



IEEE Signal Processing Society - Gujarat Section

NewsLetter Volume 1 | Issue 3

July, August & September 2021

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About IEEE

The Signal Processing Society is a dynamic organization that is the preeminent source of signal processing information and resources to a global community. We do this by: being a one-stop source of signal processing resources; providing a variety of high-quality resources to a variety of users in formats customized to their interests; adapting to a rapidly changing technical community; and being intimately involved in the education of signal processing professionals at all levels.

IEEE Signal Processing Society (SPS) provides dynamic opportunities to collaborate and connect with industry professionals, academics, and students alike working toward the advancement of signal processing and the technology it enables. It includes conferences and events, employment and professional networking opportunities, award eligibility, and top-ranked educational resources that help build rewarding, lifelong careers in the signal processing fields.

Technical Talk Series

The screenshot shows a Zoom meeting interface. The main content is a presentation slide titled 'Multi-scale model'. The slide is divided into two parts: 'First Part: Calculation of patient scores for each magnification' and 'Second Part: Estimates multiplying weights (w1, w2, w3, w4) using least square method and calculate'. The first part shows a flowchart where patient scores (P1, P2, P3, P4) are calculated from basis units. The second part shows a matrix multiplication:
$$\begin{bmatrix} w_1 \\ w_2 \\ w_3 \\ w_4 \end{bmatrix} = \begin{bmatrix} P_1 \\ P_2 \\ P_3 \\ P_4 \end{bmatrix} \begin{bmatrix} w_1 & w_2 & w_3 & w_4 \\ w_2 & w_1 & w_3 & w_4 \\ w_3 & w_2 & w_1 & w_4 \\ w_4 & w_3 & w_2 & w_1 \end{bmatrix}^{-1}$$
 The final scores are then used in a classification framework: 'Classification framework: Quadratic Support Vector Machine (QSVM)'. The decision region of selected layers using majority voting is shown as a bar chart. The slide is labeled 'Fig 6. Multi-scale model'.

Dr. Arnav Bhavsar, Associate professor at the Indian Institute of Technology, Mandi, Himachal Pradesh on 21st July 2021 on the topic of Applications of Deep Learning in Medical Image Analysis.

The screenshot shows a presentation slide titled 'Respiratory Anatomy: Normal lung'. The slide features two anatomical diagrams: (a) 'The human respiratory system' and (b) 'The lung structure'. Diagram (a) shows a human torso with the respiratory system highlighted, including the trachea, right and left primary bronchi, and right and left lungs. Diagram (b) shows a detailed view of the lung structure, including the primary bronchus, secondary bronchus, tertiary bronchus, bronchioles, terminal bronchioles, and alveoli. The slide is presented by NORLIZA BTE MOHD NOOR UTM RAZAK SCHOOR and is dated 17/07/21.

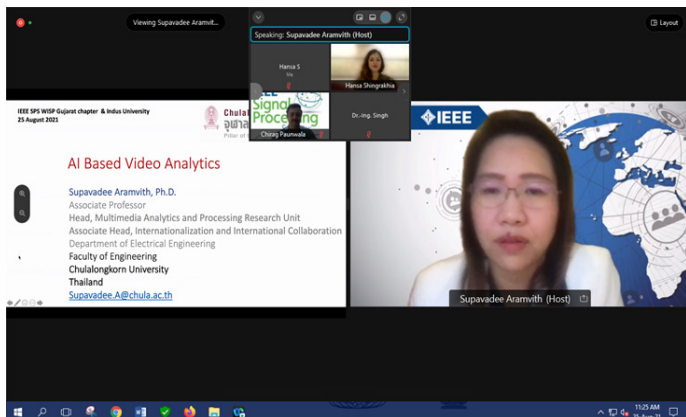
Prof Dr. Norliza Mohd Noor, Head of Electrophysiology Research Group Razak Faculty of Technology and Informatics, University Teknologi Malaysia, Kuala Lumpur Campus, Malaysia on 17th July 2021 on the topic of Classification and Management of Lung Disease.

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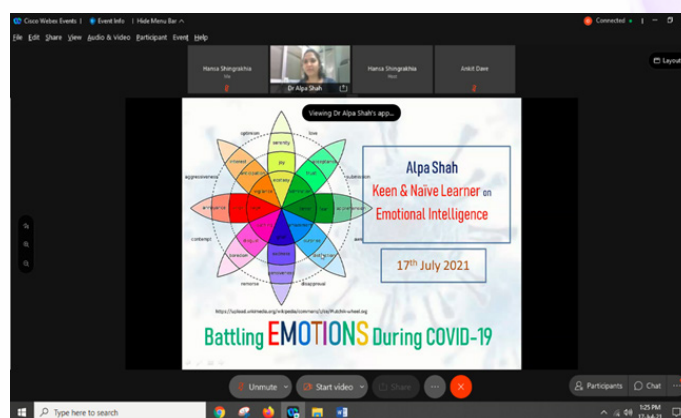
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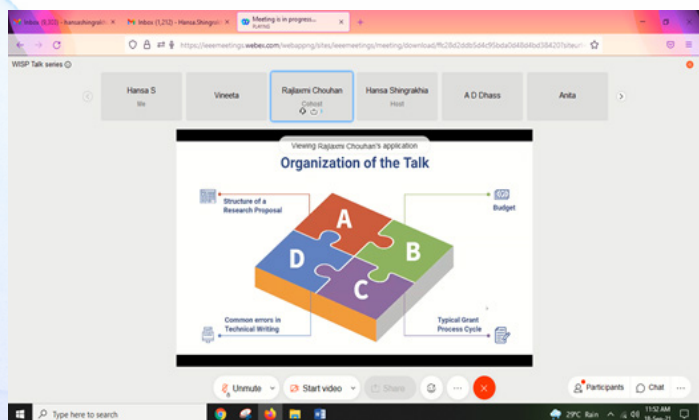
WISP Events



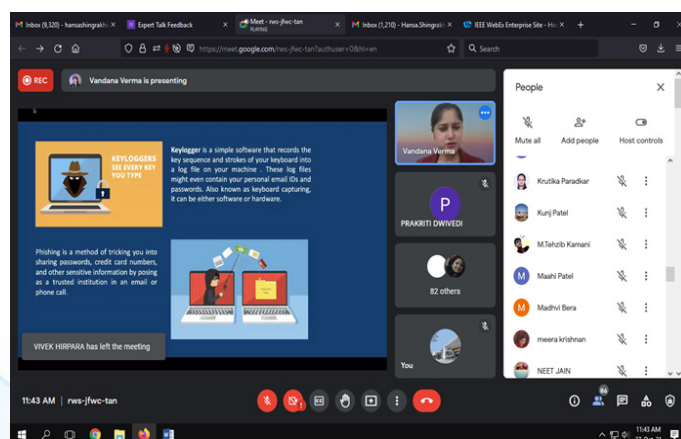
Dr. Supavadee Aramvith, Associate Professor, Multimedia Analytics and Processing Research Unit, Chulalongkorn University, Thailand on 25th August 2021 on the topic of AI-based Video Analytics.



Dr. Alpa Shah, Head- MCA Department Sarvajnik College of Engineering and Technology, Sarvajnik University on 17th July 2021 on the topic of Battling Emotions during COVID 19.



Dr. Rajalaxmi Chouhan, Department of Electrical Engineering, IIT Jodhpur on 18th September 2021 on the topic of An Overview of Technical Writing for research Proposal.



Ms Vandana Verma, Security Relations Leader – APJ, Global BoD at OWASP & InfoSec Girls on 27th October 2021 on the topic of Cyber Security.

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From the pen of Dr Nirali Nanavati, Digital Content Chair, IEEE SPS Gujarat Section

Dr Nirali and her team of six students from Faculty of Computer Engineering of Sarvajanik College of Engineering and Technology worked on Medical Image Translation that used a deep learning framework to translate MRI images from one modality to the other. IEEE SPS Gujarat Section congratulates Dr Nirali Nanavati and the team for winning “First Prize” in the 10th Computer Society of India - In-app International Student Project Awards 2021.

We applaud Dr Nirali for sharing her work to our Newsletter to be published and benefit our readers.

Medical imaging is very important to track progress of ongoing illnesses and to create a visual representation of internal organs of the human body. A Computed Tomography (CT) scan normally takes 45 to 60 minutes while a Magnetic Resonance Imaging (MRI) can require 60 to 90 minutes. Sometimes it is possible that two different kinds of imaging modalities (e.g., T1 MRI and T2 MRI scan) provide supplementary information to complete a diagnostic process. So, if we are able to convert a medical image from one modality to another, we can save the time and money required for scans and make the diagnostic process faster and safer.

Our focus was on converting the modalities of MRI scan. The various modalities in MRI are T1, T2, Flair, Proton Density (PD), etc. We have been successful in generating MRI T2 from T1 modality. In T1 modality, tumours are light while in T2 modality, the tumours are bright. In T1 modality, fat tissues are bright while in T2 modality, fat and water are bright. Currently, long acquisition time (AQT) is observed due to series acquisition of multi-modality MR images (especially in T2 weighted images the acquisition time is longer). Due to this prolonged procedure, there are 50% chances of motion artifacts as well. Also, prolonged exposure to MRI has been widely reported to induce Transient sensory effects such as vertigo, nausea, dizziness, metallic taste, and visual phosphenes. Creating a model that could possibly generate other modality can enhance the efficiency of the conventional MRI procedure.

For medical image translation, a modified UNET based architecture which uses a convolutional neural network was proposed which will help them to generate the required brain images (generating T2 images from T1 images to save on the MRI scan time and exposure for the patients). In this project, they have worked on improving the efficiency and accuracy for medical image translation using DICOM (Digital Imaging and Communications in Medicine) brain images which are mostly used in contemporary MRI

radiology practices. They have proposed a solution based on a deep neural network to convert T1 modality to T2 modality for DICOM images using our modified UNET architecture. Since the DICOM images were not available online they have sourced them. The proposed network provides a significant and promising T2 image for a given T1 image. The proposed solution is giving promising results in terms of MSE, MAE and PSNR (accuracy metrics). The generated T2 modality has also been validated clinically by a prominent Radiologist.

In Fig. 1, the left side image is the ground truth of the T2 MRI modality and the right side is the image generated by our proposed model. This model can be further extended to other modalities and to other parts of the body as well. Fig. 1 – Ground Truth vis -a - vis the generated T2 modality image.

Hence, to conclude this project would help save on resources for the radiologists, cost for the patients, reduce motion artifacts. Hence, making MRI scan time shorter would make them less expensive, enabling more MRI examinations. It would also be beneficial for children as it would reduce the time needed for their MRI.



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Our Upcoming Events

1. Data Science Challenge 1.0 (DSC 1.0)

With the goal of turning data into information, and information into insight, Sarvajanic College of Engineering and Technology (SCET), Surat in association with IEEE Signal Processing Society SCET Student Branch Chapter and IEEE SCET Student Branch has organized a National Level Project Competition 'Data Science Challenge 1.0 (DSC 1.0)'. The event will be held on 28th and 29th January, 2022.

Participants in a team have been given a problem statement based on Data Science and they were required to produce the output based on given performance parameters.

Kindly refer to the link: <https://ieeespsgs.org/data-science-challenge/>

Sarvajanic College of Engineering and Technology, Surat
in association with
IEEE SPS SCET Student Branch Chapter, GS & IEEE SCET Student Branch organizes
A National Level Project Competition on
Data Science Challenge 1.0 (DSC 1.0)
| The goal is to turn data into information, and information into insight |
6th and 7th January 2022

Instructions:

- Participants can form a team of 3 (maximum) and 1 mentor.
- Last date for registration with video clip submission is 18th Dec, 2021.
- .MP4 Video Format submission (3 minutes duration).
- Qualified teams will participate in the Semi-final round on 6th Jan, 2022 and will have to work with the exact problem statement provided in the domain of interest.
- Final round will be on 7th Jan, 2022.

Registration:

- **Free:** If at least one member of the team has IEEE SPS Membership
- **Rs 500/- per team:** If none of the members of the team have IEEE SPS Membership

<https://bit.ly/Data-Science-Challenge-21>

Win Attractive Prizes:

- First Prize: Rs 11,000/-
- Second Prize: Rs 7,000/-
- Third prize: Rs 4,000/-

For Any Queries Contact:

- Abanob Bhanu: +91 7043775099
- Darshan Mevawala: +91 7202819540
- Email: spsbs@scet.ac.in | Website: <https://ieeespsgs.org/data-science-challenge/>

2. Two Days International Webinar on Women Leading Technology on 13th and 14th December 2021

The IEEE Gujarat Section Sensors Council's Women in Sensors (WiSe) and the Signal Processing Society Chapter's Women in Signal Processing (WiSP) in collaboration with IEEE Gujarat Section are pleased to announce an International Webinar (virtually) called Women Leading Technology (WoLT 2021) during 13-14 December 2021.

The objective of the Webinar is to provide a global stage for visionary women entrepreneurs, researchers, and academicians to understand and share their experiences. The Day-1 is completely devoted to successful women entrepreneurs. Day-2 is scheduled with four technical talks of state-of-the-art development in the area of sensors and signals. Besides these some other talks and networking moments are also arranged.

Kindly refer to the link: <https://sites.google.com/scet.ac.in/wolt-ieee/home>

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2-DAYS INTERNATIONAL WEBINAR ON WOMEN LEADING TECHNOLOGY (WoLT 2021)

SENSORS AND SIGNALS



REGISTER HERE EVENT WEBSITE

DECEMBER 14 2021



Wearable computing system based on body sensor networks
Giancarlo Fortino, University of Calabria, Rende, Italy

Wearable sensors for monitoring movement in sports
Elena Bergamini, University of Rome, Italy

Hearable devices: New directions with new functions
Akihiko Sugiyama, Yahoo! Japan Research, Tokyo, Japan

Design and development of an IoT enabled wearable ECG measuring system
Maryam Shojaei, IIT Bombay, India

IEEE Gujarat Section

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IEEE Signal Processing Society
GUJARAT CHAPTER

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IEEE Sensors Council
Gujarat Chapter

2-Days International Webinar - WoLT 2021

Women Leading Technology

Rajul Patkar (Co-Founder CEO - Proximal SoilSens)
Devina Bharadwaj (Founder CEO - Intervene Lab.)
Anupama Panchal (Founder CTO - ClientJoy Inc.)
Anuradha Upadhyay (Founder CEO - Anukriti)

December 13 2021





invited talks followed by an open house

Women of Wonder

on the success stories of women entrepreneurs

Inaugural Talk: Nita Patel, IEEE WIE Chair 2020-21 & IEEE CS President-Elect 2022-25
Open Forum Moderator: Shefali Jha, DA-IIT

Register here   Event website

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3. Expert Talk on Challenges and Opportunities in AI

by Dr. Deepak Garg, Dean, International & Corporate Affairs, Bennett University on 20th January 2022, 10.00 am

The poster features a green and blue background with a circular portrait of Dr. Deepak Garg. It includes logos for IEEE Signal Processing Society Gujarat Chapter, IEEE SCET SB Chapter, and IEEE SPS SCET SB Chapter. The text reads: 'IEEE Signal Processing Society Gujarat Chapter in collaboration with IEEE SCET SB Chapter & IEEE SPS SCET SB Chapter presents Expert Talk Challenges and Opportunities in AI 20 January 2022 | 10:00 AM IST Scan to Register'. A QR code is provided for registration, along with the URL <https://bit.ly/330eloi> and a note that a WebEx link will be sent to registered participants. Social media icons for website, Facebook, Instagram, and LinkedIn are at the bottom.

4. Winter School on Advances in Deep Learning for Multimedia Signal Processing from 3rd -5th March 2022 . Refer our website for more details.

CONGRATULATIONS!!
for elevation to grade of IEEE Senior member

1. Dr Arpan Desai,

Technical Activity Chair, IEEE SPS Gujarat Section.

2. Dr Manish Khare,

Membership Development Chair, IEEE SPS Gujarat Section.