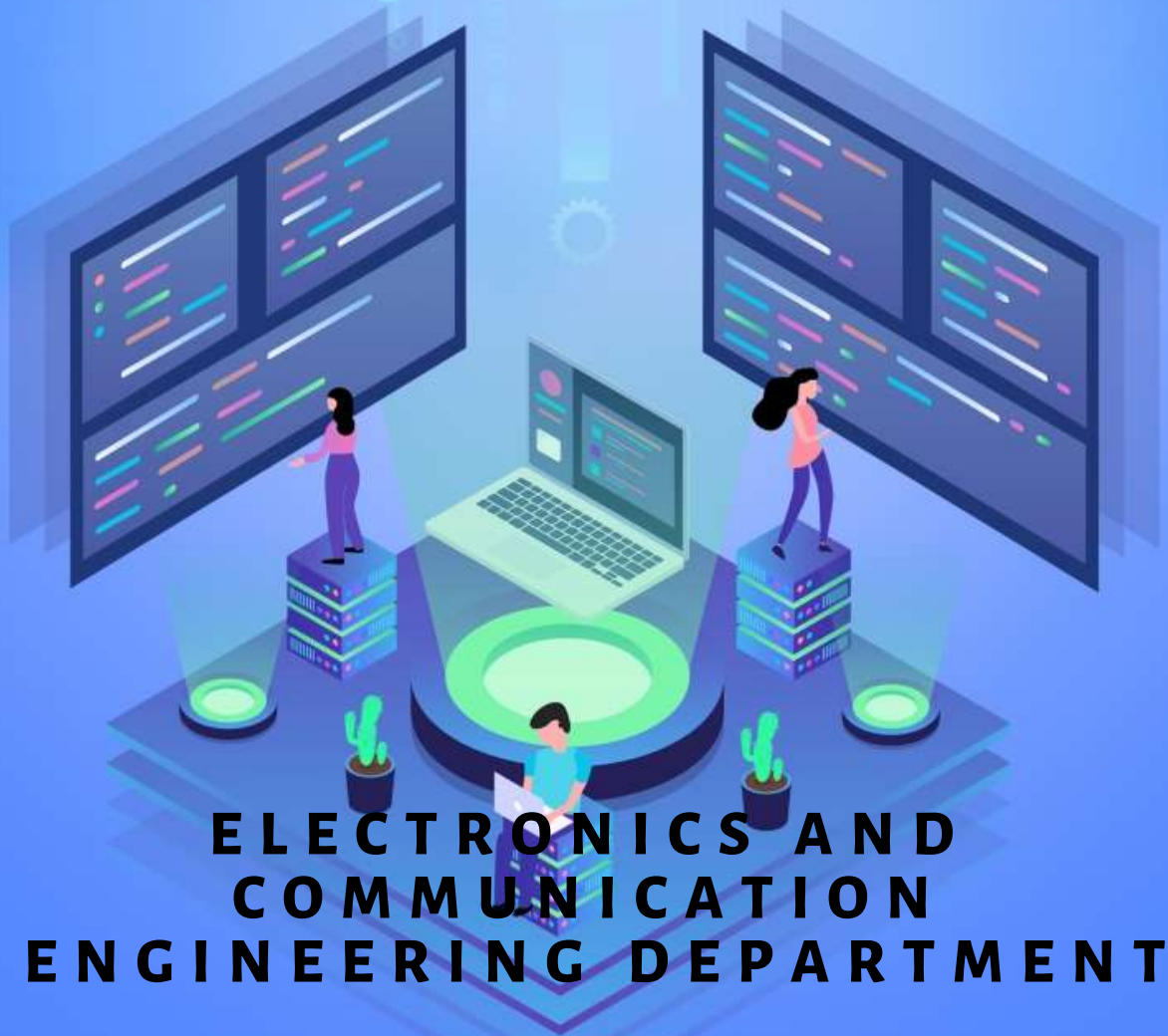
DR. AKHILESH DAS GUPTA INSTITUTE OF TECHNOLOGY & MANAGEMENT

LECTRON

July 2019 - July 2020



ELECTRONICS AND COMMUNICATION ENGINEERING DEPARTMENT

Our Patrons

Late Shri Babu Banarasi Das Ji

Late Dr. Akhilesh Das Gupta

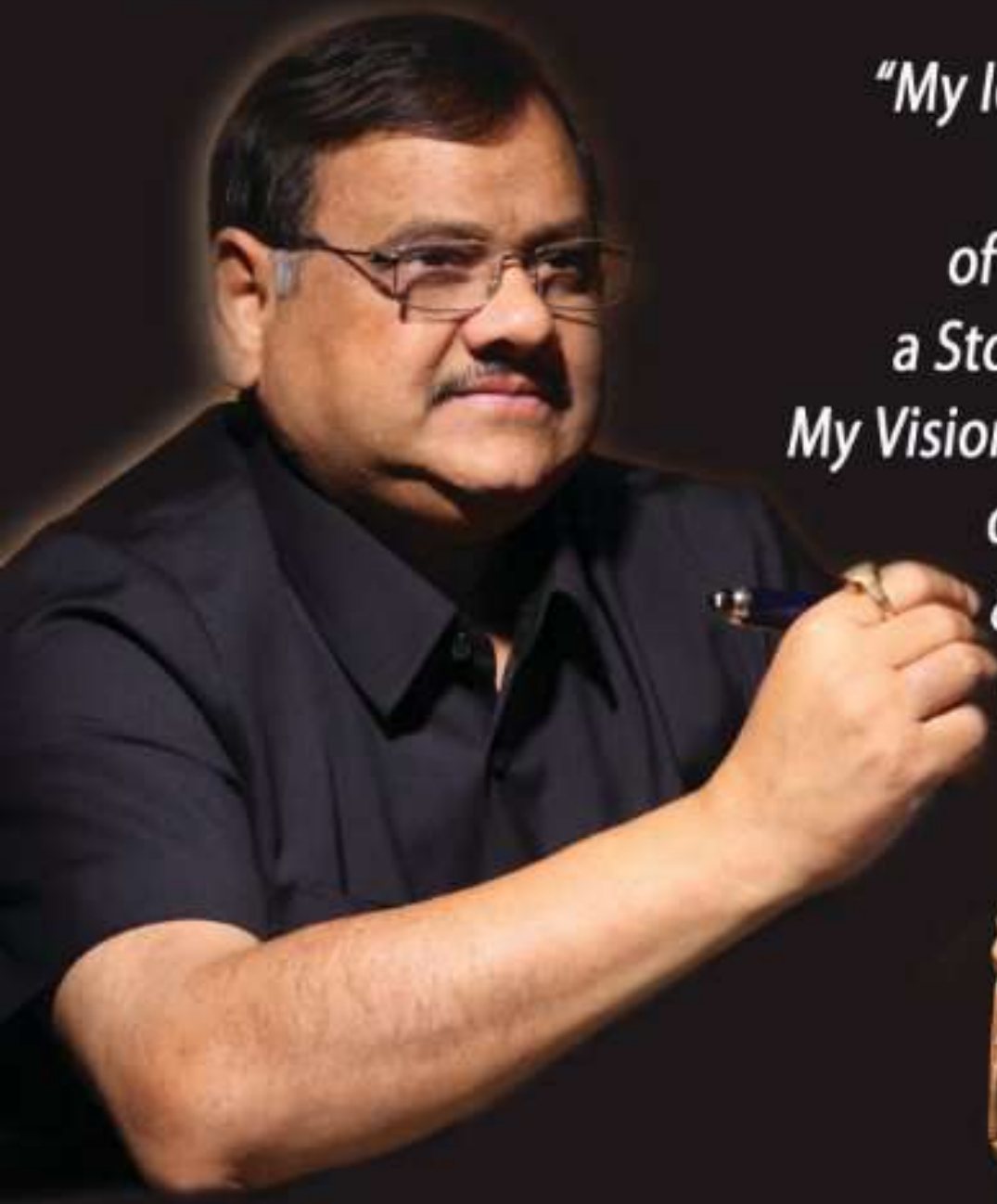
Mrs. Alka Das Gupta

Mr. Viraj Sagar Das Gupta

In Memory of Dr. Akhilesh Das Gupta

अखिल ज्योत

AKHIL JYOT



"My Idea of a Society
is a River
of Education &
a Storm of Success.
My Vision of life is an Ocean
of Learning
& a Tide of
Humanity"

शत् शत् नमन

Mrs. Alka Das Gupta

Chairperson

BBD Group of Education

Message from Chairperson

The Department of Electronics And Communication Engineering has always been the gem of the Dr. Akhilesh Das Gupta Institute of Technology and Management. The perennial zeal of the Department has never left the achievements stagnant. The Department not only gives students the exposure to the regular engineering curriculum but also to the aspirations of today's corporate world, thus inculcating a professional aptitude in them. The dedication of the faculty members has strengthened the learning process ensuring an environment of collaboration, experimentation, imagination, and creativity. It is such a prodigious delight in watching the students cutting edge in technical exploration, enhancing their analytical skills and brushing themselves up for the rapidly changing sector, and establishing themselves as entrepreneurs and engineers.

The Department has always reached new heights and I am looking forward to more wonders and achievements. I wish the very best to the Department of ECE for the launch of the **LECTRON**, the official technical magazine of the Department. The magazine beautifully provides an overview of academic programs, research activities, various laboratories, training and the other fields explored by our faculty members and students.

Mr. Viraj Sagar Das Gupta

President, BBD Group

Message from President

I am extremely happy to witness the shaping up of the next volume of **LECTRON**.

A special mention to the Editorial Board, who were able to capture the noteworthy proceedings of the ECE Department of Dr. Akhilesh Das Gupta Institute of Technology and Management and were also able to present it in an alluring manner. I thoroughly enjoyed myself going through the pages of this technical magazine.

This issue of the technical magazine is an insight to what campus life truly means, the surfeit events together represent the opportunities that one can take and augment their personalities up to the brim and be glorious predominantly.

I hope students and faculty members find this Edition as sound as I did. I congratulate the Department and the Editorial Board for this achievement.

Shri S. N. Garg

Chief Executive Officer

Message from CEO

Even after so many batches passing under my supervision, the joy and happiness remain constant. ADGITM is exemplary both from the point of view of merit as well as from the placement perspective. Our students have been placed in the best organisations of the country and we strive to maintain such decorum by which the students are benefited the most. With an aim to remain quality conscious ADGITM has put in efforts for providing the best industrial exposure along with a professionally ethical environment, where one can develop himself / herself on multiple levels. As technology is advancing at a very rapid rate, we have an experienced and well-qualified faculty panel to adjust to the market requirements and guide the students as and when required. The only way to become technically stimulated is byreceiving the proper exposure to the world and that is what we inculcate in our students. Our institution is technology-friendly and we don't restrain students from experimenting new technologies and work styles, that is how we inculcate self-reliance and tech-savvy mind.

Prof. (Dr.) Sanjay Kumar

Director, ADGITM

Message from Director

"Engineering is not only the study of the technical subjects, but it is about living an intellectual life."

As the Director of Dr. Akhilesh Das Gupta Institute of Technology and Management, I strongly believe that education is not only about imparting knowledge but more about opening the individual's mind to self-expression. I have been personally encouraging students to develop an overall sensibility and awareness. Encouraging them to, not try, but make it happen. I saw an overwhelming response by the students in not only technical domain but also in the branch of sports, art, dance, photography, music and a lot more. Students are our partners in our mission to set a new benchmark in the field of engineering. I am confident that with such a positive and progressive attitude they would be able to justify the credibility of the Department as well as the college by bringing laurels and what not.

I am immensely proud to observe a team of such enthusiasts. The next volume of the technical magazine of the Department of Electronics and Communication Engineering - **LECTRON**, has been able to make a count of all the achievements, hard work and dedication of the faculty members and students alike. I wish them luck.

Dr. Yamini S.

Principal, ADGITM

Message from Principal

When it comes to the real world, everybody needs to be a go-getter. The onus of our institution is to enable the students not only to adapt to changes for the betterment of the society but also be the catalyst to make it more equitable. Dr. Akhilesh Das Gupta Institute of Technology and Management believes in this maximand the institution has always worked to provide quality education.

We believe that the best way to learn something is actually by doing it, therefore practical education is of utmost importance to us which makes the students well fortified with contemporary techniques and innovative practices.

Our staff is highly committed and dedicated to provide an environment where one can freely think and burgeon their persona and also to help them encourage others to bloom.

The ADGITM family will stay united to bring glory to the institution and serve for the betterment of the society.

One of my beliefs is a very famous quote by Albert Einstein that still motivates brilliance, "Never regard study as a duty, but as the enviable opportunity to learn".

Prof. (Dr.) Rajiv Sharma

HOD, ECE Department

Message from HOD

A child's psychology is the most difficult to understand. We at Dr. Akhilesh Das Gupta Institute of Technology and Management believe in imparting quality education to the students at a level where they can easily retain the knowledge and clear their basics to the pinnacle. Our staff members have been incessantly redefining the standard of erudition in a manner through which the students are equipped to face the challenges of future with their technical proficiency and scientific knowledge. The institution is highly esteemed with reference to its innovative endeavours, keen involvement and exceptional merit. I am proud to be a part of an institution that believes in putting the education of the students beyond everything. Igniting the youth with knowledge, life skills and ethics, we develop the students into confident, persuasive and practically insightful individuals. We encourage and imbibe them the lessons of self-reliance and discipline by letting them to take up multiple roles in different aspects of life. I extend my heartfelt congratulations to ADGITM, Delhi for being successful in producing strong individuals who believe in scripting stories of success with their unfailing resoluteness and indomitable will power.

CONTENTS

About ECE Department

The Department of Electronics and Communication Engineering is committed to render-quality and professional pedagogy to pioneering engineers. The ECE department provides opportunity for the students to learn and fulfill the industry demands of Communication Engineering. The Department has state of ail equipment, in various laboratories which is necessary to blend the theoretical & practical aspects of engineering. The Department offers Under-Graduate program in Bachelors of Technology. The Department has faculty members having expertise in wide variety of fields in Electronics & Communication. The department has a strong industry institution interaction.

OLED - A Need of Future

An organic light-emitting diode (OLED) is a solid state device similar to the light-emitting diode (LED) but composed of several layers of material. An OLED is flat light emitting technology composed by placing a series of extremely thin organic films between two conductors. When a potential difference occurs between the conductors, a bright light is emitted. This technology can be used to produce curved display panels, smart watch faces, and televisions. Since OLEDs emit light, the panels do not require a backlight like liquid crystal display (LCD) televisions do, making them thinner and more efficient.

With an almost instantaneous refresh rate, OLED displays do not suffer from motion lag or motion blur as do LED displays. Since OLEDs generate their own light, unlike LCDs, they do not need a backlight and therefore have deeper blacks, brighter whites and gray scales in between can be easily achieved. Both active and passive matrix structures operate each pixel individually, offering maximum efficiency and the greatest contrast ratio. While the light-emitting layers of an OLED are much thinner and lighter, the substrate of an OLED can be flexible instead of a standard rigid LED. Due to OLEDs being much more efficient than LCDs, there is no doubt that their presence in the market will increase.

References:

"Organic EL - R&D". Semiconductor Energy Laboratory. Retrieved 8 July 2019.

Student Achievements

Total 3 teams went for the **AMI Hacks**, the Hardware Edition 5 hours hackathon at Amity University, Sector 125, Noida.

Event: AMI Hacks

Venue: Amity University, Sector 125, Noida

Date: 22nd October, 2019

Out of 3 teams, 2 teams got the positions.

Team Name:

The Robogyan: 1st Position: Team Members: Hardik Gossian, Devansh

Robogyan: 3rd Position: Team Members: Maninder Bir Singh Gulshan, Mohd Shayan Khan and Nikhil Singhal


SMART INDIA HACKATHON 2019
Organizers
MHRD
MIC
12072019
D D M M Y Y Y Y
HARDWARE EDITION
Winner of SIH 2019
Grand Finale July 8-12, 2019
Pay
Robogyan
Rupees
One lakh only
₹ 1,00,000/-
Signature
Partners
Deloitte.
DEYNET
KPIT


INTERNATIONAL CONFERENCE
SAFER MOBILITY'19
2nd RUNNER-UP


Pay Winner
Rupees
Ten Thousand Only
AMITY UNIVERSITY
MADE EASY
India's Best Institute for IES, GATE & PSUs
Date 22-10-2019
₹ 10,000/-
AMI HACKS
cppsecrets.com
Tool world

TECHKRITI
Winners
Embedded
IIT Kanpur


AMITY UNIVERSITY
Date 22-10-2019
Pay 2ND RUNNER- UP
Rupees Two Thousand Only
₹ 2,000
MADE EASY
India's Best Institute for IES, GATE & PSUs
AMI HACKS
cppsecrets.com
Tool world


HACKATHON
Top 3
Solve for Safer India
FINALE 2019


SIH
SMART INDIA HACKATHON - 2019
HARDWARE EDITION
WINNER

Student Achievements


GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY
Sector-16C, Dwarka, New Delhi-110078
Inter College B. Tech Major Project Competition -2019
3rd to 7th June 2019
CERTIFICATE OF APPRECIATION
Presented to
Prof./Dr./Mr./Mrs./Ms. Devraj Gautam
for mentoring the students on the project entitled "Multi-Purpose Agriculture Robot"
in the discipline of Electronics And Communications
Dr. Suman Mann, Project Coordinator, MSIT
Prof. Arvinder Kaur, Dean, USIC&T
Prof. K.P. Chaudhary, Director, MSIT

It is a great moment for ECE department that our major project got 1st position in GGSIPU Inter college project competition held on 04.06.2019 at HMRITM.

Project- Multipurpose Agriculture Robot

Mentor- Devraj Gautam

Students-

Raghav (40915602815)

Vaivhav Goyal (41115602815)

Vanshika (08615602815)

Student Achievements

SIH 2019

Members

- Aditya Agrawal
- Ashish Ohri
- Jai Garg
- Hardik Gossain
- Mohd Shayan Khan
- Shridhi Aggarwal

Nodal center

IIT Kharagpur

Dates

8-12 July

Ministry

Ministry of Coal

Total teams - 421

SIH 2019

Company

Mahyco

Members

- Abhishek kr jha
- Varun singh
- Satyam kumar
- Manish
- Prerna jain
- Pooja Gupta

Nodal center

DSU Banglore

Dates

8 -12 July

Total teams - 50

Robogyan Fiesta

Event Organizers: Maninder Bir Singh Gulshan, Mohd Shayan Khan, Diksha Tuli, Hardik Gossain, Aditya Agrawal, Nikhil Singhal, Devansh, Jai Garg,

The event was organized to make student's future ready with implemented ideas (prototypes) and enhance their thinking abilities in technical and non-technical session along with a brainstorming session. This workshop was aimed to give the basic idea of current innovations being worked upon and provide them with the scratch to advance level knowledge of every field of engineer like Hardware, Software, Security, Aerodynamics and many more such fields. To reflect these values and to promote gender equality, Robogyan has formulated a WIT(Women in technology) cell and is specially conducting women only workshops that was led by women only and graduates from the institute who are pioneers in their respective fields.

Why there's room for a Variety of Solutions in LOT Technology?

As the hype around 5G technology continues to grow, the possibility of faster, more streamlined connectivity is driving conversations globally. But while 5G adoption has started, it continues to roll out slowly. To date, some have experienced the benefits 5G technology can bring, but most are patiently awaiting its arrival – and that's assuming the technology fits the needs of their use case. 5G technology shows a breadth of new possibilities, however since it's not a one size fits all technology, connectivity solutions from a variety of sources are still necessary.

While 5G deployments continue to increase in quantity and more applications are discovered, this simultaneously fuels a rise in the deployment of complementary technologies. 5G was designed to bring faster speeds, stronger connectivity, and lower latency, and the connectivity market has been so focused on the impact that will bring. But when taking a look at the logistics and steps needed to actually deploy 5G, some use cases don't need that level of connectivity and in many cases, simply do not have the hardware to support constant connectivity.

As technology continues to evolve, and new solutions are developed to suit specific needs, it's important that these solutions can help streamline operations and improve the processes used to tackle day-to-day tasks. Though reliable connection is critical, it's important that businesses and individuals choose the right solution that with not only scale as technology develops, but that will maintain a reliable connection between devices and server.

In the broad wireless market landscape, there is room for 5G, LPWAN, Bluetooth, and other technologies to coexist. Adaptability and choice continue to be the name of the game, and while the market continues to watch 5G evolve, alternative solutions are equally as important.

Article by: Remy Lorrain, Semtech

GUEST LECTURE (Machine Learning)

Ms.Mansi Gupta, Data Scientist Lead at IBM India Pvt Ltd.

The speaker delivered presentation to the students of 2nd and 3rd year that covers a detailed explanation of machine learning using python and its application and future scope. The guest was honored by Prof. (Dr.) Sanjay Kumar, Director, ADGITM and Prof. (Dr.) Rajiv Sharma, Head ECE Deptt. with a sapling as a token of gratitude. The 1st, 2nd and 3rd year students got the knowledge of emerging trend and IoT concept, it's wide applications and growing job opportunities in the field of IoT. It made students aware of various dimensions of IoT and how it can automate our day to day lives.

Workshop on AI & ML Dataquest ADGITM

The workshop was organized for the 2nd & 3rd year students. It gave hands-on experience on Machine Learning and Artificial Intelligence and its application. The workshop was run for 3 hours of duration that covered the following topics related to ML & AI: Basics of Python, Introduction to ML & AI, Supervised & Unsupervised Learning, Clustering and hands on experience with natural Language Processing.

SCRATCH TO MARVELS

The workshop was organized for the 1st year students keeping in mind their technical interest and also to provide them a great start for their respective technical fields.

Workshop was conducted by experts Akash Gupta, Hardik Jain, Ugrash Mishra and Rachit Jain. It covered a brief explanation on embedded systems and IoT and its application. The students were also explained about the future scope of these fields. A small hand on session was also provided to the students.

1st year students were got a good start in their respective technical fields. They demonstrated some of their projects in TECHNORAX V5.0 that boosted up the confidence and knowledge of the students.

STC on Embedded Systems & IoT

The program aimed to introduce teachers of technical institutions. This program is funded by NITTTR Chandigarh (MHRD, Govt. Of India) and Faculty Members of Electrical, Electronics, Mechanical, Instrumentation and Control Engineering, Computer Science and Engineering and Information Technology can attend this programme. The STC was attended by all the faculty members of ECE department. The programme encompasses coverage around the following themes:

(i) Embedded Systems
(ii) ES in IoTS
(iii) Microcontroller in IoTs
(iv) IoT technologies
(v) Biomedical applications
(vi) SPIN
(vii) SPIN based ES

Short Term Course
Embedded Systems & IoT
23-09-19 to 27-09-19

☆ TECHNORAX ☆

A platform is necessary to groom talent and deliver productive outcome. A plethora of students in our institution possess an appreciable amount of interest and skill in competitive scientific activities. Technorax provides a collection of competitions that caters to all the parts of scientific spectrum and commends them for their approach. Moreover, it helps them discover a new vantage point for their project.

☆ TECHNORAX ☆

Day one started with an inauguration of fest where the Director and CEO lit-up the lamp in the presence of Head of other departments as well as students. Our very first event T-HACKS 2.0 begin, where participants/teams were brought into their designated labs and the event was undertaken. Now Buckling up for TUG OF BOTS and the winner was Team Skull and first Runner up was Team Mechabot. Moving forward with our very last event of Day 1 TREASSURE HUNT, all the riddles were technically solved and chased down by the only team Team Pratyush.

Following day 1, Day 2 began with winding up T-HACKS 2.0 with a completion of 24 hr. Dr. Amitanshu Pattanaik from DRDO (Senior Scientist) and Ms. Neha Singh from Pepcoding as the judge for the 24-hour hackathon. The winner of T-HACKS was the Tech Wizards (Smart Plant Control), first runner up Team DeadHex (Automated Guns), second runner up FSociety (Drowsiness Detection). The Most awaited LFR RACE was commenced where enthusiastic participants showcast their skills and the winner were Carduino, first runner up Robogyan. Atlast with our very final event ROBOWAR we ended our TECHNORAX journey with the winner Team Mechabotsand runner up Team Robogyan.

What exactly IoT Is?

Imagine that things around you start sharing information in a smarter way to you. How would you feel if your alarm clock, knows your office location and path, knows traffic conditions and is learned enough to create an estimate of your arrival time and wake you up accordingly. No traffic on road, you can enjoy some more sleep. Wouldn't it be great if your umbrella updates you about the weather by beeping and tell you to carry it ?

Wouldn't you like to have hot coffee while you are on your way home just through an app?

It is a blend of Sensors(input), Processors(brain), Actuators(output) with the sweetness of internet. Electronics has become smaller and faster. Internet has become more simpler to use. And the degree of possessiveness of humans is ever increasing. That is why I feel that internet of things is on the cusp of explosion.

Every giant in the industry in all domains want to have IoT as a part of their organization. And the field is so vast that there is scope for all. To put everything in simpler words “Internet of Things will enable things around you to update their status on the internet”. There are over 7 billion people. There are over 1 billion devices on the internet. The amount of books/information if stacked on top of each other could take you to pluto and back 7 times ! IoT is just going to increase this exponentially. IoT (Internet of Things) is taking over the world in an unprecedented manner. It is all about bi-directionally connecting things to internet to create a smarter and more intelligent world, by building a grid of smart things. Here things can be anything including your toys, devices and even your people. Everything living or non-living is considered as a object\thing in IoT.

Data published by major research organizations predicts that there will be 25 billion devices connected to theinternet by 2020, you might be wondering it’s even more than the population on this earth. Yes just look around your table you can see your phone, Laptop and many other things of yours are already connected. What can be achieved with IoT: Connect with things: With the implementation of Internet of things in the real world there is High possibility to completely new way of interacting with things and learning about things. Suppose back home you have one study chair that you love and you are far away from home but you want to know is chair occupied by some? If yes who is that?. With IoT it is possible. Yes you must be wondering how it can be possible.

Here in IoT everything will be connected with the sensors and will have unique identity. These sensors will be continuously sending the data to the personal cloud to which you are connected. That's how you can know who is occupied your chair.

1. Isn't that excited and even you can know who has played your piano just before you and what song has been played.

2. Search for things: Forget about the searching google for the information, you can even search your things that are gone missed Just simple like "Where is my phone?"

3. Manage Things: According to the surveys 52% of the population is living in the cities. With the implementation of IoT we can manage Facilities to the citizens in much efficient way. IoT is no longer a buzz word in the web, It has been making a decent progress across the verticals and It's happening in the real world. Geeks and Technologists are already adapting and embracing the IoT in the form of wearable devices. Google glass and Apple watch, Mi's Health band are the well-known in the field and to say as example.

IoT can change our lives by connecting various types of devices, not just computers, tablets and communication devices to the internet, could lead to new ways of working with a wide range of systems, machinery, sensors, domestic, personal smart devices and what not anything can be connected. Scenarios that illustrates the impact of IoT:

1. Hospitals: Hospitals can monitor their patient's health collecting the data from the sensors connected to wearable devices like Health Band. From Apple to many other tech giants are already into this business. IoT can enhance the quality of patient care and health condition monitoring.

2. Future of Banking: With the wearable banking apps, Omni channel personalization and ability to detect fraud all we can say is IoT can redefine the future of banks through next generation services.

3. Smart grid: Smart grids which enables the more homes and building getting connected to the grid solving many problems that Electricity departments facing like power theft, also ensuring the High quality power and less black outs.

Therefore, Internet of Things has set its trend and is growing at a fast pace in the technological world and soon we shall witness ultra-modern innovations in this domain.

Mukund Aggarwal

Batch 2009-2013

Senior Firmware Engineer | Team Leader | Aritron Technologies

Papers published by ECE faculty in 2019-2020

Madhurima Sarkar, A Tri - Band Circularly Polarized Y-shaped Patch Antenna for Wireless Communication Application, International Conference on Computing, Power and Communication Technologies" (GUCON), 28.09.2018, published by **IEEE on 28.3.2019, pp. 992-996**.

Khushboo Verma, A Static Hand Gesture and Face Recognition System for Blind People, International Conference on Signal Processing and Integrated Networks (SPIN)",13.5.2019 published by **IEEE**.

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Manan Jani, Performance Analysis of a Mixed Cooperative PLC–VLC System for Indoor Communication Systems, IEEE Systems Journal, Vol. 14, no. 1, pp. 469-476, May 2019, (**Impact Factor: 4.463)**.

Khushboo Verma, Comparison of Two Design Methods of Triboelectric Nanogenerator for Building Efficient Energy Harvesting and Storage, **Springer**: The book series Lecture Notes in Electrical Engineering (LNEE) "Applications of Computing, Automation and Wireless Systems in Electrical Engineering" 1ST June 2019.

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Surender Kumar, 'COMSOL Multiphysics Simulation of Piezoelectric Sensor for Energy Harvesting from Railway tracks', International Journal of Recent Technology and Engineering (IJRTE), (Scopus),Vol. 8., Issue No. 2, pp 5446-5452, July 2019.

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Surender Kumar, 'Return Loss and Bandwidth Enhancement in Antenna Having Imperfect Ground Plane', Journal of Xi'an University of Architecture &amp Technology (scopus) , pp. 1104-1111, Volume XII, Issue V, 2020.(Impact Factor : 3.7)

Ankur Sood, 'BER Analysis of 60GHz Millimeter Wave over Free Space Optical Communication System', "IEEE International Conference on Signal processing & Communication, ICSC-2020, 5-7th March 2020.

Placements

Congratulations!

- Rahul Gupta
- Shilpi Sharma
- Smruti das
- Vaaneet kapoor
- Mansi Kaushik
- Ashish tripathy
- Ruchi Shrivastava
- Saurabh Saigal
- Tamanna Deb
- Ujjawal Srivastava
- Vishal Saini
- Vrinda Bajaj
- Yash Singhal
- Lakshya Rana
- Tushar Kajla
- Vrishabh Sharma
- Aishwarya
- Harshit Joshi
- Jagriti Bhutani
- Rahul Jhamb
- Abhijeet Roy
- Abhineet Rudola
- Aman Tanwar
- Jagriti Bothra
- Kriti Dhalla
- Muhammad Usmani
- Naman Jain
- Pankhuri Bhatnagar
- Sahil Khandelwal
- Shivanshu Sarin
- Tanmay Singh
- Zorawar Jaiswal

Placements

Cognizant

- Bhaskar Banerjee
- Aditya Sinha
- Varyam Singh
- Vasu Goyal
- Rohan Singh
- Vinay Kumar Verma
- Shivansh Malhotra
- Aman Puri
- Vrishabh Sharma
- Mankaran Singh Sikka

- Abhijeet Kr Roy
- Abhishek
- Ajay Kumar Rathi
- Aman
- Asjad Fahmi
- Avinash Kumar
- Ayush Dwivedi
- Bhavya Bhatia
- Deepak Sharma
- Deepak Negi
- Deepanshu Bansal
- Dhruv
- Gagan Naib
- Sonika Gupta
- Tanishq Varshney
- Tushar Kirar
- Tushar Gupta
- Gaurav Ranjan
- Jitin Kumar
- Lokesh Choraria
- Mehul Bachani
- Prashant Koli
- Rahul Garg
- Yash Kumar
- Ritika Panjwani
- Sakshi Raturi
- Sharon Samuel
- Shubham Singh
- Smruti Shree S Das
- Taruna Sharma
- Rishabh Aggarwal

CTL

Placements

- AVNEET KAUR BATRA
- BHAWNA SINGH
- GAURAV RANJAN
- KOMAL HALDUA
- LOKESH CHORARIA
- PREKSHA VATS

Vrishabh Sharma

- Aditya Gulati
- Isha Sharma
- Ritik Jain

Naman Rastogi

Manasvi Grover

- Utkarsh Jain
- Tanmay Singh
- Deepak Sharma
- Taruna Sharma

Placements

- Rakesh Kumar Khetwal
- Bhaskar banerjee
- Lakshay Sehgal
- Vrishabh Sharma
- Shivansh Malhotra
- Jatin Kapoor
- Vinay Kr Verma
- Bhaskar chandra joshi
- Nirbhay Kr Yadav
- Naman Rastogi
- Himanshu tuteja
- Arshad Ali
- Manasvi Grover
- Vrinda Bajaj
- Zorawar Jaiswal
- Priyanka Bhagat
- Rohan Singh

Autonomous driving in Asia is much more than a marketing claim

Vehicle autonomy technology in is no longer just science fiction but certainly the most talked about automotive sector nowadays. Ever since Google introduced its "driver-less" prototype in 2010, the entire automotive and electronics industry has taken a deep dive in an ocean done to full of technology upheavals, political and media skepticism. This is acclimatize drivers to this new way of "assisted" driving and eventually paving the way for "fully autonomous" mobility.

When it comes to "infrastructure readiness", the United States leads the way in pursuit of autonomous vehicles with four states (Florida, Nevada, Michigan and California) issuing carmakers the permit to test their "autonomous" on public roads. Not to be outshone, other countries have also jumped on the bandwagon. The government is supporting the implementation of driver-less cars and is reportedly in talks with Google. In Sweden, Volvo is planning to conduct trials involving 100 of its driver-less cars on the streets of Gothenburg in 2017 under the rubric "Drive Me". Australian government also concluded its autonomous car trial in Adelaide this year making it the first-ever project in Southern Hemisphere.

Singapore 'SMART' driver-less car: The entire city-state of Singapore is no larger geographically than Tokyo, and its population is both growing and aging. Add to this the worsening traffic congestion across urban regions, and it is clear why the government is keen on promoting self-driving cars that can move people around more efficiently and economically. A team in Singapore has successfully developed their own self-driving car prototype at under half the cost – just S$30,000 ($23,500) for two off- the-shelf LiDAR sensors and an onboard computer which are mounted onto a conventional vehicle.

Last year in October, a pair of modified golf carts made their debut in Chinese and Japanese Gardens in the western Singapore. Instead of a steering wheel, the carts sported a touch panel. Riders simply touched the panel to start the journey and the cart did the rest, steering around pedestrians and obstacles enroute to designated stops inside the park. The event was part of a test drive conducted by SMART, acronym for Singapore-MIT Alliance for Research and Technology in partnership with National University of Singapore (NUS). The SMART students team developing the autonomous vehicle is composed of NUS doctoral and professors from the university and from MIT. Provided all the legal obstacles are removed, SMART believes it can bring their prototype onto public roads in two years.

Nissan's vision towards ZERO fatality on roads :

At the 2018 Tokyo Motor Show, Nissan presented a glimpse into future as to what the convergence of electric mobility and vehicle autonomy could look like many years down the line. Nissan "most affordable laser scanners, 2013, Nissan showcased electric cameras, received with an advanced an car", all-electric "LEAF", Japanese driver assist calls it "Piloted Driving 1.0" is advertised as equipped with features such as a millimeter wave radar, high-speed computer chips, the which specialized HMI. Back in (ADAS) on public roads for the first time. Nissan allows highway traffic conditions. By 2018, a government approval to test its LEAF equipped system which and for autonomous driving under heavy the company hopes to implement a multiple lane piloted drive that can conduct lane changes on highways (level 4 autonomy). The Piloted Driving 2.0 system (yet to be formally announced) is far more sophisticated and includes multi-lane and city-driving capabilities, including the ability to smoothly maneuver around obstacles and be seen in any slower-moving vehicles (or stop for pedestrians). It won't production model for at least several years, although Nissan's chief Carlos Ghosn said that the technology will be ready by 2020, which is incidentally the same year when the Japanese car maker believes fully autonomous vehicles to hit the roads. Toyota Highway Teammate Toyota, unlike its rival Nissan, didn't focus much on autonomous cars during initial days stating "driver safety" as its priority. Although, Toyota has been working on automated driving tech since the 1990s, but it wasn't until2015 when Toyota made their first "tangible" push towards autonomous cars, a technology which it aims to commercialize before the 2020 Tokyo Summer Olympics. The company, on Oct. 6, conducted a test run of a modified driverless Lexus GS on Tokyo's Shuto Expressway. Dubbed as Highway Teammate, the concept vehicle used on-board technology to understand traffic conditions, make decisions about what maneuvers to make, including merging,maintaining or changing lanes and keeping distance between vehicles. It also uses roadmap data and multiple external sensors to recognize nearby vehicles and hazards, and select appropriate routes and lanes depending on the destination, the company says. Toyota will also invest more than 50 million USD in the next five years to establish research centers with both Stanford and intelligence and autonomous MIT universities, driving technology. towork on artificial Research at MIT will focus on "advanced architectures" that will let cars perceive, understand, and interpret their surroundings while Stanford will concentrate on computer vision and machine learning. It will also work on human behavior analysis, both for pedestrians outside the car and the driver.

Honda has not revealed any plans to bring autonomous cars in Asia. Honda's sr. Chief manager, Yoichi Sugimoto, who has been working on the technology since 1986, says it will be "at least" 2030 before a car can completely drive itself. Sugimoto says there are still too many variables — such as weather, pedestrians, cyclists and even animals that can run onto the road — and not enough computing power to process all the information fast enough, and then make the correct decision. However, Honda has been issued a license to test driverless car in California. For this the company has already secured a testing facility to the northeast of San Francisco in Concord, CA. Its autonomous vehicles are tested here before being put out on the road. Benefits and challenges It only takes to understand in coming a closer look at the ambitious plans of automotive OEMs and tech-giants how the autonomous cars will change mobility across urban cities for better days.

Public transit authorities and urban planners seem to believe that these vehicles could potentially autonomous vehicles could serve as new mobility modes to offer customized and demand-responsive transport services of dynamic routes within towns. An integrated network of driverless vehicles could include self- driving taxis and autonomous car-sharing that could address "first mile, last mile" issues. Most importantly, they could very well integrated with various smart city projects. Applications may include driverless ommercial vehicles that ply in the middle of the night to optimize road space (such vehicles are already being tested in the US). This would besides save manpower on drivers and minimize regulatory concerns and technological hurdles psychological traffic there are congestion. Several However, infrastructural and questions that are still unanswered. For autonomous vehicles to work well, roads, road signs and signals may need to be mapped or made intelligent. Thes e would involve costs. Who should pay for them: the owners of autonomous vehicles or the general tax-payers? Also, despite advancements in artificial intelligence, would driverless vehicles be able to make the right decisions in unexpected situations? Can they adapt and respond to the dynamic traffic conditions and interactions with other road users, like what human drivers can do? Could an autonomous vehicle make a value judgment between avoiding a pedestrian and causing harm to its own passengers? If both industry and governments can address these points, self-driving vehicles could become a common foresight in Asia.

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RACH Mechanism in LTE-Adv for M2M Communication

H2H communication is the key driving force for the breakthrough developments and innovations in the wired and wireless communication technologies. For the past few years, it has been witnessed that a huge number of active/passive network equipment shifting traditional interest of human centric communication towards self automated networks that are communications. Technique, such M2M designed technological H2H, independent for smart human communication computing up-gradation. As of is intervention, which is called M2M self-accessed automation environment to realize "Internet of Things" There are huge set of applications, far greater than the electricity network, remote security surveillance, health monitoring, intelligent transport system and many more. Beyond (4G) wireless technology, enabling such as Fourth-Generation LTE-Adv, network is designed efficiently in compliance to 3GPP recommendations to deliver smart decisions via interconnecting equipments. Congestion M2M communication scenarios communications, with is backward extremely optimized compatibility with to handle complex legacy H2H based such as video streaming, voice calls, online gaming, video/audio chatting, web surfing and social networking. Unlikely to H2H communication, M2M communication possesses different set of requirements and operable parameters. RANDOM ACCESS PROCEDURE 3GPP services and applications were initially planned to exploit H2H communication over different platforms. It is a random access channel that is the basic requirement for any cellular terminal to get a connection configuration with authenticated network.

This is generally known as random access procedure. Random access is not only used for initialization but also to facilitate state change when moving from idle to active after periods of immobility uplink. The RACH procedure consists of four steps

Step1: Random access preamble transmission: The first stage begins by the network for transmitting the a random access preamble, allowing the eNB (cell station) to guess transmission timing of the terminal. As part of this step, the terminal selects one preamble to broadcast on the Physical Random Access Channel (PRACH).

Step2: Random access response: The second stage begins by the network for transmitting a timing advance previous command to adjust user transmitter, based on the amount of timing in the step. To establish uplink synchronization, it also assigns uplink resources to the terminal that is to be used in next stage of the RACH procedure.

Step3:RRC Connection Request (Msg 3): The third stage begins with the transmission of the mobile terminal identity on the network with the uplink signaling channel (UL-SCH) similar to normal dataset.

Step4: RRC conflict Connection resolution Setup message (Msg 4): It begins with the transmission of a network of to the terminal on the signaling channel in the downlink (DL-SCH). 3GPP PROPOSED SOLUTIONS Research study shows that both M2M equipments and H2H devices continue to experience RACH congestion when multiple machine type communication (MTC) systems are involved. There are following five possible solutions offered by 3GPP to remove th bottleneck. Back off Specific Scheme: In this scheme, terminal back off time is kept far shorter than that of MTC depth devices. This is the way to find the possibility to restrict number of collision and of level congestion in the access network. Although, it is an impactful solution for low depth RACH but not suitable for RACH congestion is intermittent. It also causes accountable overload case where high level of delay in terminal connection, which is again not a desirable solution for applications where low latency is must. Access Class Barring Scheme (ACB): manage access The Access Class Barring is an efficient way to of MTC devices mainly when the network is congestion overloaded. There are 16 different classes are structured such that, AC0 – AC9 designated for normal UEs, AC10 is a predefined emergency service, AC11 -AC15 are meant for some specific services (security) with high priority applications. The time chosen by the UE, have a random value q for which $0 \leq q \leq 1$. If $q \leq$ broadcasted access probability, UE is produced with the RACH. If $q >$ broadcasted access probability, UE is kept excluded for AC limitation periods. Separate RACH Resources for MTC: When MTC devices use similar RACH resources that is of H2H devices, it will absolutely cause congestion problem. Thus, separating the RACH resources between possibility of H2H and M2M devices can reduce the congestion and eliminate the collision. In LTE system, the separation of RACH resources can be achieved by separating the preambles

into two subset: One for only MTC devices and the other one for H2H preamble devices, comprehensive study proposes two fold method: "Method 1" where completely divided in two subsets, each for H2H and MTC devices. The other method, called "Method 2" also divide the set into two subsets, however one subset is shared to the H2H/M2M client.

Dynamic Allocation of RACH Resources: In this approach, network attempt to estimate in advance, if overload caused by extreme access attempts by large number of MTC devices. It has ability to dynamically allocate additional resources for the RACH procedure. Slotted Access: In this approach, the dedicated access slots are defined and reserved for MTC devices. MTC devices can access the network at the beginning of predefined dedicated time slot. This means that MTC devices are not permitted for accessing the network every time it seeks but only to the Pull-based scheme: In the pull-based fixed and dedicated time slot. scheme, an MTC server requests to the attached eNodeB to broadcast page messages to all accessed MTC devices. Upon receiving a paging signal from RACH procedure. of paged devices the In eNodeB, this through authorized MTC devices started the initialization of centralized scheme, attached eNodeB can manage the number PRACH load and resource availability. However, this scheme seeks additional control channel resources to be deployed for paging huge number MTC devices.

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Editor

I am extremely delighted to introduce the latest edition of ECE Departmental technical magazine "LECTRON" for the session July, 2019 to July, 2020.

LECTRON provides you a perfect opportunity to immerse oneself in the technical developments of ECE DEPARTMENT as it gives you insights about the latest achievements in field of technology, placements, high quality publishing, original contributions & happening events from both i.e. faculty and students, point of view.

I would like to thank all the members of the editorial board for putting up such a brilliant piece of work within such a short span of time which included collection of data, compiling, proof reading, editing, checking plagiarism etc.

I would also like to thank all the people who have contributed in some way or the other towards the magazine release.

It will be highly appreciated if our team is provided with your valuable suggestions for the further improvement and enrichment of our upcoming volumes.

Student Editor

Maninder Bir Singh Gulshan

The three of us take great pride in presenting to you all the third edition of "Lectron" - Official Technical Magazine of the Electronics and Communications Department. Striving to outlive the expectations of all to make the college a better institution every single day. Thanking the department for providing us with this opportunity and all our mentors who helped us along in building this piece.