EASWARI ENGINEERING COLLEGE

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CONNECTRIX

VOLUME 2
ISSUE NO. 2
JAN 2019
http:// cse.srmeaswari.ac.in/

VISION OF THE DEPARTMENT

To impart quality education in the field of computer science and engineering and to provide graduates with technical skills enabling them to contribute to the society by solving real world problems and to become a centre of excellence for advanced computing.

MISSION OF THE DEPARTMENT

M1. To provide strong foundation in computer science and engineering and in problem solving techniques to become successful professionals in the field of computing and prepare them for higher education.

M2. To provide students with latest skills in the field of computer science and engineering and to realize the importance of life-long learning.

M3. To produce graduates with the ability to participate in interdisciplinary collaborations and apply recent computing tools and technologies in new domains and industry.

M4. To produce graduates capable of ethically and responsibly approaching and committing themselves to the social impact of computing.

M5. To prepare students to communicate effectively and exhibit leadership qualities to work on diverse project teams.

M6. To provide research environment for students and faculty to undertake inter-disciplinary research in emerging areas.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1 Graduates will possess the ability to think logically and have capacity to understand technical problems and to design optimal solutions for a successful career in industry, academia and research.

PEO 2 Graduates will have foundation in mathematical, scientific and computer science and engineering fundamentals necessary to formulate, analyze and solve engineering problems.

PEO 3 Graduates will have the potential to apply their expertise and current technologies across multiple disciplines to solve real world challenges and research issues.

PEO 4 Graduates will have the ability to work as a team and will be able to promote the design and implementation of products and services with an understanding of its impact on economical, environmental, ethical, and societal considerations through their strong interpersonal skills, leadership quality and entrepreneurial skills.

PEO 5 Graduates will possess an urge to learn continuously and to be responsive to the demands of the progressive industrial world by carrying out researches in frontier areas of computer science and engineering.

Message from the HOD's Desk

Welcome and best wishes to all the departments who receive this newsletter. It gives me great opportunity to present the second issue of "CONNECTRIX" for the academic year 2018-2019. My hearty wishes to the staff members of our department who are doing a great job in bringing out the best in each and every student. I wish all my final year students good success in their placements and projects. Regarding the performance in Continuous Assessment Test 1, I look forward for better improvement. Finally, I wish all my students good luck for their upcoming semester results. I would like to thank all my colleagues for their tireless efforts to help the department progress at a very steady pace. We as a team strive hard to take the department to height of success, glory and to achieve our vision.

"It does not matter how slowly you go as long as you do not stop."

Dr.K.M.Anandkumar
Professor & Head,
Dept. of CSE.

DEPARTMENT ACTIVITIES:

GUEST LECTURES:

- Department of CSE organized a Guest Lecture on “Awareness on NPTEL Courses” on 12.01.19 for II and III year students. Ms.E.Ambica, Project Officer, NPTEL PROJECT-IIT Chennai is the resource person.

- Department of CSE organized a Guest Lecture on "**Prospects of Higher education in US**" on 18.01.19 for III year students. **Mr. Veerapan, B.E, M.S (SUNY Buffalo University, US) (Alumni)** is the resource person.

- Department of CSE organized a Guest Lecture on "The world after college" on 21.01.19 for III and IV year students. Mr. Aravind. G, Software Engineer, Embed-UR is the resource person.

- Department of CSE organized a Guest Lecture on "**Various Scopes in IT industry**" on 23.01.19 for III year students. Mr. Sujith, Software Engineer, TCS is the resource person.

INDUSTRIAL VISIT:

- Department of Computer Science and Engineering has organized an Industrial Visit to Neyveli Lignite Corporation on 21.1.19 for III year students.

STUDENTS ACHIEVEMENTS:

STUDENTS PLACEMENTS:

Sl No	Date	Companies Visited	No of Students Eligible	No of Students Placed	No of Students Eligible	No of Students Placed
			UG	UG	PG	PG
1	**5.1.19**	**ATOS**	10	2	NA	NA
2	**10.1.19**	**VOLANTE**	10	1	NA	NA

STUDENTS INTERNSHIP:

The following students are attending the internship in various organizations listed below:

S.NO	NAME	YEAR	SEC	COMPANY	DURATION		TITLE
					FROM	TO	
1.	Ishwarya.R.M	IV	A	AMAZON	Oct-18	Jun-19	Support Engineer
2.	Sanjay.S	IV	B	CODINGMART TECHNOLOGIES	3-Dec-19	6 Months	Product Engineering Trainee
3.	Nithya.R	IV	B	ZOHO CORPORATION	5-Dec-18	5 Months	Member Technical Staff
4.	Surya.E	IV	B	ZOHO CORPORATION	5-Dec-18	5 Months	Member Technical Staff
5.	Dinesh Kumar V	IV	A	ZOHO CORPORATION	5-Dec-18	5 Months	Member Technical Staff
6.	Gopikrishna G	IV	A	ZOHO CORPORATION	5-Dec-18	5 Months	Member Technical Staff
7.	Arun K G	IV	A	ZOHO CORPORATION	5-Dec-18	5 Months	Member Technical Staff
8.	Sriram G.R	IV	B	KADAMBA TECHNOLOGIES.PVT.LTD	16-Dec-18	Six Months	Sports Analyst
9.	Naveen.S	IV	B	BYJUS	24-Dec-18	3 Months	Business Development Associate
10.	Niveditha Nair	IV	B	BYJUS	24-Dec-18	3 Months	Business Development Associate
11.	Gokul.S	IV	B	BYJUS	24-Dec-18	3 Months	Business Development

							Associate
12.	Sruthi Kannan	IV	B	HAPPY MARKETER	24-Dec-18	24-Mar-19	Hr Intern
13.	Antony Sundar.H	IV	A	BYJUS	24-Dec-18	3 Months	Business Development Associate
14.	Sharadh.R	IV	B	DOODLE BLUE INNOVATIONS.PVT.LTD	1-Jan-19	3 Months	Web Designer
15.	Vaibhav .M	IV	B	DOODLE BLUE INNOVATIONS.PVT.LTD	1-Jan-19	3 Months	Web Designer
16.	T.Tamilselvi	IV	B	FULL CREATIVE PVT.LTD	2-Jan-19	30-Mar-19	Python Developer Trainee
17.	V.Thirumavalavan	IV	B	FULL CREATIVE PVT.LTD	2-Jan-19	30-Mar-19	Python Developer Trainee
18.	Saagar.S	IV	B	FULL CREATIVE PVT.LTD	2-Jan-19	30-Mar-19	Python Developer Trainee
19.	Petchi Prakash.S	IV	B	FULL CREATIVE PVT.LTD	2-Jan-19	30-Mar-19	Python Developer Trainee
20.	Arun Sudharsan	IV	A	FRESHWORKS TECHNOLOGIES.PVT.LTD	2-Jan-19	31-May-19	Software Engineering Intern
21.	Maheshwar.A	IV	A	FULL CREATIVE PVT.LTD	2-Jan-19	30-Mar-19	Python Developer Trainee
22.	Hiranmayi S	IV	A	TRIMBLE	2-Jan-19	3 Months	Technical Graduate Intern
23.	Bhagyalakshmi P	IV	A	SOPRA STERIA	10-Jan-19	9-Jul-19	Engineer-Trainee
24.	Rupa Ramachandran	IV	B	SOPRA STERIA	10-Jan-19	9-Jul-19	Engineer-Trainee

STUDENTS WORKSHOPS:

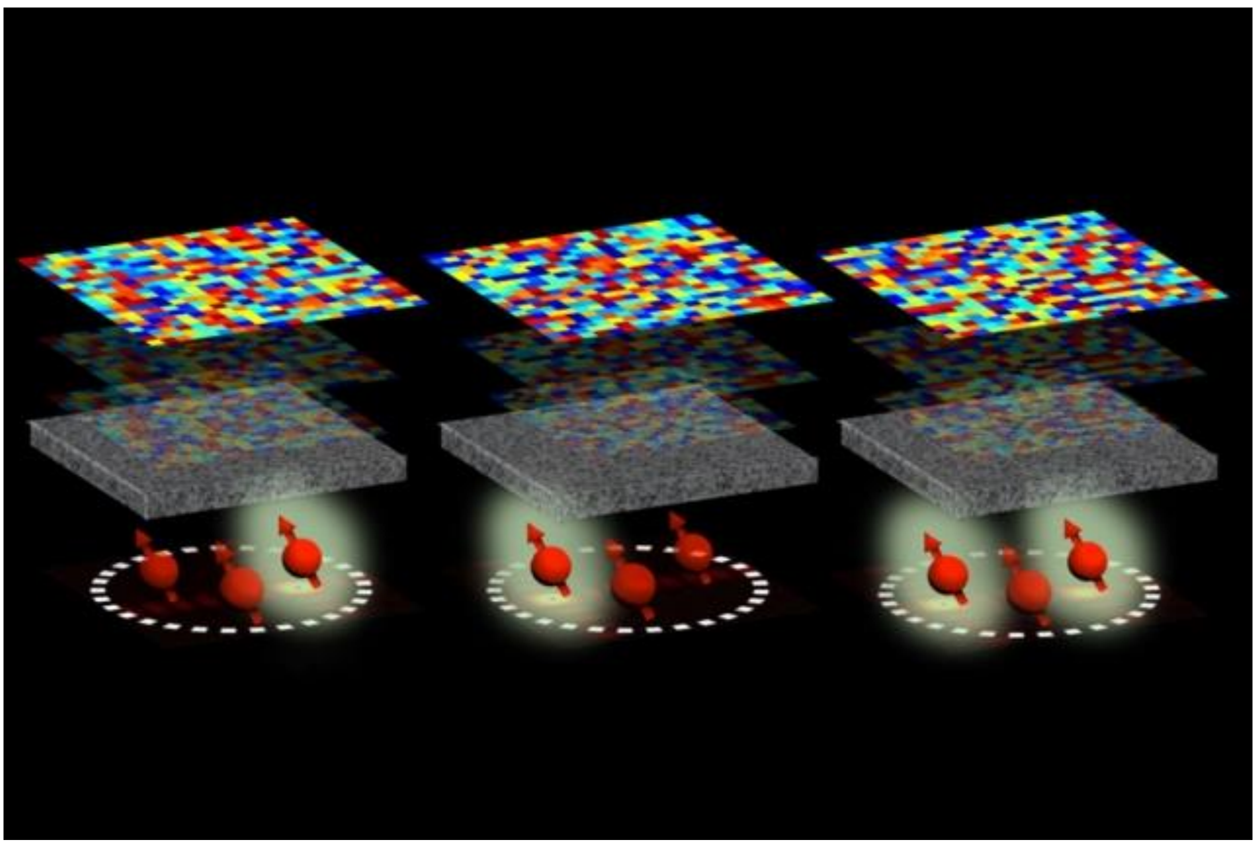
- Ms. Prathima Sundar, second year CSE B has attended the annual research workshop on "Cracking your MS Admissions – Build Stand Out Profile" conducted by Solarillion Foundation, held at IIT Madras Research Park on 28th December 2018.
- Ms. Prathiksha S, second year CSE B has attended the annual research workshop on "Cracking your MS Admissions – Build Stand Out Profile" conducted by Solarillion Foundation, held at IIT Madras Research Park on 28th December 2018.
- Ms. Muthu Harini K, second year CSE B has attended the annual research workshop on "Cracking your MS Admissions – Build Stand Out Profile" conducted by Solarillion Foundation, held at IIT Madras Research Park on 28th December 2018.
- Ms. V.Sri Divya, second year CSE B has attended 2 days workshop on "Cracking Android App Development" conducted by TechByte held at IIT Madras on 12th and 13th January 2019.
- Ms. Prathiksha S, second year CSE B has attended 2 days workshop on "Cracking Android App Development" conducted by TechByte held at IIT Madras on 12th and 13th January 2019.
- Ms. Prathima Sundar, second year CSE B has attended 2 days workshop on "Cracking Android App Development" conducted by TechByte held at IIT Madras on 12th and 13th January 2019.
- Ms. Muthu Harini K, second year CSE B has attended 2 days workshop on "Cracking Android App Development" conducted by TechByte held at IIT Madras on 12th and 13th January 2019.
- Mr. J.Mukesh, second year CSE B has attended 2 days workshop on "Cracking Android App Development" conducted by TechByte held at IIT Madras on 12th and 13th January 2019.
- Ms. A.K.Savitha, second year CSE B has attended 2 days workshop on "Cracking Android App Development" conducted by TechByte held at IIT Madras on 12th and 13th January 2019.
- Ms. Shalini. D, second year CSE B has attended 2 days workshop on "Cracking Android App Development" conducted by TechByte held at IIT Madras on 12th and 13th January 2019.

ARTICLES

TECHNIQUE COULD BOOST RESOLUTION OF TISSUE IMAGING AS MUCH AS TENFOLD

Approach developed by MIT engineers surmounts longstanding problem of light scattering within biological tissue and other complex materials.

Imaging deep inside biological tissue has long been a significant challenge. That is because light tends to be scattered by complex media such as biological tissue, bouncing around inside until it comes out again at a variety of different angles. This distorts the focus of optical microscopes, reducing both their resolution and imaging depth. Using light of a longer wavelength can help to avoid this scattering, but it also reduces imaging resolution.



Now, instead of attempting to avoid scattering, researchers at MIT have developed a technique to use the effect to their advantage. The new technique, which they describe in a paper published in the journal *Science*, allows them to use light scattering to improve imaging resolution by up to 10 times that of existing systems.

Indeed, while conventional microscopes are limited by what is known as the diffraction barrier, which prevents them focusing beyond a given resolution, the new technique allows imaging at "optical super-resolution," or beyond this diffraction limit.

The technique could be used to improve biomedical imaging, for example, by allowing more precise targeting of cancer cells within tissue. It could also be combined with optogenetic techniques, to excite particular brain cells. It could even be used in quantum computing, according to Donggyu Kim, a graduate student in mechanical engineering at MIT and first author of the paper.

In 2007, researchers first proposed that by shaping a wave of light before sending it into the tissue, it is possible to reverse the scattering process, focusing the light at a single point. However, taking advantage of this effect has long been hampered by the difficulty of gaining sufficient information about how light is scattered within complex media such as biological tissue.

To obtain this information, researchers have developed numerous techniques for creating "guide stars," or feedback signals from points within the tissue that allow the light to be focused correctly. But these approaches have so far resulted in imaging resolution well above the diffraction limit, Kim says.

In order to improve the resolution, Kim and co-author Dirk Englund, an associate professor in MIT's Department of Electrical Engineering and Computer Science and the Research Laboratory of Electronics, developed something they call quantum reference beacons (QRBs).

These QRBs are made using nitrogen-vacancy (N-V) centers within diamonds. These tiny molecular defects within the crystal lattice of diamonds are naturally fluorescent, meaning they will emit light when excited by a laser beam.

What's more, when a magnetic field is applied to the QRBs, they each resonate at their own specific frequency. By targeting the tissue sample with a microwave signal of the same resonant frequency as a particular QRB, the researchers can selectively alter its fluorescence.

"Imagine a navigator trying to get their vessel to its destination at night," Kim says. "If they see three beacons, all of which are emitting light, they will be confused. But, if one of the beacons deliberately twinkles to generate a signal, they will know where their destination is," he says.

In this way the N-V centers act as beacons, each emitting fluorescent light. By modulating a particular beacon's fluorescence to create an on/off signal, the researchers can determine the beacon's location within the tissue.

"We can read out where this light is coming from, and from that we can also understand how the light scatters inside the complex media," Kim says.

The researchers then combine this information from each of the QRBs to create a precise profile of the scattering pattern within the tissue.

By displaying this pattern with a spatial light modulator — a device used to produce holograms by manipulating light — the laser beam can be shaped in advance to compensate for the scattering that will take place inside the tissue. The laser is then able to focus with super resolution on a point inside the tissue.

In biological applications, the researchers envision that a suspension of nanodiamonds could be injected into the tissue, much as a contrast agent is already used in some existing imaging systems. Alternatively, molecular tags attached to the diamond nanoparticles could guide them to specific types of cells.

The QRBs could also be used as qubits for quantum sensing and quantum information processing, Kim says. "The QRBs can be used as quantum bits to store quantum information, and with this we can do quantum computing," he says.

Super-resolution imaging within complex scattering media has been hampered by the deficiency of guide stars that report their positions with subdiffraction precision, according to Wonshik Choi, a professor of physics at Korea University, who was not involved in the research.

Helen Knight |

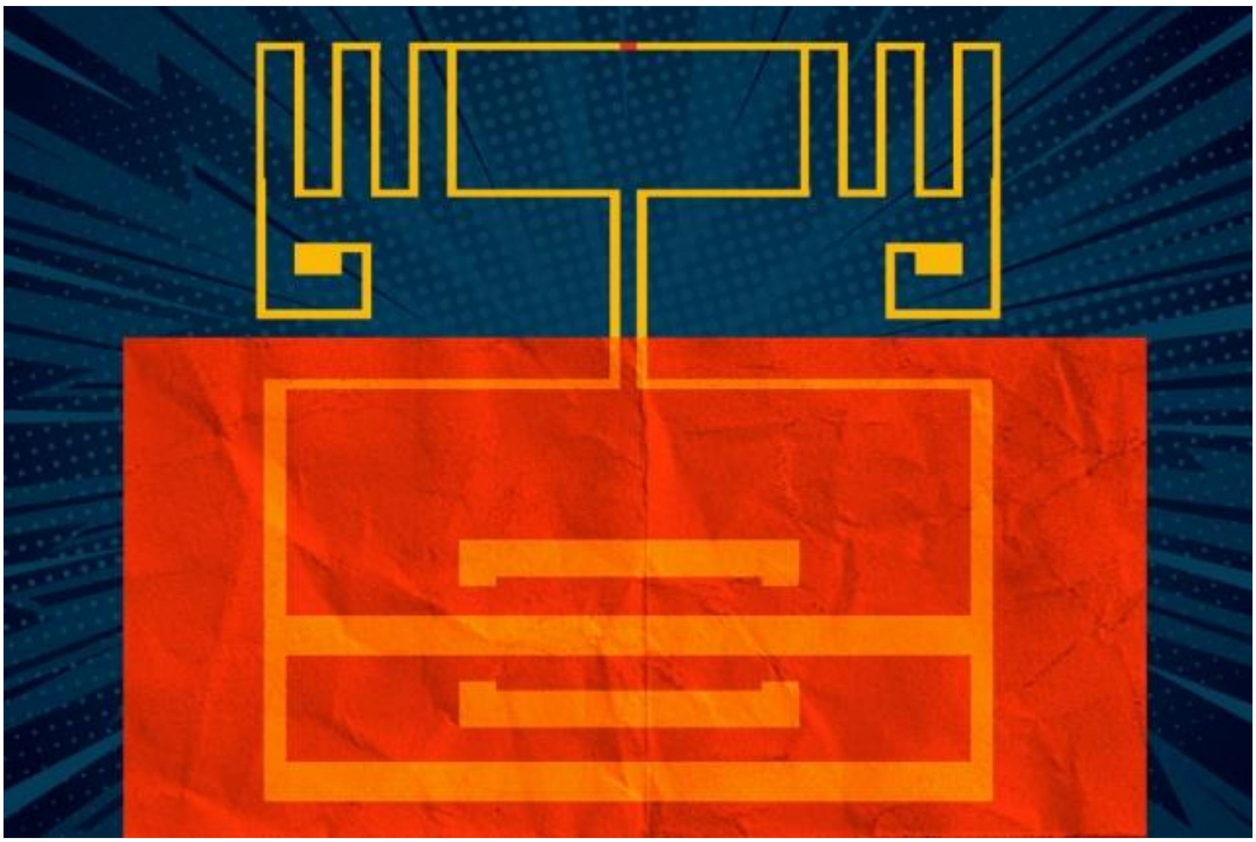
MIT News correspondent,

January 31, 2019

CONVERTING WI-FI SIGNALS TO ELECTRICITY WITH NEW 2-D MATERIALS

Device made from flexible, inexpensive materials could power large-area electronics, wearables, medical devices, and more.

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.



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* today, 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 an LED or drive 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. The resulting 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 rectennas made from rigid, more expensive silicon or gallium arsenide achieve around 50 to 60 percent.

Rob Matheson |

MIT News Office

January 28, 2019