ALL INDIA SHREE SHIVAJI MEMORIAL SOCIETY'S
INSTITUTE OF INFORMATION TECHNOLOGY
KENNEDY ROAD NEAR R.T.O, PUNE-411001


# TELESCAN 2018

VOLUME 8 SEPTEMBER 2018

## Electronics & Telecommunication department

# EDITORIAL COMMITTEE


We, the Students of Electronics & telecommunications feel the privilege to present the Technical Departmental Magazine of the current Academic year – TELESCAN 2018 in front of you. The magazine provides a platform for the students to express their technical knowledge and enhance their own technical knowledge by

We would like to thank Mrs M.P Sardey(HOD) and Mrs Harshada Magar for their constant support and encouraging us throughout the semester to make the magazine a great hit.

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# VISION OF E&TC DEPARTMENT

To provide quality education in electronics and telecommunication engineering with professional ethics

# MISSION OF E&TC DEPARTMENT

**To Develop technical competency, ethics for professional growth and a sense of social responsibility among students**

# INDEX

# Neural Network

**What is a Neural Network?**

An Artificial Neural Network (ANN) is an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information. The key element of this paradigm is the novel structure of the information processing system. It is composed of a large number of highly interconnected processing elements (neurones) working in unison to solve specific problems. ANNs, like people, learn by example. An ANN is configured for a specific application, such as pattern recognition or data classification, through a learning process. Learning in biological systems involves adjustments to the synaptic connections that exist between the neurones. This is true of ANNs as well.

**Why use neural networks?**

Neural networks, with their remarkable ability to derive meaning from complicated or imprecise data, can be used to extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques. A trained neural network can be thought of as an "expert" in the category of information it has been given to analyse.

**Advantages :**

1. Adaptive learning: An ability to learn how to do tasks based on the data given for training or initial experience.
2. Self-Organisation: An ANN can create its own organisation or representation of the information it receives during learning time.
3. Real Time Operation: ANN computations may be carried out in parallel, and special hardware devices are being designed and manufactured which take advantage of this capability.

4. Fault Tolerance via Redundant Information Coding: Partial destruction of a network leads to the corresponding degradation of performance. However, some network capabilities may be retained even with major network damage.

**- Rajat Suri**
**TE (B)**

# 3-D Metal Printing



While 3-D printing has been around for decades, it has remained largely in the domain of hobbyists and designers producing one-off prototypes. And printing objects with anything other than plastics—in particular, metal—has been expensive and painfully slow.

Now, however, it's becoming cheap and easy enough to be a potentially practical way of manufacturing parts. If widely adopted, it could change the way we mass-produce many products.

## 3-D Metal Printing

- Breakthrough Now printers can make metal objects quickly and cheaply.
- Why It Matters The ability to make large and complex metal objects on demand could transform manufacturing.
- Key Players Markforged, Desktop Metal, GE
- Availability Now

In the short term, manufacturers wouldn't need to maintain large inventories—they could simply print an object, such as a replacement part for an aging car, whenever someone needs it.

***Fig. : Model of 3D Metal Printer***

In the longer term, large factories that mass-produce a limited range of parts might be replaced by smaller ones that make a wider variety, adapting to customers' changing needs.

The technology can create lighter, stronger parts, and complex shapes that aren't possible with conventional metal fabrication methods. It can also provide more precise control of the microstructure of metals. In 2017, researchers from the Lawrence Livermore National Laboratory announced they had

developed a 3-D-printing method for creating stainless-steel parts twice as strong as traditionally made ones.
Also in 2017, 3-D-printing company Markforged, a small startup based outside Boston, released the first 3-D metal printer for under $100,000.

Another Boston-area startup, Desktop Metal, began to ship its first metal prototyping machines in December 2017. It plans to begin selling larger machines, designed for manufacturing, that are 100 times faster than older metal printing methods.



***- Yash Gawade***
***SE (B)***

# Biodegradable, paper-based bio-batteries

For years, there has been excitement in the scientific community about the possibility of paper-based batteries as an eco-friendly alternative. However, the proposed designs were never quite powerful enough, they were difficult to produce and it was questionable whether they were really biodegradable.

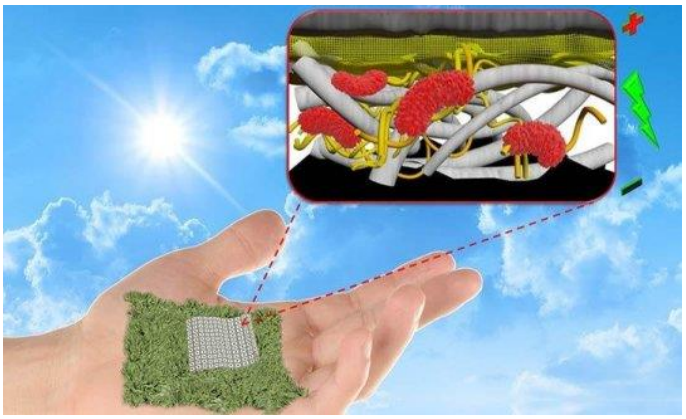


***Fig:Paper-based battery that is more efficient***

This new design solves all of those problems.

Associate Professor Seokheun "Sean" Choi from the Electrical and Computer Engineering Department and Professor OmowunmiSadik from the Chemistry Department worked on the project together. Choi engineered the design of the paper-based battery, while Sadik was able to make the battery a self-sustaining bio-battery.There's been a dramatic increase in electronic waste and this may be an excellent way to start reducing that. This hybrid paper battery exhibited a much higher power-to-cost ratio than all previously reported paper-based microbial batteries.

The bio-battery uses a hybrid of paper and engineered polymers. The polymers -- poly (amic) acid and poly (pyromelliticdianhydride-p-phenylenediamine) -- were the key to giving the batteries biodegrading properties. It was tested by the team that degradation of the battery in water and it clearly biodegraded without the requirements of special facilities, conditions or introduction of other microorganisms.The polymer-paper structures are lightweight, low-cost and flexible. The flexibility also provides another benefit.Power enhancement can be potentially achieved by simply folding or stacking the hybrid, flexible paper-polymer devices.The team said that producing the bio-batteries is a fairly straightforward process and that the material allows for modifications depending on what configuration is needed.

The research paper, titled "Green Bio-batteries: Hybrid Paper-Polymer Microbial Fuel Cells," was published in Advanced Sustainable Systems.

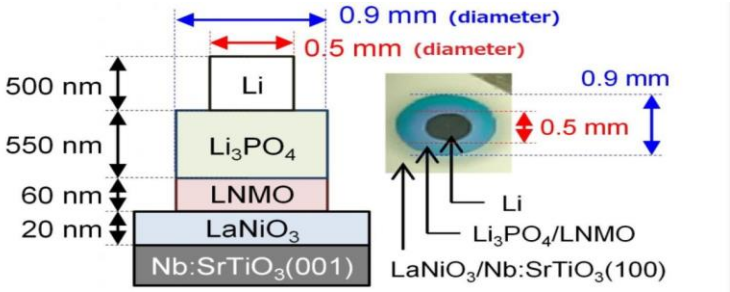
The work was supported by a grant from the National Science Foundation and done through the Center for Research in Advanced Sensing Technologies and Environmental Sustainability (CREATES).

- *Prachi Kolte*

*BE-A*

# Expanding The Limits Of Li-ion Batteries






Scientist at Tokyo Institute of Technology have addressed one of the major disadvantages of all solid state batteries by developing batteries with a low resistance at their electrode/solid electrolyte interface. The fabricated batteries showed excellent electrochemical properties that greatly surpass those of traditional and ubiquitous Li-ion batteries; thereby, demonstrating the promise of all solid state battery technology and its potential to revolutionize portable electronicmany consumers are familiar with rechargeable lithium ion batteries, which have developed over the last few decades and are now common in all sorts of electronic devices. Despite their broad use, scientists and engineers believe that traditional Li-ion battery technology is already nearing its full potential and new types of batteries are neededAll-solid-state batteries are a new type of Li-ion battery, and have been shown to be potentially safer and more stable energy-storing devices with higher energy densities. However, the use of such batteries is limited due to a major disadvantage: their resistance at the electrode/solid electrolyte interface is too high, hindering fast charging and discharging.Scientists from Tokyo Institute of Technology and Tohoku University, led by Professor Taro Hitosugi, fabricated all-solid-state batteries with extremely low interface resistance using $Li(Ni_{0.5}Mn_{1.5})O_4$ (LNMO), by fabricating and measuring their batteries under ultrahigh vacuum conditions, ensuring that the electrolyte/electrode interfaces were free of impurities.

After fabrication, the electrochemical properties of these batteries were characterized to shed light on Li-ion
distribution around the interface. X-ray diffraction and Raman spectroscopy were used for analyzing the crystal structure of the thin films comprising the batteries. Spontaneous migration of Li ions was found to occur from the Li3PO4 layer to the LNMO layer, converting half the LNMO to $L_2NMO$ at the $Li_3PO_4$/LNMO interface. The reverse migration occurs during the initial charging process to reg
The resistance of this interface, verified using electrochemical impedance spectroscopy, was 7.6 Ω $cm^2$, two orders of magnitude smaller than that of previous LMNO-based all-solid-state batteries and even smaller than that of liquid-electrolyte-based Li-ion batteries using LNMO. These batteries also displayed fast charging and discharging, managing to charge/discharge half the battery within just one second.

Moreover, the cyclability of the battery was also excellent, showing no degradation in performance even after 100 charge/discharge cycles.

$Li(Ni_{0.5}Mn_{1.5})O_4$ is a promising material to increase the energy density of a battery, because the material provides a higher voltage. The research team hopes that these results will facilitate the development of high-performance all-solid-state batteries, which could revolutionize modern portable electronic devices and electric cars.



- ***Rushikesh Shinde***
  ***BE(C)***

# Bringing Home Automation to Life with Open Source Technology

Easier consumer access to high-performance computing and wireless technologies means the home automation sector could finally be about to take off. Open source hardware could be critical in this being accomplished - helping engineers to deliver solutions quickly and cost-effectively.


A Market Still in Waiting

Over the course of several generations, automation of the domestic environment has met with a fairly mixed response from homeowners. While appliances, such as washing machines, dishwashers and vacuum cleaners, have been welcomed warmly since their inception, smarter technologies like automatic lighting have received a more tepid reaction. There are several reasons for this. In the past, smart technologies have been relatively expensive and installation has been difficult, usually involving disruptive rewiring. The skills of installers have typically lagged behind the technology, and customer demand has tended to come from small numbers of wealthy homeowners or technophiles.


***Fig.: Sensor***

The situation could change as the prices of smart devices, like sensors and controllers, continue to fall and as suitable wireless technologies have emerged to make extensive rewiring unnecessary. In addition, the advent of almost universal consumer access to the Internet and smartphones greatly simplifies interactions with smart home equipment. With the emergence of digital home assistants, such as Google's Alexa, the home automation market may now be gaining real traction. So far, however, major brands have not succeeded in dominating, and opportunities remain for start-ups to find a successful formula and establish a presence. At the other end of the scale, enthusiast makers and hobbyists have been building their own home automation systems for many years, and are keen to experiment with the latest and best technology now available. Open source ecosystems, such as Arduino, Raspberry Pi, Beagle Board or Udoo, can be effective either in helping business-minded engineers get proof-of-concept models up and running, and from there quickly develop a marketable product, or in empowering enthusiast innovators to fulfil their

ambitions to build ever-more sophisticated systems. Each provides a choice of processor baseboards, covering a broad spectrum of performance and features, with a rich set of optional modules for expanding functionality, as well as accessible I/Os that simplify adding custom circuitry. In addition,

users can benefit from plentiful and easily accessible open source software, and connect with developer communities prepared to share how-to tips on just about any aspect of using the hardware or customizing code.

Occupancy detection is another key aspect of home automation system. PIR sensors have been used for decades in home security systems, and remain an effective means of detecting activity. Unlike the case with an intruder alarm, a home automation system is not challenged to detect individuals who are seeking to hide their presence. Here it is in the occupant's interest to be detected, to help the system manage the home as effectively as possible. On the other hand, the PIR's dependence on movement, to detect presence, is a well-known drawback of this type of device. Moreover, a better, more sensitive means of occupancy detection can allow the possibility to add other features or services to the home automation system, such as the ability to determine if help is needed. The elderly, in particular, could benefit from a system capable of detecting if a person has been stationary for an unusually long period, or may have fallen and is struggling to get up. Microwave-based occupancy detection could offer a solution. Makers have begun exploring its potential, in projects such as the Squirco home automation system published on the Hackaday website. Indeed, following home automation projects on engineering sites/forums provides the opportunity to connect with other makers and share experiences. Additional responses of a home automation system could include opening and closing window blinds automatically as ambient light levels change in the morning or evening, or if the outdoor ambient temperature becomes excessive. A motor-driven actuator can be used to turn the slats of a Venetian blind between open and closed positions. Suitable motor-driver boards are available from manufacturers that are well known to the maker community, such as Adafruit, DFRobot or Maxim Integrated, which simplify the power design challenges associated with driving DC or stepper motors.

***Conclusion :*** A home automation system can contain large numbers of small, low power but smart and feature-rich sensors, as part of a home-wide wireless network. Open source boards provide developers with a choice of ready-to-use, high performing platforms for building such sensors, with easy wireless connectivity already integrated or as turnkey expansion boards. They can help get a prototype up and running quickly, and provide access to the open source community to streamline software development

***Sanmay Kamble***
***TE (B)***

# Introduction to new and trending programing language:Julia

**Julia** is a high-level *general purpose* dynamic programming language. That was originally designed to address the needs of high performance numerical analysis and computational science, without the typical need of separate compilation to be fast, also usable for client and server web use, low-level systems programming or as a specification language.


Now with **Julia 1.0** available, the race is on to unseat R and Python.

From the onset, Julia was designed for a "greedy" purpose.

"We want a language that's open source, with a liberal license. We want the speed of C with the dynamism of Ruby. We want a language that's homoiconic, with true macros like Lisp, but with obvious, familiar mathematical notation like Matlab. We want something as usable for general programming as Python, as easy for statistics as R, as natural for string processing as Perl, as powerful for linear algebra as Matlab, as good at gluing programs together as the shell. Something that is dirt simple to learn yet keeps the most serious hackers happy. We want it interactive, and we want it compiled," said an early note authored by Jeff Bezanson, Stefan Karpinski, Viral Shah, and Alan Edelman.

- Language features
  - A built-in package manager
  - Good performance, approaching that of statically-typed languages like C
  - Dynamic type system: types for documentation, optimization, and dispatch
  - Call C functions directly: no wrappers or special APIs
  - Call Python functions: use the PyCall package
  - Designed for parallel and distributed computing
  - Powerful shell-like abilities to manage other processes

- **Current and future platforms**

  While Julia uses JIT (MCJIT from LLVM) – it still means Julia generates native machine code, directly, before a function is first run (not a bytecode that is run on a virtual machine (VM) or translated as the bytecode is running, as with e.g., Java; the JVM or Dalvik in Android).

  Current support is for 32- and 64-bit x86 processors (all except for ancient *pre-Pentium 4-era*, to optimized for newer), while Julia also supports more, e.g. "fully supports *ARMv8* (AArch64) processors, and supports *ARMv7* and *ARMv6 (AArch32)* with some caveats." Other platforms (other than those mainstream CPUs; or non-mainstream operating systems), have "Community" support, or "External" support (meaning in a package), e.g. for GPUs.

  Julia is now supported in *Raspbian* while support is better for newer (e.g.) *ARMv7* Pis; the Julia support is promoted by the Raspberry Pi Foundation. Support for GNU Hurd is being worked on (in JuliaLang's openlibm dependency project).

- **Should Data Scientists Switch, After Spending Years Learning The Subtle Nuances Of Other Programming Languages?**

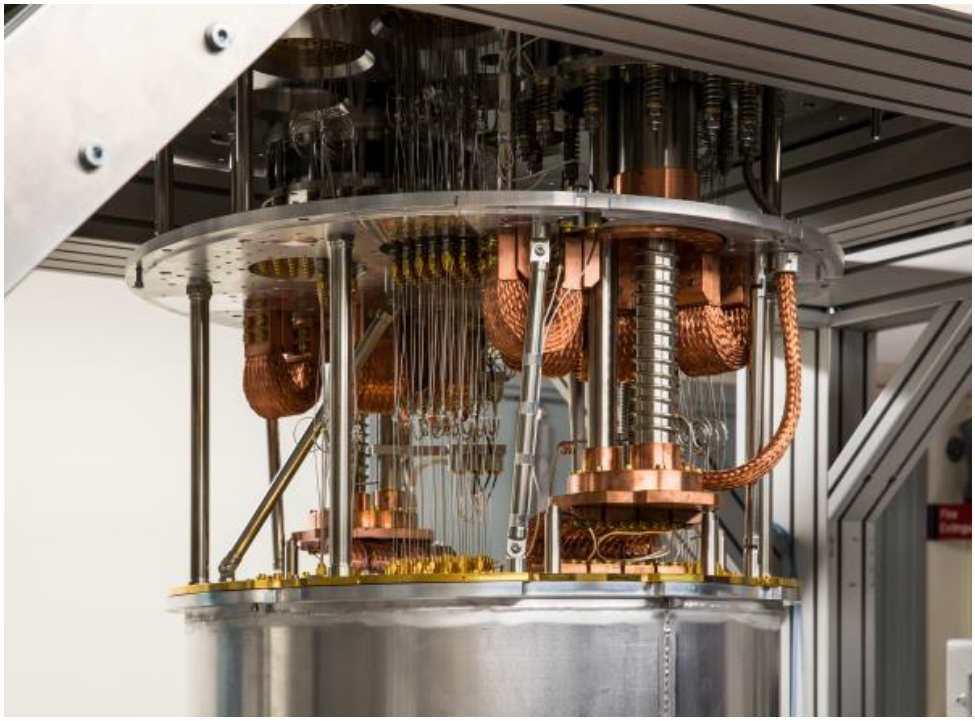
It depends.Julia is still at version 1.0. Other languages have matured and it remains to be seen whether Julia will develop faster to catch up or lag behind.Julia also assumes that processing speeds matter, which is only true for large and sophisticated algorithms.

Many data scientists seldom work with such processing hogging expressions on a daily basis, although this is fast changing as they get involved in AI and complex analytical projects.Community plays a significant role in a programming language's adoption rate.R and Python have a strong following but Julia's community is only starting to grow.

MIT's Julia Lab now supports Julia, and but it will need a bigger community to convince data scientists to switch over.However, Julia is already creating significant inroads.It already made the top 50 list at the TIOBE programming language index – a monumental feat in itself.

- ***GOTE VIPUL DILIP***
***TE (A)***

# Materials' Quantum Leap



The prospect of powerful new quantum computers comes with a puzzle. They'll be capable of feats of computation inconceivable with today's machines, but we haven't yet figured out what we might do with those powers.
Materials' Quantum Leap

- **Breakthrough** IBM has simulated the electronic structure of a small molecule, using a seven-qubit quantum computer.
- **Why It Matters** Understanding molecules in exact detail will allow chemists to design more effective drugs and better materials for generating and distributing energy.
- **Key Players** IBM; Google; Harvard's AlánAspuru-Guzik
- **Availability** 5 to 10 years

One likely and enticing possibility: precisely designing molecules.
Chemists are already dreaming of new proteins for far more effective drugs, novel electrolytes for better batteries, compounds that could turn sunlight directly into a liquid fuel, and much more efficient solar cells.
We don't have these things because molecules are ridiculously hard to model on a classical computer. Try simulating the behavior of the electrons in even a relatively simple molecule and you run into complexities far beyond the capabilities of today's computers.

But it’s a natural problem for quantum computers, which instead of digital bits representing 1s and 0s use “qubits” that are themselves quantum systems. Recently, IBM researchers used a quantum computer with seven qubits to model a small molecule made of three atoms.
It should become possible to accurately simulate far larger and more interesting molecules as scientists build machines with more qubits and, just as important, better quantum algorithms.

- ***Vaibhav Kolekar***
***SE ( B)***

# MICROELECTRONICS IN SPACE

With approximately 1,500 active satellites orbiting Earth, most of them carry highly sophisticated microelectronics that support communication and enable research that was scarcely imaginable a generation ago.

Telecom satellites keep people around the world continuously in touch and informed, research satellites monitor global weather, while other missions provide scientists with information on the earth's magnetic field and geomagnetic storms.

Europe's Copernicus environmental programme, which began 20 years ago, manages seven Sentinel satellites that deliver terabytes of data every day. It is the world's biggest provider of Earth observation data, and that data is offered free to anyone, anywhere.

In fact, Geneviève Fioraso, the former French minister for higher education and research, speaking at Leti Innovation Days in July, said that 54 percent of the data that scientists use to evaluate climate change comes directly from space.

But with extended space missions comes the requirement for flawless performance by on-board equipment over a period of years, in a very harsh environment.

Leti has been designing components and measurement tools, for many years, which have underpinned several European space programmes and provided both emerging and mature technologies for space missions.

Emerging technologies may be born in research-and-teaching (R&T) projects prior to their selection for new missions. For example, the vector mode of magnetometers launched in the Swarm magnetic-field mission were the subject of a PhD theses and R&T programme before they were selected for that mission.

***- Rajat Suri***
***TE (B)***

# GEFORCE RTX™ GRAPHICS


NVIDIA Corp released a new generation of gaming chips(RTX Graphic cards) with combination of latest "real-time Ray Tracing, artificial intelligence and programmable shading, the new NVIDIA Turing™ GPU architecture and revolutionary RTX platform which delivers ultimate PC Gaming experience.

At a Gamescom 2018 press conference in cologne, Germany, NVIDIA rolled out its newest generation of gaming chips named RTX 2070, RTX 2080, RTX 2080 Ti.

These cards are powered by Turing and all new RTX platform. these cards provides 6 times more performance than previous-generation graphic cards and brings the power of AI to games.

"Turing opens up a new golden age of gaming, with realism only possible with ray tracing, which most people thought was still a decade away," said Jensen Huang, founder and CEO of NVIDIA, Speaking in conference at gamescom, world's largest gaming expo. "The breakthrough is a hybrid rendering model that boosts today's computer graphics with the addition of lightning fast ray-tracing acceleration and AI. RTX is going to define a new look for computer graphics. Once you see an RTX game, you can't go back."

You can PRE-ORDER for these cards with limit 2 cards per customer, the cards will be ship on or around 27th September while RTX 2070 will be available in October.

NVIDIA GEFORCE RTX 2080 Ti Founders Edition is available Rs 1,02,500 while RTX 2080 Founders Edition and RTX 2070 Founders Edition costs Rs 68,500 and Rs 51,200 respectively in India.

| GeForce GPU | Ray Tracing | Performance* | Memory | Founders Edition |
|---|---|---|---|---|
| RTX 2080 Ti | 10 GigaRays/sec | 78T RTX-OPS | 11 GB | Rs 1,02,500 |
| RTX 2080 | 8 GigaRays/sec | 60T RTX-OPS | 8 GB | Rs 68,600 |
| RTX 2070 | 6 GigaRays/sec | 45T RTX-OPS | 8 GB | Rs 51,200 |

*Equivalent aggregate math operations contributed by the Turing Shaders, CUDA Cores, Tensor Cores, and RT Cores needed to render RTX graphics. Result applies to Founders Edition Version.

# ADDITIONAL FEATURES AND BENEFITS

**GAME READY DRIVERS :** get the highest level of performance, and the smoothest experience possible, from the moment you start playing.
**NVIDIA SHADOWPLAY :** record and share high quality game play videos, screenshots and live streams with your friends.
**NVIDIA ANSEL :** Turn your screenshots into an art with this powerful in-game photo mode that captures 360, HDR and Super-resolution Photos.
**VIRTUAL REALITY :** By combining advanced VR rendering, real-time ray tracing and AI, the GeForce RTX will take VR to a new level of realism.
**NVIDIA G-SYNC AND HDR :** Get smooth, tear free game play at refresh rate up to 240 Hz, Plus HDR and many more. This is the ultimate gaming display and the go-to equipment for enthusiast gamers.
**DIRECTX 12 :** power new visual effects and rendering techniques for more lifelike gaming.
**4K :** step up to the ultimate 4K gaming experience with the GeForce RTX and enjoy today's biggest games in amazing details.

***- Pratik Ingle***
***BE - C***

# MOVING CLOSER TO COMPLETELY OPTICAL ARTIFICIAL NEURAL NETWORK

Researchers have shown that it is possible to train artificial neural networks directly on an optical chip. The significant breakthrough demonstrates that an optical circuit can perform a critical function of an electronics-based artificial neural network and could lead to less expensive, faster and more energy efficient ways to perform complex tasks such as speech or image recognition.

"Using an optical chip to perform neural network computations more efficiently than is possible with digital computers could allow more complex problems to be solved," said research team leader Shanhui Fan of Stanford University. "This would enhance the capability of artificial neural networks to perform tasks required for self-driving cars or to formulate an appropriate response to a spoken question, for example. It could also improve our lives in ways we can't imagine now."

An artificial neural network is a type of artificial intelligence that uses connected units to process information in a manner similar to the way the brain processes information. Using these networks to perform a complex task, for instance voice recognition, requires the critical step of training the algorithms to categorize inputs, such as different words.

**A light-based network**

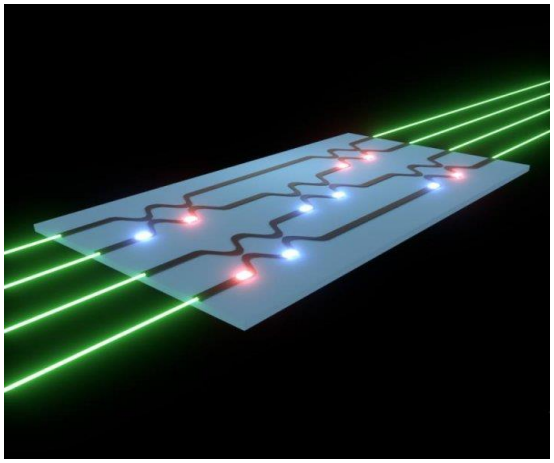
Although neural network processing is typically performed using a traditional computer, there are significant efforts to design hardware optimized specifically for neural network computing. Optics-based devices are of great interest because they can perform computations in parallel while using less energy than electronic devices. "Our method not only helps predict which direction to turn the knobs but also how much you should turn each knob to get you closer to the desired performance," said Hughes. "Our approach speeds up training significantly, especially for large networks, because we get information about each knob in parallel."

**On-chip training**

The new training protocol operates on optical circuits with tunable beam splitters that are adjusted by changing the settings of optical phase shifters. Laser beams encoding information to be processed are fired into the optical circuit and carried by optical waveguides through the beam splitters, which are adjusted like knobs to train the neural network algorithms. In the new training protocol, the laser is first fed through the optical circuit. Upon exiting the device, the difference from the expected outcome is calculated. This information is then used to generate a new light signal, which is sent back through the optical network in the opposite direction.

By measuring the optical intensity around each beam splitter during this process, the researchers showed how to detect, in parallel, how the neural network performance will change with respect to each beam splitter's setting.

The phase shifter settings can be changed based on this information, and the process may be repeated until the neural network produces the desired outcome. The researchers tested their training technique with optical simulations by teaching an algorithm to perform complicated functions, such as picking out complex features within a set of points. They found that the optical implementation performed similarly to a conventional computer.



Researchers have shown a neural network can be trained using an optical circuit (blue rectangle in the illustration). In the full network there would be several of these linked together. The laser inputs (green) encode information that is carried through the chip by optical waveguides (black). The chip performs operations crucial to the artificial neural network using tunable beam splitters, which are represented by the curved sections in the waveguides. These sections couple two adjacent waveguides together and are tuned by adjusting the settings of optical phase shifters (red and blue glowing objects), which act like 'knobs' that can be adjusted during training to perform a given task.

***- Ninad Jagtap***
***BE (C)***

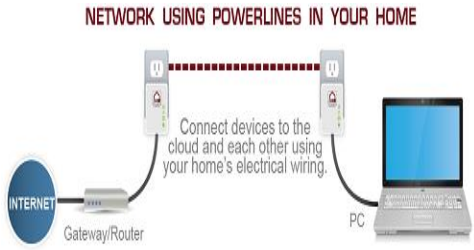
# POWERLINE ADAPTERS

**Have you anytime face problem with WIFI for Low Network Available?**

Powerline Adapters are solution to it.

**What are powerline adapters?**

As the Wi Fi range is up to few kms, and due to walls, it is not possible to have a range in every corner of house or an office. To draw a bunch of wires is a messy work and costly. But powerlines adapter is a plug like structure with electronic circuit which will be using installed electricity wire, that is the wire which carry 230V / 50hz. The internet will be get available on these 230v wire which are installed and available in every room of house. No need to rewire the cables.




**Working Principle:**

Sending signals across a home's electrical wiring isn't a 21st century idea. In fact, the power companies have been sending control signals over the mains since the 1920s − it's how electricity meters know when to switch to an off-peak rate. The electrical wiring in the average home can support a variety of frequencies. As electricity uses 50/60Hz signals, extra data can be transported along the same wiring at much higher frequencies, without causing any interference. Powerline Adapter were known as HomePlug 1.0 which is an IEEE 1901 its speed was 14 Mbps. HomePlug's IEEE 1901 format is also part of a converged IEEE 1905 standard that embraces 802.11 wireless networking, IEEE 802.3 Ethernet connectivity and Multimedia over Coax. This will further ensure home networking compatibility when you mix wireless and wired technologies together.

**Types:**

Wired → 230V AC Cable → Wireless

Wireless → 230V AC Cable → Wired

Wireless → 230V AC Cable → Wireless

Wired → 230V AC Cable → Wired

**Advantage:**

1) Cost Effective
2) Reduce Cable

3) Increases number Device Connection
4) Separate security conditioning for each room
5) No need of new connection

**Disadvantages:**

1) Surge protectors can block internet signals, as it high frequency and noise for surge protectors (Inverters, SMPS, UPS, etc)
2) Connection can be available in complete circuit, so it is possibility the internet used for free by neighbour in same connection.

**Top Brands:**

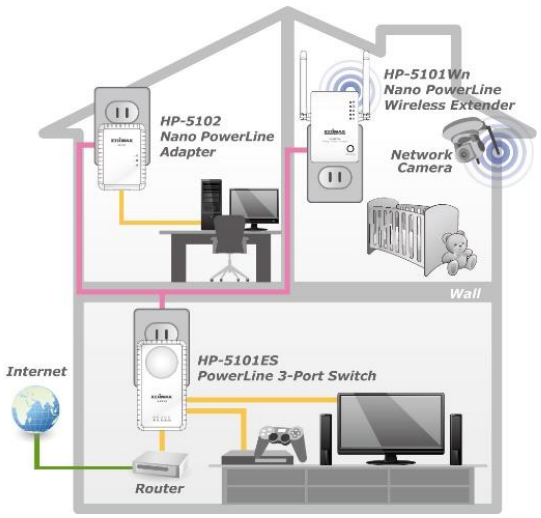
1) Xiaomi
2) Vodafone
3) TP-Link

**Price Range: -**

INR 2500 – INR 15000

**Installation Process:**

It a simple device which is plug & play. But it requires a pair of adapter which is required for encode & decode at socket 1 & socket 2 respectively. Install & enjoy internet at every room.




https://www.edimax.com/edimax/mw/cufiles/images/productimage/homeplug/overview/HP-5102-Diagram.jpg

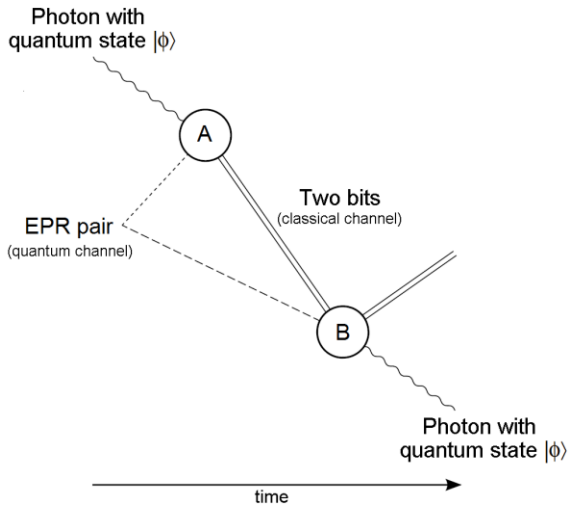
**Ref:**

1) https://geekmom.com/2018/06/how-powerline-adapters-could-banish-your-wi-fi-woes/
2) https://www.techradar.com/news/networking/powerline-networking-what-you-need-to-know-930691

- **Shaikh Ahmed Parvez**
**(TE B)**

# QUANTUM TELEPORTATION

Quantum teleportation is a process by which quantuminformation (e.g. the exact state of an atom or photon) can be transmitted (exactly, in principle) from one location to another, with the help of classical communication and previously shared quantum entanglement between the sending and receiving location.



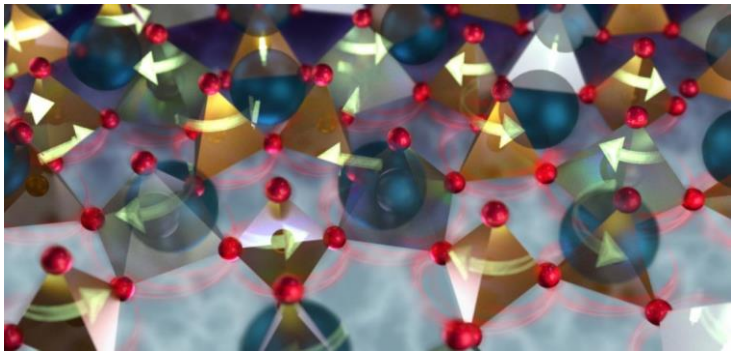

The procedure works as follows:

1. Create a pair of quantum entangled particles in a known state, such as one of the "Bell states."
2. Move one of entangled particles to near the particle whose state we would like to copy (the "orignal"), and the other entangled particle to near the particle on which we would like to copy the state (the "copy").
3. Perform a set of combined measurements on original and the nearby entangled particles. This destroys the original state, but information about the quantum state of the original has been copied onto the other entangled state.

***- Rajat Suri***
***TE (B)***

# SUPERSONIC WAVES MAY HELP ELECTRONICS BEAT THE HEAT

Researchers at the Department of Energy's Oak Ridge National Laboratory made the first observations of waves of atomic rearrangements, known as phasons, propagating supersonically through a vibrating crystal lattice -- a discovery that may dramatically improve heat transport in insulators and enable new strategies for heat management in future electronics devices."The discovery gives you a different way to control the flow of heat," said lead author Michael Manley of the paper published in *Nature Communications*. "It provides a shortcut through the material -- a way to send the energy of pure atomic motion at a speed that's higher than you can with phonons [atomic vibrations]. This shortcut may open possibilities in heat management of nanoscale materials. Imagine the possibility of a thermal circuit breaker, for example."The scientists used neutron scattering to measure phasons with velocities about 2.8 times and about 4.3 times faster than the natural "speed limits" of longitudinal and transverse acoustic waves, respectively. "We didn't expect them to be going that fast without [fading]," Manley said.Insulators are necessary in electronic devices to prevent short circuits; but without free electrons, thermal transport is limited to the energy of atomic motion. Hence, understanding the transport of heat by atomic motion in insulators is important.The researchers scattered neutrons in fresnoite, a crystalline mineral so named because it was first found in Fresno, California. It is promising for sensor applications through its piezoelectric property, which allows it to turn mechanical stress into electrical fields.Fresnoite has a flexible framework structure that develops a competing order in the structure that does not match the underlying crystal order, like an overlay of mismatched tiles. Phasons are excitations associated with atomic rearrangements in the crystal that change the phase of waves describing the mismatch in the structure.



Phase differences accumulate in a lattice of wrinkles -- called solitons. Solitons are solitary waves that propagate with little loss of energy and retain their shape. They can also warp the local environment in a way that allows them to travel faster than sound.

"The soliton is a very deformed region in the crystal where the displacements of the atoms are large and the force-displacement relationship is no longer linear," Manley said. "The material stiffness is locally enhanced within the soliton, leading to a faster energy transfer."

Raffi Sahul of Meggitt Sensing Systems of Irvine, California, grew a single crystal of fresnoite and sent it to ORNL for neutron scattering experiments that Manley conceived to characterize how energy moved through the crystal. "Neutrons are the best way to study this because their wavelengths and energies are in a sense matched to the atomic vibrations," Manley said.

Manley performed measurements with Paul Stonaha, Doug Abernathy and John Budai using time-of-flight neutron scattering at the Spallation Neutron Source, and with Stonaha, Songxue Chi, and Raphael Hermann using triple-axis neutron scattering at the High Flux Isotope Reactor.

At SNS, the scientists started with a pulsed source of neutrons of different energies and used the ARCS instrument, which selects neutrons in a narrow energy range and scatters them off a sample so detectors can map the energy and momentum transfer over a wide range.

"The large measurement area was important to this study because the features weren't where you would normally expect them to be," said Abernathy. "This gives the neutron measurements a great chance to determine the velocities of the propagating phasons, calculated from the slope of their dispersion curves."

Dispersion is the relationship between the wavelength and the energy that characterizes a propagating wave.

"Once the SNS measurements told us where to look, we used triple-axis spectrometry at HFIR, which provided a constant flux of neutrons, to focus on that one point," Manley said. "A unique thing about Oak Ridge National Laboratory is that we have both a world-class spallation source and a world-class reactor source for neutron research. We can go back and forth between facilities and really get a comprehensive view of things."

Next the researchers will explore other crystals that, like fresnoite, can rotate phasons. Strain applied with an electric field may be able to change the rotation. Changes in temperature may vary properties too.

***Manasi Nirhali***
***BE (A)***

# DiGiSENSE

( A connected vehicle technology solution
for small commercial vehicles)

## Mahindra brings in a cloud-based technology platform DiGiSENSE in Arjun Novo

Mahindra & Mahindra Ltd. has introduced DiGiSENSE, a revolutionary connected vehicle technology solution in its leading tractor brand, Arjun Novo. DiGiSENSE technology will be available in the 57HP – 605DI-i Arjun Novo. Mahindra is the first OEM in India to offer a cloud-based technology platform in the tractor category.

DiGiSENSE will empower tractor owners to access vital information about their tractors remotely, on a real time basis. This technology will benefit farmers significantly to improve their efficiency and productivity, enhancing their earning potential.

Digitization is emerging as a key differentiator to increase productivity and the connected vehicles technology is one such manifestation. DiGiSENSE is a technology platform which is multi-application and multi-product enabled. This unique technology connects the owner to his tractor and enables him to control its usage and prevent misuse. It is a smart application that informs customers 24X7 about the performance and location of their tractors. Farmers can now avail of live tractor tracking, while remote diagnostics and reports will enable them to monitor the tractor's health and productivity parameters.

DiGiSENSE is a technology platform enabled by a Telematics device. Data is sent from the device to the Mahindra server via mobile network. The same data is processed and sent back to the customer on his mobile app and web-application on laptop/computer in real time, thereby allowing the customer to access important information and benefit from it. The DiGiSENSE technology will enable the following:

- Geo fencing & live tractor tracking: Farmers can now secure their tractors in the area defined by them on Google maps. The Farmer will receive an alert when the tractor drives out of the fenced area and he will also receive an alert when the tractor drives inside the fenced area. This is similar to having a virtual tractor lock.

- Alerts: These are SMS notifications about critical parameters of tractors which allows customers to monitor and take corrective actions in situations such as Low fuel alert, Battery not charging, Clutch override, High engine temperature, Air filter clog and High Engine rpm alert

- Reports: This allows customers to access online and real time reports through the website on their laptop/computer about the usage of engine rpm on an hourly basis as well as other vital information on the vehicle usage and alerts.

***Mrs S. Ahire***
***( Assistant Professor)***

# Android 9 Pie

Android "Pie" is the ninth major update and the 16th version of the Android operating system. Android "P" was officially released on August 6, 2018 as "Android 9 Pie" and is available for Google Pixel devices and the Essential Phone. Google announced it will release Android 9 Pie, the lite version of Android Pie, in the autumn.


**FEATURES**

- New user interface for the quick settings menu.
- The clock has moved to the left of the notification bar.
- Battery saver no longer shows an orange overlay on the notification and status bars.
- A "Screenshot" button has been added to the power options.
- Rounded corners across the graphical user interface.
- New transitions for switching between apps, or activities within apps.
- Richer messaging notifications, where a full conversation can be had within a notification, full scale images, and smart replies akin to Google's new app.
- Support for display cutouts.
- Redesigned volume slider, which is now located next to the device's physical volume button.
- Battery percentage now shown in Always-On Display.

- Experimental features (which are currently hidden within a menu called Feature Flags) such as a redesigned About Phone page in settings, and automatic Bluetooth enabling while driving.
- HEIF support.
- A new gesture-based system interface, similar to the one found on the iPhone X and other devices.
- Redesigned, horizontal multitask app switcher with Google search bar and app drawer built in.
- A "Digital Wellbeing" feature which discourages excessive usage of your phone which will launch officially on Pixel phones this fall.
- A "Shush" feature launches Do Not Disturb mode when the phone is placed face down, only allowing notifications from Starred Contacts.
- An adaptive battery feature that maximizes battery power by prioritizing the apps you're most likely to use next.
- Improved adaptive brightness feature which modifies screen brightness based on personal preferences.
- New back button icon in navigation bar if gesture navigation is enabled.
- Manual theme selection.
- Rotation Lock button indicates in navigation bar if the device is in locked rotation mode.

Android P Developer Preview 1 home screen with Pixel Launcher on the Google Pixel 2

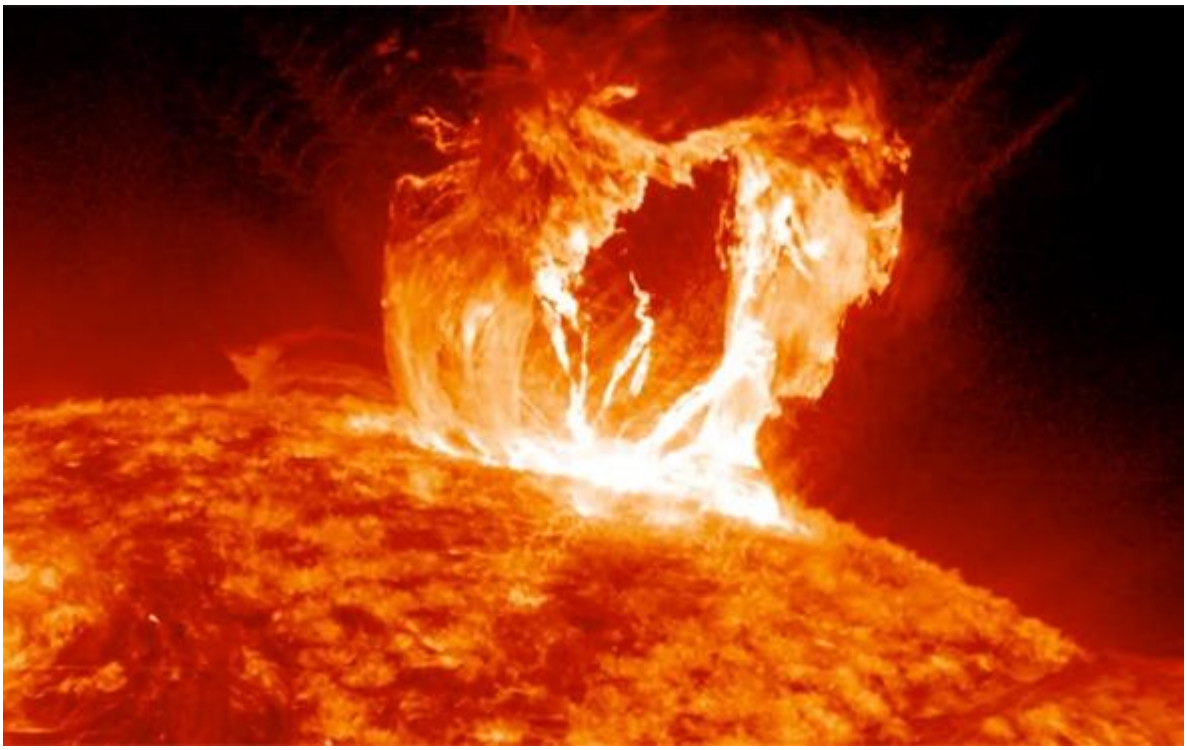
**SECURITY**

- A new "Lockdown" mode which disables biometric authentication once activated, which will be disabled once the user used their password to login.

***MOTE MAHESH BABU***
***(TE-A)***

**SOURCE**: http://www.android.com

# Why fringes of the Sun’s atmosphere hotter than the surface?



The sun's surface is blisteringly hot at 10,340 degrees Fahrenheit -- but its atmosphere is another 300 times hotter. This has led to an enduring mystery for those who study the sun: What heats the atmosphere to such extreme temperatures? Normally when you move away from a hot source the environment gets cooler, but some mechanism is clearly at work in the solar atmosphere, the corona, to bring the temperatures up so high.

Jim Klimchuk, a solar scientist at NASA's Goddard Space Flight Center in Greenbelt, Maryland, explained that the new evidence supports a theory that the sun's corona is heated by tiny explosions called nanoflares. These are impulsive heating bursts that individually reach incredibly hot temperatures of some 10 million Kelvins or 18 million degrees

Fahrenheit – even greater than the average temperature of the corona – and provide heat to the atmosphere.

The research evidence presented by the panel spotted this super hot solar material, called plasma, representative of a nanoflare."The explosions are called nanoflares because they have one-billionth the energy of a regular flare". "

Despite being tiny by solar standards, each packs the wallop of a 10 megaton hydrogen bomb. Millions of them are going off every second across the sun, and collectively they heat the corona."

***- Ms. Shobha S. Niakm***
***Asst. Prof., Dept. of E&TC Engineering***