IIT Delhi professor develops device to reduce frequency of charging electronic goods


The research has been done in collaboration with the National University of Singapore.

The frequent charging of wireless electronic devices such as mobile phones, IoT devices, etc would be significantly reduced with the proposed device.

A professor of Indian Institute of Technology, Delhi (IIT-D) has developed a device for high-density magnetic memory which could reduce the frequency of charging wireless electronic devices, such as mobile phones, in the future. The research has been done in collaboration with the National University of Singapore (NUS).

“As we are moving toward a data-driven age, there is a need for faster and very low power computing. Memories play a crucial role in this, as for faster processing of data, the CPU rapidly reads and writes on the memory. The main memory, i.e. the Random-access memories (RAMs), are most commonly used in modern computer architecture...They are fast but volatile, which means they require a constant supply of power, this consumes lots of energy. But if these could be made non-volatile, then computing could be made more energy efficient,” IIT-D said in a statement.

“Spintronics memories like spin-transfer torque magnetoresistive RAM (STT-MRAM) and spin-orbit torque magnetoresistive RAM (SOT-MRAM) are inherently non-volatile. They consume no power at standby. Also, their operation speeds are comparable to RAMs. Hence, these spintronics memories are the most potential candidates for replacing current electronic RAMs,” it added.
Professor Rahul Mishra from the Centre for Applied Research in Electronics (CARE), IIT Delhi and Professor Hyunsoo Yang from NUS “experimentally demonstrated” a “possible solution for achieving higher integration density in SOT-MRAMs”.

The work was published in Volume 15, Issue 2 of the journal ‘Physical Review Applied’ in February this year.

“We demonstrated a shared write channel based multibit SOT cell scheme, which reduces the number of transistors required per bit. This cell design requires half the area compared to conventional SOT-MRAM, thus almost doubling the area efficiency of the memory chip,” said Mishra.

To make the design feasible, the team designed a magnetic memory device, which can be programmed by application of gate voltage, IIT-D said. The gate voltage was used to “migrate oxygen ions in the device which resulted in modulation of the spin current polarity”, therefore, cells can now be “written individually” and hence obtained a “full-fledged, working area-efficient SOT memory”.

“The results of this work could eventually help to develop low power electronic devices. The frequent charging of wireless electronic devices such as mobile phones, IoT devices, etc would be significantly reduced with the proposed device. It would be especially useful for industrial applications where sensors are put in locations, which are not easy to access. Low power and high-density memory devices would not only be helpful in reducing global energy footprint, but the saved energy can also be used for extra computational tasks,” said Mishra.

IIT Delhi moves towards adopting new National Education Policy


This year, IIT-D will also start two new multi-disciplinary programs at the PG level — MTech in Electric Mobility and Master of Public Policy. Discussions are underway for an MTech program in Artificial Intelligence and Data Science, the institute said.
The Indian Institute of Technology (IIT) Delhi Wednesday said it was in the process of adopting the new National Education Policy (NEP) and had started “exploring appropriate measures” for its implementation.

“As an Institute of Eminence, IIT Delhi is fully cognizant of its role in the timely and proper execution of educational policies. The institute is carefully examining the structure and nature of its existing programs, that could provide a strong foundation for introducing the NEP 2020 directives. Over the last many months, a committee for the implementation of NEP 2020 has carefully considered all Higher Education-related guidelines. Currently, feedback on the committee’s report is being sought from all academic units for further deliberations,” IIT-D Director V Ramgopal Rao said in a statement.

He said several initiatives have recently been taken “to form new schools, departments and centres at the institute with multi-disciplinary teaching and research programs”, which “dovetail nicely with the broad objectives of the NEP 2020”.

“A new department named, ‘Department of Energy Science and Engineering,’ has recently been created. The Transportation Research and Injury Prevention Programme (TRIPP), which was running at the institute since 2002 as an interdisciplinairy programme, has been converted into a full-fledged centre in 2021. Another new centre named, ‘Optics and Photonics Centre,’ “has been created that will focus on doctoral and postgraduate programmes including special programs for industry professionals,” IIT-D said in a statement.

“The institute also has in recent years started a School of Public Policy, School of Artificial Intelligence, Department of Materials Science and Engineering and the Department of Design, which are all highly interdisciplinary in nature. IIT Delhi’s School of Interdisciplinary Research (SIRe), which has been around since 2017, also promotes interdisciplinarity. Every PhD student admitted in this academic unit is supervised by two or more supervisors belonging to different academic disciplines,” it said.

IIT-D said while it already has “multiple inter-disciplinary undergraduate programs”, “several more” were in the pipeline. This includes a BTech program in Energy Engineering starting in the Academic Year 2021-22, and a Bachelor of Design in 2022-23. It has also planned to start a B. Tech. program in Design from 2025-26.

This year, IIT-D will also start two new multi-disciplinary programs at the PG level — MTech in Electric Mobility and Master of Public Policy. Discussions are underway for an MTech program in Artificial Intelligence and Data Science, the institute said.

“IIT Delhi already offers several options for multiple exits from programs, and movement between programs. In order to make the options even more flexible, as envisioned in NEP 2020, a committee has also been constituted to examine the same and make recommendations for implementation,” IIT-D said.

**IIIT-Delhi and IIT Delhi Sign an MoU for Collaboration**

IIIT-Delhi and IIT Delhi to collaborate with each other in various domains

IIIT-Delhi and IIT Delhi, two of India’s prestigious research-driven institutes have recently signed an MoU to help students and faculty from both the institutes to collaborate and cooperate with each other in various domains.

The MoU will enable both the institutes to jointly guide research candidates registered in either of the institutes, jointly propose and engage in research and/or training programs, permit PhD students from one institution to take advanced courses in the other, encourage faculty members from both institutes to jointly formulate and offer advanced courses available to the students from both institutes, jointly organize seminars, conferences, or workshops on topics of mutual interest, and jointly propose centres of excellence, which may be spread over the two institutions.

As an institute that values research and innovation, IIIT-Delhi always focuses on making it easier and more convenient for its students to pursue their ideas, conduct thorough research, and achieve paradigm-shifting breakthroughs. Throughout the pandemic period, several students from IIIT-Delhi have innovated novel solutions to counter the challenges posed by the unprecedented scenario. From launching the WashKaro App that provided crucial bite-sized information on Covid-19 to the CoWIN Alerts bot for Telegram, that notifies the users as soon as the vaccination slots are open in their District/Pincode, the students from IIIT-Delhi have been serving the society during the times of need.

**IIT Delhi-based startup on mission to make ‘all-weather’ national flag**


Flag Foundation of India is a non-governmental organization, which aims to popularise the display of Tricolor by more and more Indians, with a great sense of pride, said officials.
In order to develop an advanced textile solution for the national flag, SWATRIC, an Indian Institute of Technology (IIT) Delhi-based startup has collaborated with the Flag Foundation of India to engineer a fabric suitable for the country’s diverse climate conditions.

The startup was launched by researchers from the IIT’s Department of Textile and Fibre Engineering to develop state-of-the-art technologies to help Indian domestic textile and garment industries in commercialising new and competitive categories of smart and functional products.

It has also signed an MoU with the FITT, IIT-Delhi and the Foundation to execute the associated activities via the startup. “Given India’s diverse climatic and geographical conditions, developing engineered fabric for the flag is a big challenge. The materials have to be designed specifically to make it durable for extreme weather conditions without being too heavy,” said Professor Bipin Kumar, Textile and Fibre Engineering department, IIT Delhi and mentor, SWATRIC.

“It is the need of the hour to help manufacturers with a proper standardisation and skills on technical yarns to improve the quality of the flag fabric,” Kumar said. Flag Foundation of India is a non-governmental organization, which aims to popularise the display of Tricolor by more and more Indians, with a great sense of pride, said officials.

“We have always been facing a challenge of obtaining good quality flags. It is indeed a proud moment for us to work with IIT Delhi’s experts on developing appropriate technologies, which are relevant to the country’s pride,” said Ashim Kohli, Major General (retired), CEO of Flag Foundation.

“India has the potential to be the global leader in technical textiles. The Department of Textile and Fibre Engineering at IIT has been constantly working in the field of smart and functional textile projects, actively supporting the National Technical Textiles Mission to empower textile sector through ‘Make in India’ technologies for various applications ranging from geotextiles, defence, sportswear, smart wearables and others,” said Professor Ramgopal Rao, director, IIT-D.
IIT Delhi Alumnus Establishes Chair to Promote Research in Smart Textiles


Indian Institute of Technology (IIT) Delhi alumnus Manish Singhal has endowed the ‘Manish Singhal Chair’ to promote excellence and leadership in teaching and research in the Department of Textile and Fibre Engineering with an emphasis on smart textiles.

It will facilitate wider and deeper interactions between the industry, faculty and students and promote ‘Smart Textiles’ in the country, Prof RS Rengasamy, Head of the Department, Textile and Fibre Engineering, IIT Delhi said.

An ex-student of BTech in Chemical Engineering, 1994 batch, Singhal is now the Managing Director of KG Petrochem Ltd, a Jaipur based company having interests in textiles, garments, artificial leathers, and polymers.

Smart textile is an emerging area that is taking applications of textiles to new territories of Artificial Intelligence (AI), Internet of Things (IoT), medicine, defence, space, and manufacturing, stated IIT Delhi. It aims at adding electronic functionality in textiles for sensing, communication, energy harvesting and storage, and creating highly protective apparel against microbes and radiations.

Dr Ashwini K Agrawal, a professor in the Textile and Fibre Engineering Department added, “I am really happy to learn that Mr Manish Singhal has taken initiative to encourage and recognize research in Smart Textiles at IIT Delhi. Several faculty members at the Department of Textile and Fibre Engineering have been doing pioneering work in this area for the last several years. SMITA
Research Lab, which is now a Centre of Excellence in Smart Textiles, has been instrumental in taking some of the technologies to the market”

IIT-Delhi yet to take decision on opening boarding facilities

Denying reports from various sections of the media, Indian Institute of Technology-Delhi on Wednesday said that no general on-boarding of undergraduate students is being undertaken at the institute. The institute has not taken any decision on this.

“Some of the students permitted (to stay) are those who have a project component or pressing academic requirement, which require them to be on the campus to access laboratories, central research facilities and library,” the institute said.

It added that further decision regarding on-boarding of students will be taken by the institute based on the COVID-19 situation and that teaching has been going on in the institute through online mode since the start of the pandemic.

IIT Delhi launches part-time certificate courses for working professionals, aspiring engineers

The Sensors, Instrumentation and Cyber-Physical System Engineering (SeNSE) centre, which was recently launched at the IIT, Delhi, campus will provide all of the courses.

The Indian Institute of Technology in Delhi will offer several part-time courses, ideal for working professionals and aspiring engineers. Among these will be courses on sensor, artificial intelligence, instrumentation engineering, and cyber-physical system engineering. The classes will take place on weekends. The institute will also make available its existing MTech course in instrument technology in the part-time mode as well as introduce new courses for Master of Science Research for both full-time and part-time classes.

The institute will also provide a few certificate courses that will carry industry significance in order to ultimately expand its outreach programme. The Sensors, Instrumentation and Cyber-Physical System Engineering (SeNSE) centre, which was recently launched at the Indian Institute of Technology, Delhi, campus will provide all of the courses in the sensor, cyber-physical system engineering, and instrumentation programmes.

Aspirants will be able to take admission for all these certificate courses on the basis of their Cumulative Grade Point Average scores or marks obtained in their previous classes. The entrance for the courses under MTech and MSR will take into account the candidate’s GATE score. In case the number of applications for these certificate courses are more than the number of seats available, the institute will conduct a screening test that will include a written examination to select deserving candidates.
Registrations for both the MTech and certificate courses will begin after announcement of the GATE 2020 results. Aspiring candidates will be able to apply to the course of their choice by logging into the official website of the Indian Institute of Technology, Delhi. This initiative by one of the country’s premier institutes to introduce for graduates and working professionals various certificate courses envisages making them more skilled and efficient to be able to stand out in the fields of technology and high-rising industrialisation.

Justice Bhat inaugurates IIT Delhi’s Universal Justice Foundation lab facility on AI for judiciary

THE Indian Institute of Technology (IIT), Delhi has developed the Universal Justice Foundation (USJ), a lab facility based on Artificial Intelligence (AI) for Judiciary.

The lab was inaugurated by Supreme Court Judge Justice S. Ravindra Bhat in presence of V. Ramgopal Rao, Director of IIT Delhi, and Krishna Deva Rao, Vice-Chancellor of National Law University (NLU), Delhi. Former Chief Justice of India K.G Balakrishnan also joined the event virtually.

Ramgopal Rao said that the institute had previously set up a Centre of Excellence for Law and Technology and is in the process of collaborating with NLU Delhi for innovation and research activities including joint projects, innovation, start-ups and can work on processes of judicial delays.

Justice Bhat acknowledging how technology has improved data management and time consuming process in e-courts, said, “We must craft the safeguards around the use of AI for public function and ensure that the element of human discretion remains wherever required and definitely at each level where important decisions are made. This will ensure that at the very least discriminatory decision-making can be appealed and responsibility determined. Ultimately technology must aid judicial functioning and accessibility and not create ground for further exclusion.”

He further added that this move will ensure that least decision-making is appealed as technology will help to make unbiased decisions and increase the accessibility of judicial proceedings.

IIT-Delhi, NLU to Collaborate on Law, Technology Research
The Indian Institute of Technology (IIT) Delhi is in the process of signing an MoU with the National Law University (NLU) Delhi to collaborate on research and innovation activities, joint projects, start-ups, outreach, and courses. IIT Delhi and NLU Delhi will be working closely on various aspects related to law and technology, Prof V Ramgopal Rao, Director, IIT Delhi announced.

Prof Rao also declared that the institute has already set up a Centre of Excellence for Law and Technology for this purpose.

IIT Delhi has expertise in several areas such as operations research, management science, machine learning, and other data/modeling-based methods that can work on problems around judicial delays said Prof Nomesh Bolia in an official press release. Some of this research is already going on as a part of the Daksh CoE on Law and Technology at IIT Delhi.

The institute also hosted an event on modeling, data, and artificial intelligence-based innovations in the judiciary recently that was chaired by Justice S Ravindra Bhat of the Supreme Court. During the event, the Universal Justice Foundation (UFJ) lab facility on Artificial Intelligence for Judiciary at IIT Delhi was also inaugurated.

While acknowledging the benefits of technology at the event, Justice Bhat said, “We must craft the safeguards around the use of AI for public function and ensure that the element of human discretion remains wherever required and definitely at each level where important decisions are made. This will ensure that at the very least discriminatory decision-making can be appealed and responsibility determined. Ultimately technology must aid judicial functioning and accessibility and not create ground for further exclusion.”

IIT Delhi says new course on EVs finds many takers: Check details

The new M.Tech course on Electric Mobility has about 20 seats available. It was developed in consultation with experts from both academia as well as the industry.
A new course on e-mobility sees a large volume of takers at one of India’s premier education institutes, the Indian Institute of Technology (IIT) Delhi. The course is slated to begin in the next academic session.

This new M.Tech course on Electric Mobility has about 20 seats available. It was developed in consultation with experts from both academia as well as the industry.

"The automotive industry in India is in the process of transformation from the traditional IC engine-based vehicles to electric vehicles to reduce the environmental impact due to pollution, and dependency on traditional fossil fuel-based energy sources," BK Panigrahi, Head of the Centre for Automotive Research and Tribology (CART) at IIT Delhi, said.

What's in the course?

The course syllabus will cover a wide range of subjects. This includes multidisciplinary aspects of batteries, EV charging station and infrastructure, power electronics and drives for EVs, connected and autonomous vehicles, vehicle telematics, embedded system for automotive, connected and autonomous vehicles among others.

As far as the EV industry is concerned, skilling and re-skilling of the personnel associated with the EV industry continue to be a major challenge. According to IIT, this course has been designed to fill this gap.

IIT Delhi Establishes a Chair in Data Analytics to Attract Best Talents


In 2008, Chadha had also endowed a Chair in Operations Research at IIT Delhi.

IIT Delhi has established a Chair in Data Analytics with a view to attract the best researchers and practitioners from the field of data science and data analytics.

Prof Sanjiva Prasad, Head, Computer Science and Engineering Department, IIT Delhi said, “The Department of Computer Science and Engineering is delighted that alumnus Jassi Chadha has endowed “Jaswinder and Tarvinder Chadha Chair in Data Analytics”. Data drives many of today’s decision-making processes, and the establishment of this Chair is both timely and of strategic importance to research in analytics at IIT Delhi.”

Chadha is a data scientist and a serial entrepreneur. Currently, he serves as the founder and CEO of Axtria, an AI and analytics company in the life science industry that recently became a Unicorn. In 2008, Chadha had also endowed a Chair in Operations Research at IIT Delhi and is the founder of the IIT Delhi Endowment Fund. In honour of his achievements and service to the institute, IIT Delhi conferred him with the Distinguished Alumni Service Award in 2008.

Chadha’s association with IIT Delhi goes back. His mother Dr Tarvinder Kaur Chadha was the first woman to receive a PhD in Mathematics from IIT Delhi in 1968; interestingly, the mother-son duo is the first parent-child graduate of IIT Delhi. Dr Kaur went on to establish a distinguished career in Mathematics and fluid dynamics. She had also served as the Head of the Mathematics Department.
and Dean of Sciences at Guru Nanak Dev University. The newly established data analytics Chair at IIT Delhi is named after the mother-son duo.

**All-Women Team from IIT Delhi Develops Novel Strategy for Fungal Eye Infections**


IIT-Delhi’s Prof Archana Chugh along with her PhD students have been working in collaboration with Dr Sushmita G Shah, Ophthalmologist and Cornea Specialist, to find a cure for fungal keratitis or infection of the cornea.

India has a huge agrarian population, which is very prone to vegetative trauma while farming. Vegetative trauma to the eye is generally caused by infected vegetable matter such as plant leaves and often leads to fungal infection of the cornea in the eyes or fungal keratitis.

According to the WHO, fungal keratitis is a leading cause of monocular blindness i.e, blindness in one eye, in the developing world. According to a recent study published in the Lancet, the highest annual incidence per 1 lakh people is reported in Southern Asia. India accounts for more than 50% of the fungal keratitis cases out of total microbial keratitis cases.

Currently, available drugs for fungal keratitis are less effective, especially in severe diseases, due to poor drug penetration, poor bioavailability and antifungal efficacy. US FDA-approved Natamycin is employed as a primary line of treatment for fungal keratitis but due to poor ocular penetration, it requires prolonged and frequent dosing, causing discomfort to patients.

To develop a better antifungal strategy for fungal keratitis, an all-women team of IIT Delhi researchers led by Prof Archana Chugh from Kusuma School of Biological Sciences along with her PhD students—Dr Aastha Jain, Harsha Rohira and Sujithra Shankar—have been working in collaboration with Dr Sushmita G Shah, Ophthalmologist and Cornea Specialist from Dr CM Shah Memorial Charitable Trust and Eye Life, Mumbai.
The team has successfully developed a novel peptide-based antifungal strategy for enhanced Natamycin penetration. The developed peptide-drug conjugate showed an appreciable antifungal effect in the lab.

“These peptides are known to have the ability to carry molecules with them in the cells. Therefore, when poorly permeable Natamycin was attached to the peptide, the formed complex showed better antifungal effect”, Prof Archana Chugh said.

In their research study, the scientists found that conjugate drug penetration was five times higher than Natamycin in rabbits, thus enabling lowering of the dosage frequency. Further, 44% of mice showed complete resolution of fungal infection with the novel conjugate as compared with 13% of mice that were treated with Natamycin suspension only. The study has been recently published in the International Journal of Pharmaceutics.

The animal studies were carried out in collaboration with Dr Shikha Yadav, Head of Animal Facility at the National Institute of Biologicals, Noida. The research was initially funded by the Department of Biotechnology followed by Nanomission, Department of Science and Technology, Government of India.

Prof Chugh further says, “This is a great example of ‘Make in India’; however, a few hurdles persist for us before this novel conjugate can enter the clinics and is useful to patients. With promising results obtained in the animal studies, we are hopeful that the Biotechnology/ Pharmaceutical industry will come forward for its clinical trials.”

Dr Sushmita G Shah, Ophthalmologist & Cornea Specialist, Eye Life, Mumbai says, “Collaboration between Clinicians and Scientists is important to develop newer and better drugs, diagnostic devices, etc, which can improve patient care. We are very excited with the results obtained so far and look forward to initiating a clinical trial with the participation of the Industry and other relevant agencies.”

While speaking of the research study by the team led by Prof Chugh, Dr Virender Singh Sangwan, Director Innovations, Dr Shroff’s Charity Eye Hospital, New Delhi said, “The study clearly demonstrated enhanced penetration and effectiveness of a conjugated form of Natamycin for the treatment of fungal keratitis. In India and most of the developing countries, fungal keratitis is a significant public health problem and is responsible for almost 50% of cases of keratitis. Currently
available treatments such as Natamycin have poor penetration of the drug into the cornea and hence results in delayed response to treatment.”

**IIT-D launches course to find solutions to grassroots problems**


**Students will visit villages to understand local needs and challenges**

Indian Institute of Technology, Delhi, on Wednesday launched a Grassroots Innovation Programme (GRIP) for students, under which students will work on finding solutions to societal problems identified by them from rural and semi-urban areas, including the communities they come from.

The institute said that as a part of the programme, students will visit communities located in smaller towns and villages to immerse in social environments for a substantial time to study, understand and identify local needs and challenges, which can possibly be addressed by the students when they return to the institute campus. Students will then be allowed to work on semester-long or year-long projects on finding novel solutions to grassroots problems identified by them.

“The programme provides an opportunity for students to put themselves in the shoes of end-users and to co-create solutions which are likely to succeed. This programme also acts as a pipeline of ideas, which students and student teams can address as a part of semester-long design and innovation courses already available to them,” said PVM Rao, Head, Department of Design, IIT, Delhi who is coordinating the GRIP initiative.

IIT, Delhi, director V. Ramgopal Rao said that the GRIP initiative is aimed at providing resources to the students who want to help the society by solving its problems.