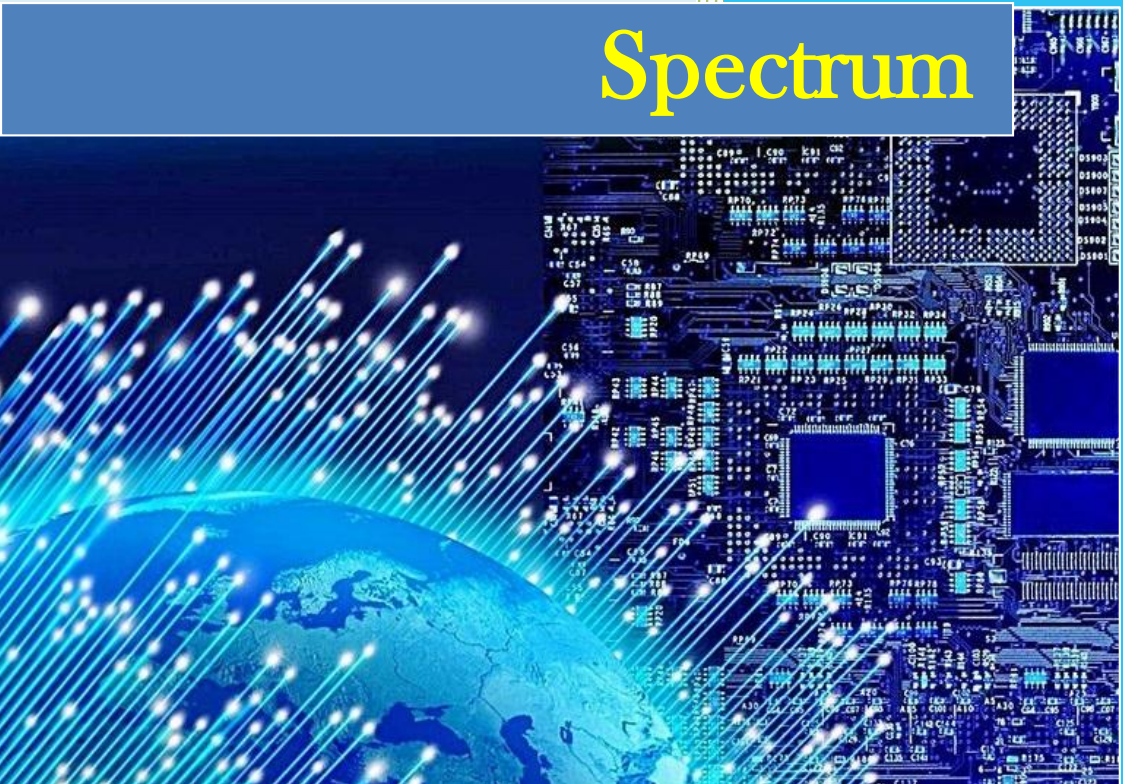


Department Newsletter Cum Student Magazine

Spectrum



Volume 2, Issue 1
July - December, 2020

Department of Electronics & Communication Engineering
Institute of Technology, Nirma University,
Sarkhej-Gandhinagar Highway,
Ahmedabad 382 481

Vision of the Department

To lead in developing cutting-edge knowledge & technology and producing globally competent professionals in Electronics and Communication Engineering

Mission of the Department

To shape technically competent, analytical, creative and problem solving Electronics and Communication Engineers capable of meeting industry challenges and societal needs

To foster a conducive environment for multidisciplinary research and innovation

To encourage faculty and students to achieve excellence in the profession and to grow as ethical and socially responsible leaders

Preface

Department magazine is a symbol of vibrancy of any active department. Department of Electronics and Communication is one of the most vibrant departments on the campus of Nirma University. We are happy to present the second volume of our Newsletter 'Spectrum'. The current issue covers the various activities witnessed in the department during July 2020 to December 2020. The current COVID pandemic has imposed many challenges on the operations of education systems. In such tough situations, the department of Electronics and Communication has continued its progress and has proved its commitment and dedication towards the betterment of the student community. The second issue of 'Spectrum' covers all such activities organized in the department in the odd semester of 2020.

Department has enthusiastically organized the expert lectures in online mode and the students also have participated actively in all the lectures. The major achievement of the department is the organization of webinars on a variety of subjects covering various aspects of EC engineering. The involvement of the alumni members in the growth is a key achievement of the EC department. Continuing the tradition, the alumni members have also contributed their latest research in form of articles for the current issue of the newsletter. Department has demonstrated their keen interest in the field of research and has bagged three externally funded major research projects even in the era of the current pandemic. The collective efforts of students and faculty members in the research publications are also showcased in the current issue with the other achievements.

The student body is an integral part of any progressing department. The Electronics and Communication Students' Organization (ECO) also has continued their efforts in organizing various co-curricular and extracurricular activities in the pandemic situation. The students of department won various awards at national levels in various activities and brought laurels to the department. Such achievements of the last six months, student articles and photographs clicked by the students are also part of the current issue.

We will continue the legacy and will come up with the next issue covering all the aspects of EC department in the future as well.

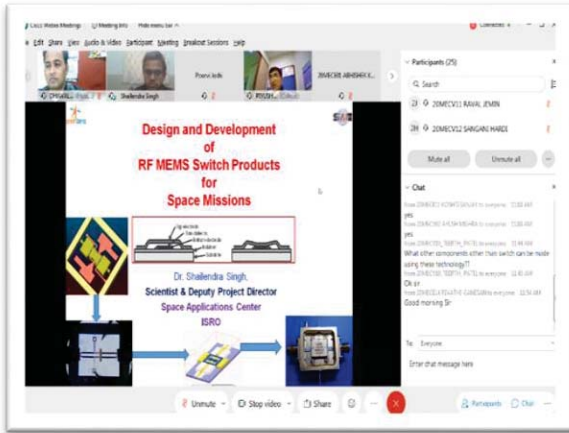
Prof. Akash Mecwan

Prof. Hardik Joshi

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Activities at the Department

GUJCOST sponsored Two-Day National Webinar on “Micro-Electro Mechanical System (MEMS) Design”

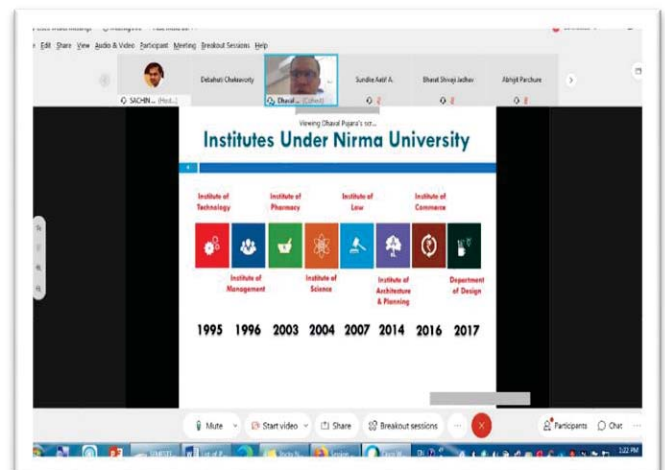


A Two-Day National Webinar on “Micro-Electro Mechanical System (MEMS) Design” was organised during November 28-29, 2020 through WebEx platform. This webinar was partially funded by the Gujarat Council on Science and Technology (GUJCOST). All the sessions in this webinar were conducted by the renowned experts from Industry and Academic Institutes. The registration of the webinar was open for engineering students of UG, PG and PhD program, faculty members and industry personnel across the nation. More than 30 participants from different regions participated in this National level seminar. The

webinar was coordinated by Dr Piyush Bhatasana and Dr Dhaval Shah from Electronics and Communication Engineering Department, IT-NU.

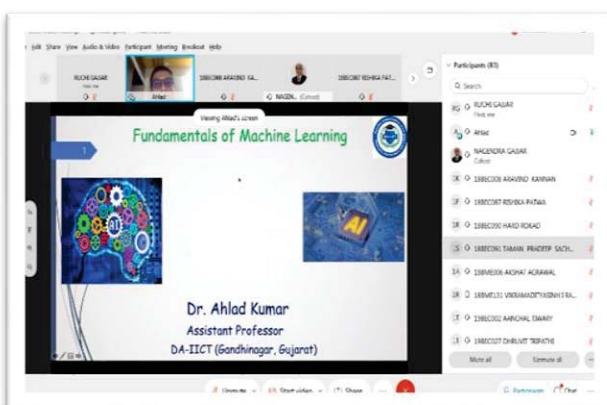
GUJCOST sponsored Online Short Term Training Programme (STTP) on “Digital Era Tools for Teaching, Learning and Research”

The Department of Electronics & Communication Engineering, Institute of Technology, Nirma University organised online Short Term Training Programme (STTP) on “Digital Era Tools for Teaching, Learning and Research” during November 23-27, 2020. The Gujarat Council on Science & Technology (GUJCOST) sponsored the five-day online STTP through the WebEx platform. The experts from the reputed Academic Institutes and Research Organisations conducted all the sessions in this programme. Dr Dhaval Pujara and Dr Sachin Gajjar from the Department of Electronics and Communication Engineering



coordinated the STTP. During the programme, apart from the lectures by the experts, there were hands-on sessions on various ICT tools on teaching, learning and research.

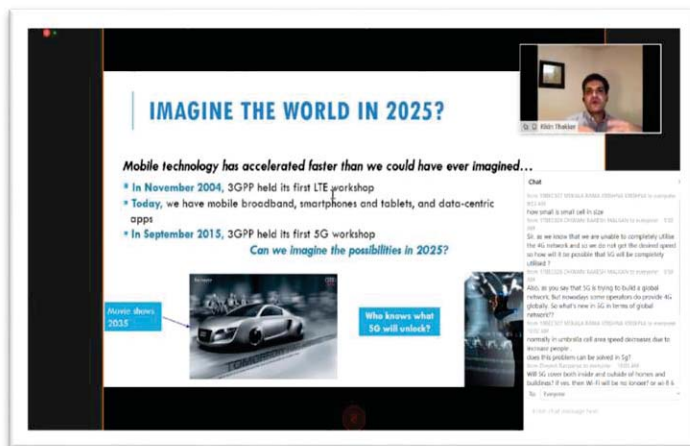
GUJCOST sponsored National Workshop on “Machine Learning using MATLAB”



A National workshop on “Machine Learning using MATLAB” was organised on Nov 07, 2020. This one day workshop was sponsored by GUJCOST and was conducted through online mode using the WebEx platform. All the sessions in this workshop were conducted by experts from Industry and Academic Institutes. The webinar was coordinated by Dr Ruchi Gajjar and Dr Nagendra P Gajjar from Electronics and Communication Engineering Department, IT-NU.

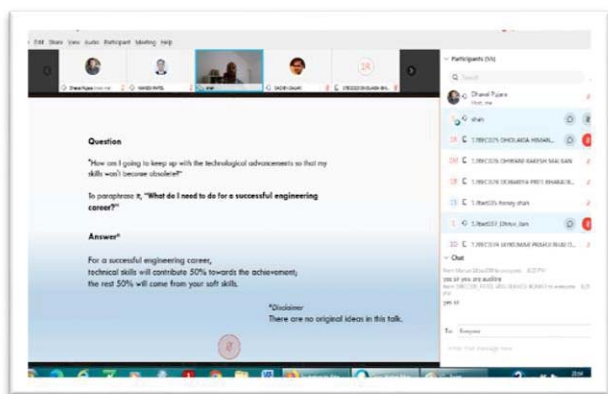
Webinar on “Why 5G matters for your career?”

The Department of Electronics & Communication Engineering organised a webinar on “Why 5G matters for your career?” by Dr Rikin Thakker, Faculty at ECE Department, University of Maryland, USA. Dr Rikin is also an alumnus of the Department of Electronics and Communication Engineering, Institute of Technology, Nirma University. He is considered to be the world’s top 5G expert and has nearly 20 years of experience in the field of cellular and wireless communications.



The session was held on September 5, 2020, from 09:00 to 10:35 am on the Cisco Webex platform for the students of BTech EC, Semester V, and VII in which 135 students and faculty members participated. The session was mainly focused on the currently evolving 5G technology. The speaker covered topics like the need for a 5G network in the industries, drawbacks of 4G LTE, interesting statistics highlighting the opportunities for EC engineers in 5G technology, the basics of 5G and 4G LTE, the speed and features of 5G, the data rate from 2G to 5G evolution, the international standardization regarding wireless communication, which is decided by ITU (International Telecom Union) like IMT-2000 (ITU’s umbrella name for 3G), IMT-Advanced (LTE), IMT-2020 (Pathway for 5G).

Webinar on “Lessons from My Professional Engineering Career”



The Department of Electronics & Communication Engineering organised a webinar on “Lessons from My Professional Engineering Career” delivered by Mr Viral Shah on August 29, 2020, from 08:30 to 10:00 pm. Approximately 55 students and faculty members participated in the session.

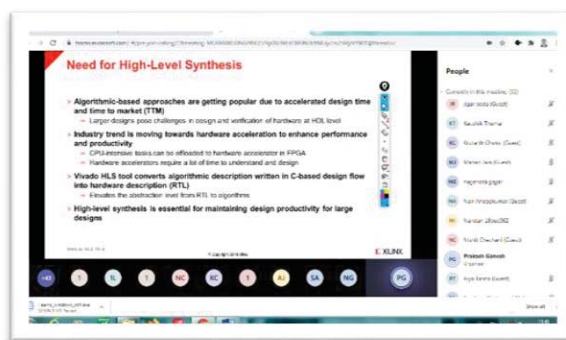
Dr Dhaval Pujara, HoD of the EC Department briefed the audience about the objectives and the outline of the webinar. For the first part of the talk, Mr Viral presented his thoughts on future technology areas. He

stressed upon the development of soft-skills. The lecture was quite interesting and interactive. The feedback from the participants was very overwhelming.

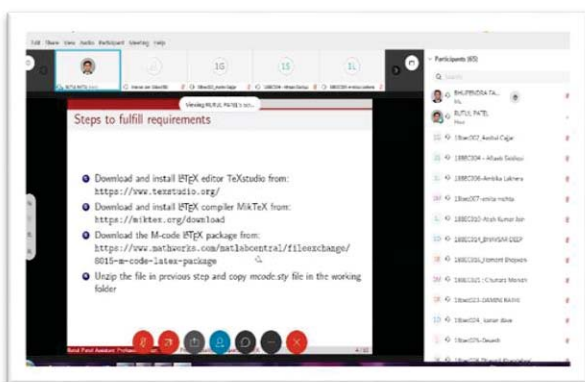
National Conference on “Recent Advancements in Materials science And Nanotechnology (RAMAN)-2020”

Nanotechnology is one of the emerging technologies of the world that approaches many frontiers of human lives nowadays. There is ample scope of improvement in the current techniques and technologies of Nanotechnology. The materials science nanoscale is going to revolutionise the current electronics, machines, and their designs, optical and mechanical sensors, chemical and their reactions etc. Considering the importance of this technology, during the Silver Jubilee Year of Institute of Technology, the National Conference on ‘Recent Advancements in Materials science And Nanotechnology (RAMAN)-2020’ was organised Online via Google Meet by the Department of Electronics and Communication Engineering, Nirma University, Ahmedabad during July 30- August 01, 2020.

Organisers received support from various national agencies such as the GUJCOST, and DRDO for its execution. Dr Suddhasatwa Basu (Director, IMMT (Bhubaneswar) was the Chief Guest of the event. Approximately 145 abstracts of research were received out of which with after 40% rejection ratio, 88 abstracts were selected for the presentations. The invited talks were delivered by the prominent academicians and scientists abroad and India. During the conference, various eminent professors delivered their invited talks including Prof Robert Pullar (University of Aveiro, Portugal), Prof Nandu Chaurse (Pune University), and scientists Dr Brahmananda Chakraborty (BARC, Trombay) and Dr Sudhindra Rayaprol (UGC-CSR, BARC). The participants of the conference belonged to various reputed institutes of the nation including IIT (Delhi), IISc Bangalore, NIT Arunachal Pradesh, SVNIT (Surat), PDP (Gandhinagar), etc. RAMAN-2020 has publication MoU with Materials Today Proceedings: Elsevier and the selected manuscripts after the peer review process will be recommended for the publication.



Webinar on “Preparing Technical Reports with LATEX”

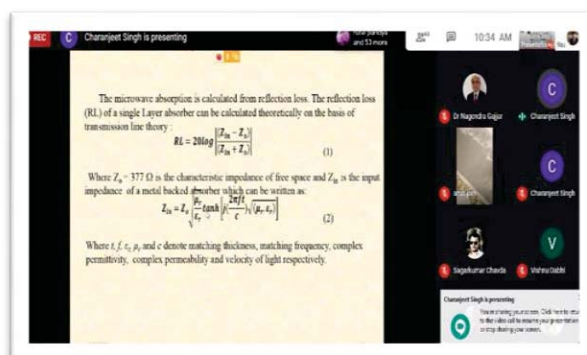


The Department of Electronics & Communication Engineering organised a webinar on “Preparing Technical Reports with LATEX”. The session was held on August 01, 2020, from 11:30 am to 12:40 pm on Webex for the BTech EC, Semester V students. Approximately 70 students participated in the webinar. The sessions were conducted by Prof Rutul Patel in support with Dr Bhupendra Fataniya and Prof Hardik Joshi.

The necessary guidelines were shared with the students before the session. The session was divided into two parts, in which the first part was a demonstration and the other had hands-on exercises. The demonstration was shown by Prof Rutul Patel, which covered inserting symbols, equations, figures, tables, and MATLAB codes in a technical report. During the demonstration, the queries of the students were responded by Prof Hardik Joshi. In the hands-on session, students were asked to implement a piece of a document having symbols and mathematical expressions. This exercise created interest among the students. The queries were satisfactorily answered by the faculty members. The feedback from the participants was overwhelming.

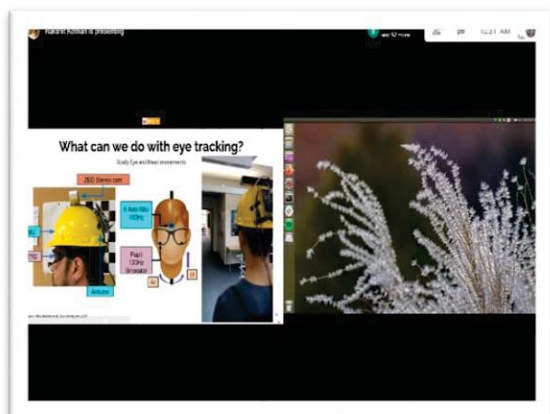
Webinar on “System Design Flow on Pynq-Z2 Board using Vivado High-Level Synthesis”

The Department of Electronics & Communication Engineering organised a webinar on, “System Design Flow on Pynq-Z2 Board using Vivado High-Level Synthesis” on July 30, 2020, from 01:30 to 03:45 pm for the students of B Tech EC, Semester V who opted for the new elective course on, ‘System on Chip Design’. The experts Mr Prakash Ganesh, Mr Sandeep Chidanand, and Mr Hemant Kumar from Coreel



Technologies, Bangalore delivered this webinar. The webinar was coordinated by Dr N P Gajjar and Dr Manish Patel.

Webinar on “Eye-tracking – An Application of Computer Vision and Machine Learning”

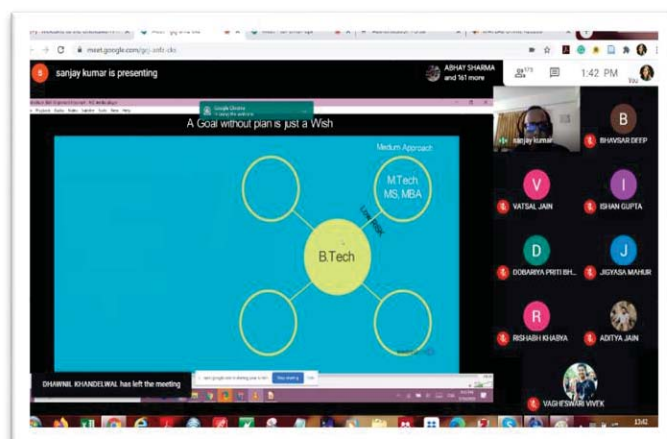


The Department of Electronics & Communication Engineering organised a webinar on the topic, ‘Eye-tracking – An Application of Computer Vision and Machine Learning’ on July 26, 2020, from 10:00 to 11:20 am on Google Meet by Mr Rakshit Kothari, the alumnus of the Department of ECE who has done his Master’s degree in Electrical Engineering from the Rochester Institute of Technology, NY. Mr Rakshit Kothari is a computer vision and eye tracking researcher and is pursuing doctorate at the Rochester Institute of Technology (RIT). The webinar was attended by approximately 55 students and faculty members.

Online Orientation Programme

The Department of Electronics and Communication Engineering organised a two-days Online Orientation Programme for the students of B Tech, Semester III, V, and VII. The introductory talk was delivered by Dr Dhaval Pujara, Head of Department, briefing the students about the programme objectives, and the expected outcomes.

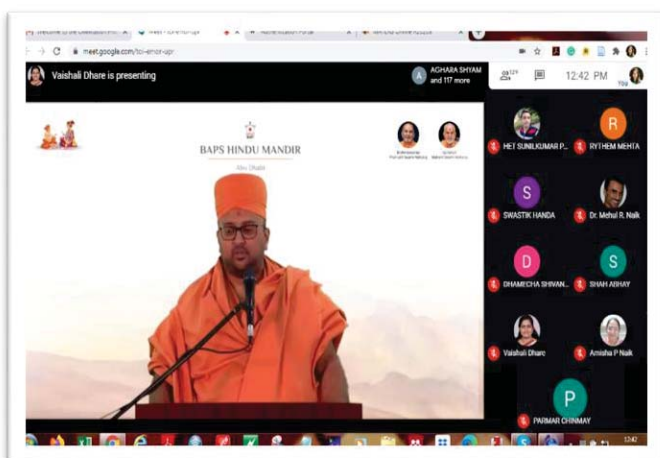
In the first session, the students were divided into two groups. The first talk for the students of Semester III was delivered by Dr N P Gajjar, Professor, Department of Electronics and Communication Engineering on ‘Dynamic Learning for Bright Future’. He shared his experience with the former batches of EC in terms of their career and placements. The parallel session for the students of semester V and VII was taken by Mr Kathan Shukla, a 2014 Graduate from Nirma University who then pursued Masters



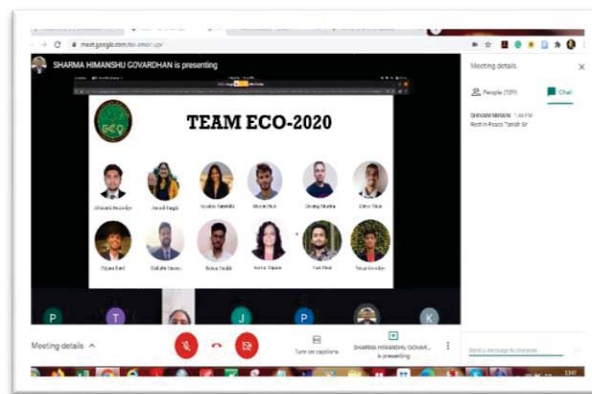
in Computer Engineering from the Arizona State University. Currently, he is working as a Software Engineer at Google in Silicon Valley.

The second session was delivered by Sadhu Shri Akhsratit Ji, UAE-BAPS. He gave a talk on ‘Exploring Horizons’ and discussed the important pillars for managing life, i.e. managing self, managing others, managing time and managing work.

There were two sessions post-lunch break and the students were again divided into two groups. The first session for semester III students was delivered by Dr Akash Mecwan, Assistant Professor (EC) along with the student members of the ECO (a student body of Department of Electronics and Communication Engineering).



In a parallel session for semesters V and VII students, Shri Sanjay Adhikari, Founder, Embedkari talked about “Case Study of Current Industry Skills and Possible Alignment with Industry Program”. The last session for the first day was delivered by Dr Parth Vaishnav, Consultant Psychiatrist & De-addiction Expert, Samvedna Happiness Hospital, Ahmedabad on ‘The New Normal – the Life Change after COVID Outbreak, the Stress, and Depression’.



The second day of the Orientation programme started with a talk on ‘Online Teaching and Learning through Cisco Webex’ by Prof Sachin Gajjar and Prof Rutul Patel and the faculty members from the Department of ECE, Nirma University. Prof Vaishali Dhare and Prof Tanuj Gupta explained, ‘Moodle – Introduction to Learning Management System’. Mr Rakshit Goyal, Mr Shivang Dalal, Ms Aditi Bhatnagar (Alumni of EC) motivated the Semester III students with their deliberations on the topic ‘Little Things to Know, Before Stepping In’. The parallel session for the students of semester students was delivered by Mr Parimal Govani, Scientist, SAC-ISRO (Alumnus-ITNU) on the topic ‘My Contribution and Journey with Indian Space Programme’.

Webinar on “Journey from Nirma B. Tech EC to Apple USA”



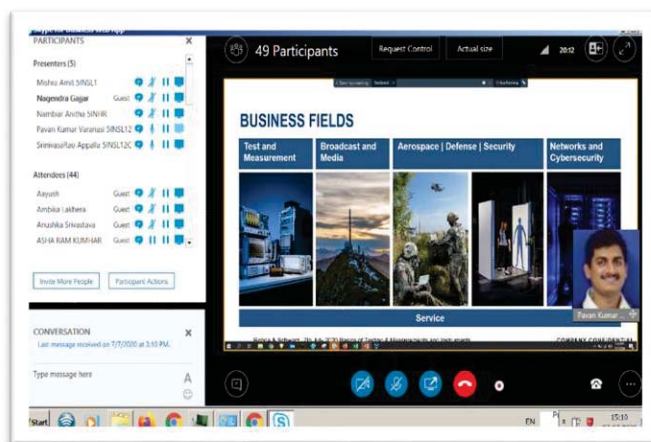
The Department of Electronics & Communication Engineering organised a webinar on “Journey from Nirma B Tech EC to Apple USA” was delivered by Mr Bhavin V Nayak, the alumni of 2014 batch of BTech EC from Institute of Technology, Nirma University) on July 10, 2020, from 8.30 to 11 pm. It was attended by 106 participants including the Head of Department of Electronics and Communication Engineering The EC students of semester V and VII and the current students doing their internships in final year benefitted the most by this webinar. The webinar started

with a brief speech on the sad demise of Dr Tanish Zaveri. Dr Dhaval Pujara, Dr Mehul R Naik and the speaker of the webinar Mr Bhavin Nayak paid tributes to him and a two-minute silence was observed.

At the beginning of his talk, Bhavin shared the list of subjects which shaped and changed his career. Some of them were – Fibre Optics Communications, Embedded System, DSP, Computer Architecture and Multimedia System. Bhavin’s key experiences during his BTech in Nirma University were doing an internship in the SAC-ISRO and doing side projects in Image Processing. While doing his internship at the SAC-ISRO, he was guided by Dr Tanish Zaveri. Bhavin was able to contribute to the Mars Orbiter Mission of the ISRO by his project Colour Image Processing Pipelining. Bhavin pursued his MS from Arizona State University (2014 – 2015). The webinar was concluded with Bhavin expressing his gratitude to be invited as a speaker for the webinar. Dr. Dhaval Pujara and Dr Mehul R Naik appreciated Bhavin’s efforts and expressed their desire to remain in touch with him for conducting future webinars for imparting his knowledge.

Webinar on “Basics of Testing & Measurement and Instruments”

The Department of Electronics and Communication Engineering organised a webinar on “Basics of Testing & Measurement and Instruments” for faculty members, PhD scholars, laboratory assistants, and students on July 07, 2020. The session was held through Skype by Rohde & Schwarz. The Coordinators of the programme were Mr Amit Mishra, Assistant Manager-Rohde & Schwarz, and Dr N P Gajjar, Professor - EC, Nirma University. The introductory talk was delivered by Dr N P Gajjar briefing the audience about the programme, objectives, and expected outcomes. A total of 50 participants attended the webinar. The agenda of the webinar was mainly focused on testing and measurement of various equipment.



Expert Lectures Arranged by the Department

Mr. Pranjal Shrivastva, delivered lecture on “Little things to know before stepping in” to B.Tech semester III on July 17, 2020.

Mr Parimal Govani, Scientist, SAC - ISRO, delivered lecture on “My contribution and journey in SAC” to B.Tech semester V on July 17, 2020.

Mr Kaushal Buch, Senior Engineer at the Giant Metrewave Radio Telescope, delivered lecture on “Signal processing in radio telescopes” to B.Tech semester V and VII on August 11, 2020.

Mr Pranav Joshi, Sr. Engineer, E-infochip, Ahmedabad, delivered lecture on “Advances in verification of VLSI design” to B.Tech semester VII on August 28, 2020.

Ms. Prachi Patel, Research Scholar at Columbia University, delivered lecture on “Brain computer interface” to B.Tech semester V on August 28, 2020.

Mr Manoj Parmar, Sr. Innovation Expert, Robert Bosch, Bangalore, delivered lecture on

“RTOS” to B.Tech semester V on September 02 and 15, 2020.

Ms. Vandna Dhingra, delivered lecture on “Roadmap to engineering” to B.Tech semester III, September 3, 2020.

Dr. Rikkin Thakkar, Faculty at ECE Department, University of Maryland, USA, delivered lecture on “Why 5G Matters for your carrier” to B.Tech semester III, V, VII on September 5, 2020.

Dr Sejal Saha, Associate Professor, Department of CSE, Kaziranga University delivered lecture on “Runtime IoT sensor data analysis and visualization in cloud computing environment” to B.Tech semester VII on September 5, 2020.

Mr. Dhaval Upadhyay, Scientist, SAC, ISRO, delivered lecture on “Fundamentals of satellite navigation” to B.Tech semester V on September 6, 2020.

Dr Biswajit Misra, Professor DAIICT Gandhinagar, delivered lecture on “Low power

design issues” to B.Tech semester VII on September 10, 2020.

Dr. Deepak Kumar Panda, Applications of Deep learning in Self Driving Cars, delivered lecture on “Applications of deep learning in self driving cars” to B.Tech semester VII on September 10, 2020.

Dr Shyamal Kumar Das Mandal, Professor, IIT, Khrapur, delivered lecture on “Speech signal processing” to B.Tech semester VII, Multimedia elective on September 19, 2020.

Mr Rachit Patel, delivered lecture on “Cross-domain application of embedded systems” to B.Tech EC semester V on September 29, 2020.

Dr. Ashish Chittora, BITS Goa, delivered lecture on “Design and applications of microwave components” to B.Tech semester VII on September 29, 2020.

Meera Bagdai, Application Engineer, Xilinx, Hyderabad, delivered lecture on “Digital design & timing analysis” to B.Tech semester V on October 1, 2020

Nikunj Naliyapara, Senior Engineer (Level 2) - ASIC Verification, eInfochips, Ahmedabad, delivered lecture on “Verilog HDL: digital design and simulation” to B.Tech semester III on October 1, 2020.

Dr Nihar Mohapatra, Associate Professor, IIT Gandhinagar, delivered lecture on “MOS transistor basics” to B.Tech Semester V on October 1, 2020.

Prof. M P Gururajan, Professor, IIT, Bombay, delivered lecture on “Research paper writing” to B.Tech Semester V on October 5, 2020.

Krishna Patel, Engineer, NXP, Pune, delivered lecture on “Perl applications” to B.Tech semester V on October 10, 2020.

S. R. Mahadeva Prasanna, Professor Dean at IIT Dharwad, delivered lecture on “Speech signal compression and processing in MPEG Audio” to B.Tech semester VII on October 19, 2020.

Dr Yash Vasavda, DAIICT Gandhinagar, delivered lecture on “Error control coding” to B.Tech semester V EC on October 22, 2020.

Funded Research Projects

Project Title: Growth and Characterization of Nano-Structured thin films of Magnetic materials for high speed computer memory cell

Principle Investigator: Dr. Chetna Chauhan

Co - Investigator: Dr. N M Devashrayee

Funding Agency: Gujarat Council on Science and Technology, Department of Science and Technology, Government of Gujarat

Sanction Amount: Rs. 25,35,500/- (Start Date: September 2020)

Duration: 3 Years

Scope of Project: Ferromagnetic materials exhibits a spontaneous magnetization at room temperature. Their spontaneous magnetization disappears above Curie temperature T_c also called as critical temperature. The most important ferromagnetic substances consist of double oxides of iron and other

oxides called ferrites. These ferrites are ceramic ferromagnetic materials, which are composed of ferric oxide, (α - Fe_2O_3 , hematite) and have been considered as highly important electronic materials for more than half century. Their crystal structure is cubic in shape and belongs to that of mineral spinel ($MgAl_2O_4$). The crystal structure of hexagonal materials allow the



substitution of various metallic ions which affects the magnetic properties of the hexagonal ferrites like, the coercive field, the magnetic anisotropy, the saturation magnetization and changes the magnetic property of the materials. In addition, due to their excellent dielectric properties, ferrites have the advantage of low loss and high power handling capacity as compared to that of semiconductors. Ferrites are the magnetic dielectric materials that absorbs the electromagnetic waves, thereby initiating electromagnetic interaction between the wave and the magnetization within the material. This interaction has been used for the manufacturing of useful devices. In the present suggested project, highly pure barium hexaferrites and strontium hexaferrites will be synthesized by wet chemical methods like heat treatment and co precipitation techniques. The main objective of the proposed project is thin film deposition of hexaferrite/composite material to have negative value of K (Magnetocrystalline anisotropy constant) and low tangent loss. To develop the pure barium and strontium hexaferrites and study its important properties such as structural, magnetic and dielectric with various experimental techniques. The data generated for the electrical and the magnetic properties of the material in the form of the thin film on silicon substrate will be useful to fabricate high computing devices, radiation shielding and microwave devices.

Project Title: Development of Autonomous Reconfigurable Load Carrier

Principle Investigator: Dr. Akash Mecwan (EC), Dr. Mihir Chauhan (ME)

Co - Investigator: Dr. Dhaval Shah (EC), Dr. Bhupendra Fataniaya (EC), Dr. Jatin Dave (ME)

Funding Agency: Gujarat Council on Science and Technology, Department of Science and Technology, Government of Gujarat

Sanction Amount: Rs. 17,32,500/- (Start Date: September 2020)

Duration: 3 Years

Scope of Project: Modern era is driven by the industrial automation and robotics. For the in house movements of goods and materials, the industries prefer the autonomous robots. On the railways stations and Airports, the manual trollies are



available for the movement of luggage. In the day to day life, physically disabled people use the wheel chairs. In all the stated applications the autonomous or semi-autonomous machines are available in the market. The common problem with all the available solutions is that they can perform the given action on the single floor environment only.

There are no autonomous machines available, which are capable to climb and descent the stairs in multi-storey buildings. The research aims at the design of a platform which can climb and decent the staircase without disturbing the load put on it. The platform can be human controlled and can be autonomous also when required. The platform will be designed to carry maximum of 150 KG load on almost any kind of staircase. The platform can be used for carry the goods or the material in the industry environment. The platform can be converted to the trolley for the movement of the luggage at public transport stations. A wheel chair used for physically disabled can also be mounted on the platform. The platform will be equipped with obstacle avoidance algorithm to provide the safety while transporting in the autonomous mode. The proposed research encompasses the different disciplines of engineering. The mechanical design and stability of the system will be taken care by the mechanical engineering area. The precise control of the machine comes under the area of Electronic. The algorithms to avoid the obstacles are part of research under Image and Video Processing.

Project Title: Development and Testing of NavICSuite: Processing Software Tool for NavIC Receiver

Principle Investigator: Dr. Sachin Gajjar

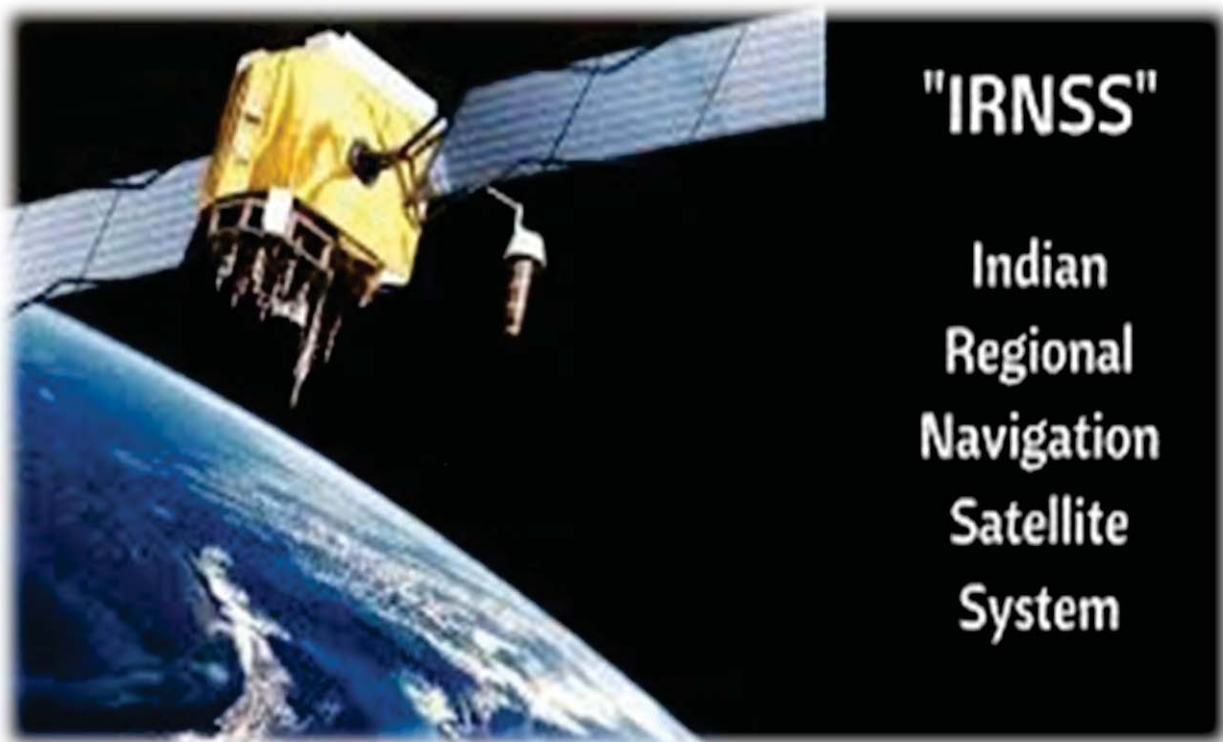
Co - Investigator: Dr. Manisha Upadhyay

Funding Agency: Indian Space Research Organization, Ahmedabad

Sanction Amount: Rs. 20,02,000/- (Start Date: December 2020)

Duration: 2 Years

Scope of Project: The proposed research proposal aims to develop NavICSuite: a precise, scientific, multipurpose, data processing software suite for processing NavIC receiver data.



NavICSuite will be a multipurpose software that can be used for: (i) identifying and extracting relevant data from raw NavIC files, (ii) pre-processing the data to apply necessary corrections and compensations for drags and atmospheric loading etc., (iii) deriving and analyzing ionospheric and tropospheric content variations, scintillation strength, multipath components, etc.

NavICSuite with its Graphical User Interface (GUI) will be easy to explore and will allow the user to easily explore the functionalities of the software.

Publications in the Department

Shah, Dharambhai, Zaveri, Tanish and Trivedi, Yogesh "Entropy-based convex set optimization for spatial-spectral endmember extraction from hyperspectral images." *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 13 (2020): 4200-4213.

Abstract: Spectral unmixing is an important problem for remotely sensed hyperspectral data exploitation. Automatic spectral unmixing can be viewed as a three-stage problem, where the first stage is subspace identification, the next one is endmember extraction, and the final one is abundance estimation. In this sequence, endmember extraction is the most challenging problem. Many researchers have attempted to extract endmembers from hyperspectral images using spectral information only. However, it is well known that the inclusion of spatial information can improve the endmember extraction task. In this article, we introduce a new endmember extraction algorithm that exploits both spectral and spatial information. A main innovation of the proposed algorithm is that spatial information is exploited using entropy, while spectral information is exploited using convex set optimization. In the literature, none of the spatial-spectral algorithms has used entropy as spatial information. The inclusion of this entropy-based spatial information improves the accuracy of the endmember extraction process. The results obtained by the proposed algorithm are compared (using a variety of metrics) with those obtained by other state-of-the-art methods, using both synthetic and real datasets. Our experimental results demonstrate that the proposed algorithm outperforms many available algorithms.

Shah, Dharambhai, and Tanish Zaveri. "Convex geometry and K-medoids based noise-robust endmember extraction algorithm." *Journal of Applied Remote Sensing* 14.3 (2020): 034521.

Abstract: Spectral mixture analysis (SMA) is an effective means of finding a unique spectral signature of constituents called endmembers and approximating their proportion of presence (abundance fractions). In the literature of SMA, the challenging task of endmember extraction from the hyperspectral imagery is approached by different methods. The majority of the endmember extraction algorithms are developed based on the convex geometry of the dataset perhaps due to low computation. But the performance of these convex geometry-based algorithms is degraded in the high-level noise scenario. To make the noise-robust algorithm, we propose an algorithm by introducing K-medoids with convex geometry. The proposed algorithm uses the K-medoids clustering approach in the removal of extra convex points, which leads to improving the endmember extraction efficacy. The proposed algorithm is tested by introducing white Gaussian noise under different signal-to-noise ratio conditions in the synthetic dataset, especially for high-level noise. Our experimental results show that the proposed one improves the endmember extraction efficiency in the high-level noise condition. The proposed algorithm is also tested on the real datasets of Cuprite and Mangalore. The proposed algorithm outperforms others on the real benchmark datasets as well.

Shah, Dharambhai, Tanish Zaveri, and Y. N. Trivedi. "Convex Polygon Maximization-Based Hyperspectral Endmember Extraction Algorithm." *Journal of the Indian Society of Remote Sensing* (2020): 1-14.

Abstract: Pure endmember extraction from the hyperspectral image is a very essential step in target detection, classification and unmixing applications. Using the concept of convex geometry, a novel algorithm for endmember extraction is proposed in this paper. The algorithm uses convex polygon maximization to determine a convex set that gives maximum convex polygon area according to the surveyor's formula. The parallel implementation of the proposed algorithm is useful in finding more

effective distinctive pixels. The robustness of the proposed algorithm in the presence of noise is demonstrated with synthetic data. The simulation results, conducted using real hyperspectral data, indicate that the proposed algorithm reduces the Spectral Angle Error (SAE) and Spectral Information Divergence (SID) error by 2.4–8.8%. The effectiveness of the proposed algorithm in abundance mapping is also validated using Root Mean Square Error (RMSE). The RMSE of the proposed algorithm is also improved by 1.7–7.6%.

Joshi, Khushbu, and Manish I. Patel. "Recent advances in local feature detector and descriptor: a literature survey." *International Journal of Multimedia Information Retrieval* (2020): 1-17.

Abstract: The computer vision system is the technology that deals with identifying and detecting the objects of a particular class in digital images and videos. Local feature detection and description play an essential role in many computer vision applications like object detection, object classification, etc. The accuracy of these applications depends on the performance of local feature detectors and descriptors used in the methods. Over the past decades, new algorithms and techniques have been introduced with the development of machine learning and deep learning techniques. The machine learning techniques can lead the work to the next level when sufficient data is provided. Deep learning algorithms can handle a large amount of data efficiently. However, this may raise questions in a researcher's mind about selecting the best algorithm and best method for a particular application to increase the performance. The selection of the algorithms highly depends on the type of application and amount of data to be handled. This encouraged us to write a comprehensive survey of local image feature detectors and descriptors from state-of-the-art to the recent ones. This paper presents feature detection and description methods in the visible band with their advantages and disadvantages. We also gave an overview of current performance evaluations and benchmark datasets. Besides, the methods and algorithms are described to find the features beyond the visible band. Finally, we concluded the survey with future directions. This survey may help researchers and serve as a reference in the field of the computer vision system.

Honey Dhandhukia and Dhaval Pujara, "Fabry-Perot Horn Antenna with Improved Gain" in *IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting, Montréal, Quebec, Canada, July 2020.*

Abstract: The paper presents a Fabry-Perot Horn Antenna (FPA) with an improved gain. Design and simulation results of pyramidal and conical horn antennas with Frequency Selective Surface (FSS) functioning as a Partially Reflecting Surface (PRS) layer are discussed. The simulated results for parameters like return loss, gain and radiation patterns are presented. There is an increment of 2 dBi gain for both the designs. The proposed designs can be used in applications such as feed clusters for multiple-beam antennas (MBAs), satellite communication and many more.

Vidhi Patel, Pratik Mevada, Dhaval Pujara, Soumyabrata Chakrabarty, and Milind Mahajan, "Analysis of Multi-Faceted Reflectarray Antenna for Spatial Bandwidth Improvement" in *IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting, Montréal, Quebec, Canada, July 2020.*

Abstract: This paper presents the analysis of the multifaceted reflectarray (RFA) antenna for spatial bandwidth improvement. Geometries of faceted RFA have been designed by segmenting the phase correcting surface in tilted 3-panel and 5-panel configurations. Phase distribution over RFA surface and directivity variation with frequency have been computed using Geometric Optics (GO) based technique and achieved 6.5% and 7.4% 1-dB gain bandwidth in case of 3-panel and 5-panel faceted RFA, respectively as compared to a flat RFA having 1.8% 1-dB gain bandwidth.

Kedar Trivedi, and Dhaval Pujara, “Mutual Coupling Reduction using Defected Ground Structure in UWB DRA Array for MIMO Application” in *IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting, Montréal, Quebec, Canada, July 2020*.

Abstract: In this paper, the design of a closely spaced two element ultra-wide band (UWB) Surya Yantra shaped dielectric resonator antenna (DRA) array is presented. Novel rectangular loop shaped defected ground structure (DGS) is introduced to reduce mutual coupling between DR elements. Fabrication and testing of the antenna array were carried out. Measured UWB of about 101% (3.1–9.4 GHz) was achieved. Mutual coupling below -15 dB is achieved over the entire band of interest using DGS. The proposed antenna array is a prominent candidate for MIMO applications due to its low mutual coupling, 101% UWB, the average gain of about 4.4 dBi, and fairly stable radiation pattern.

Jayesh Popat, Usha Mehta, Manisha Upadhyay, “A Hash based Secure Scheme (HSS) against scan-based attacks on AES cipher” in *International Test Conference ITC-2020, Bangalore, July 2020*.

Abstract: The AES is used in portable devices for secure communication. The AES is incorporated with scan-chains to make it testable. However, it poses security vulnerability since AES cipher can be attacked to recover private key. We propose a novel countermeasure, Hash based secure scheme, to prevent such attacks.

Sagar Maheshwari, Sachin Gajjar, “Continuous Recognition of 3D Space Handwriting using Deep Learning” in *8th International Conference on Innovations in Computer Science and Engineering, Hyderabad, August 2020*.

Abstract: In this paper, we attempt to present novel input methods that help enable byzantine free of hands interface through recognition of 3D Handwriting. The motion is detected wirelessly by the use of the inertial measurement unit (IMU) of the Arduino 101 board. Two different approaches are discussed. One approach is to use the Pattern Matching Engine (PME) of the Intel® Curie™ module on Arduino 101 mounted on the back of the hand. The second approach uses the IMU input to a well-structured Recurrent Neural Network. The spotting of handwriting segments is done by a support vector machine. The former approach, being indigent of memory, is not preferred over the latter. The Deep Learning approach can continuously recognize random sentences. The model was trained on 1000 freely definable vocabulary and was tested by only one person, achieving the lowest possible word error rate of 2%. The Electronics and Communication Students’ Organization (ECO) organized two events on the 26th foundation day of the Institute of Technology on October 3, 2020. Both events were organized on an online platform.

Dipesh Panchal, and Amisha Naik, “Design and Simulation of Operational Amplifier using Non-Conventional Method for Low Power Applications” in *17th IEEE Indian Council Conference (INDICON), New Delhi, December 2020*.

Abstract: The power budget is a very stringent requirement for the portable biomedical instrument. In this paper, the bulk driven (Non-Conventional Method) two-stage operational amplifier designed and simulated for small size and low power biomedical applications. The first stage is a non-tailed differential amplifier with bias current control. The second stage is a common source amplifier with a capacitive load. The pole splitting method is utilized for stability and aspect ratios are calculated using the graphical method (gm/Id). The total power dissipation is 15.77nW for the gain level at a gain of 61dB. The simulation is performed using Cadence Virtuoso in 0.18μm CMOS technology with supply voltage 0.3V.

Honey Shah, Jyotika Gurnani, Sachin Gajjar, “Design and Development of AR-PlaSys: Augmented Reality Based Plant Monitoring System” in *17th IEEE Indian Council Conference (INDICON)*, New Delhi, December 2020.

Abstract: This paper presents the design of the Augmented Reality Plant System (AR-PlaSys). AR-PlaSys is designed by merging Augmented Reality (AR) and the Internet of Things (IoT). A proficient observing framework is required for easy and long-term plant monitoring in industries such as nurseries and at domestic level. AR-PlaSys is an innovative and viable solution for the same. The humidity and temperature data from plant is collected by a DHT11 sensor and uploaded to Particle Photon cloud. The screen to be augmented is built in Unity 3D which is a real-time 3D development platform and is connected to the Particle Cloud. An android application file (APK) is developed which can be installed in all android cell phones. Whenever the camera detects the target image data is retrieved from the cloud and augmented on the screen. This system is unique, compact, cost and energy-efficient which can be deployed for domestic and industrial purposes.

Deep Pujara, Pratyusha Patel, Sachin Gajjar, “Geo Tracking of Waste, Triggering Alerts and Mapping Areas with High Waste Index” in *17th IEEE Indian Council Conference (INDICON)*, New Delhi, December 2020.

Abstract: This paper aims to improve the efficiency of the garbage collection process by developing a system for monitoring waste levels in garbage bins using ultrasonic sensors and connecting them to Arduino Uno board for sending the measurements like the amount of waste level to the user. Two smart dustbins were designed for home use and public use which are monitored in real-time using the mobile applications. Notification alerts are also sent when the amount of waste exceeds a certain threshold level. These dustbins are connected wirelessly using Zigbee based transceiver in the form of a mesh network to facilitate the transfer of the amount of waste present in these dustbins to the nearest garbage collection truck and an optimized shortest route to be followed by the garbage collector truck is calculated. The proposed system is user friendly, compact and cost-effective requiring minimum human intervention.

Ph. D. Competed in the Department

Title of Thesis: Countermeasures against Test Infrastructure based attacks on AES Circuits and Trojans

Name of Student: Mr. Jayesh Popat

Name of Guide: Dr. U. S. Mehta

Abstract: In the era of Information and Communication Technology, the user information or data may take electronic form. The security of such user information from malicious intentions is a prime concern nowadays. Cryptography is used for securing the data by using algorithms in such a way that only authorized parties can access it. Cryptography goals can easily be achieved by the most widely used encryption algorithm Advanced Encryption Standard (AES). AES is a mathematically unbreakable algorithm. However, AES hardware implementation is vulnerable to attacks and secret data stored can be leaked. Therefore, Hardware Security and Trust of such crypto-hardware are critically important. Hardware

Security normally deals with securing the private data stored in the crypto-hardware. Hardware Trust generally aims at the design and fabrication of hardware.

Hardware Trust can be violated by inserting Hardware Trojans during the design or manufacturing steps of the IC life cycle. By definition, Hardware Trojan is any addition or modification to a circuit or a system with “malicious intention”. The thesis investigates different types of hardware trojans and their state-of-the-art detection schemes in detail. Further, the novel transition probabilistic technique for Hardware Trojan detection is proposed. Experimental results demonstrate the effectiveness of the proposed scheme on various ISCAS’85 benchmark circuits.

Hardware Security can be violated by attacking the AES hardware and recovering the secret key. When implemented in hardware, the most widely used scan-chains and other test infrastructure are incorporated with AES for detecting manufacturing defects after fabrication. As found generally, these scan-chains and test compression hardware are being exploited by the attacker to retrieve the secret encryption key of AES cipher. The most commonly cited test infrastructure-based attacks are the Differential Scan Attack (DSA) and Test Mode Only (TMO) attack.

In this work, the basics of the AES algorithm and its state-of-the-art attacks as well as countermeasures are surveyed, studied and analyzed. As a proof of concept, it is demonstrated that with DSA as well as TMO, the secret key is recovered in case of normal AES and AES with Response Compactors (X-Tolerant and Multiple Input Signature Register). State-of-art countermeasures have area and test time limitations. Some of them are only capable of preventing DSA and others are capable of only TMO attacks. There is a high need for unified countermeasure which can thwart both attacks and should have less overheads as well as be easily integrated into the current SoC integration flow.

The proposed countermeasure, Modular Exponentiation Secure Scheme (ME-SS) is based on a one-way function. The software and hardware implementation of the proposed countermeasure is included in detail. Experimental results and statistical analysis show that the proposed countermeasure is improving the security in the case of DSA as well as TMO as compared to the recently published countermeasure. It is further shown that the time and area overheads are comparatively less.

To further improve the security, the novel Hash function based Secure Scheme (HSS) is proposed. This scheme is improving the security against DSA and TMO attacks compared to the recently published countermeasure as well as the proposed ME-SS countermeasure at the cost of a marginal increase in area and test time compared to previously proposed ME-SS.

A New Definition of Ampere

- Dr. Heli Vora
(2008 Batch Passout)

The SI system of units, commonly known as the metric system, is currently the most widely adapted system of measurement by the scientific community world-over. It has seven base units and many other derived units which have definitions based on these base units. The seven base units are mass(kg), length(m), time(s), electrical current(A), temperature(K), unit of substance (mol) and luminous intensity (cd). Their definition is being maintained by BIMP (International Bureau of Weights and Measures) and its 59-member states. [1]

An ideal definition of a base unit should not be based on any artifact, it should be precisely reproducible in laboratories world-over and should not change over time. This is however not true for all of the base units. The unit of time (s), for example, is defined as the hyperfine transition frequency of the cesium-133 atom. [2] This definition is based entirely on fundamental constants of nature and remains the same no matter when and where it is measured. It is also one of the most precise definition of an SI unit that we have till date (with least uncertainty in the measurement). Kilogram, on the hand, was until very recently defined as the mass of a block of Pt-Ir based alloy safely stored in a vault in Paris. This definition is not easily accessible in laboratories around the world, has a high measurement uncertainty and is not stable over hundreds of years. This chunk of alloy was so precious that other kilogram prototypes around the world were calibrated against it only once every 40 years. And even then, its value was changing over time. [3]

For these reasons, in 2018, the BIMP voted to redefine all of the SI base units in terms of the fundamental constants of nature such as the speed of light (c), Planck constant (\hbar), elementary charge (e), Boltzman constant (k) etc. [4] And in 2019, the kilogram was officially redefined based on the Planck constant, meter and second. Meter and second already being defined in terms of fundamental constants of nature. The definition can be realized by an instrument called the Kibble balance [5], which measures the Planck constant. What does this mean for the rest of the world? The biggest impact would be felt if you were developing a weighing instrument-either capable of measurement in the range of micro to nano-kilogram or in the range of hundreds of thousands of kilograms, you would need to calibrate your instrument against the SI measure of kilogram and the error in the precise measurement could make or break your instrument.

Let's look at some of the other base units, in particular the one that electrical engineers care the most about: Ampere (A). the previous definition of the ampere was once again based on artifacts and prone to errors: "that unit of current which passes through two straight parallel conductors of infinite length, of negligible circular cross-section, and placed one meter apart in vacuum, would produce between these conductors a force equal to 2×10^{-7} newtons per meter of length." It is based on artifacts such as infinite length wires and negligible cross sections. The new BIPM definition of Ampere is the unit of electric charge times the hyperfine frequency of cesium ($e * f$). However, just as we have the Kibble balance to realize the kilogram in a laboratory, we currently lack a realizable experiment for the Ampere. But there's a ray of hope-if you look at other derived electrical units such as the voltage, you would find that we do in fact have a laboratory realizable precise definition of the voltage based entirely on the fundamental constants of nature. [6]

This definition is based on a phenomenon called the Shapiro steps in a superconductor-based device known as the Josephson junction. Superconductors are materials that lose all of their electrical resistance when cooled below a certain temperature and the electrical current can flow unimpeded, persisting forever. In a Josephson junction, a device based on these superconducting materials, when subjected to RF

radiation in addition to DC excitation something remarkable happens. It's current-voltage characteristics (or I-V curve) splits into steps of constant voltages for a range of current values. These steps are known as Shapiro steps and the voltage at these steps is given by the precise formula: $V_n = n\hbar f / 2eV$. Where n is an integer number. As you can see, the voltage is defined in terms of the Planck constant, electrical charge and the frequency which is inverse of second-also precisely defined in terms of the cesium hyperfine frequency.

The goal then is to also find a similarly elegant definition for the SI base unit of electrical current-based on fundamental constants of nature and with the same ease of realization as the voltage standard. There are several proposals and approaches that scientists and metrologists around the world are exploring. One of them is based on the single electron transistor (SET). As the name suggests, in very simplified terms it counts the number of electrons that passes through the gate of a transistor. Due to the extremely small size of this device, this number is quantized and can be counted precisely. However, this is an extremely challenging semiconductor-based device to fabricate and even more challenging to measure. The signal to noise ratio is very important in order to minimize the error in measurement and these measurements often have to be performed at extremely low temperatures to minimize the background and thermal noises. [7]

Another approach, being explored at NIST-Boulder, is based on a fundamental concept of the phase-charge duality. [8] In a superconducting device, there is something called the coherent superconducting phase which is related to the charge passing through device by the Heisenberg uncertainty principle. The basic principle behind the voltage standard is a concept of charge-slips. This is because phase is the 'good quantum number' (as in it's the less uncertain quantity) in a typical Josephson junction. But if we can somehow turn this duality around, charge should become the good quantum number with less uncertainty. What this would manifest as is essentially the axis on the volt standard I-V plot being flipped. Now the constant voltage steps of the volt standard should become the constant current steps, related to the current by the formula $I=2ef$, giving us our desired definition of the Ampere. However, it is extremely challenging to swap this quantum duality with several proposals being considered. Just as the SET approach, most of these proposals required challenging nano-fabrication techniques and extremely low temperature measurements performed in a dilution refrigerator at 20mK or close to -272C.

In closing, the new hunt to realize a fundamental constants-based definition of Ampere is very much a hot topic of research, interesting to metrologist and fundamental scientists alike. If realized, not only would it provide a stable definition of the electric current but also close the so-called metrological triangle of current-voltage-resistance and allow us to test the accuracy of the Ohm's law.

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The progress in the field of cognitive sciences, which primarily deals with qualitative research, has relied on the supporting quantitative research related to physiological measurements to establish scientific grounding. In this context, the measurement of vital physiological parameters (e.g., Heart Rate, Blood Pressure, SpO₂, Respiration Rate, etc.) has not just remained confined towards the screening and diagnosis for medical conditions, but has been widely used in the fields of cognitive sciences and human computer interaction. Yet another and more popular use of physiological sensing can be observed from the proliferation of fitness gadgets, e.g. smart watches and fitness band which have helped increasing the general awareness about the body vitals and have also encouraged people to maintain healthy lifestyles.

This diverse usage scenarios and growing adoption of technologies for physiological sensing has raised various challenges, and to address the same, multi-disciplinary approach is needed to enhance the reliability while meeting the design that considers human factors. More specifically, certain user groups, e.g., children find wearable devices highly obtrusive, whereas few others with sensitive skin have reported discomfort and skin-irritation with prolonged used of wearable devices. The need of contactless and remote physiological sensing has further emerged with the Covid-19 pandemic restricting the mobility of individuals.

Towards this, various attempts have been made and concepts such as remote physiological sensing have emerged in the last decade to overcome some of the limitations of wearable health tracking devices. Researchers have used various technologies including ubiquitous RGB camera based sensing, thermal imaging as well as RF doppler to monitor the physiological signals without touching the body. More recently, the advancements in artificial intelligence (AI) has given boost to the research for imaging based contactless physiological sensing as AI has shown extra-ordinary performances in various computer vision tasks. All these technologies have demonstrated encouraging results, though, most of the studies have been remained constrained to the controlled lab environment. It is therefore needed to further advance the state of this research to handle in-the-wild scenarios. It is also to be noted that current set of technologies have majorly focused on extracting single physiological parameter, whereas for contactless sensing to see mass adoption, it is very essential that it is able to reliably extract multiple physiological signals. These are some of the active and ongoing research avenues in the field of physiological computing.

Outcome based Education

- Dr. Yogesh N. Trivedi

The traditional education system (TES) is mostly teacher centric and based on gathering information or knowledge. In TES, the focus is much on what the teacher teaches instead of what their students learn. Teaching/learning process in this system is very static and memory oriented. It is more intended towards syllabus completion and maximum grade achieving. In fact, TES is a generalised approach that takes away the spark of interest that attracted these students in the first place. Not only does it often fail to acknowledge the fact that students have individualised incentives – it also fails to take into account their personal and unique talents and pace. In turn, these students spend more time and effort in studying something they are neither good at nor interested in.

A sociologist, William Spady innovated Outcome Based Education in 1994. He outlined the following objectives for OBE.

- **Student-centred:** It is an approach by which the learner's mastery over a particular skill is demonstrated and measured.
- **Clarity in focus:** A learning outcome has to be made obvious to the learner even at the outset of learning. This outcomes-based model works on bringing out the specific outcomes from the learners.
- **Design down, deliver up:** It means the curriculum has to be designed with a clear definition, outlining the expected outcomes. This will pave a way to achieve the expanded opportunities in the student's performance.
- **Exceeding expectations:** All students can deliver the highest level of performance. The only kick start needed is to make them believe and encourage, the only way to attain high expectation.
- **Expanded opportunities:** It means giving countless chances and ways to show the students that they have met with their objective. Not all learners learn the same thing, the same way, and at the same time. However, extended opportunities can help achieve high standards. They help students to learn what is mostly needed for the time and hour.

The OBE directly leads to increasing the proficiency of a particular skill, knowledge, or behavior of the student. In Spady's (1994) words, Outcome Based Education is

“An OBE curriculum means starting with a clear picture of what is important for students to be able to do, then organizing the curriculum, instruction and assessment to make sure this learning ultimately happens”.

For any education system to be successful, we need excellence in its three components – content, pedagogy and assessment – and continuous improvement strategy is the key to success. OBE requires a mind shift in the curriculum process in addition to delivery and evaluation approach in a way that empowers learners for achievement of the outcomes.

OBE addresses the following key questions: What do we want the students to have or be able to do (curriculum)?, How can we best help students achieve it (pedagogy)?, How will we know whether they students have achieved it (assessment)? And how do we close the loop for further improvement (Continuous Quality Improvement, CQI)? OBE facilitates measuring the outcome as per targets set. The system ensures that graduates become lifelong learners.

The educational landscape is changing. We must realise how it translates into real world challenges. More than half of current school children would be entering into jobs that do not exist today – the digital disruption in both manufacturing and service sectors is transforming the job market. The world at large stands at the threshold of an over-all evolution in the meaning of education – it is a tool to make our generation equipped to face an increasingly globalised world. We can expect a growth in students (traditional or otherwise) seeking to acquire new skills to further propel their careers. This implies increased demands in vocational training with flexible degrees and competency-based programmes. Teachers remain to be disseminators of knowledge, but with technological intervention, they might become facilitators.

Hence, Outcome Based Education (OBE) is the new strategy to accommodate these changes. The services and results attained by the student are the most significant aspect of education. Contrary to the mark/grade based educational system, it does not depend on the conformist instruction approaches. OBE makes it imperative that institutions and teachers alike change and improve their ways of instruction and assessment. After all, education is not about teaching – it is about what the students learn.

ARE YOU HEALTHY ??

MENTAL HEALTH

- Manan Jain (18BEC050)

CAUSE FOR CONCERN

13.7% Prevalence of mental illness in India as per National Mental Health Survey (2016)

28% of global suicides occur in India

Access to mental healthcare

49% had a mental health facility within 20km radius

26% reported no mental health facility within 50km radius

59% reported lack of any de-addiction service in their area

Awareness about mental health

57% not aware of any person with mental illness

28% did not consider suicide to be associated with mental illness

Insurance for mental healthcare

80% had no health insurance or thought mental health treatment was not covered



Health is referred as the state of complete physical, mental & social well-being, which indicates that if an individual is physically fit, don't have any disease, doesn't signifies that he is healthy. According to the researches, 2 out of every 5 individuals suffers from the mental health issues which in turn degrades the health status. So what is mental health!! & what are the issues?? Mental health refers to the mental state of an individual which accounts for the emotional, psychological & social well-being, it signifies how we feel, think & act. It represents the ability of an individual to handle stress, make decisions, & how one relate things. Mental health issues affects our mental status / well-being and affects the various factors which indicates the mental status.

These issues often confused with the mental illness & considered as same but the reality is they both are far apart. If the mental health issues are not taken care they may lead to mental as well as physical illness. Mental health issues affects how the individual think, feels, ability to overcome difficulty whereas as the mental illness affects the way an individual acts, interacts and behave with other individuals or group.

Mental health affects various part of one's life school, home, relationship, sleep, energy level, satisfaction, confidence & many more. Hence mental health is as important as the physical health.

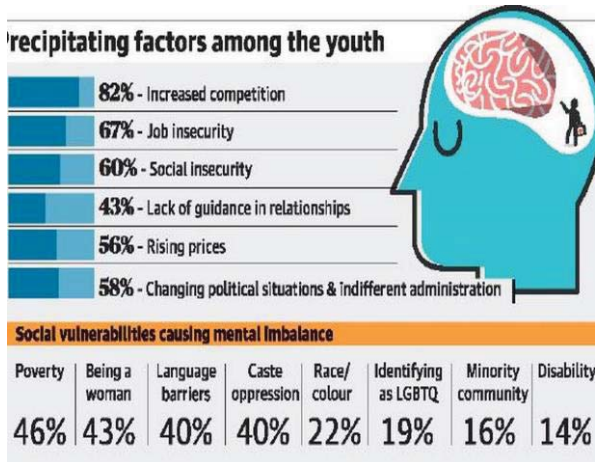
Some of the indicators of poor mental health which can be observed as symptoms for mental includes eating & sleeping disorders ,pulling away from usual daily activities ,low energy level, feelings like hopelessness, helpless, stressed , depressed, etc.

Various mental health illness to be taken care of which one should not ignore:--

- **Anxiety & panic attacks:** It is a normal emotion that we all experience. You might think of anxiety as feeling stressed, tense, worried, uneasy or scared. Most of the time these emotions are not a problem.
- **Bipolar disorder:** It is a mood disorder that can cause extreme periods of low (depressed) and high (manic) moods. Bipolar used to be called manic depression.
- **Depression:** When someone experiences a low mood that lasts for a long time and affects their everyday life.
- **Panic attacks:** Panic attacks are a type of fear response. They're an exaggeration of your body's normal response to danger, stress or excitement.
- **Self-harm:** When you hurt yourself as a way of dealing with very difficult feelings, painful memories or overwhelming situations and experiences. It may also include suicidal feelings.

- Obsessive-compulsive disorder: OCD is a diagnosis given to someone who experiences obsessive thoughts and compulsive behaviours.
- Personality disorders: The disorder which can affect how a person copes with day-to-day life and manages relationships, as well as how they feel and behave.

CAUSES



There might be many reasons for the mental health problems, many peoples have complicated combination of the factors which might be deeply rooted with one's life.

Various causes of mental issues includes

- Childhood abuse, trauma, or neglect
- Social isolation or loneliness
- Experiencing discrimination
- Social disadvantage
- Severe or long-term stress
- Long-term physical health condition
- Unemployment or losing your job

There are various tips for keeping your mental health sound , it might be possible that few of them do not work for all ,some of them are listed below

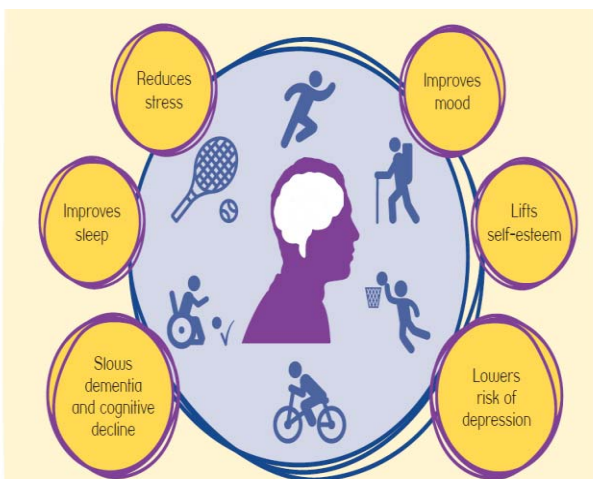
- Track gratitude and achievement
- Start your day with a cup of coffee.
- Set up a getaway
- Work your strengths
- Show some love to someone in your life.
- Boost brainpower
- Take time to laugh
- Go off the grid

TIPS FOR GOOD MENTAL HEALTH

HELP CHECKLIST
What to do when someone sends a signal that he or she is about to commit suicide

Express willingness to help or give advice	Give moral support and hope that every problem can be solved	Ask to meet person so as not to leave him or her alone	Recommend counselling services including the Department of Mental Health hotline 1323
Accept the problems cited by the person as real and not a joke	Send advice and comforting messages	Ask family or close friends to closely watch the person, and keep objects which can be used to inflict self-harm away	Contact a nearby help centre such as a community leader or hospital

BENEFITS OF MENTAL HEALTH



There are various benefits of mental health some of them are discussed above moreover it controls a lot of mental activities it also affects the mental and physical peace and illness. Some major benefits are given below

- Realize their full potential
- Cope with the stresses of life
- Work productively
- Make meaningful contributions to their communities



“Big people have Big eyesight”

-Neel Joshi

We all love stories. We feel happy & energies reading these stories. But quit often these stories are not real ones, and it sucks.

But how one can deny to real ones. I have picked up some of them to justify my views.

We all have seen Micky Mouse in our childhood. Once Walt (Disney) was working with his team in a studio. They were making a film on bicycle. It was “we will tell everything; you just have to listen and do not need to use your brain” kind of show. ¹

He had a team with him. All were trying to put their views and making something interesting collaboratively. Walt was just observing them. One guy was making animations, someone was taking care of sound & one was narrating the speech.

He started to narrate “blah blah blah.....” then at

certain point he spoke that “Take your bicycle”, then ...” Walt immediately stopped him and corrected that we must not use word “your”.



Every child does not have bicycle. So, relapse it with “Take a bicycle”. Now, go to first line of this ^{2nd} paragraph, when you read the line “We all have seen Micky Mouse”. Those who haven’t seen Micky Mouse it must triggered something in your brain.

So, the point is generally we do not know actually how many people will be affected

by what we say or more importantly what we do. People are always hearing & observing you. A single line can affect many people. Of course, we can make foolish comments with our friends.

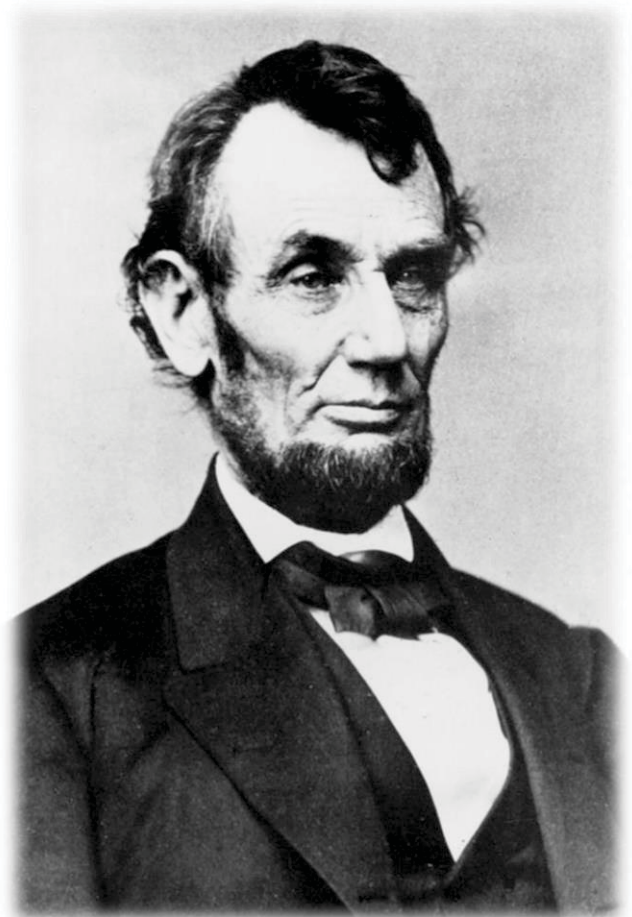
But, think before making any comments or doing anything and think that how many people will be affected from it. Because *after all, you are changing the world somehow.*

Abraham Lincoln spent many years of his life to fight with the practice of slavery. There is no need to say anything about how many obstacles had come in his life to achieve the same. But He was very clear with his goals and always focused on what actually matters, instead of looking into tiny things in daily life. He said that “My fight is not with the people who promotes the slavery. My fight is with their thinking process/ ideology of keeping slaves. I will remove that from their brains.”²

Sometimes we get angry when people do not do their job as per our expectations, in workspace or family.

Someone asked the well-known Gujarati author Jyotindra Dave that what is the thing which people like to give to others but do not like to take. He replied that it is “Suggestion”.

We easily make comment on what government should do. *But it is really hard to follow the*



norms, in which we believe that ‘it should be followed by others’, and not getting angry at the same time.

Ramkrishna Paramhans, Guru of swami Vivekananda, always prayed for the betterment of the world including all mankind, animals, insects and trees. His moto was “Vasudhaiva Kutumbakam” which means “The whole world is family”.

Helen Keller has given a very nice quote that “*The only thing worse than being blind is having sight but no vision.*” So, think big. Have a big eyesight.

Through the journey of writing this article I came to know there is a mistake in writing the title. It should be “*Big people are those who have big eyesight*”.

1. And that’s what toddlers like to watch.
2. These are not the exact words. Reference: Abraham Lincoln’s biography.

Nanotechnology in Communication Engineering

- Gandhi Rutul (19BEC033)

Nanotechnology nowadays became the most amazing studies developed and an active research area in many fields. This article discusses about nanotechnology in communication systems, issues related to it, the potential applications of various nanotechnology developments and the future possible researches that may lead to improved communication systems.



Nanotechnology was first developed in 1965, it consists of the processing of, separation, consolidation, and deformation of materials by one atom or by one molecule. It's fabrication of devices ranges in a scale from 1 to 100 nanometers. Nano-scale science can be divided into three broad areas, nanostructures, nanofabrication and Nano characterization with typical applications in Nano electronics, life sciences and energy. Next generation of telecommunication system is expected to be built in nanotechnology modules, especially in electronics field. For mobile communication systems, the application of Nano science is used to make the control process to a Nano meter scale. Nanotechnology known as Molecular Nano Technology

(MNT), represents Atom by atom and molecule by molecule based control of the structure of matter.

Challenges faced in Nanotechnology:

One of the issues in communication system based on nanotechnology is discovering new materials on the nanometer length scale which is expected to play an important role in future challenges in the field of communication systems such as devices of ultra-high-speed for long and short range communications links, power efficient computing devices, high density memory and logics, and ultra-fast interconnects. Also the use of molecules, instead of electromagnetic or acoustic waves, to encode and transmit the information represents a new communication paradigm that demands novel solutions such as molecular transceivers, channel models or protocols for Nano networks.

Applications:

1. **Wireless Technology:** The use of



intelligence and Nano technology concepts in the mobile devices

will assist in embedding the devices inside the human environments that can create a brand new platform on the way to permit the ever present sensing, and computing. The Nano devices may be loaded to achieve some capabilities like self-powering, sensible to the environment or smart interaction with other systems.

3. Internet of Things (IoT)

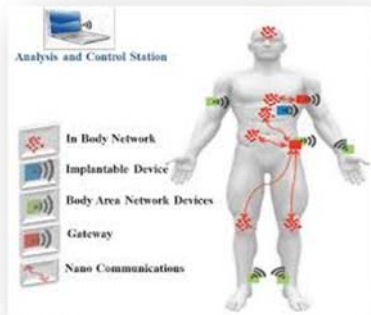
Technology: It is the arrangement of physical articles or things introduced with equipment, programming, sensors and network system to enable it to achieve more essential regard and organization by exchanging data with the executive and other related objects. The nanotechnology



with the internet of thing will provide a Nano size of thing which is able to communicate together with the ability to interact with human or machines in a good and efficient manner.

Body Area Network: Body area network devices can be

coordinated into dress or body. Therapeutic devices such as pacemakers, prosthesis, and stents are in great demand in medical field. One case is a sensors focused at congestive heart failure patients, these sensors may be planted inside the



body and communicate to each other by the way of inter-body Nano communication.

Future Possibilities

Nanotechnology opens the best way to deal with many fields, for example, Telecommunications, Bio Engineering, Medical Electronics and Robotics. In communication and information exchange the use of the nanotechnology will be recognized as it offers smart transmission media. A future prediction of nanotechnology in telecommunication engineering is in building Nano-headphones which interact as the cell phone by allowing listening amplification and location focused microphones to interface with voice activated technology. Other technology like using chips in jacket, shirt, shoes, or pants that can be

downloaded with ID, allowing fast access to secure items. OLED innovation, which remains for natural light-emitting diode, is enhancing the screens of advanced mobile phones and different media communications innovation. OLED screens are adaptable and paper thin, and can be put on any surface for utilization.

So, there are a lot of domains in this field which an electronics and communication engineer can explore and excel in it. As an EC engineer, we should dive into the field and try to deal with the challenges. EC engineers have got a great scope in Nanotechnology.

Virtual Reality

- Kanan Tekwani (19BEC134)



travel industry, VR documentaries etc. The best part of it is can be connected to smart phone, which will increase the viewing and experiencing the performance of the end user and would feel more immersive than ever before. It can be integrated with different other technologies like Artificial Intelligence to help

Virtual reality is the next game changing technology in the world. VR is one of the greatest tools that would be helpful to humanity in coming future. There are more than 2 million VR users in world, with more than 1000 start-ups, and

estimated to have 40+ billion market by 2025. 79% of the users tried VR once wanted to try it again. It is a rumour that it is only about gaming but in fact it is used in many sectors like entertainment, education, healthcare, military, automotive,



user working in risky sectors like monitoring area of nuclear power plant that can be dangerous for human health.

VR for gaming:

VR gaming is the term used to describe a new generation of computer games with virtual reality (VR) technology that gives players a truly immersive, first-person perspective of game action. Participants both experience and influence the game environment through a variety of VR gaming devices and accessories, including VR headsets, sensor-equipped

gloves, hand controllers, and more.

Moreover it will have more advanced way of communication with would make you feel that you are really talking with your loved ones and won't feel the



barrier that you feel when you simply talk on voice call or video



call. You will feel that your loved one is sitting just beside you and you are having a cup of tea together and enjoying your favourite TV series.

In education, both students and teacher would find it easy to share concepts and will be able to experience even better and students would feel more immersive. VR is not meant to completely replace real-life but instead enhance it to a very notable level. For example the travel industry uses it for destinations and hotels to get the guests to get a glimpse of they would feel and experience when they book a room there.



Companies like Facebook and amazon are investing in this tech and till now have spent millions on it. It's a very rapid growing tech and there is more to its evolution. The next frontier is working with human senses.



.....आपखुद आये हो

शमा बुझा दि तो चांद बनके आये हो.

अमास की रात को सितारे बनके आये हो |

पलक बंद किया तो नजरों के सामने छाये हो..

कलम रखना चाही तो कोरा कागज बनके आये हो |

जब दिल की हसीं इतफाक बनने जा रही थी..

गुलाबी मुस्कान बनके आप खुद सामने आये हो

जब याचना ही छोड़ दिया जिंदगी से..

तभी हसीन आरजू बनके सामने आये हो |

ऐसी हजारों उपमा दे तो भी कम है..

फिर भी...

मुझ जैसे बेगाने के गाने बनके आये हो |

मेरे लिए हसी-गम की गज़ल बन कर आये हो |

--Prof. Jayesh Patel

.....કંઈક જીવી લઈશું

કોઈ જો આવીને ધરી જશે કંટક તો..

એ કંટક થકી અમે બીજો કંટક કાઢી જોઈશું.

હશે જો કાળી અંધારી અમાસની રાત તો..

ખૂબસૂરત સિતારો ની ચમક અમે માણી જોઈશું.

ઇર્ષ્યાથી જો કોઈ દેશે અમ ધરને આગ તો..

કાળજી કઠણ રાખી બળતા ધરે તાપી જોઈશું.

કોઈ જો આવશે સામે દુશ્મન માની તો..

સમજી તેને મિત્ર દિલથી છાતીએ લગાવી જોઈશું.

આવશે જો જીવનમાં દિવસો બેવફાઈના તો..

તેની ખુશી કાજે દિલ પર પત્થર મૂકી હસી લઈશું .

સંજોગો જો પીગડાવશે બેસુર દિલ ને તો..

તેના વહેણમાં દુઃખ અમારા વહેવડાવી દઈશું.

આવશે જો જાત સાથે લડવા ના સંજોગો ફરી તો..

બસ પૂરા જોશથી ફરીથી તેને લડી લઈશું

બનશે જો એકલતા જ જિંદગીનો પર્યાય તો..

મનમાં સજાવી મેળો થોડું કંઈક જીવી લઈશું.

ઉતરી જો કોઈ દિલમાં કરશે વિશ્વાસઘાત તો..

બદલામાં માફ કરી દિલથી દુઆઓ આપી જઈશું.

--Prof. Jayesh Patel

THE LIGHT OF THE WORLD

My eyes behold the light of the world,
Extremely bright, having great might,
Enlightening a number of pleasures and joys,
Hiding but many unbearable sorrows,
I chased these joys, to walk with the world,
To feel bestowed and make some worth,
But I fell on path of sorrows eventually.
Efforts were made, but something was missing,
Something was inside me that was pinching,
I tried and tried and tried again to succeed,
But remained where I was,
With same sorrow to feel.
The sorrows but, stood inside me,
Holding me firmly and belittling me.
Finally a realization came up on me,
The world with which I wished to walk,
Was present inside me,
The light of the world,
That completely startled me,
Was present in my own eyes.

– Jetwani Lalit (19BEC047)

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Executive Head
Taman Sachanandani
18BEC091

Activities under the ECO

DASTANGOI: A Story Telling Event

On the occasion of 25th foundation day of Institute of Technology, Electronics and Communication Students' Organization had organized a story telling event. This event was approximately 80 minutes long and was held on the CISCO WEBEX platform. In this event, many students from different branches of the Institute of Technology (ITNU) came together to share their stories. The judge for the event was Dr. Mehul R. Naik, Associate Professor, EC. The event commenced with the arrival of various participants as well as audience members. The event was divided into two segments. All the participants had to tell a story on both the themes of two different segments in proper order. The participants were judged on various parameters such as clarity in speaking (pronunciation, tone, articulation, etc.), fluency in speaking, relevance to the theme as well as their creativity. It was a truly mesmerizing show as the participants from different branches of ITNU shared their exclusive memories in NIRMA.

Cypher Pirates: Coding based Event

Electronics and Communication Students' Organization had organized a coding event on the occasion of silver jubilee foundation day of Institute of Technology, The event was comprised of two rounds. In the first round, an MCQ based quiz was organized using Google Form. Approximately 50 participants could make to round two, where two problem statements were given to the students to solve on the online platform of 'HackerRank'. The participants were allowed to use languages like C, C++, Python, or Java as per their choice. The event lasted for almost 90 minutes.

Swadeshi Microprocessor Challenge

To provide impetus to the strong ecosystem of start-ups, innovators & researchers in the country, MeitY announces Swadeshi Microprocessor Challenge made available by IIT Madras (शक्ति processors) and C-DAC (वेगा processors), powered by FPGA Boards of XILINX which is supported by CoreEL Technologies, to promote a culture of innovation and entrepreneurship by taking up complex designs in the country and innovate frugal solutions around home-grown processor ecosystem, catering to both global and domestic requirements. To motivate the students of EC to take part in the said event, Electronics and Communication Student's Organization had organized the selection for the said event. Total 10 proposal were received with 5 members in each team in the phase 1. Total 6 proposals were selected for the next round and each team is assigned a mentor from EC department, who will guide the student team for the future process in the event.

Tour - De - India

Electronics and Communication Students' Organization organized an Online Treasure Hunt named Tour-de- India on the occasion of Independence Day August 15, 2020 from 3:00 to 5:00 pm on the platform of WhatsApp and Google Meet. The event consisted of treasure hunt based on the theme of Explore India. In the event, the clues were based on basic electrical and electronics circuits and freedom fighters who fought for the freedom of India. Total 25 teams and more than 80 student participated from third and fifth semester in the event. In the beginning, all the teams were given instruction and briefed about the event flow by organizer team on Google meet platform. At 3'O clock, the captains of all the team were given their first clue. Then onward they had solve the answers in their respective groups and contacted to the next volunteer via WhatsApp to avail the next password protected clue and so on. Event ended at 5'O clock and as this was a time based event the data of all the team were collected from volunteers. Team "Chosen Ones", from semester five were declared as winner. Team "Phoenix" and "Khazana-e-Hind" were declared as first and second runners up respectively. Following site map was used for the event.

Sweet Distribution

Electronics and Communication Students' organization distributes the sweets to support staff of Nirma University every year on the auspicious occasion Diwali. Even in this pandemic situation, this year also, ECO celebrated Diwali by distributing the sweets to support staff on the campus. The sweet distribution was organized on November 10, 2020. Dr. R. N. Patel, Director, IT, NU honoured the event by starting the first distribution. Faculty of EC department, enthusiastically took part in this event. More than 270 boxes of sweets were distributed to the entire support staff of Nirma University.

Some of the memories of the event are as follows:



Students' Achievements



Saket Lunker(16BEC060) awarded merit certificate for making it to ET Campus Stars Class of 2019-20



Ayush Mishra (20MECV02) selected in top ten Inno champ male finalist across India Srilanka



Team consisting of Thakore Vaibhav (17BEC118), Tarun Khilani (17BEC116) and Patel Nikhil (17BEC068) won the first prize of Rs. 5,00,000/- in Chess Playing robot in the Robofest Gujarat competition by Organized by GUJCOST, Department of Science and Technology, Government of Gujarat



Student team of Keshav Kasat (17BEC048), Pujara Deep (17BEC076), Patel Pratyusha (17BEC069), Patel Mansi (17BEC066), Jeswani Aman (17BEC040), Sagar Patel (17BEC092) won special prize of Rs. 25,000/- in Smart India Hackathon 2020 organised by MHRD.

Image Courtesy:

Mission and Vision : [Nimit Malani \(19BEC064\)](#)
 Preface : [Patel Atman \(19BEC091\)](#)
 आपखुद आये हो : [Nimit Malani \(19BEC064\)](#)

કંઈક જીવી લઈશ : [Patel Atman \(19BEC091\)](#)
 The light of the World : [Ambika Lakhera \(18BEC006\)](#)
 Last Outer Page : [Patel Atman \(19BEC091\)](#)

Up Coming Event

GUJCOST Sponsored Online National Conference
on

“Advancement in Communication, Electronics
, Computer and Automation Technology”

February 12 – 13, 2021

Organized by
Department of Electronics and Communication Engineering,
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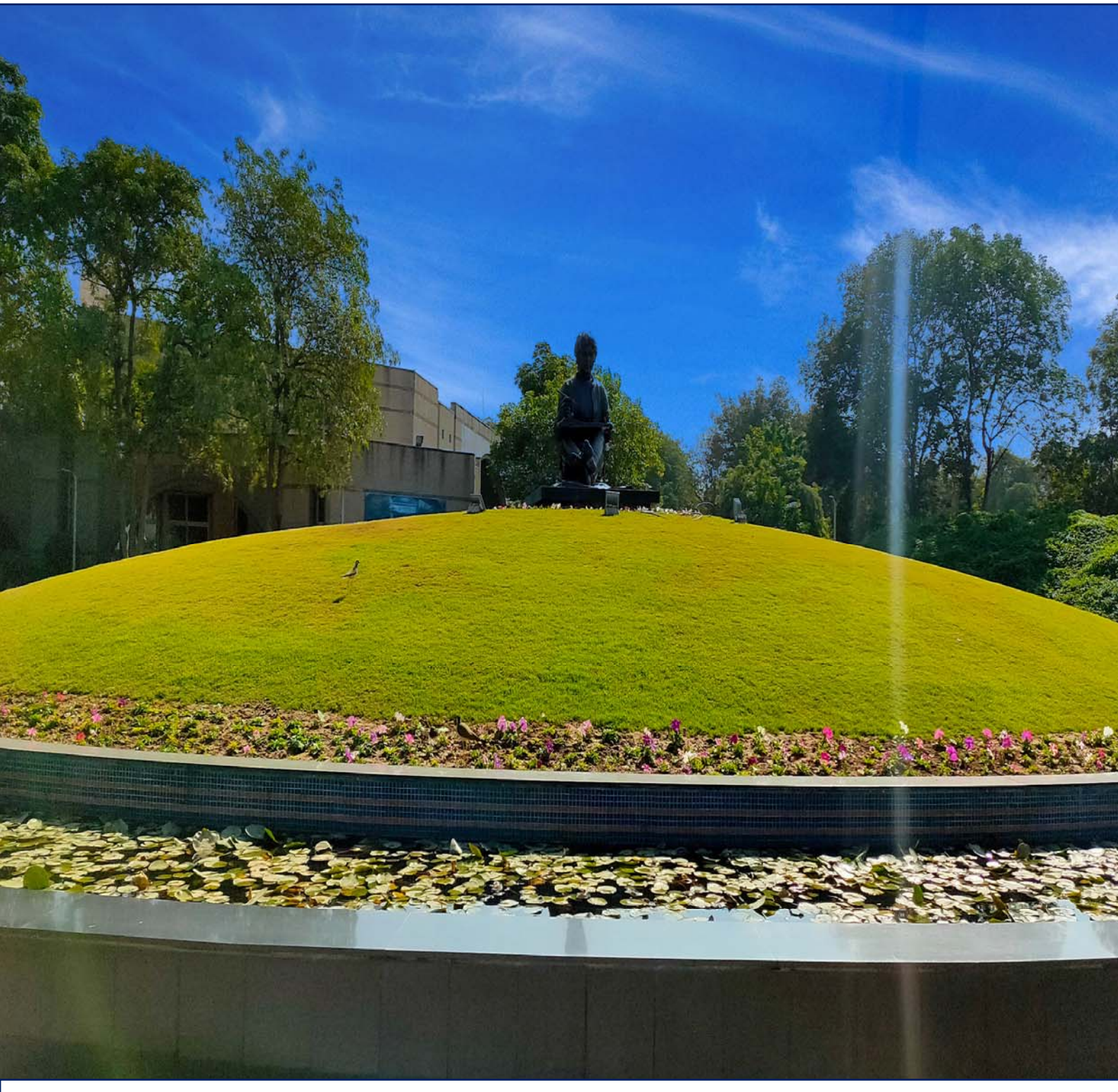
Dr. Amisha Naik (Alumni Member and Associate Professor, EC)

Our Collaborators:

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IEEE Antenna Gujarat Section

Nirma University



Department of Electronics & Communication Engineering,
Institute of Technology, Nirma University, Ahmedabad 382 481

Website: <https://ec.nirmauni.ac.in/>
Email: hod_ec.it@nirmauni.ac.in