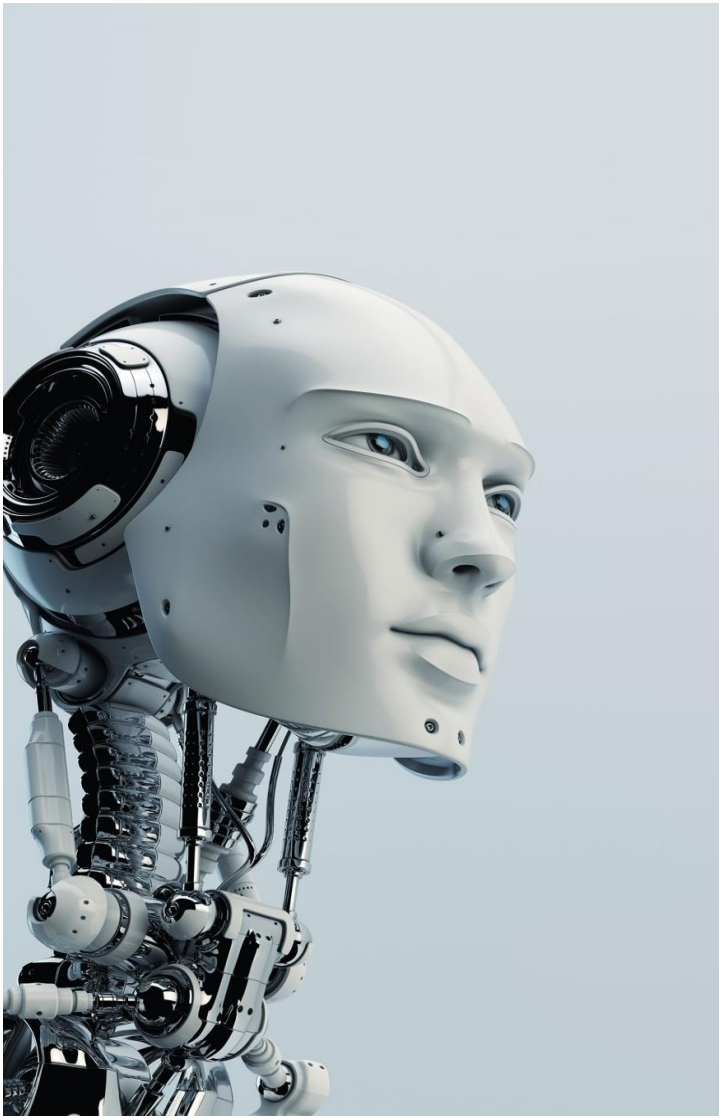
The Zenith

January 01, 2019

Volume 2, Issue 1



Contents:

USB communication in CNC Environment (2)

New technique allows analysis of clouds around exoplanets (3)

Life of AI (4)

Wi-Fi signals to Electricity (5)

Two day's workshop on "latest Trends in Biomedical Instrumentation" (9)

Training/ Workshop/ seminar done by staff (10)

Using USB Communication and FAT32 File System in CNC Environment

Computer Numeric Control (CNC) is specialized form of soft automation and it has wide range of various applications. End to end product design is highly automated using Digital Signal Controllers in the modern CNC systems. The problem with the existing system is that Personal Computer system needs to connect to the CNC system as communication takes place through the RS232 protocol. RS232 communication is a low speed communication, so using it for time critical tasks is very inefficient. RS232 communication can be replaced by USB communication in CNC environment and can increase the speed from 115.2 Kbps to 12 Mbps.

The USB interface eases the task of installation with plug and play operations. Our experiment is concentrated on designing the USB 2.0 based FAT32 file management system (instead of NTFS file system) for CNC machines using the dual core Digital Signal Controller TMS320F28377D. This controller supports high end real time applications and helps to reduce the tool processing time in CNC systems. One of the advantages of this experimental work is that system will not require any external memory interface as USB flash drive itself is a memory. If memory of processor is insufficient for system then virtual memory of the device can be used. Better scheduling algorithm of this experiment ensures Quality of Service to support real-time requirements. Isochronous transfer provides guaranteed bus access, constant data rate and are characterized by timely delivery of data.

Ms. Nisha Gosavi , Junior Research Fellow (KKWIEER, Nashik).

New technique allows analysis of clouds around exoplanets

Meteorologists sometimes struggle to accurately predict the weather here on Earth, but now we can find out how cloudy it is on planets outside our solar system, thanks to researchers at MIT.

In a paper to be published in the Astrophysical Journal, researchers in the Department of Earth, Atmospheric, and Planetary Sciences (EAPS) at MIT describe a technique that analyzes data from NASA's Kepler space observatory to determine the types of clouds on planets that orbit other stars, known as exoplanets.

The team, led by Kerri Cahoy, an assistant professor of aeronautics and astronautics at MIT, has already used the method to determine the properties of clouds on the exoplanet Kepler-7b. The planet is known as a "hot Jupiter," as temperatures in its atmosphere hover at around 1,700 kelvins. NASA's Kepler spacecraft was designed to search for Earth-like planets orbiting other stars. It was pointed at a fixed patch of space, constantly monitoring the brightness of 145,000 stars. An orbiting exoplanet crossing in front of one of these stars causes a temporary dimming of this brightness, allowing researchers to detect its presence.

Researchers have previously shown that by studying the variations in the amount of light coming from these star systems as a planet transits, or crosses in front or behind them, they can detect the presence of clouds in that planet's atmosphere. That is because particles within the clouds will scatter different wavelengths of light.

Modeling cloud formation

To find out if this data could be used to determine the composition of these clouds, the MIT researchers studied the light signal from Kepler-7b. They used models of the temperature and pressure of the planet's atmosphere to determine how different types of clouds would form within it, says lead author Matthew Webber, a graduate student in Cahoy's group at MIT.

"We then used those cloud models to determine how light would reflect off the atmosphere of the planet [for each type of cloud], and tried to match these possibilities to the actual observations from the Kepler mission itself," Webber says. "So we ran a large set of models, to see which models fit best statistically to the observations."

By working backward in this way, they were able to match the Kepler spacecraft data to a type of cloud made out of vaporized silicates and magnesium. The extremely high temperatures in the Kepler-7b atmosphere mean that some minerals that commonly exist as rocks on Earth's surface instead exist as

vapors high up in the planet's atmosphere. These mineral vapors form small cloud particles as they cool and condense.

Kepler-7b is a tidally locked planet, meaning it always shows the same face to its star — just as the moon does to Earth. As a result, around half of the planet's day side — that which constantly faces the star — is covered by these magnesium silicate clouds, the team found. "We are really doing nothing more complicated than putting a telescope into space and staring at a star with a camera," Cahoy says. "Then we can use what we know about the universe, in terms of temperatures and pressures, how things mix, how they stratify in an atmosphere, to try to figure out what mix of things would be causing the observations that we're seeing from these very basic instruments," she says.

Helen Knight | MIT News correspondent

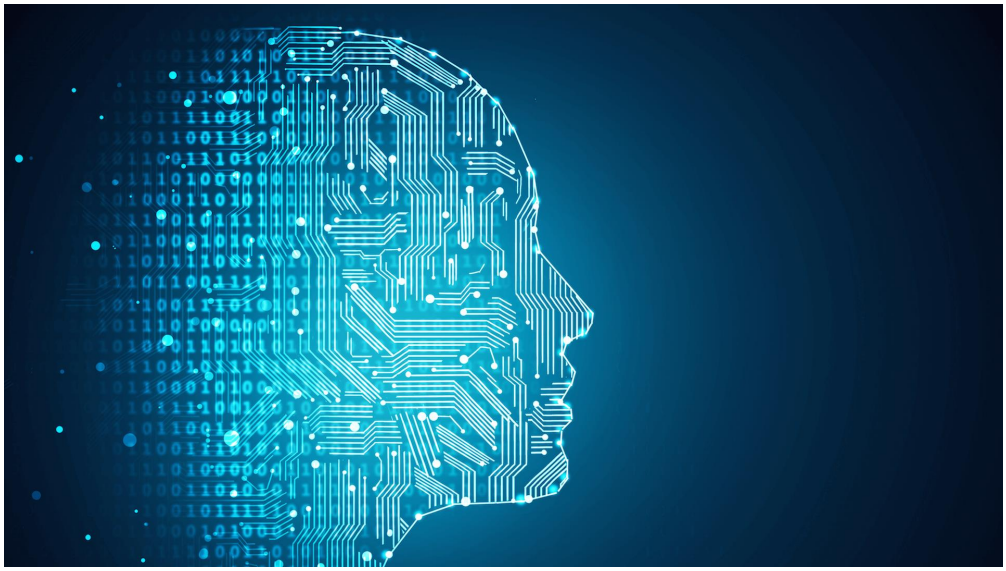
Life of AI

Asking Google for nearest cafeteria, commanding Alexa for latest soundtrack or ask siri to call someone now it is no longer wonder to talk with machine's. But how it can be possible to make machine think same way as any living being can. Artificial intelligence is the answer of all questions you would want to ask about latest technology Advancement's It will be no longer fictional think to be talk with someone name Jarvis and feel like being iron man .

The technology is simply made to give machines some level of independent thought processing capabilities with the help of that they can obey command as well as assist the human. The term artificial intelligence first coined by John McCarthy a computer scientist in 1956 when he held the first Academic conference on AI. From last one decade the need of AI increase resulting lot of companies in the market of AI take off with great products. Whether you want to listen news or want to watch your favorite TV show the device contain some control to sort out your favorite shows and can give you remainders also. The purpose of making human life more and more comfortable with use of latest technology is possible in much extent with AI.

The coordination of hardware with software is what makes certain system work smartly. After adding Artificial Intelligence the same system can be upgrade to work autonomously. Practically if you take a complex problem and allot it to machine for completion surely machine fails to do it as machine has inadequate information about how to solve that complex problem but if you allot a small part of that complex system to be work on with sufficient information then task can be done and with such group of tasks the entire problem can also complete with efficient and fast way. Artificial intelligence work on similar fashion as it breaks down task and algorithms and for each part different algorithms can used to reach a decision. From past results and experience the system continuously generates new algorithm

for advancement. The uses of this technology are not just limited to household luxuries they are widely used in Industrial purpose. Many large scale production industries prefer bots for arranging goods ,during manufacturing , packaging and even designing also .

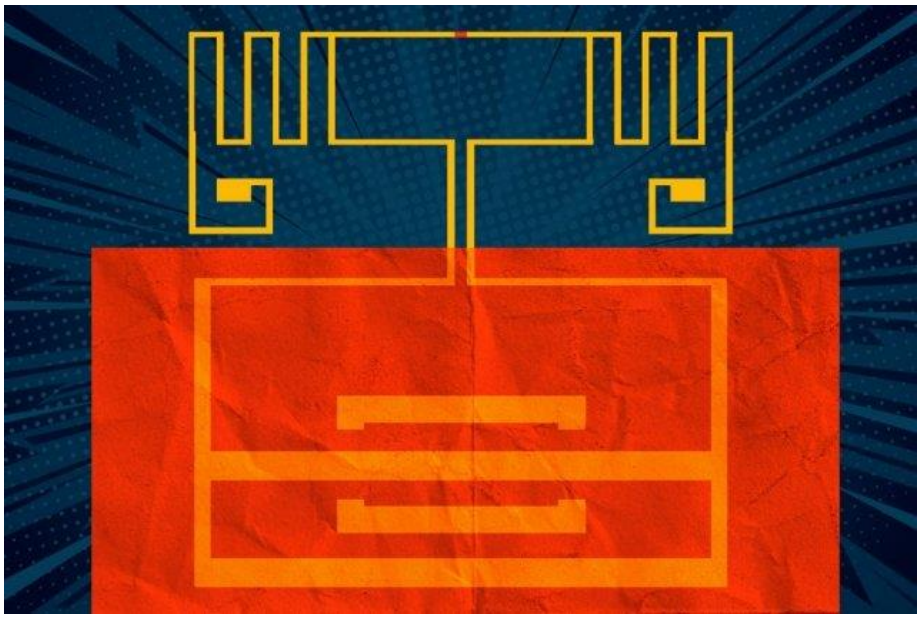


On one hand AI make production cheaper and faster and others hand it causes unemployment as automation widely target job that need large human efforts. The main motto of AI should be helping human and makes things easy and solve problems that seems nearly impossible for human. The advancement should not see as Human vs Robot; it should be taken as humans and Robots vs problems.

Aniket Govardhan (E&TC)
KKWIEER, Nashik

Converting Wi-Fi signals to electricity with new 2D materials

“Imagine a world where smartphones, laptops, wearables, and other electronics are powered without batteries. Researchers from MIT and elsewhere have taken a step in that direction, with the first fully flexible device that can convert energy from Wi-Fi signals into electricity that could power electronics.”



Researchers from MIT and elsewhere have designed the first fully flexible, battery-free "rectenna" -- a device that converts energy from Wi-Fi signals into electricity -- that could be used to power flexible and wearable electronics, medical devices, and sensors for the "internet of things."
Credit: Christine Daniloff

Devices that convert AC electromagnetic waves into DC electricity are known as "rectennas." The researchers demonstrate a new kind of rectenna, described in a study appearing in *Nature*, that uses a flexible radio-frequency (RF) antenna that captures electromagnetic waves -- including those carrying Wi-Fi -- as AC waveforms.

The antenna is then connected to a novel device made out of a two-dimensional semiconductor just a few atoms thick. The AC signal travels into the semiconductor, which converts it into a DC voltage that could be used to power electronic circuits or recharge batteries.

In this way, the battery-free device passively captures and transforms ubiquitous Wi-Fi signals into useful DC power. Moreover, the device is flexible and can be fabricated in a roll-to-roll process to cover very large areas.

"What if we could develop electronic systems that we wrap around a bridge or cover an entire highway, or the walls of our office and bring electronic intelligence to everything around us? How do you provide energy for those electronics?" says paper co-author Tomás Palacios, a professor in the Department of Electrical Engineering and Computer Science and director of the MIT/MTL Center for Graphene Devices and 2D Systems in the Microsystems Technology Laboratories. "We have come up with a new

way to power the electronics systems of the future -- by harvesting Wi-Fi energy in a way that's easily integrated in large areas -- to bring intelligence to every object around us."

Promising early applications for the proposed rectenna include powering flexible and wearable electronics, medical devices, and sensors for the "internet of things." Flexible smartphones, for instance, are a hot new market for major tech firms. In experiments, the researchers' device can produce about 40 microwatts of power when exposed to the typical power levels of Wi-Fi signals (around 150 microwatts). That's more than enough power to light up a simple mobile display or silicon chips.

Another possible application is powering the data communications of implantable medical devices, says co-author Jesús Grajal, a researcher at the Technical University of Madrid. For example, researchers are beginning to develop pills that can be swallowed by patients and stream health data back to a computer for diagnostics.

"Ideally you don't want to use batteries to power these systems, because if they leak lithium, the patient could die," Grajal says. "It is much better to harvest energy from the environment to power up these small labs inside the body and communicate data to external computers."

All rectennas rely on a component known as a "rectifier," which converts the AC input signal into DC power. Traditional rectennas use either silicon or gallium arsenide for the rectifier. These materials can cover the Wi-Fi band, but they are rigid. And, although using these materials to fabricate small devices is relatively inexpensive, using them to cover vast areas, such as the surfaces of buildings and walls, would be cost-prohibitive. Researchers have been trying to fix these problems for a long time. But the few flexible rectennas reported so far operate at low frequencies and can't capture and convert signals in gigahertz frequencies, where most of the relevant cell phone and Wi-Fi signals are.

To build their rectifier, the researchers used a novel 2-D material called molybdenum disulfide (MoS_2), which at three atoms thick is one of the thinnest semiconductors in the world. In doing so, the team leveraged a singular behavior of MoS_2: When exposed to certain chemicals, the material's atoms rearrange in a way that acts like a switch, forcing a phase transition from a semiconductor to a metallic material. This structure is known as a Schottky diode, which is the junction of a semiconductor with a metal.

"By engineering MoS_2 into a 2-D semiconducting-metallic phase junction, we built an atomically thin, ultrafast Schottky diode that simultaneously minimizes the series resistance and parasitic capacitance," says first author and EECS postdoc Xu Zhang, who will soon join Carnegie Mellon University as an assistant professor.

Parasitic capacitance is an unavoidable situation in electronics where certain materials store a little electrical charge, which slows down the circuit. Lower capacitance, therefore, means increased rectifier speeds and higher operating frequencies. The parasitic capacitance of the researchers' Schottky diode is an order of magnitude smaller than today's state-of-the-art flexible rectifiers, so it is much faster at signal conversion and allows it to capture and convert up to 10 gigahertz of wireless signals.

"Such a design has allowed a fully flexible device that is fast enough to cover most of the radio-frequency bands used by our daily electronics, including Wi-Fi, Bluetooth, cellular LTE, and many others," Zhang says.

The reported work provides blueprints for other flexible Wi-Fi-to-electricity devices with substantial output and efficiency. The maximum output efficiency for the current device stands at 40 percent, depending on the input power of the Wi-Fi input. At the typical Wi-Fi power level, the power efficiency of the MoS_2 rectifier is about 30 percent. For reference, today's best silicon and gallium arsenide rectennas made from rigid, more expensive silicon or gallium arsenide achieve around 50 to 60 percent.

There are 15 other paper co-authors from MIT, Technical University of Madrid, the Army Research Laboratory, Charles III University of Madrid, Boston University, and the University of Southern California.

The team is now planning to build more complex systems and improve efficiency. The work was made possible, in part, by a collaboration with the Technical University of Madrid through the MIT International Science and Technology Initiatives (MISTI). It was also partially supported by the Institute for Soldier Nanotechnologies, the Army Research Laboratory, the National Science Foundation's Center for Integrated Quantum Materials, and the Air Force Office of Scientific Research.

www.sciencedaily.com
Materials provided by
***Massachusetts Institute of Technology**.*
Original written by Rob Matheson.

Two Days Workshop on "Latest Trends in Biomedical Instrumentation"

Workshop on Latest trends in Biomedical Instrumentation was conducted by the department of Electronics and telecommunication of K. K. Wagh Institute of Engineering Education and Research, Nashik on 26th and 27th December 2018 in collaboration with Apollo Hospitals, Nashik, Dr. Vasantarao Pawar Medical College, Hospital and Research Center, Nashik and IETE (The Institution of Electronics and Telecommunication Engineers)

The session was marked by the presence of Dr. A.G.Patil, Head, Medical Electronics, SGM Polytechnic College, Mumbai, Dr. Pradip B. Barde, HOD, Physiology Department, Dr. Vasantarao Pawar Medical College, Hospital and Research Center,Nashik, Prof. Dr. K.N.Nandurkar, Pricipal, KKWIEER Nashik, Prof. Dr. D. M. Chandwadkar (Hon. Chairman, IETE Nashik Sub-Center & HOD E&TC, KKWIEER) , participants from various hospitals and companies and all staff members of E & TC department, who are also members of IETE.

This workshop provided both technical and practical understanding of biomedical instrumentation. The key speakers were from reputed Institutes and companies of India. On day one technical sessions were conducted by Dr. A.G.Patil and Dr. Pradip B. Barde. On second day technical session and lab visit was covered at Apollo Hospital, Nashik

Department of Electronics & Telecommunication Engineering

Two Days Workshop on

"Latest Trends in Biomedical Instrumentation"

Industrial Training / Seminar/Workshop done by Staff

Sr. No.	Type of Event	Name of Staff	Duration
1	Hands-on Training on Machine Learning	Prof. Dr. M.R.Admane (Satone)	3 Days
2	Faculty Orientation workshop on BE E&TC/ELEX revised syllabus 2015 course on Computer Networks	Prof. R. R. Khinde	2 Days
3	Faculty Orientation workshop on BE E&TC/ELEX revised syllabus 2015 course on PLC and Automation	Prof. D. C. Shimpi	2 Days
4	Faculty Orientation workshop on BE E&TC/ELEX revised syllabus 2015 course on Process Instrumentation	Prof.S.S.Ansari	2 Days
5	Faculty Orientation workshop on BE E&TC/ELEX revised syllabus 2015 course on Elective-IV (Wireless Sensor Networks)	Prof. M. P. Joshi	2 Days
6		Prof. D. D. Khartad	2 Days
7	Faculty Orientation workshop on BE E&TC/ELEX revised syllabus 2015 course on Elective-IV (Mobile Communication)	Prof. P. J. Mondhe	2 Days

Published By

Department of E&TC

K.K. Wagh Institute of Engineering Education & Research, Nashik

Hirabai HaridasVidyanagari, Amrutdham, Panchavati Nashik-422003

Editor: Prof. Dipankar D. Khartad

E-mail: ddkhartad@kkwagh.edu.in

Vision

Provide quality education to create engineering professionals of global standards by keeping pace with rapidly changing technologies to serve the society.

Mission

M1: To educate the students with the state-of-the-art technologies and value based education to meet the growing challenges of industry.

M2: To provide scholarly ambience & environment for creating competent professionals.

M3: To inculcate awareness towards societal needs.