IEEE Signal Processing Society

GUJARAT CHAPTER

IEEE Signal Processing Society - Gujarat Section

NewsLetter Volume 1 | Issue 2

June 2021

Pride Month Edition

IEEE Signal Processing Society - Gujarat Section

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Message from Director, Region 10

It is happy to note that the Signal Processing Society Chapter of IEEE Gujarat Section is very active and organizes value added programs. The volunteers of the Chapter are committed to innovative and creative activities even in virtual mode during this challenging time of ongoing pandemic. I would like to congratulate the IEEE Gujarat Section SPS Chapter for their dedicated efforts.

Hope you and your families are doing well, keeping safe and healthy during this unprecedented difficult time due to the ongoing pandemic. It has been over a year since the world faces the current global medical and health challenges. We are witnessing worsening scenarios in many countries within the Asia Pacific region, especially India, which has been severely affected by the second wave of Covid-19.

I take this opportunity to express my sincere concern to members and families who have been affected. I urge every member to take all precautions and follow the covid protocol for safety and adhere to guidelines issued by local authorities.

IEEE has dedicated resources and news in the following link related to Covid-19 and members are welcome to utilize and promote them as possible.

https://spectrum.ieee.org/the-institute/ieee-covid19-resources

I request all volunteers to explore the possibility of technological interventions that could be made to deal with this situation while keeping your safety at highest priority.

I would like to take this opportunity to thank each of you for your contributions to IEEE, please take care, stay safe and stay healthy.

IEEE Region 10

Deepak Mathur
Director
IEEE Region 10 (Asia Pacific)
06th May 2021

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Tribute to Dr. Suman Mitra

It is hard to forget someone, who gave us so much to remember!

Immediate Past Chair, IEEE SPS GS

Your light on us was descending to the fullest. The Moon, the Light, the Sun and the Air were filling us with your zeal and blessings. Now, when we realize the void all of a sudden by your unexpected departure, all seems deep and agonizing. We shall always live by your teaching and blessing.

Our deepest condolences to Dr Suman Mitra, the guiding lamp behind SPS Gujarat Section.

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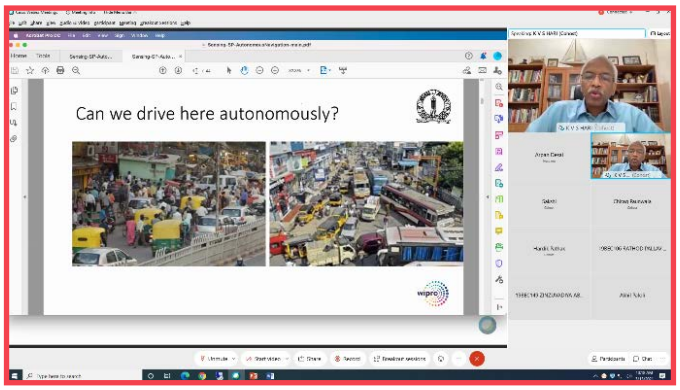
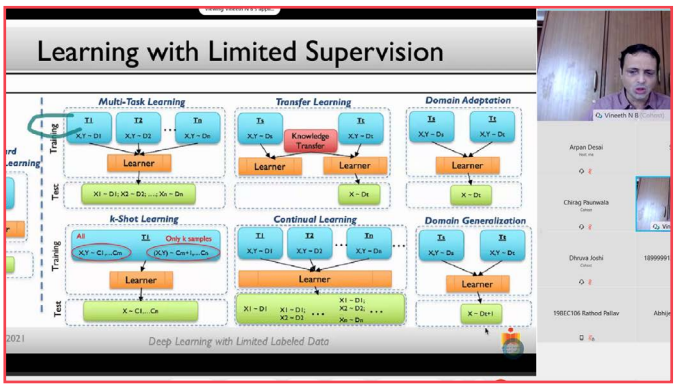
IEEE SPS Gujarat Section Technical Talk Series

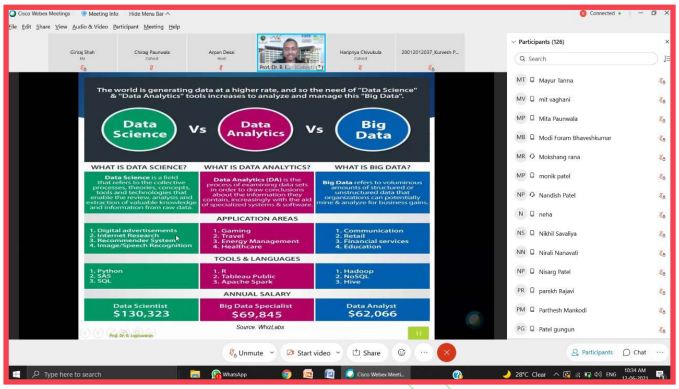


Dr. K.V.S Hari from Indian Institute of Science, Bengaluru talked on **Sensing and Signal Processing for Autonomous Navigation** on 13th March 2021

Dr Emil Bjornson, Visiting Professor, KTH Royal Institute of Technology, Sweden talked on **MIMO Communication in 5G and Beyond** on 16th April 2021

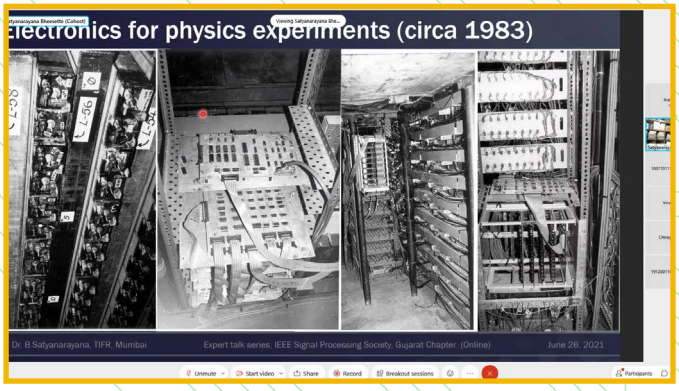


Dr. Vineeth N Balasubramanian, Associate Professor in the Department of Computer Science and Engineering and Head of the Department of Artificial Intelligence at Indian Institute of Technology, Hyderabad (IIT-H) talked on **Deep Learning with Limited Labelled Data: Challenges and Trends** on 6th May, 2021.



Dr. R Logeswaran, Professor and Dean of Graduate Studies at Asia Pacific University (APU), Malaysia talked on **Data science and Big data: From Introduction to Applications** on 12th June, 2021

Dr. Satyanarayana Bheesette, Scientific Officer(H), TIFR, Mumbai talked on **Advances in VLSI based Signal Processing & Applications** on 26th June 2021



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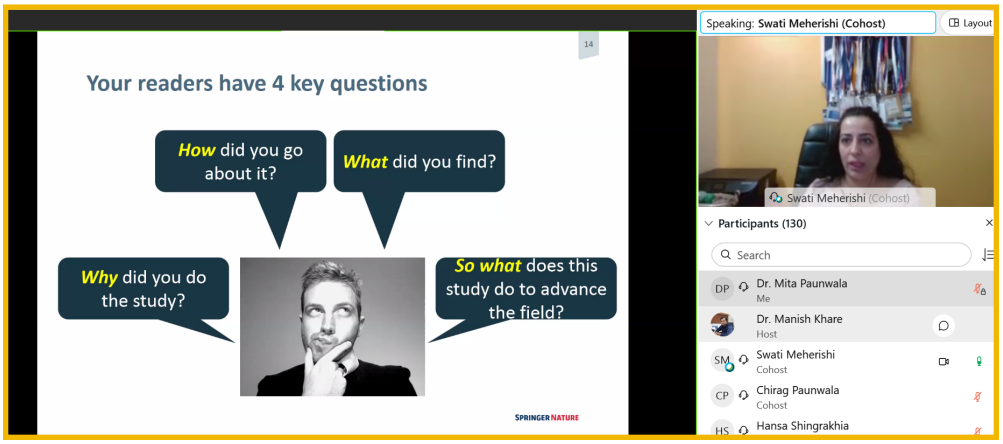
WiSP Events



Miss. Swati Meherishi, Executive Editor – Applied Science and Engineering, Springer talked on **How to write a good research paper: An editor's perspective** on 20th March 2021

LOGO DESIGN COMPETITION.

To design the Logo for IEEE WiSP SPS Gujarat Chapter

IEEE Signal Processing Society WISP WOMEN IN SIGNAL PROCESSING

IEEE SIGNAL PROCESSING SOCIETY

Women In Signal Processing

WISP

IEEE WOMEN iN SIGNAL PROCESSING™ GUJARAT CHAPTER

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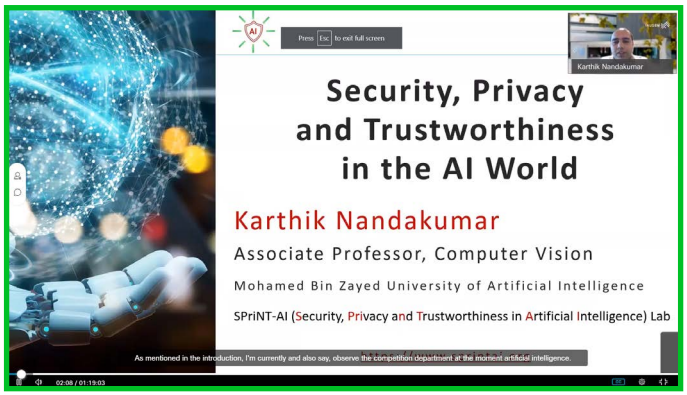
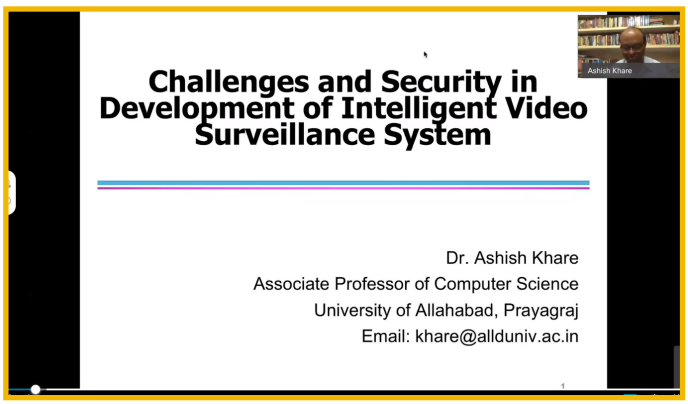
IEEE SPS GS Events

4th National Seminar on New Trends in Signal Processing (NeTSiP – 2021) 19th – 21st March 2021



Mr. Karthik Nandakumar from Mohamed bin Zayed University of Artificial Intelligence talked on **Security, Privacy and Trustworthiness in the AI World**



Mr. Ashish Khare from University of Allahabad talked on **Challenges and Security in Development of Intelligent Surveillance System**

Mr. Rajeev Srivastava from IIT BHU talked on **AI/ML, Computer Vision and its Applications**

Miss. Pritee Khanna from IIIT Jabalpur talked on **Biometric Systems - Applications and Challenges**

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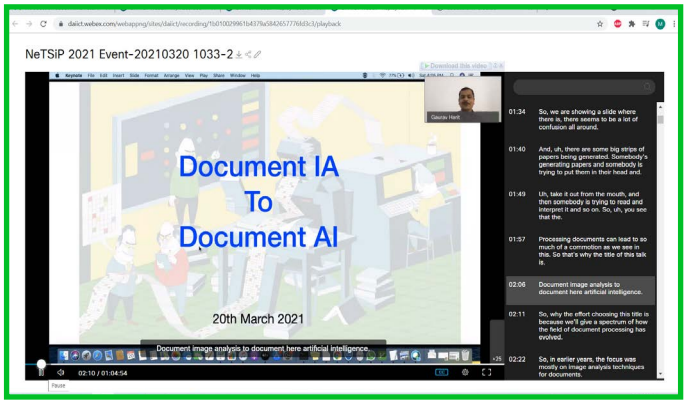
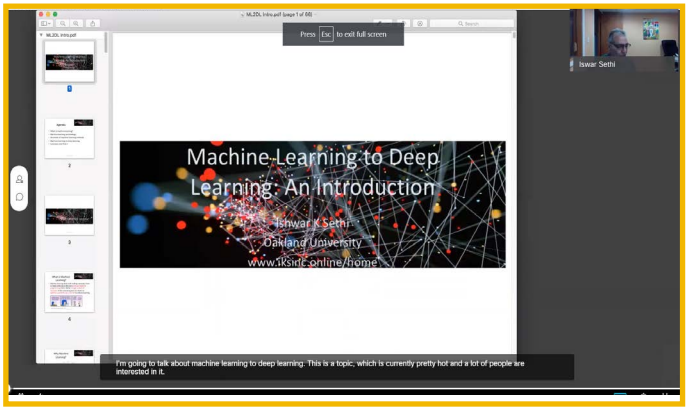
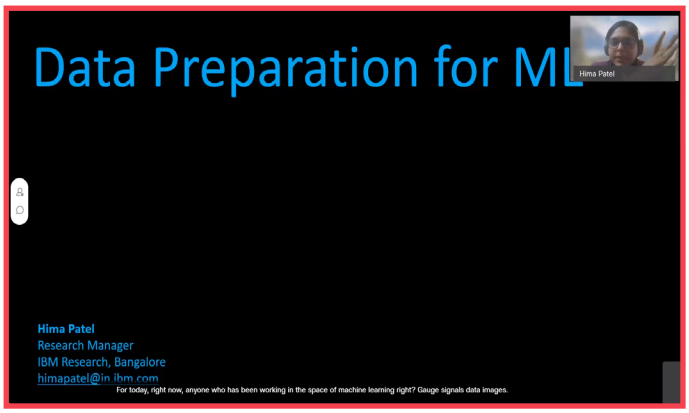


Mr. Gaurav Harit from IIT Jodhpur talked on **Semantic Information Extraction from document images**

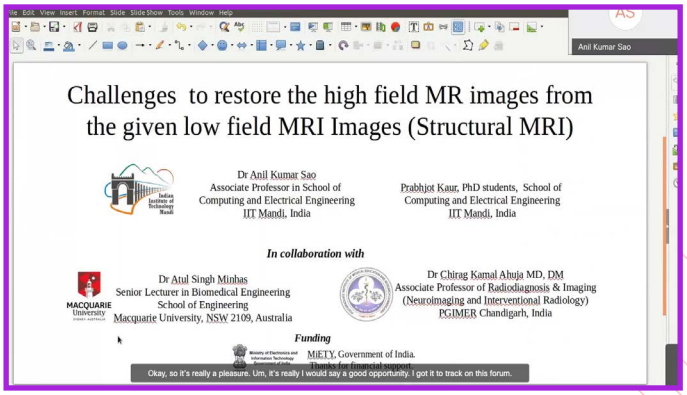


Mr. Ishwar Sethi from Oakland University, USA talked on **Machine Learning to Deep Learning**

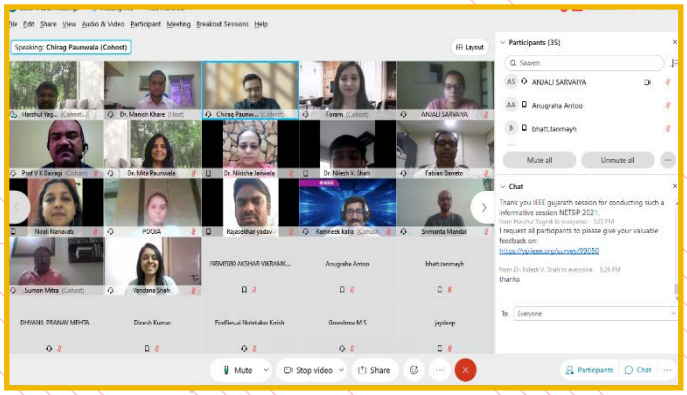


Miss. Hima Patel from IBM Research India talked on **Data Preparation for Machine Learning**

Mr. Siddhartha Mukherjee from Samsung Research India, Bangalore talked on **Challenges of NLU in an AI Assistant Surveillance System**



Mr. Anil Sao from IIT Mandi talked on **Challenges to restore the high field MR images from the given low field MR**



Panel Discussion
"Motivating Young Professionals Towards Research" on 21st March 2021.

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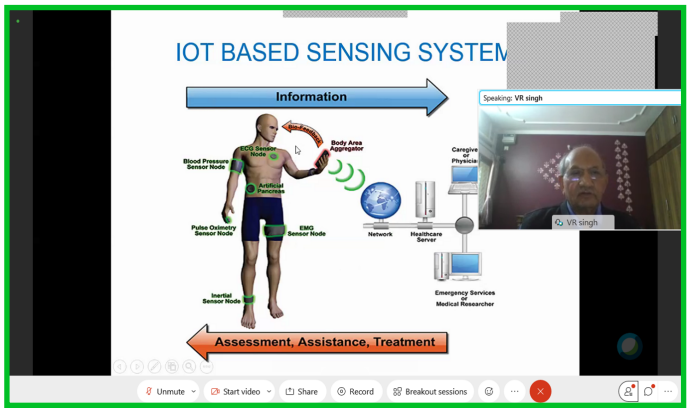
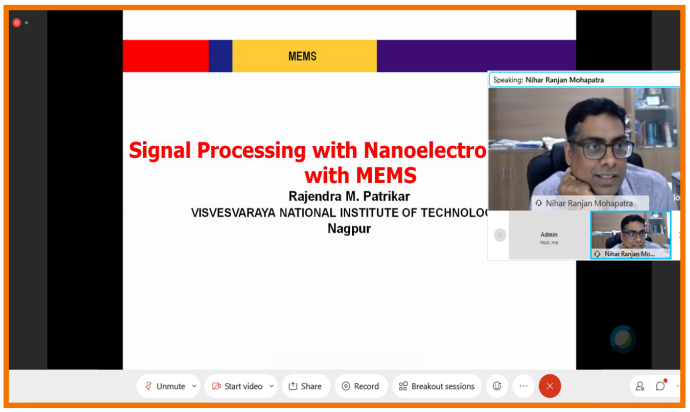
Symposium on Signal Processing for Nanoelectronics and BioSciences on 26th – 27th March 2021

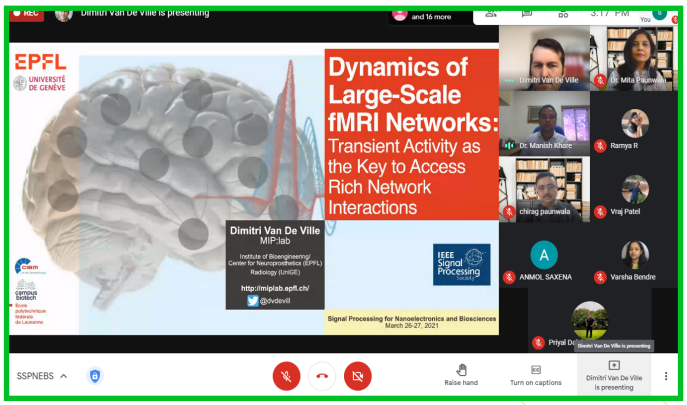
(Joint Event IEEE SPS Chapter NTC, Gujarat Section, C. K. Pithawala College of Engineering and Technolgy and S.V.N.I,T, Surat)



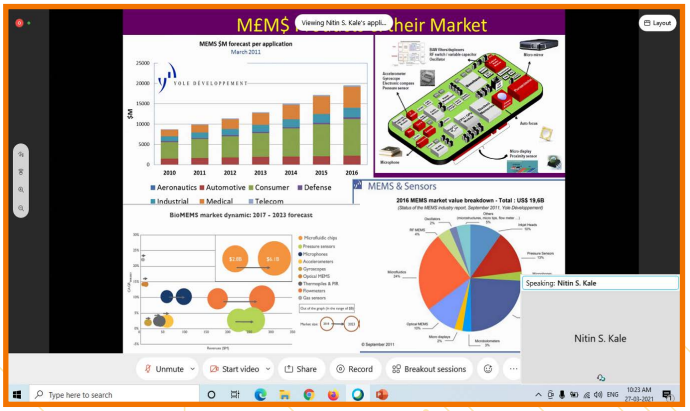
Dr Ved Ram Singh from Director-grade-Scientist/ Head of Instrumentation, Sensors & Biomedical Measurements and Standards talked on **Advanced nano-sensors and smart systems for ubiquitous healthcare**



Dr. Rajendra Patrikar from Professor at VNIT Nagpur at Center of VLSI and Nano technology. talked on **Signal Processing using nanoelectronics and MEMs Surveillance System**



Dr. Dimitri Van De Ville from Professor at Bioengineering at the École polytechnique fédérale de Lausanne (EPFL) talked on **Dynamics of Large scale fMRI networks: transient activity as the key to access rich network interactions**



Dr. Nitin Kale from Chief Technology Officer and Co-founder at Nanosniff Technologies talked on **MEMs based sensors for chemical and biochemical sensing applications**

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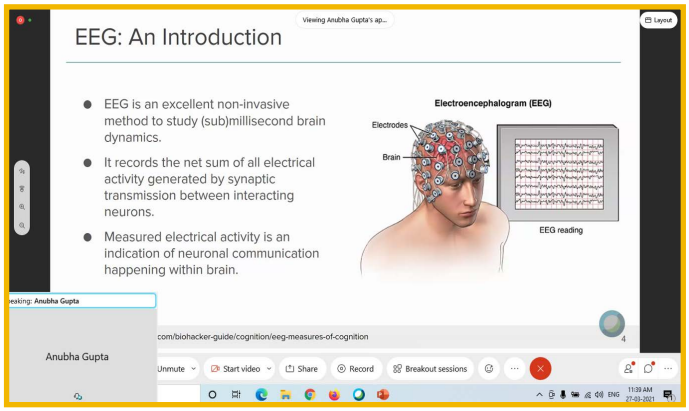
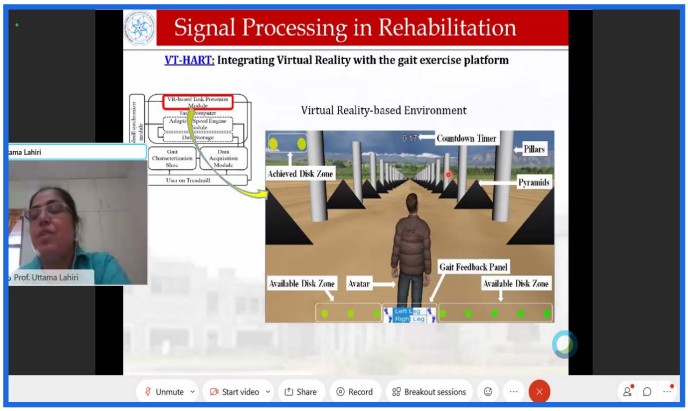
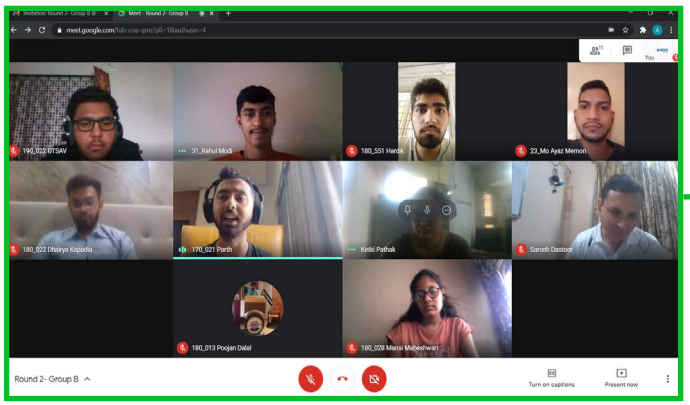


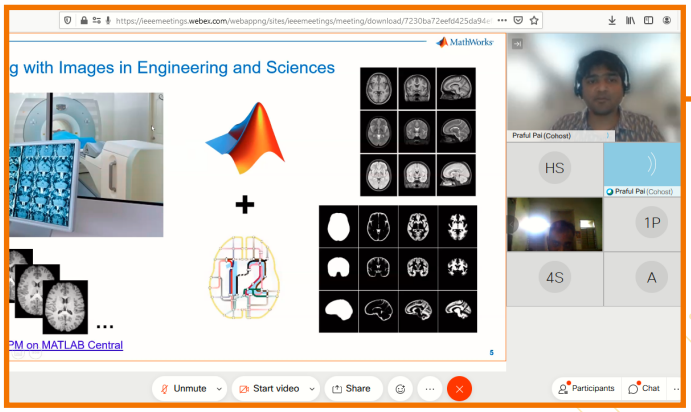
Dr. Anubha Gupta from Associate Professor at IIIT Delhi talked on **EEG data capture and processing to infer functional brain network connectivity**



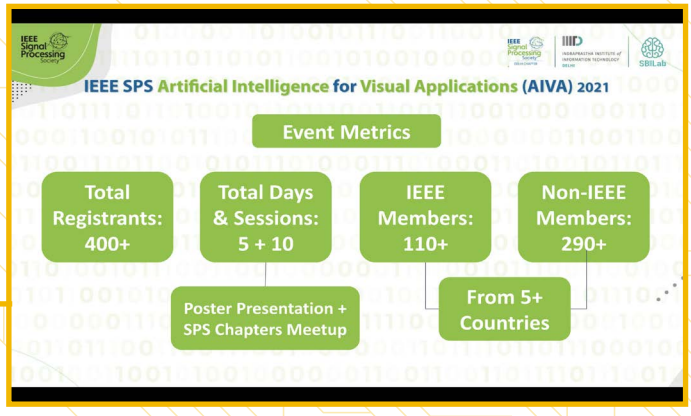
Dr.Uttama Laheri from Faculty at Electrical Engineering, IIT, Gandhinagar talked on **Signal Processing in healthcare technologies for diagnostics and rehabilitation**



Let's Crack It – Soft Skills Development Competition (Virtual Mode) 3rd April 2021



MathWorks Workshop on " Playing with Pixels & Voxels: Working with Images in MATLAB & Simulink" on 15th April 2021, Thursday



Co-Host for IEEE SPS AIVA 2021 (Artificial Intelligence for Visual Application) Start time: 24 Jun 2021 08:30 AM End time: 28 Jun 2021 01:30 PM

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Achievements

We heartily Congratulate Dr. Mita Paunwala for receiving:

- INNOVATE TO IMPACT (I2I) Award from GTU Innovative Council Sankul
- "Maulana Abul Kalam Azad Excellence Award of Education-2020"
- 'OUTSTANDING WOMAN RESEARCHER IN ELECTRONICS' from Venus International Foundation

We heartily Congratulate Dr. Chirag Paunwala for receiving:

- INNOVATE TO IMPACT (I2I) Award from GTU Innovative Council Sankul
- Appointment as "Recruiter and Retention" Subcommittee Chair, Membership Board, IEEE SPS USA

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From the pen of **Dr. Mita Paunwala**
Vice-Chair, IEEE SPS Gujarat Section

" Leading Research during COVID-19 "

Coronavirus Disease 2019 (COVID-19) emerged in December 2019 and soon became a public health emergency of international concern, with WHO declaring it as a pandemic. On 23 March 2020, India observed a nationwide lockdown as a preventive measure against the pandemic. Several researchers in the medical fraternity focussed on developing an efficacious vaccine to immunize the human body against the life-threatening repercussions of the Coronavirus. We understood that the non-invasive and automated mass screening of the susceptible people is inevitable to ensure that they can be quarantined and the dissemination of the disease can be controlled during the incubation period of the Coronavirus. Thermal screening is being utilized to identify the susceptible cases; however, the feverish symptoms can be concealed by the consumption of paracetamol. Furthermore, fever is a symptom that varies from person to person and fluctuates multiple times in a day. Working in collaboration with doctors, professors and studets from other institutes, we recognized that throat inflammation is a vital perceivable symptom of COVID-19. Thus, we started developing mathematical models to analyze and detect Tonsillitis and Pharyngitis in throat images.

The work was started on the month of May 2020. It was difficult to collect throat image of the COVID 19 patiant at that time. So the idea of mass screening was tested on the images contain tonsillitis /Pharyngitis. Initial work involved detecting the Region of Interest, performing HSV Segmentation, and Template Matching. The accuracy of the model obtained is 86% and work was published in **[1].**

To enhance the performance, we decided to leverage deep learning techniques. A Siamese Network based One-Shot learning framework was developed to identify Tonsillitis and Pharyngitis that can be administered without direct contact with the infectious patients, thereby reducing the burden on the medical and paramedical fraternity. To support the work, the database was created by collecting the throat images from the web through extensive web scraping. Around 200 images were identified to be of interest, out of which 146 images had sufficient visual information for classification and were then segregated into Tonsillitis, Pharyngitis, and normal images by a medical professional. Moreover, image augmentation was done on these images that the learned model could be better at generalizing all conditions. Augmentation resulted in a total of 730 images, and then, 80:20 split was created for training and validation, respectively. The accuracy of the model obtained is 96% and work was published in **[2].**

It has been also observed that several COVID-19 infected patients have been diagnosed with pneumonia; hence the radiological examinations can be considered beneficial for the assessment and diagnosis. Residual Network with weighted cross-entropy loss was deployed to handle imbalance database for accurate detection of COVID-19 susceptible patients. The accuracy of this model obtained is 97.5% and the work was published in **[3].** Thus, a complete system comprising throat inflammation based mass-screening and early prediction followed by Chest X-Ray based diagnosis has been developed. To improve the parametric efficiency and enable effective deployment of the entire system, fine-tuned Depth-Wise separable convolutions were utilized to produce clinically reliable results.

The national daily appreciated the efforts, and the work was accepted to top conferences and renowned journals. Moreover,the innovative idea for mass screening with throat inflammation recognized as best idea of innovation in the 17th IEEE Flagship India Council International Conference (INDICON) under M.V.C Award . The work also received INNOVATE TO IMPACT (I2I) Award from GTU Innovative Council Sankul out of 100 nomination from all over Gujarat.

[1] P. Dalal, H. Mulchandani, O. Ramwala, P. Parikh, U. Dalal, M. Paunwala, C. Paunwala, "A Novel Approach for Mass Screening of Covid-19 on Embedded Platform based on Throat Inflammation," 2020 2nd International Conference on Soft Computing and its Engineering Applications (icSoftComp2020), Dec. 11-12,Changa, India, 2020.

[2] Himansh Mulchandani, Poojan Dalal, Ojas A. Ramwala, Parima Parikh, Upena Dalal, Mita Paunwala and Chirag Paunwala, "Tonsillitis based Early Diagnosis of COVID-19 for Mass-Screening using One-Shot Learning Framework," 2020 IEEE 17th India Council International Conference (INDICON), 2020, pp. 1-6, doi: 10.1109/INDICON49873.2020.9342371.

[3] O. A. Ramwala, H. Mulchandani, P. Dalal, M. C. Paunwala and C. N. Paunwala, "COVID-19 Diagnosis from Chest Radiography Images using Deep Residual Network," 2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT), 2020, pp. 1-5, doi: 10.1109/ICCCNT49239.2020.9225521.

Dr. Mita Paunwala

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From the pen of **Dr. Arpan Desai**
Technical Activity Chair, IEEE SPS Gujarat Section

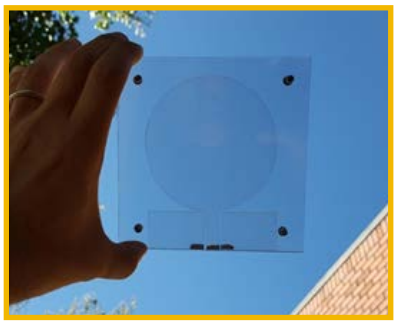
" Optically Invisible Transparent Antennas "

Ever wondered if the antennas you are using till now can be made invisible!
Yes, the new developments in the field of conductive oxides have provoked researchers to work in this domain where the entire antenna can be made optically transparent. Such antennas are almost hidden from the human eye due to their transparency which ranges between 80-85%.
The main idea behind making the antenna transparent is that it can be installed anywhere with no visual clutter and it also helps in receiving the signals at every possible corner. The transparent antennas can be attached to indoor ceilings and walls, window glasses, large monitors, and automobile glazing due to their unobtrusive property.

Transparent Thin Films [www.dnp.co.jp]

There are two categories of transparent antennas where one is made up of mesh structure **[1]** and is visible to eyes while the other is made of conductive oxides like FTO (Fluorine Tin Oxide), ITO (indium Tin Oxide), AgHT (Silver Tin Oxide), AZnO (Aluminum Doped) which are completely transparent **[2].** The conductive oxides like ITO, and AgHT are available commercially in the form of sheets while other conductive oxides need to be prepared using sputtering technique **[3]** or chemical vapor deposition process **[4].** The commercially available sheets need to be carefully patterned based on the antenna geometry simulated using software for the antenna to work in specific frequency bands. The conductive sheets once patterned need a mechanism to be interfaced with the transparent glass (known as substrate) to ensure that no air gap is present between the conductive sheet and substrate. The sputtering and CVD process is a bit complex however it mitigates the requirement of adhesives for sticking the conductive layer on the substrate.

A variety of transparent antennas are proposed which are divided into non-conformable **[5]** and conformable **[6]** based on the applications in which they need to be utilized. The difference between flexible and non-flexible transparent antennas is the material used for the substrate. Glass, acrylic glass, etc. falls into the category of non-flexible substrates while PET, Malinex, etc. are categorized as flexible substrates.



Transparent antennas [https://metamaterial.com/solutions/transparent-antennas/]

Transparent antennas can be widely used for applications like 5G, IoT, CubeSats, reflecting surfaces, automotive industry, energy harvesting, RFID Tags, mobile phones, and many more. The future looks promising for such antennas.

[1] T.W. Turpin and R. Baktur, "Meshed Patch Antennas Integrated on Solar Cells," IEEE Antennas and Wireless Propagation Letters, vol.8, pp.693-696, 2009

[2] Ginley, David S., and Clark Bright. "Transparent conducting oxides." MRS bulletin 25, no. 8 (2000): 15-18.

[3] Wu, Chun-Te, Ying-Rong Ho, Da-Zhan Huang, and Jung-Jie Huang. "AZO/silver nanowire stacked films deposited by RF magnetron sputtering for transparent antenna." Surface and Coatings Technology 360 (2019): 95-102.

[4] Azuma, Kazufumi, Satoko Ueno, Yoshiyuki Konishi, and Kazuhiro Takahashi. "Transparent silicon nitride films prepared by surface wave plasma chemical vapor deposition under low temperature conditions." Thin Solid Films 580 (2015): 111-115.

[5]Desai, Arpan, Trushit Upadhyaya, Merih Palandoken, and Cem Gocen. "Dual band transparent antenna for wireless MIMO system applications." Microwave and Optical Technology Letters 61, no. 7 (2019): 1845-1856.

[6] Desai, Arpan, Trushit Upadhyaya, Jay Patel, Riki Patel, and Merih Palandoken. "Flexible CPW fed transparent antenna for WLAN and sub-6 GHz 5G applications." Microwave and Optical Technology Letters 62, no. 5 (2020): 2090-2103.

Dr. Arpan Desai

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Reader Article

Renewable Energy: Importance, Recreation and Upgradation in World of Energy

Introduction to Energy Sector in India 2020-21:

Electricity and Power Sector is one of the most Prior in demand source of nowadays for each country. With a populace of 1.4 billion and one of the world's quickest developing significant economies, India will be essential for the fate of the worldwide energy markets. India's power area is overwhelmed by non-renewable energy sources, specifically coal, which during the 2018-19 monetary year created around 3/4 of the nation's power. The public authority is putting forth attempts to build interest in environmentally friendly power. The public authority's National Electricity Plan of 2018 states that the nation needn't bother with more non-sustainable force plants in the utility area until 2027, with the appointing of 50,025 MW coal-based force plants under development and expansion of 275,000 MW all out inexhaustible force limit after the retirement of almost 48,000 MW old coal-terminated plants. On 29 March 2017, the Central Electricity Authority (CEA) expressed that interestingly India has become a net exporter of power. India traded 5,798 GWh to adjoining nations, against an absolute import of 5,585 GWh.

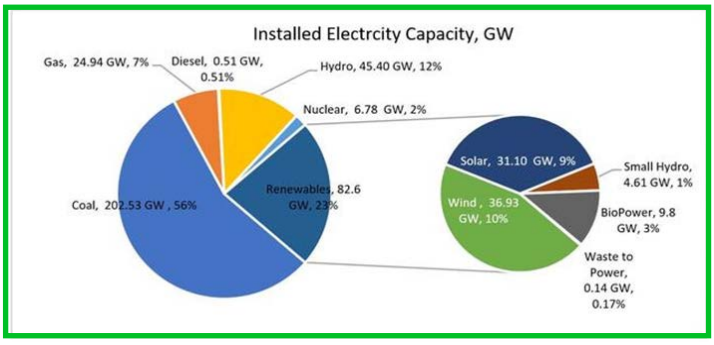

Fig. 1: Derived Change in Energy Generation

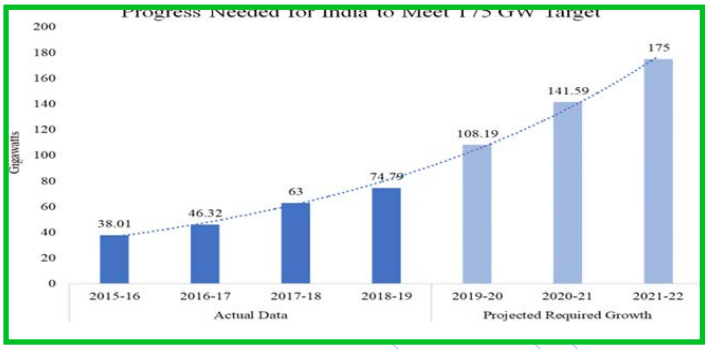

Fig. 2: India towards Renewable Energy

What is Renewable (Alternative) Energy:

Renewable Energy, frequently alluded to as Net clean energy, comes from regular sources or cycles that are continually recharged. For instance, daylight or wind continue sparkling and blowing, regardless of whether their accessibility relies upon time and climate. While Renewable Energy is frequently considered as another innovation, saddling nature's force has for some time been utilized for warming, transportation, lighting, and the sky is the limit from there. Wind has controlled boats to cruise the oceans and windmills to pound grain. The sun has given warmth during the day and ignited flames to last into the evening. In any case, in the course of recent years or something like that, people progressively went to less expensive, dirtier fuel sources like coal and explored gas.

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Importance of Renewable Energy in Recent Era against Polluted World:

Sustainable power sources will be wellsprings of perfect, limitless and progressively cutthroat energy. They contrast from petroleum products essentially in their variety, wealth and potential for utilize anyplace in the world, however most importantly in that they produce neither one of the greenhouses gases – which cause environmental change – nor dirtying emanations. The native idea of clean sources gives nearby economies a benefit and carries importance to the expression "energy autonomy".

Future and Upgradation in Renewable Energy for India:

India's age limit should increment up to multiple times the current figure to meet our development needs. The significant piece of our energy blend comprises of petroleum products. They are limited sources and have genuine natural results. Sun powered is the excellent free wellspring of limitless energy accessible to all. Also, India is one of the sun's most preferred countries, favored with around 5,000 TWh of sunlight-based insolation consistently. As per graph shows, In April 2015, the Narendra Modi government proposed an arrangement to support India's inexhaustible force ability to 175 gigawatts (GW) by 2022. That would be in

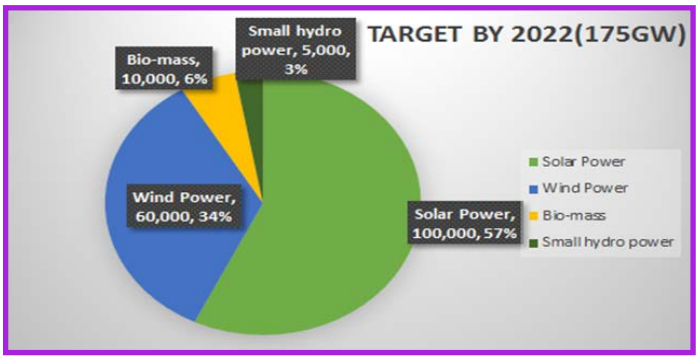

Fig. 3: Target till Year 2022

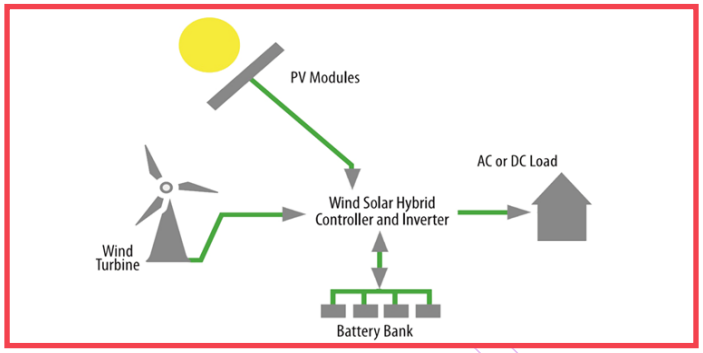

Fig. 4: Hybrid Sustainable Energy neration

excess of a four-overlay increment from the 40 GW or so India had at that point. In any case, with simply a year left, India looks put forward to miss the objective: pretty much 53% of the objective has been met, and expresses that should have been key benefactors are slacking.

Future Prospective for Renewable Energy in India:

India is confronting an intense energy shortage which is hampering its modern development and financial advancement. Setting up of new force plants is definitely subject to import of exceptionally unpredictable petroleum products.

Hence, it is vital for tackle the energy emergency through sensible usage of bountiful the sustainable power assets, like biomass energy, sunlight-based energy, wind energy and geothermal energy. Aside from enlarging the energy supply, inexhaustible assets will help India in relieving environmental change. A restrictive sun powered age arrangement of limit of 250 to kWh units each month would cost around Rs. 5 Lacs, with present evaluating and charges.

A new concept: Round the Clock Generation with all Measures and Economical Enhancement:

WHAT IS ROUND THE CLOCK GENERATION?

Basically, one of the vital parts to generate and deliver that generated power to the transmission system should be economical and consistent also. Round the Clock concept is emphasizes that Solar and Wind Energy Generation towards to meet the expectations in reliability for Energy Generation. Daylight atmosphere offers Sunlight Energy (Solar) as gradually increment in the Irradiation and Temperature whereas Wind speed is low. At the other hand, in Evening Time, Wind Speed is very high as compare to Day time so, Wind Energy is gradually increasing in Evening and Night time whereas Solar Energy or Heat Energy is decreases. So, Wind Energy Generation is on demanding in Evening time.

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Reader Article

Letter to... Dear Engineer!

Dear engineer!

Just a few days ago I read about you in the newspaper in response to which I am writing this letter.

“Engineering is not only a study of 45 subjects but it is a moral study of intellectual life.”

This quote is not written by any great personality. It is from an Indian engineer working for an MNC company. His quote is basically true as engineering is a total of intellectual thoughts. At present, engineering is considered just a stream divided into 45 subjects. Please try to answer my basic question, which is to all students of engineering. Have you ever thought about the applicational value of various subjects which are studied all through these four years? Moreover, why are you becoming an engineer? Or what will you do after becoming an engineer? Or what engineering will give you? That time has come to ponder upon this idea. You have your own identity. Answering these questions is not rocket science to be studied thoroughly. These questions are not difficult as it makes you confused. It is simple if you can think in the right direction. You are certainly to live a joyful life by getting the answer of your own that too in a true manner otherwise you will be stuck.

Have you ever thought about how much applicational value a single subject brings?

Many people have completed their engineering with not even a single thought of its applicational value. Rather than having an honor of a degree or a stream, here it is your turn to think deeply upon it. Only obtaining good marks will not make you a good engineer. Any educational degree which is only taken for the sake of studying will lead you to miserable consequences. Remember, the market demand is also to be faced as an engineer.

If you are learning just a simple formula, ask your faculty, why? It will add new knowledge to your learning and your vision will be clear.

If the faculty fails to explain the applicational value that doesn't arise a doubt on their qualifications. At present, how education is delivered makes us think about its dangerous future. It is not necessary for everyone to be perfect and know everything. But to know little is necessary. You are not expected to be a master of all things related to that stream after completing engineering. e.g. if anyone has pursued computer engineering so it is not needed that that person has command over all languages. One might be good at only C and another at C++ or only JAVA or PYTHON. A student of

civil engineering is better at water management or at structure. Perfection in all things is rather a fantasy. It is good to have mastery over one thing but if you are not master in one subject then it is miserable.

Why are you becoming an engineer?

You should have at least one point or any basic idea in defense. I know that 95% of people are offered different branches opposite to their expectation. Then how can you answer! There is no fault in getting which was not desired. Because there is a fault in education from the very basic level, in the context of practical knowledge. Lord Bhikhu Parekh says, if you want to get a good education then you must go abroad. One thing to be noted: he is just saying to go to develop your mind not to stay there! It is also possible if you are interested in tabla so you do a PhD in that. Many great artists have shifted abroad due to the crisis of equipment. Here there is not an approach that you convert your creative ability into a full- time job. People think of it as a part time chores. One must be clear with their dreams. Think about why you are becoming an engineer.

What will you do after becoming an engineer?

What will you do after becoming an engineer? Job... Business...

If you are supposed to do a job then please do not live a life like a robot. Along with a job, do an activity which you like, which makes you alive. Because there are many things which can inspire a person to deal in different ways and reach to many people. Please do not tell me that you are inclined towards social service. I know that no one will say this. Once the chairman of the TATA company went to his father and said that he wanted to do social service along with staying among people and asked for his help in that. His father's response still has been a motto of the TATA group. He said,
“Start a foundation which can give employment to people instead of doing social service. having a single idea of these types of a big dream will surely bless you in the form of success.

Let's think peacefully about what you would do after completing your engineering.

What will engineering give you?

Please ask this question first to yourself before all the other questions above. As a person, what type of a major change will be brought through engineering. You will be different from what you are at present or you will lose something. Be aware that you must not lose your words, your talk, especially your nature. Because many people boast of their extraordinary achievement in this field. Another thing to say is that it will not ruin your creativity as we already know many bestseller writers, actors and singers are basically engineering students. If I say from my

experience the theatre medium shapes you differently from engineering knowledge. It is true that engineering gives many things but it is your duty to search out what it has given to you.

Now you are to decide how you will do your engineering. If you are a good engineer then nobody can tell you anything. Otherwise people will seldom praise you by uttering words like 'great' or Good job. But when you make a mistake everyone says why have you wasted these many years in engineering? Perhaps I have told more than enough to you. I look forward to your reply.

Your sincere,
An engineering faculty, who wants to be a lifelong engineering student.

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