flexibility of FEM analysis to accurately represent the geometry. The software can be broken down into three main steps:

1. Geometry generation of the Litz wire. The model of the TX and RX coils is based on the discretization of the Litz wire strand as a single wire coupled with the others with a given resistance.
2. Calculation of the coupling at strand level. After this step, all the coupling calculated allows for creation of a coupling circuit, as shown in Figure 5.
3. Extraction of the electrical model. Using the equivalent circuit of Figure 5, the software calculates the losses P_i‘, P_i”, and P_i”’ referred to in the three-circuit condition previously defined.

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