



INDRAPRASTHA INSTITUTE of
INFORMATION TECHNOLOGY DELHI




Electro Buzz

ECE Magazine
BI-ANNUAL
MAR-2021



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HOD MESSAGE

Dear readers,

I am happy to share with all of you the latest edition of the ECE magazine. What a year, this has been for all of us! A year racked with anxiety and distance, of courage and resilience. Hopefully, we will emerge wiser from these experiences.

This last year has been a period of remarkable innovations. Faculty have had to adapt their teaching and evaluation styles to suit the new online mode. We, in IIIT Delhi, can proudly say that we are perhaps one of the very few colleges in the country (or even across the globe) to carry out hardware labs in the online mode. Our newsletter describes some of the innovations, in this direction, in greater detail. Our students have adapted to attending virtual classes, writing online exams, carrying out group projects with geographically displaced team members, even while enthusiastically participating in co-curricular and extra-curricular activities. A special shout out to our ECE student driven clubs who have been extremely productive during this pandemic time in conducting a variety of training programs for all the students.

The department's focus on high quality research remains undiminished. Our faculty and their student collaborators have published, this last year, in top quality journals, won awards at reputed conferences and secured highly competitive grants. We have highlighted some of our research in this newsletter. Our colleague, Dr. Angshul Majumdar and our director, Dr. Ranjan Bose, from the ECE department have been recognized among the top 2% researchers among 7 million scientists in the world by the Stanford survey.

A campus without our students feels empty. All faculty colleagues are united by the desire to see the revival of our vibrant campus community with our students in labs, libraries, sports facilities and most importantly class rooms. We hope to see you soon.

Best regards
Shobha Sundar Ram
Associate Professor (ECE)
HOD (ECE Department)





FROM THE EDITOR'S DESK

Welcome to the 3rd edition of student run ECE magazine of IIITD. Looking back at our decision of reviving the ECE Department Newsletter in October 2018, we can proudly say that it was the right one and we couldn't be more proud to share it with you all.

Recollecting the journey to present, it sure was a tough one. As we were working on the logistics of the magazine, Covid-19 happened and everything came to a halt. 2020 has been an unprecedented year due to Covid-19, which unfortunately continue to spread across the globe affecting millions of lives till date. Colleges, schools, offices were forced to shut down and suddenly our lives shifted to online-mode which has been a new experience for all of us. However, technologies played a keen role during this pandemic by opening all new avenues to learning. Colleges and schools started using technologies to adapt the situation. This new style of teaching was challenging for both teachers and students and we really need to commend ourselves how we all rose to the occasion. Meanwhile, nature continued to heal itself. The water quality of Ganga improved remarkably, and resulted in a dropdown in the emission level of pollutants in the air.

Inspired by Mother Nature, we didn't let Covid dampen our spirits and the entire team, constantly encouraged by Ms Sanjna, continued to meticulously work for ECE Newsletter and, I am grateful to everyone involved in making this edition of the ECE Newsletter an astounding success. I feel really honored to present to you, **the ECE Newsletter** which we have now commenced as **ECE Magazine**.

I would love to conclude by saying that: *Engineer is someone who gets excited about small things no one else cares about and solve problems you didn't know even existed. It is to us, engineers, to provide the structure upon which the entire order of the world stands.*

I am sure you will have a wonderful experience while going through this new edition of magazine. Happy Reading!....

Thank you all

Khalid Lodhi
ECE (Final Year)
Former Student Council (2019-2021)

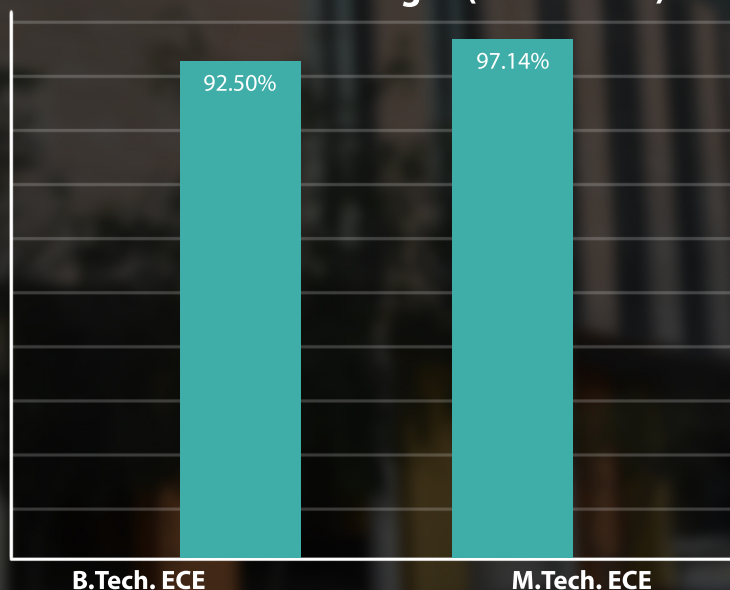


Placement Statistics

Total Companies



Placement Percentages (2019-2020)



RESEARCH HIGHLIGHTS

1. EXPLORING NANOSCALE DEVICES FOR FUTURE APPLICATIONS

Metal Oxide Semiconductor Field Effect Transistor (MOSFET) has been used for decades in the semiconductor industry. However, due to continuous downscaling, the device dimensions have reached to 10's of nanometers. At such small dimensions, the scaling of the threshold voltage and supply voltage in a MOSFET based device is difficult. This may lead to high leakage current and high power consumption. This in turn, results in the well-known phenomenon of "Dark Silicon". Therefore, the exploration of novel devices that can complement MOSFET has become important. Certain devices such as Negative-Capacitance FET (NC-FET), Impact Ionization MOS (IMOS), Tunnel Field Effect Transistors (TFETs) etc. are being explored.

However, TFET has attracted a great deal of attention as an alternative to MOSFETs at nanoscale device dimensions. The main reason for the same is that a TFET can exhibit subthreshold swing below 60mV/dec at room temperature. This lower subthreshold swing makes the scaling of threshold voltage possible in a TFET. It makes TFET suitable for low voltage and energy-efficient circuit applications. The application of a TFET in circuits is challenging due to the high ambipolar current, low ON-state current, high threshold voltage and delayed saturation in the output characteristics. Out of these, the ambipolar current and low ON-state current are major problems restricting its use in circuit applications. Therefore, we are working on TFET to solve these problems or make the TFETs useful in circuit applications.

Publications:

1. S. Banerjee, S. Garg and S. Saurabh, "Realizing Logic Functions Using Single Double-Gate Tunnel FETs: A Simulation Study," in IEEE Electron Device Letters, vol. 39, no. 5, pp. 773-776, May 2018. doi:10.1109/LED.2018.2819205

2. S. Garg and S. Saurabh, "Improving the Scalability of SOI-Based Tunnel FETs Using Ground Plane in Buried Oxide," in IEEE Journal of the Electron Devices Society, vol. 7, no. 1, pp. 435-443, 2019. doi: 10.1109/JEDS.2019.2907314

1. S. Banerjee, S. Garg and S. Saurabh, "Realizing Logic Functions Using Single Double-Gate Tunnel FETs: A Simulation Study," in IEEE Electron Device Letters, vol. 39, no. 5, pp. 773-776, May 2018. doi:10.1109/LED.2018.2819205

2. S. Garg and S. Saurabh, "Improving the Scalability of SOI-Based Tunnel FETs Using Ground Plane in Buried Oxide," in IEEE Journal of the Electron Devices Society, vol. 7, no. 1, pp. 435-443, 2019. doi: 10.1109/JEDS.2019.2907314

2. RECONFIGURABLE WIDEBAND SPECTRUM SCANNER

Next-generation wireless networks such as 5G aim to follow the revolutionary path of spectrum sharing to offer a wide range of additional services including enhanced local broadband, high-speed multimedia, mission-critical control, private networks such as Industrial IoT. To support these services, 3GPP has proposed a new radio (NR) which is expected to operate not only in the licensed spectrum but also in the shared (2.3 GHz Europe / 3.5 GHz USA) as well as an unlicensed spectrum (2.4 GHz / 5-7 GHz / 57-71 GHz global). To meet the desired quality of service, latency, interference and efficiency constraints, the central controller needs to allocate suitable spectrum resources from the wideband spectrum to every NR. To achieve this, the central controller should scan the wideband spectrum to identify the available spectral bands. Furthermore, we expect beamforming to be a de facto standard in future generation wireless networks. Hence, for supporting the services of upcoming wireless standards, there is a need to do scanning over a wideband angular spectrum (WAS).

The existing WAS scanning techniques suffer from two limitations: 1) Hardware resources required for scanning is proportional to the maximum possible number of transmissions in the spectrum, and thus leads to inefficient utilization of hardware. 2) Perform contiguous WAS scanning which is not required as some parts of the spectrum such as ISM, radar and military bands are not available due to high traffic, quality and security constraints. Our research work aims to develop a computationally efficient WAS scanning algorithms and architectures.

To achieve this, we propose multi-play multi-armed bandit (MP-MAB) and sub-Nyquist sampling framework for wideband spectrum scanning. By learning the spectrum occupancy statistics, such DRL algorithms reconfigure the mixing function that will aid in selecting a part of the spectrum which has a high probability of being vacant. Another task for the proposed MP-MAB algorithms is to find an optimal number of scanning bands which is a nontrivial task.

In addition, since our research work also includes spatial sensing which can be done by estimating the direction of arrival of transmissions present in the sensed spectrum, the research work also focuses on the designing of a receiver architecture which is independent of the number of transmissions present in the spectrum. The last and important part of the research work is to validate the functionality of the proposed reconfigurable wideband spectrum scanner in the real radio environment. This is achieved by developing a hardware testbed consisting of USRP- RIOS, octo-clock and multiple antenna-array arrangement. Here, we explore both uniform linear antenna array which restricts the scanning of transmissions to the number of antennas in the antenna array and sparse antenna array which allows scanning of a higher number of transmissions than the number of antennas. Following image shows the proposed hardware testbed of a reconfigurable wideband spectrum scanner.

Readers may refer <https://radarmimo.com/?p=1966> for the more details of the proposed hardware testbed. The research work is done in collaboration with Radar Group, SnT, University of Luxembourg and supported by an NI academic research grant.

Publications:

1. H. Joshi, S. J. Darak and A. A. Kumar, "Low-Complexity Reconfigurable and Intelligent Ultra-wideband Angular Sensing," in *IEEE Systems Journal*, Jan. 2020. (Early Access)
2. H. Joshi, S. J. Darak, A. A. Kumar and R. Kumar, "Throughput Optimized Non-Contiguous Wideband Spectrum Sensing via Online Learning and Sub-Nyquist Sampling" in *IEEE Wireless Communication Letter*, Jan. 2019.
3. H. Joshi, M. A. Kerahroodi, A. A. Kumar, B. S. M. RamaRao and S. J. Darak, "Learning based Reconfigurable Sub-Nyquist Sampling Framework for Ultra-Wideband Angular Sensing" in *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Barcelona, Spain, May 2020.

3. WIRECOMM LAB(WIRELESS AND RADIO COMMUNICATION)

The upcoming fifth-generation (5G) wireless standard has been envisioned for serving a large number of devices consisting of smart sensors, autonomous vehicles, standalone devices, massive machines, etc., connected via a wireless network. This massive connectivity leads to severe spectrum crunch, also due to the increase in energy consumption it raises significant environmental and economic concerns such as radiation hazards and escalation of fuel costs of electricity. Hence, spectral efficiency (SE) and energy efficiency (EE) are two of the crucial performance metrics while designing and evaluating the performance of the 5G wireless network.

Further, for the upcoming 5G wireless standards, a new kind of waveform that can support various new technologies such as Device-to-Device (D2D), Machine-Type communication (MTC), internet-of-things (IoT) etc.. These technologies create bursty and short duration traffic that requires robustness against the time-frequency synchronization requirements.

Moreover, the upcoming 5G standards have to be low latency based and support for high data rates for crucial public safety communication. However, the fixed infrastructure of the wireless network is vulnerable to disasters. Hence, in our group, we are developing novel frameworks for unmanned aerial vehicles (UAVs) based flying base stations to establish connectivity in disaster-affected areas.

IN THIS LAB, WE ARE WORKING IN THE FOLLOWING DOMAIN:

1. FULL-DUPLEX COMMUNICATION: HIGHER SE
2. DEVICE-TO-DEVICE (D2D) COMMUNICATION: MASSIVE CONNECTIVITY
3. ORTHOGONAL TIME-FREQUENCY SPACE (OTFS) MODULATION: HIGH MOBILITY APPLICATIONS
4. UAVs AS FLYING BASE STATIONS: DISASTER RESILIENCE NETWORKS
5. WIRELESS RF ENERGY HARVESTING: WIRELESS SENSOR NETWORKS, HIGHER EE
6. 5G WAVEFORMS - WOLA-OFDM AND OTHER

Publications -

1. Mohd Hamza, V. A. Bohara, P. Aggarwal and A. Srivastava, "Energy Efficiency Evaluation for Downlink Full-Duplex Nonlinear MU-MIMO-OFDM System with Self Energy Re-cycling," in IEEE Systems Journal
2. Mohd Hamza, V. A. Bohara, P. Aggarwal and A. Srivastava, "On EE-SE Trade-Off for Downlink Full-Duplex MISO Systems with Self-Energy Recycling," 2019 IEEE 89th Vehicular Technology Conference (VTC2019-Spring), Kuala Lumpur, Malaysia, 2019, pp. 1-5.
3. Mohd Hamza, V. A. Bohara, P. Aggarwal and A. Srivastava, "Spectral Analysis of WOLA-OFDM in the presence of DPD and HPA," 2020 Twenty-Sixth National Conference on Communications (NCC), Kharagpur, 2020, pp. 1-5.
4. M. Peer, V. A. Bohara and A. Srivastava, "Real-World Spatio-Temporal Behavior Aware D2D Multicast Networks," in IEEE Transactions on Network Science and Engineering, 2019.

4. EEG AND NEUROSCIENCE

The human brain is one of the most complex and fascinating components of human life. It works 24/7 and continuously consumes, re-wires existing data, and consolidates all information into a real experience. Understanding its behavior and underlying drivers requires a comprehensive understanding of its structure and function. One of the many ways to explore this complex functionality of the brain is through Electroencephalography (EEG). It records the electrical activity through electrodes positioned over the scalp and reflects how neurons communicate with each other to develop a response. The Signal Processing and Biomedical Imaging Lab (SBILab), headed by Prof. Anubha Gupta, is actively exploring the area of human electrophysiology through EEG as a brain-imaging modality to study the neurocognitive processes linked to human behavior. The lab is equipped with multiple EEG acquisition systems, related-tools, and enthusiastic research staff to facilitate this research. Ekansh Sareen, Research Assistant at SBILab, is working on various in-house and collaborative projects on EEG from various perspectives like biomedical signal processing, brain connectomics, cognitive neuroscience, and brain-computer interfaces.

His primary research work includes exploring functional brain connectivity markers in intellectual developmental disorders. He is also spearheading collaborative projects in investigating functional connectome fingerprinting with MIP-Lab at EPFL, Switzerland, and inter-brain synchronization in virtual reality environments with the University of Queensland and the University of Auckland. Lakshya Singh, Researcher at SBILab, is working on developing deep learning models for motor-imagery classification inspired by brain connectivity fundamentals. He is also jointly working with Ekansh on a new collaborative research project of SBILab with AIIMS, New Delhi to develop a deployable diagnostic tool for profiling depression and predicting antidepressant response by EEG.

Furthermore, Mansi Saxena, a Young Scientist at SBILab is working on exploring the healthcare technologies that can be designed using BCIs and assistive technologies like orthotics and rehabilitative training devices to aid individuals with motor deficits.

Publications:

E. Sareen, L. Singh, A. Gupta, R. Verma, G. Krishnaveni Achary, and B. Varkey. Functional Brain Connectivity Analysis in Intellectual Developmental Disorder during Music Perception. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 28(11):2420–2430, 2020

I. Gumilar, E. Sareen, R. Bell, A. Stone, A. Hayati, J. Mao, A. Barde, A. Gupta, A. Dey, G. Lee, and M. Billingham. A comparative study on inter-brain synchrony in real and virtual environments using hyperscanning. *Computers and Graphics*, 94:62–75, 2021

E. Sareen, L. Singh, B. Varkey, G. Krishnaveni Achary, and A. Gupta. EEG dataset of individuals with intellectual and developmental disorder and healthy controls under rest and music stimuli. *Data in Brief*, 30:105488, 2020

M. Saxena, E. Sareen, and A. Gupta. Understanding functional brain activation using source localization of EEG signals in motor imagery tasks. In *2020 International Conference on COMMunication Systems NETWORKS (COMSNETS)*, pages 58–63, 2020



CONGRATULATIONS TO ECE STUDENTS FOR DEANS' AWARDS 2020

ASHUTOSH BANSAL
SWAPNIL BANSAL
KHALID LODHI
KARTIKEYA GUPTA
SETU GUPTA
PRAKHAR SHUKLA
NISHANT MISHRA
SAMARTH SINGHAL
ADWITEEYA CHAUDHARY
LAVANYA VERMA

SHUBHI SINGHAL
VIPIN
DEEPANKAR AGGARWAL
PUNEET YADAV
SIRIPURAPU VENKATA SAI
HRITIK GOEL
ROHITH RAJESH
MADHUR KUMAR
NAOREM EDISON SINGH
PALAKSH PATHAK

TEACHING EXCELLENCE AWARDS 2020 TO ECE FACULTY MEMBERS



DR. ANUJ GROVER



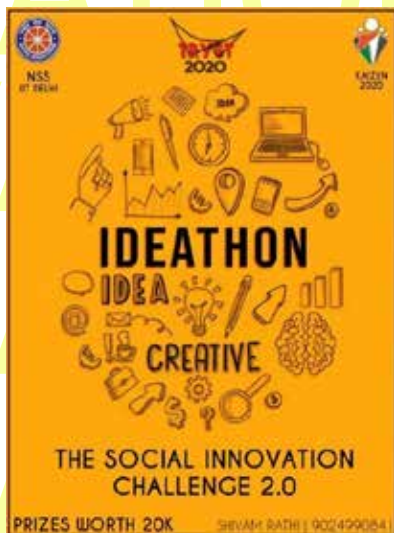
DR. SAKET ANAND



DR. SNEH SAURABH



DR. SUMIT J. DARAK



SMART WALKING STICK

Kaizen, the annual social festival of NSS IIT Delhi is a platform to recognize the continuous improvements in our society initiated and accelerated by the combined efforts of all socially motivated student bodies and NGOs across India and abroad. Interaction and opinion sharing is the prime focal point of Kaizen. In the event Innovate for elderly Social Innovation Challenge 2.0, IIIT-Delhi students Arjun Raj and Raghu.P.K participated, our team Ignited Mindz presented a prototype of a smart walking stick-"Sahayak". Total 8 teams were selected for the final round and out of which we bagged the first prize.

Remote Hardware Labs in Covid

An Experiment at IIIT Delhi

Most of the universities around the world quickly moved to online teaching after the lockdown due to

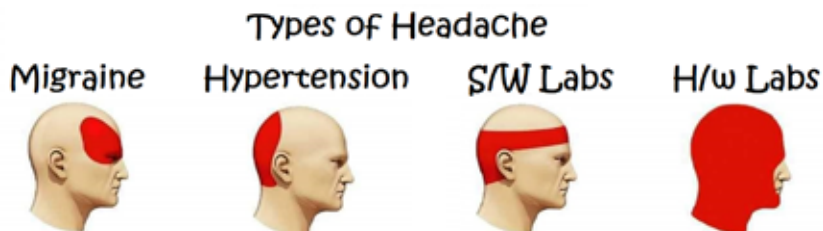
covid-19 pandemic. At IIIT Delhi, the switch was not difficult since most of the courses involved software-based projects and assignments. However, as IIIT Delhi offers hardware courses where students build complex embedded systems during weekly labs, facilitating the same in online mode was a challenging task. Over the years, students find the hardware component of courses, a bit difficult and time consuming which means we must make sure that students do not succumb to the excessive workload during these difficult times. Our team at Algorithms to Architectures Lab worked throughout the summer to identify various solutions for remote hardware labs and implemented the same during the Monsoon 2020 semester. Here we present some of our experiences, challenges and suggestions based on ECE270: Embedded Logic Design (ELD) Course with 92 students.

The ELD course has three lectures and 2.5 hour lab per week and we try our best to keep the lecture and lab contents in sync with each other. For lectures, video recordings were shared before each session and students found that the overall ELD course was very well organised in its theoretical aspects. In the beginning, course instructor, Dr Sumit J Darak, informed that all the labs will be conducted remotely and there will not be any compromise on the learning outcome.

To enable the same, IIITD ECE Lab took the responsibility of providing a 24/7 remote access to FPGA and SoC boards. For students with low-end laptops, dedicated desktops were also provided throughout the semester.

The hardware

servers were set up so that students can program the board remotely and



verify the functionality on their laptop via logic analyzers. To help the learning, the classes and the labs both were kept in sync with each other from the beginning of the course. The teaching fellows (TFs) and teaching assistants (TAs) also worked exceptionally hard and pushed themselves to clarify our doubts. IIIT Delhi's academic section also realized the workload at the instructor-end and helped us significantly by allocating additional TAs to support remote labs.

The instructor, TAs, and TFs held regular office hours (there was at least one office hour per day) and often provided the necessary debugging help outside their office hours whenever needed. The lab handouts provided to students were too detailed and were more than enough to understand the concepts and complete the lab. For better understanding, we could always watch the labs' pre-recorded videos (around 60 mins per week), which were also very detailed. To reduce the workload, lab homework was removed and students were asked to complete the lab and appear for Viva every week (around 92 vivas were conducted in each week). Most of the students appreciated the idea of taking vivas as it ensured that the students take the labs seriously and only the honest and hard-working student gets the marks.

However, we all know with everything right; there are always limitations and a room for improvement. To understand student's experiences and feedback, we (student volunteer details shared below) gathered suggestions from the rest of the ELD students. Most of the students agree with the fact that more number of boards could have been made available. For the students who use MacOS, the VIVADO software was not supported on their laptops, thus, pulling them back a little in the learning aspect. As there were a limited number of boards available for the students to work on, multiple students operated on the same board simul-

taneously, leading to incorrect results and creating a state of confusion. There could have been better commu-



nication among the students itself to avoid usage of the same board by multiple users at the same time to prevent chaos and confusion. As the complexity of the lab increased during the last few weeks, students got frustrated due to unavoidable glitches in remote access, other deadlines and increased workload. Thus, existing solutions for remote hardware access needs to be improved further. More importantly, students missed the opportunity to work on the hardware physically and explore integration of various sensors and displays.

One interesting suggestion was to create live video demonstrations from ECE labs but this was not possible since TAs/TFs were working from home. Another suggestion is to plan additional lab sessions as and when campus opens. Indeed the ELD labs had their ups and downs, but we appreciate that the ECE department did not choose the easy path of dropping the hardware labs because the labs were vital and integral to a student's learning experience.

Written by:

Dr. Sumit J Darak (Associate Professor and
Chair: UG Affairs, ECE, IIIT Delhi)
Madhur Kumar (IIITD ECE 2nd year)
Samyak Gupta (IIITD ECE 2nd year)
Prashant Singh (IIITD ECE 2nd year)
Samaksh Gupta (IIITD ECE 2nd year)
Saksham Gupta (IIITD ECE 2nd year)
Tushar Agarwal (IIITD ECE 2nd year)
Divin Dominic (IIITD ECE 2nd year)
Mohd. Siraj Ansari (IIITD ECE 2nd year)
Rishi Singhal (IIITD ECE 2nd year)

STUDENT INTERVIEWS

Alumni Student
Dr. Parag Aggarwal



Full Time
Employed @



Q. How did you know that you wanted to do a PhD?

When I was in M.Tech, my future prospects were in Academics and my seniors told me that doing a PhD is a must if I wanted to become a good Assistant Professor and hence the decision.

Q. Tell us about your research area.

My research's main domain is Wireless Communication with focus on 4G and 5G standards. I am just realising how different types of proposed wireless techniques perform in real life.

Q. How did IIITD's college environment help you in your research area and what kind of opportunities did it give you?

I would not like to compare IIITD with any other college, but with respect to academia, it is one of the best colleges in India. In many ways like financial support, admin support, and even with respect to research, IIITD is a great place to be at. The staff is willing to listen to your problem. Also, the best part is unlike other colleges which provide stipend after every 6 months, we get our stipend at the end of each month which makes sustainability easy.

Q. What changes you would like to see in the college, especially regarding the ECE department?

Since I came here in 2014, there have been a lot of changes in the ECE department. Even though there is always room for improvement, there isn't any major change which I would suggest. My request to students from both B.Tech and M.Tech is to not compare ECE with other computer science departments as all branches are at par. Therefore, I want students not to worry about placement and focus on their core courses. Also, don't run behind grades only! Go for the skills as well.

Q. What advice would you like to give B.Tech students for pursuing higher studies?

Since my B.Tech days, I knew that I wanted to be an academic and hence I needed to go beyond B.tech. So do not go for higher studies just because you are bored or aren't getting a job. First choose your dream, what you want to do in the future and then make choices. If you want to pursue a PhD, you have to emotionally prepare yourself because a PhD is not a cakewalk. A lot of people end up not completing their PhD which leads to a negative impact on their career.

Q. What motivated you to take ece and what project you are working on right now?

The culmination of both software and hardware which the other branches didn't have and my wish for hardware to be a big segment of my study, is why I pursued ECE. Currently, I'm working on an independent project which is the intersection of nonlinear control and multi-agent systems under the guidance of Dr. Sayan Basu Roy. We show how a closed-loop model reference adaptive control is better than an open-loop one. I have also applied for a PhD position in the field of Control Spaces and Dynamics and I am waiting for the responses.

Q. Given there are so many lines that one can take after undergraduation, how do you propose to make a wise decision?

Till my third year, I had no idea to pursue which field. Following my interest in Robotics, so I started my BTP thesis in Multi-Agents System under Prof. P B Sujit and kept working on it after 2nd year. In my 3rd year, the course of Non-Linear Controls under Dr. Sayan Basu Roy really fascinated me and it was then that I knew it was the right field for me to pursue as it is a culmination of Mathematics, Multi-Agent Systems and Robotics.

So my advice to the juniors is to see if there is a project working, go and get briefed by the professor and if it excites you then work on it with as much interest you can. You may not develop a liking to the field but you will grow nonetheless. You can't wait for a field to excite you because that may never happen. Trying different fields is the best way to make better and informed decisions.

Q. What changes in the ECE department do you wish to happen?

There are a number of changes I have to suggest. There is a common notion that ECE students don't get good enough placements but we don't see why that happens. The reality is that why should one take all courses in Signal Communication or VLSI when only 2-3 companies come for them in comparison to CS oriented companies. As you can see, there is not enough incentive. Nowadays, one has to be a proficient coder to get a good placement but what happens is that the courses of 2nd year make ece students a dull coder and drifts them apart from the cs branch students. So courses like ADA and Discrete Mathematics can be introduced to 2nd year ece students so they don't lose touch with coding.

RAGHAV GOEL



B.Tech [Class of 2020]

Q. Looking back to your experience at Carnegie Mellon University do you think you grew as an individual after that?

Yes, those 3 months during past summer (refers to summer of 2019) at Carnegie Mellon University were a great memorable experience for me. Working in that environment with all facilities available and being with like minded people makes you think research is really fun. They make sure that you also devote your time to co-curricular activities, sports and having fun with your peers. It is such a grounding experience to talk with them as they never flaunt away despite achieving so much in their life. So I really think that every ECE student should try to get a foreign intern for 3 months after 3rd year summer, everyone should have that experience. It serves as a great reality check.

Q. We all know what a great athlete you have been for our college. Any tips on how to strike the right balance between sports and academics at IITD?

So sports being a big part of my life, I had decided from my first year that I cannot stop playing sports. So I had to find a way to balance studies and sports. I found out that revising some of the concepts immediately after the class saves a lot of time for you and you don't have to start revising from scratch. These 15-20 mins of revision and time management for each course, which is like 1 hour for 3 courses a day leaves you with ample time to follow sports and then all you need to do is prioritise things.

Q. Can you share any recent project or research you are working upon?

The current research work is a part of my thesis under the guidance of Dr. Sanjit Kaul. In this, we have looked for scheduling policies in order to maintain timeliness of data in a given system setting which deals with time sensitive data (for eg. an IoT network). The metric which seeks freshness of data from recipient point of view rather than just maximizing/ minimising the throughput/ delay of the network is termed as Age of Information (Aol). Currently, we are looking at how Aol can be useful in dealing with systems having stationary nodes (sensors) providing information updates.



What motivated you to pursue your present field?

I think my present specialization, Communication and Signal processing, is a good amalgamation of communication theory, signal processing, basics of math, probability and statistics and programming. My inclination towards communication system networks and probability & stats, gave me a chance to then narrow down my interest area and at the same time have diversified knowledge. Again, there are a lot of research opportunities in communication system networks, for instance, in cyber physical systems or 5G networks which intrigued me to continue my work.

Q. There is a huge disparity in the average package of a ECE undergraduate and of a ECE postgraduate. any views on that!

Since postgrads specialize in a certain field, they tend to look for specific job opportunities in core ECE companies (VLSI, Wireless communication, Signal processing). On the other hand, most undergrads get offers from Computer Science and various other domains. Undergrads who wish to keep working in core ECE generally go for higher studies. Therefore, the basic skill set possessed by post grads and undergrads is different. So, I feel the comparison is not that unjustified.

Q. What changes do you think can be brought about in the ECE department?

I believe that students, due to lack of communication, are unable to find some good courses that are offered and are unaware of what all faculty is there in the department. So, faculty student interaction should happen more often than now.

On the other hand, I think the department provides many ways to help students in figuring out what they want to do at IIIT-D by offering a good number of courses, guest lectures and workshops. We even have a Faculty-Student mentorship program where one faculty is assigned to each student with whom he/she can discuss academics or how one should go about while looking for research topics.

Q. Given the opportunity to become a TA, how excited or scared are you? anything you look forward to?

I see TAs as an opportunity to improve upon something we already have knowledge of. Additionally, it facilitates interaction and exchange of knowledge with other post grad and undergrad students. It can be a bit scary at first for the reason that you don't want to teach something that is not correct.

SUGANDHA BAJAJ

M.Tech
VLSI & Embedded Systems)

Q. What motivated you to pursue VLSI and embedded systems and why did you choose it over other fields? Can you share any recent project or research you are working upon?

I've always loved to play with microcontrollers to try out different things, which eventually did make me explore visible light communication setups. I chose VLSI and embedded systems because it is something I can actually be curious about and work into more interesting projects. My current work is aligned towards implementation of AI algorithms in heterogeneous platforms and also SRAM design for ML. As I am an ece person, I have an edge over other people for knowing hardware basics and by learning ML for my research, I created a niche domain which only certain people can fill up. My project started from training an algorithm for video activity recognition for low power applications (embedded) and eventually led me into exploring the memory design for the same.

Q. What is the best thing you find about the IIITD and any changes you think could be brought about?

IIITD is undoubtedly one of the best institutes in India, it not only has the best faculty but an aura of belongingness for students. Best in class facilities and updated curriculum makes us industry ready with a right amount of research abilities. Change is part of living, our college is constantly evolving to be better each day, so as of now, we need no particular changes.

Q. What other activities do you look forward to in college life or your hobbies?

I was really overwhelmed when our new sports complex was inaugurated, since then I've been enjoying facilities like gym, badminton, basketball etc for my personal health. Because, a healthy mind requires a healthy body. I would highly recommend anyone joining our college to maintain a thorough balance between academics and hobbies.

Q. Nowadays it has sought to become a trend among students to take CSE branch only and take other branches when they have no other feasible option. Any message for those who take ECE?

There's no harm in opting for CSE branches but only if it excites you not because someone said it has more opportunities. There's a wise saying that if you are capable enough, you make your own way. For anyone who is choosing ECE over CSE because they feel more connected to it, just like me, you'd definitely make your way. Technology always requires people who have a knack for creating and not some degree, so always put value into what you learn rather than what you score.

Q. Can you recommend any other learning opportunities outside the college for our young readers?

For anyone who enjoys reading, Quora and Medium are best platforms to gain a good amount of knowledge and also give back to society by putting out your own thoughts. Also, Coursera is a good place to learn anything you need beside your curriculum, which definitely helps you to have an edge over others. Another thing which has helped me a lot is reading a lot of self help books like Power of subconscious mind, rich dad poor dad, four hour work week etc., learning is not only limited to what you study but also to what you become as a human being.



OPPORTUNITIES FOR STUDENTS

- >> EADS Innovation Works by Airbus
- >> COMSNETS Conference (COMMunication Systems and NETWORKS)
- >> INAE Young Engineer Award INAE Innovator Entrepreneur Award
- >> National Level Paper Presentation organized by IEEE

- >> Conference on Cognitive Radio Oriented
>> Wireless Networks (CROWNCOM)
- >> Marie R. Pistilli Women in Engineering Achievement Award by the Design Automation Conference (DAC)



- >> DSA Workshop organized in association with coding blocks (May 2019)
- >> IEEE DSC Conference (12th-13th October 2019)
- >> DSA Workshop organized in association with coding blocks (January 2020)
- >> IEEE CodeNoon- A Coding Contest (February 2020)
- IEEE Session by President of IEEE US, James M Conrad



ELYSIUM

IEEE-IIITD's TechWeek

A team that was full of enthusiasm put their mind & soul and worked immensely hard for approximately 3 months to create something which was appreciated by the Student Community across India & Abroad that connected with us.

During this pandemic, Elysium'20 came to the rescue of many, who were sitting around their homes getting frustrated with the monotonous routines.

- 7 Keynote Talks & Interactions by Eminent Speakers (including a Senior NASA Scientist, Highly Respected Researchers & Professors)
- 12 Technical Events & 8 Non-Technical Events A Big Project & Research Showcase with 50+ Presentations and proposals .
- Total Participation of **3500+**
- **150+ Colleges & 200+** Clubs across India
- Participants from **18 Countries** and
- 45 members of Team Elysium, putting in everything to create all of this.

Elysium'20 was appreciated by participants from both Tech & Non-Tech Community, we would like to congratulate all those who helped us catalyse the spirit of supporting events even during these difficult times.

Team Elysium is grateful to everyone for appreciating and motivating the Elysium'20 team to create this virtual TechWeek! We don't know how successful we were, yet we'll say we came far-far down the road, and we made thousands of students happy. We believe that is some sort of success.





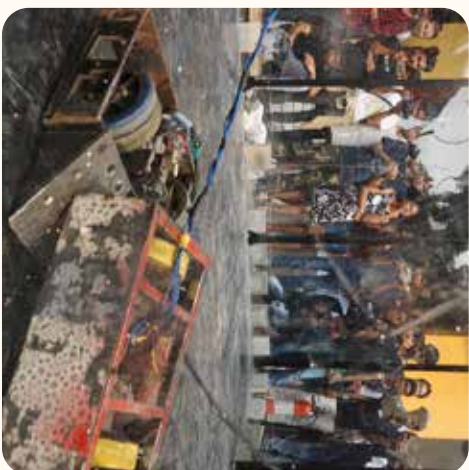
ESYA'19 TECHFUSION

A wide array of events are held every year in ESYA.
ESYA was held on 23-24th of August 2019.

Arjun Garg and Durvish Singh were Head of ECE events which are as follows:

- >> **ROBOWARS**- Organised by Setu Aditya, Ayush and Huzaif, it consisted of duels of robots made by different college student teams in a cage.
- >> **CIRCUITRIX Jr.**- Organised by Mayank, Arjun and Sanchit, it consisted of a quiz and circuit making challenges for school students
- >> **ROBORACE**- Organised by Saugat Barwa and Harsh Sonkar, it was about the fastest bot to cover all the hurdles and cross the finishing line will stand as the winner
- >> **ROBOMAZE**- Organised by Daksh Thapar and Chhavi Kirtani, it is a time bound autonomous bot based challenge arena wherein the participants are required to complete a given maze in given time
- >> **ROBOSOCER**- Organised by Vipin, it is a team manual bots which can score goals as well as defend their own goal line.
- >> **CIRCUITRIX SR.**- Organised by Khalid Lodhi and Piyush Ranjan Sahoo, it is a quiz and circuit making challenge for college students.





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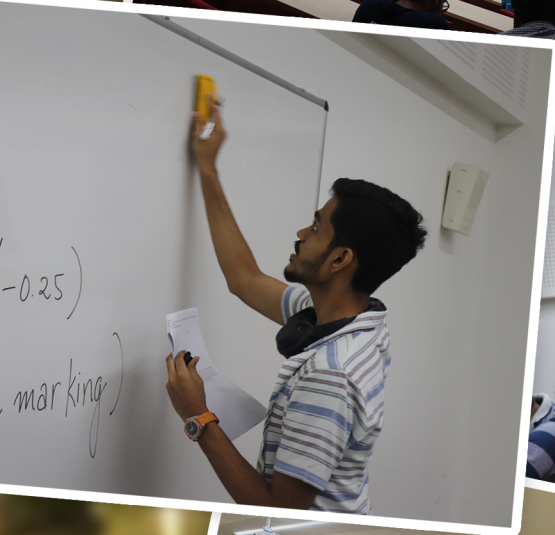
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INDRAPRASTHA INSTITUTE *of*
INFORMATION TECHNOLOGY **DELHI**

ElectroBuzz

ECE Magazine
BI-ANNUAL
MAR-2021

