

2021 Third International Conference on Advanced Computational and Communication Paradigms (ICACCP)



## 2021 Third International Conference on Advanced Computational and Communication Paradigms (ICACCP) Program



Monday, March 22

Monday, March 22 10:00 - 10:30 (Asia/Calcutta)

### Conference Inauguration

Room: <https://bit.ly/icaccp-day1>

Monday, March 22 10:30 - 10:50 (Asia/Calcutta)

### Tea Break

Monday, March 22 11:00 - 12:00 (Asia/Calcutta)

### Plenary: Energy Efficiency in Smart Buildings Through IoT Sensor Integration

**Prof. Saifur Rahman, IEEE Life Fellow, Director, Advanced Research Institute, Virginia Tech, USA**

Room: <https://bit.ly/icaccp-day1>

Abstract: Internet of Things (IoT) deployments offer a much higher value proposition if these can function in the context of smart buildings. Such advanced information and communication technology (ICT) applications in commercial buildings, schools, libraries, shopping centers, etc. offer low cost but highly effective monitoring and control opportunities. Sensors deployed in key locations can monitor the building environment in real-time, collect information for intelligent decision making, and facilitate various services. An IoT sensor platform has been developed that provides a unified communication platform which can integrate information from disparate sources and provide one control hierarchy. It is a powerful, low-cost, open-architecture software platform that can monitor and control major electrical loads (e.g., HVAC, lighting and plug loads), as well as solar PV systems, energy storage units and other IoT sensors in commercial buildings. The platform can provide new or legacy buildings with a building automation system (BAS) or connect with existing BAS systems in large and small commercial buildings. This platform leverages machine learning algorithms to draw insights from a deployed building's historical operating data and occupant preferences to save energy (kWh) while increasing occupant comfort. This also allows buildings to reduce peak demand (kW) through direct communication with utilities using demand response protocols such as open ADR.

Monday, March 22 13:00 - 14:00 (Asia/Calcutta)

### Lunch Break

Monday, March 22 14:30 - 16:00 (Asia/Calcutta)

### Track-II: Cyber Security and Data Forensics

**Dr. Debabrata Samanta, CHRIST University, Bangalore, India and Dr. Sandeep Gurung, Sikkim Manipal Institute of Technology, Sikkim, India**

Room: [http://bit.ly/ICACCP\\_Track-II](http://bit.ly/ICACCP_Track-II)

Chairs: Sandeep Gurung (Sikkim Manipal Institute of Technology, India), Debabrata Samanta (Dayananda Sagar College of Arts, Science and Commerce, India)

Implementation of the ASD's Top 4/Top 35 in a production environment Real world intrusion case studies Advanced techniques in file system, memory and network forensics Information security visualisation Sector specific information security challenges Security policy development / Aligning to standards Cloud security case studies or research Internet of things Dealing with information security at internet scale Securing underpinning internet infrastructure Vulnerability discovery and remediation processes Secure coding Threat modelling Penetration testing Database security Cyber security incident response Coordinated industry action on APT Malware Analysis Mobile device security Cyber ethics Legal aspects relating to cyber security Contemporary cyber security issues

#### **14:30 Detection of Fraudster Credit Card Transaction Using Predictive Model**

[Sudarshan Sivakumar](#) and [Mallikarjun H M](#) (RNS Institute of Technology, Bengaluru, India)

Data analytics is the science of extracting crude data, and analyzing it in order to get some useful results and conclusions. This process includes collection, data organization, preprocessing, modeling and interpretation. There are 2 methods involved in this field where the first one is called unsupervised learning in which no variable measured but the predictor is just measured on examples. The objective is fuzzy here some examples of supervised learning are clustering, forecast models etc. In supervised learning we have a dependent variable Y and the inputs of this type of learning are in vector forms. Some examples of this type of learning are linear regression models, logistic regression models, random forest etc. Classification of cancer patients with respect to their blood samples can be assumed as a practical example.

#### **14:45 An Early Detection of Distributed Denial of Services Attack**

[Chin-Ling Chen](#) (National Pingtung University, Taiwan)

DDoS attacks are arduous to detect because they can generate the attack traffic to flood the victim host from a large number of zombie machines. In this paper, we have designed and implemented an early attack detection mechanism which adopts the final probabilities to recognize the incoming attack. We have set up Nagios based on Linux-based platform to monitor all mission-critical infrastructure components including services, operating systems and network protocols. Nagios is configured to forward warning alerts whenever there is possible malicious traffic. The experiment results have shown that the proposed mechanism can detect the incoming DDoS attacks early as well as effectively.



#### **15:00 Real-Time Health Monitoring System of Soldiers Using IoT**

[Ankita Sharma](#) and [Shipra Aggarwal](#) (Indira Gandhi Delhi Technical University for Women, India)

Internet of Things (IoT) technology has become the foremost notion in the overall enhancement of monitoring the health of soldiers. This whole system combines various wearable bio-sensors, control units comprising distributed communication systems, and human-friendly user interfaces. The goal of the soldier health monitoring system is to examine and provide the health status to the control unit so that they can send the required medical help to the soldier. The health status of the soldier is acquired by the control unit that accesses current and coordinating positions of the soldier currently present using the Global Positioning System (GPS) module. The GPS module performs search and rescuing soldiers in minimum real-time expansion. In this paper, a system is proposed which is capable of monitoring the soldier's health and also provides the real-time signal to the control unit. In case of an emergency, the system will produce an alarm so that necessary actions can be taken.



#### **15:15 Health Monitoring System for Soldiers**

[Ankita Sharma](#) and [Shipra Aggarwal](#) (Indira Gandhi Delhi Technical University for Women, India)

Internet of Things (IoT) technology has become a key concept in the general enrichment of screening the physical condition of the soldiers. The entire arrangement merges an assortment of wearable bio-sensors, control units encompasses distributed communication association, along with human-friendly user interface. In order to conquer the physical condition-related matters of the soldiers in tremendous circumstances, an appropriate and moreover consistent arrangement is requisite by the health center to facilitate and moreover examine the soldier's physical condition commencing from a remote area. The general purpose of the arrangement is to screen and endow with the status of the soldier's physical condition to the control unit. Further, this information can send to the assigned health center serving to the soldier without delay. The physical condition of the soldier is acquired by the control unit by means of distributed bio-sensors. The control unit, in return also accesses the longitudinal positions as well as the latitudinal positions of the soldier to get access to the present location with the help of Global Positioning System (GPS) module. In this project, a design of a system is proposed and simulations are performed to monitor the soldier's health and also Artificial Neuro-Fuzzy Inference System (ANFIS) is demonstrated for different inputs.



#### **15:30 Strengthening Data Security Using Multi-Level Cryptography Algorithm**

[Miss Pritilata](#) and [Md. Ashiq Mahmood](#) (Khulna University of Engineering and Technology, Bangladesh)

Information security incorporates information encryption, hashing, tokenization, and key administration rehearses that ensure information over all applications and stages. The purpose of this paper is to strengthen data security using Multi-Level Cryptography algorithm. A half breed calculation is a calculation that joins at least two different calculations that take care of a similar issue, either picking one (con-tingent upon the information), or exchanging between them through the span of the calculation. This is commonly done to consolidate wanted highlights of each, with the goal that the general calculation is superior to the individual parts. The average values are calculated here for time and memory parameters by combining three algorithms which are multi-prime RSA, DES and Vernam Cipher. RSA calculation is a well-known exponentiation in a limited field over whole numbers including prime numbers. The Data Encryption Standard is a symmetric-key calculation for encryption of computerized information. Despite the fact that its short key length of 56 bits makes it excessively unreliable for applications, it has been profoundly powerful in the headway of cryptography. In present day wording, Vernam Cipher is an even stream cipher where the plaintext is joined with an arbitrary stream of information (the "keystream") of a similar range, to create the cipher text, utilizing XOR. Subsequent to consolidating these three calculations, the framework will be somewhat rugged. The results have been represented after using a different number of primes with this hybrid algorithm. The preferences and thinking for utilizing this approach have additionally been recorded in this paper.



#### **15:45 Semantics-Driven Safety Measures in Distributed Big Data Systems on IoT**

[Manoj Sahit Reddy Vanga](#) (IIITDharwad, India); [J Vijayaraj](#) (Pondicherry Engineering College, India); [Pavankumar Kolluru](#) and [TP Latchoumi](#) (VFSTR, India)

History of computation quickly appears with distributed computing, portable recording, portable figuration, and the Internet of Things (IoT). Everything can be described as a class a Distributed cooperative Bigdata System (DCBS) in an open environment. An important factor of improvement is the dramatic selection of individuals and associations within every aspect of their everyday problems. In this

environment, client protection needs basic and complex classical methodologies. It includes proper treatment security as a primary computational idea in the DCBS world view. The level is to make a formal, broad-based model for security as an institution to augment a DCBS-based structure. It has a step in different applications that allow customers to value complete administrations in open conditions while guaranteeing their seamless protection. The objective of this paper is to investigate, demonstrate, and dissect security issues in the DCBS. Due to the contrasts semantics, the substances embrace combined the basic quality factor for open conditions. It also includes granting the semantics of the communication agreement. Thus, the safety assurance system improves safety in the semantic agreement to regulate the assurance activities before completion.



**Monday, March 22 14:30 - 15:00 (Asia/Calcutta)**

### **Track-III: Signal Processing and Communication Engineering**

**Dr. Samarendranath Sur, Sikkim Manipal Institute of Technology, Sikkim, India**

Room: [http://bit.ly/ICACCP\\_Track-III](http://bit.ly/ICACCP_Track-III)

Chair: Samarendra Nath Sur (Sikkim Manipal Institute of Technology, India)

Signal Processing for Communication Image & Video Signal Processing Digital & Image Forensic Microelectronics DSP Algorithms & Architectures Pattern Analysis & Classification Control Systems and Applications Communications Software Satellite and Space Communications Optical Networks and Systems Sensor Networks and Embedded Systems Wireless Communication Statistical Signal Processing Cognitive Radio and Cognitive Networks Speech & Audio Processing Biomedical Signal Processing Signal Processing for Big Data Recent development in adaptive filtering algorithms Adaptive networking and current challenges Dynamic and innovative system designs using adaptive filter Adaptive system identification and channel modelling Advances in computing using adaptive and innovative systems Image and Speech enhancement and processing using adaptive filters Acoustic noise and echo reduction applying adaptive algorithms and designs Channel equalization/modelling, communication system design and fault analysis employing adaptive algorithms Adaptive filters for mobile computing, networking and wireless system designs AI and soft computing applications of adaptive systems Implantation of adaptive filters for real time applications using DSP Processors and FPGA Advanced adaptive channel equalization and line enhancer Adaptive and innovative systems for biomedical signal processing and applications Adaptive system design for antenna and electromagnetic applications

#### **14:30 Comprehensive Study on Denoising of Medical Images Utilizing Neural Network Based Auto-Encoder**

[Thoshara Nawarathne](#) (University of Peradeniya, Sri Lanka); [Thanushi Ruwanga Withanage](#) (Faculty of Engineering, University of Peradeniya, Sri Lanka); [Samitha Gunarathne](#) and [Upekha Delay](#) (University of Peradeniya, Sri Lanka); [Eranda Somathilake](#) (University Of Peradeniya, Sri Lanka); [Janith Bandara Senanayaka](#), [Gunawath Mudiyansele](#) [Roshan Indika Godaliyadda](#) and [Mervyn Parakrama Ekanayake](#) (University of Peradeniya, Sri Lanka); [Chathura Rathnayake](#) (Faculty of Medicine, University of Peradeniya, Sri Lanka); [Janaka Wijayakulasooriya](#) (University of Peradeniya, Sri Lanka)

Fetal motion discernment utilizing spectral images extracted from accelerometric data incident on pregnant mothers abdomen has gained substantial attention in the state-of-the-art research. It is an essential practice to avoid adverse scenarios such as stillbirths and intrauterine growth restrictions. However, this endeavor of ensuring fetus safety has been arduous due to the existence of random noise in medical images. This novel research is an in depth approach to analyze how the interference of different noise variations affect the retrieval of information in those images. For that, an algorithm employing auto-encoder-based deep learning was modeled and the accuracy of reconstruction of the STFT images mitigating the noise has been measured examining the loss. From the results, it is manifested that even a substantial addition of the Super-Gaussian noises which have a higher correlation of the frequencies possessed by the Fetal movement images can be restored successfully with the slightest error.



#### **14:45 Design of Miniaturized Dual and Tri-Band Slot Antennas With Bandwidth Enhancement for Various Applications**

[Hashibul Alam](#) and [SK. Moinul Haque](#) (Aliah University, India)

In this paper, miniaturized dual and tri-band slot antenna design for various applications (GPS, MSS, cordless telephone, radio astronomy) is presented. For these proposed dual and tri-band miniaturized antennas, the first resonant is achieved by the reference slot antenna, loaded with six slits on both the end of slot which is antenna 1, the second resonant is achieved by loading with three circular loops on the middle of slot which is antenna 2 a third resonant frequency is obtained by loading with nine metallic strips on back side of the substrate which is antenna 3. The combination of antenna 1 and 2 constructs a dual-band antenna that resonates at frequencies of 1.91 and 3.32 GHz respectively. As results, reduction in resonant frequency of 41.94% with enhanced impedance bandwidth of 117.18% is achieved for first resonance frequency in comparison with reference antenna for dual-band antenna. Then combining antenna 1, 2 and 3 construct a tri-band antenna which resonates at frequencies of 1.55, 2.64 and 3.81 GHz respectively. Hence, it is achieved reduction in resonant frequency of 52.88% with enhanced impedance bandwidth of 59.01% for first resonance frequency and 19.75% in reduction resonance frequency for second resonance frequency in comparison with reference antenna.



**Monday, March 22 14:30 - 16:00 (Asia/Calcutta)**

### **Special Track-I: Computational Neurosciences, Cognition, Bio-Medical Engineering and Biotechnology**

**Dr. Nilanjan Dey, JIS University, Kolkata, India and Dr. Akash Kr. Bhoi, Sikkim Manipal Institute of Technology, Sikkim, India**

Computational Neuroscience Cognitive Computing Computer Vision Intelligent Interfaces for Information Presentation Intelligent Data Analysis Ubiquitous Computing and Sensing Aware Home Environments Medical Image and Signal Processing Bio-Robotics Medical Image Processing Biomechanics & Ergonomics EEG, ECG, EMG, EP Signal and Applications Cognitive Learning Brain Computer Interface BioSensors Bio-electrical Signal Analysis and Applications PPG Signal Analysis and Applications Biomedical Signal Analysis Bio-electromagnetic Behavioral Signal Processing Human Signal Analysis Molecular, Cellular and Tissue Engineering Biomaterial Neural and Rehabilitation Engineering Bioinformatics Biomechanics Bioengineering Advances in biosignal Biomedical for assistive technologies

#### **14:30 Comparative Study of Heart Sound Classifier With Varying Hyper Parameter of CNN**

[Vivek Rai](#) and [Vikash Singh](#) (Sikkim Manipal Institute of Technology, India)

Cardiovascular is a serious but manageable disease if diagnosed early. So there is a need for an optimal solution for the same. The main goal of this study is to compare various heart sound classification models with different parameters like activation function, stride length, and layers used. This study purpose 16 Convolutional Neural Network (CNN) models with different hyperparameters for heart sound classification. The Mel Frequency Cepstral Coefficients (MFCC) method is used for feature extraction of the heart sound dataset. The optimal model purposed in this study was able to obtain F1-score of 91% on "the PASCAL classifying heart sound dataset".

#### **14:45 An Analysis of Epileptic Seizure Prediction Using Deep Learning Techniques**

[Mayank Gupta](#) (Indian Institute of Technology, Delhi); [Tapan Gandhi](#) (Indian Institute of Technology, Delhi, India)

Epileptic seizures are a serious affliction affecting a large number of people. Predicting a seizure early on is critical to providing the correct care to a patient. EEG signals are often used to diagnose seizures. However, analysis of such data requires significant expertise and constant monitoring. This study explores the application of various deep learning techniques on the prediction of seizures. Also, a CNN based technique is chosen and applied on spectrograms extracted from the CHB-MIT dataset, and the model achieves an accuracy of 94.03 on the validation set. The model trained displays proficiency comparable to many popular techniques. Finally, the model's output is examined and an analysis is presented on the important features that may have lead to correct prediction.

#### **15:00 Mathematical Modeling of Complex Cellular Networks of Autophagy-Lysosomal Pathway in Neurodegeneration**

[Hemalatha Sasidharakurup](#) (Amrita School of Biotechnology, Amrita Vishwa Vidyapeetham, Amrita University, India); [Anil Menon](#), [Avinash Sreedharan Sabeen](#) and [Shyam Diwakar](#) (Amrita Vishwa Vidyapeetham, India)

Systems biology modeling helps to develop large complex biochemical path-ways of disease networks including biochemical components and the interactions towards a multi-scale understanding of complex diseases. Mathematical modeling with the applications of biochemical systems theory using time-dependent ordinary differential equations and reaction rate equations help to predict emergent behavior of networks under different cellular conditions. In this study, the biochemical networks of autophagy-lysosomal pathway and role of alpha synuclein in Alzheimer's and Parkinson's disease have been modeled by using BST. The results show lysosome and autophagosome dysregulation by the action of A $\beta$  and lipofuscin aggregation as a major contributor to AD onset. The modeling allows comparing the interactions between biochemical species in both normal and diseased conditions and predicting new biomarkers to find potential targets which can help in early diagnosis and disease progression over time. Model predictions indicated activated calpain led to lysosomal leakage and activation of pro-apoptotic caspases that may result in irreversible cell damage. Simulations indicated dysfunctions in the degradation process of aggregated  $\alpha$ S result in the formation of excess Lewy bodies, a known cause leading to dopaminergic cell death in PD. From the simulations, the model implicated lipofuscin aggregates, LAMP2A, DJ-1, VMAT-2, ubiquitinated proteins, A $\beta$  and  $\alpha$ S aggregates as the major network components involved in the deregulation of protein degradation that may be used as biomarkers for AD and PD.

#### **15:15 Primates Visual Cortex Inspired Novel Edge Detection Method**

[Satyabrat Malla Bujar Baruah](#), [Uddipan Hazarika](#) and [Biswajit Das](#) (Tezpur University, India); [Soumik Roy](#) (Tezpur University, Assam, India)

Edge detection is one of the basic operations performed in the striate cortex of the primate visual cortex. In order to investigate the process of edge detection and directional feature extraction, detailed morphology of direction-selective ganglion cell (DSGC) has been designed incorporating electrophysiological, physicochemical and structural attributes of a neuron and implemented in a spiking neural network to replicate the behavior of DSGC layer in striate cortex. Simulation results successfully replicate the behavior of DSGC and suggest edge detection as early operation in the primate visual cortex. Results suggest non-maxima suppression as an inherent feature of such networks and edge reconstruction might be achieved due to max-pooling like operation in a single-cell neighborhood with four DSGC depth response.



#### **15:30 A Novel Two Electrode ECG Acquisition From Palm**

[Mohammed Adil](#) and [Satyabrat Malla Bujar Baruah](#) (Tezpur University, India); [Soumik Roy](#) (Tezpur University, Assam, India)

In the proposed article, a real time ECG acquisition system using two electrodes has been proposed. Most of the available acquisition system depends on at least three electrodes. In this work two electrode system has been studied in details and minimal system to overcome the problems has been designed and presented in the proposed work. Issues of impedance matching, power-line noise and high frequency noise due to muscle activity has been analyzed and the proposed system has been designed to overcome the addressed issues. The proposed work presents a novel way for acquisition of ECG from palms using only two electrodes and at the same time overcoming the issues related to impedance matching and muscle noise.



#### **15:45 Breast Cancer Diagnosis System Using Fuzzy Logic and Android Application**

[Md. Mahedi Hasan](#) (Khulna University of Engineering & Technology, Bangladesh); [Pintu Chandra Shil](#) (Khulna University of Engineering and Technology, Bangladesh)

The diagnosis of Breast Cancer (BrC) is an intricate process that requires accuracy, portability, and viability. Therefore, almost 5 million passing every year are ascribed to BrC. This paper represents a framework that is used to classify the stage of breast cancer. The

proposed system uses fuzzy logic to classify the stage and an android application provides the portability of the system that can relieve the pressure from the specialist. This paper uses the database of Wisconsin Diagnostic Breast Cancer (WDBC). The accuracy of the proposed framework is 98.3%. Overall, the proposed system is capable of decreasing the number of works and times of doctors while they are counseling.



Tuesday, March 23

Tuesday, March 23 10:00 - 11:00 (Asia/Calcutta)

**Keynote: Security and Privacy for the Internet of Things**

**Prof. (Dr.) Biplab Sikdar, Vice Dean, Faculty of Engineering, National University of Singapore, Singapore**

Room: <http://bit.ly/icaccp-day2>

Abstract: The Internet of Things (IoT) represents a great opportunity to connect people, information, and things, which will in turn cause a paradigm shift in the way we work, interact, and think. The IoT is envisioned as the enabling technology for smart cities, power grids, health care, and control systems for critical installations and public infrastructure. This diversity, increased control and interaction of devices, and the fact that IoT systems use public networks to transfer large amounts of data make them a prime target for cyber attacks. In addition, IoT devices are usually small, low cost and have limited resources. Therefore, any protocol designed for IoT systems should not only be secure but also efficient in terms of usage of chip area, energy, storage, and processing. This presentation will start by highlighting the unique security requirements of IoT devices and the inadequacy of existing security protocols and techniques of the Internet in the context to IoT systems. Next, we will focus on security solutions for the IoT, with special focus on protection against physical and side channel attacks. In particular, we will focus on mutual authentication protocols for IoT devices based on security primitives that exploit hardware level characteristics of IoT devices.

Tuesday, March 23 14:30 - 17:30 (Asia/Calcutta)

**Track-IV: Computer Vision and Image Processing**

**Dr. Sourav De, Cooch Behar Government Engineering College, India and Dr. Mousumi Gupta, Sikkim Manipal Institute of Technology, Sikkim, India**

Room: [http://bit.ly/ICACCP\\_Track-IV](http://bit.ly/ICACCP_Track-IV)

Chairs: Sourav De (Cooch Behar Governmet Engineering College, India), Mousumi Gupta (Sikkim Manipal Institute of Technology, India)

Computational Imaging and Displays Vision-based Graphics Restoration, Super Resolution Motion and Video Analysis Tracking and Surveillance Modeling and Animation Compressive Sensing Scientific Visualization Virtual and Augmented Reality Biometrics Image and Video Retrieval Medical Image Analysis Object and Scene Recognition Document Image Analysis Statistical Methods and Learning

**Track-IV.1 14:30 Pixel-Based Nuclei Segmentation in Fine Needle Aspiration Cytology of Lung Lesions**

[Moumita Dholey](#) and [Atasi Sarkar](#) (Indian Institute of Technology Kharagpur, India); [Amita Giri](#) (Calcutta National Medical College and Hospital, India); [Anup Sadhu](#) (Chief Consultant, EKO CT & MRI Scan Centre, Medical College, Calcutta, India); [Koel Chaudhury](#) and [Jyotirmoy Chatterjee](#) (Indian Institute of Technology Kharagpur, India)

Lung cancer is a malignant lung tumor with uncontrolled lung cell growth. Identification of cancer cells is one of the primary tasks in Fine Needle Aspiration Cytology (FNAC) based analytical decision making. The manual assessment of Papanicolaou (Pap) stained slides under the light microscope is time-consuming, erroneous and difficult due to feature ambiguities and also suffers from inter-observer variability. Here, an automated computer vision algorithm is presented for segmentation of cancer cell nucleus from microscopic images of lung FNAC samples. The proposed automated methodology includes colour correction, noise filtering, nucleus contour labelling using unsupervised clustering, supervised pixel-based nucleus segmentation and delineation of adjoining foreground nucleus. The background-foreground segmentation using Mean Shift clustering method acts as a preliminary task in Pap stained images, where contours of nucleus regions are roughly identified. Subsequently, to segment the cancerous nucleus (foreground) precisely, a Pixel-based supervised segmentation method using the Artificial neural network (ANN) is adopted. Morphological post-processing techniques are applied to fine-tune the nucleus segmentation results. The hybrid clustering-cum-supervised pixel-based nucleus segmentation method performs proficiently with a weighted accuracy of 99.15%, weighted sensitivity of 98.65% and weighted specificity of 97.73%.

**Track-IV.2 14:45 Depth-Guided Two-Way Saliency Network for 2D Images**

[Dibyendu Kumar Das](#) (AcSIR(Academy of Scientific and Innovative Research) & CSIR-CMERI, India); [Sahadeb Shit](#) (AcSIR(CSIR-CMERI), India); [Dip Ray](#) (CSIR-CMERI, India)

Depth is one of the primary visual cues which distinguish an object from its background. In recent years salient object detection has achieved great success with the help of a convolution neural network and its corresponding depth map. Previous methods have already utilized depth map to improve the precision of the results; however, all of the previous methods are only concentrating on the available RGB-D datasets to train their network. In this paper, we used a depth estimation network to find the depth map of 2D images. That depth map has been used to train the depth guided saliency network, which produces the intermediate depth saliency map. Finally, the depth saliency map has been fused with the coarse saliency map to obtain the final saliency map. Experiments demonstrate the effectiveness of the proposed method, which achieves state-of-the-art performance on six popular benchmarks.



#### **Track-IV.3 15:00 A Novel Approach for Early Detection of Disease and Pest Attack in Food Crop: A Review**

[Elakya R](#) and [Manoranjitham T](#) (SRM Institute of Science and Technology, India)

Demand for safe and healthy food has been increasing with every passing day. In order to ensure that the cultivated crop is healthy, cultivators have to monitor the crop regularly. Diseases can attack and affect the plant leaf and other parts at any time from seedling stage to harvesting stage, which can result in the less production of crops which in turn leads to huge financial loss. So plant disease detection in early stage is important in agriculture fields. Timely and accurate detection of disease and pest is important in order to reduce the production of quality crop loss caused due to crop diseases. The disease and pest attacks damages both quality and quantity of crop produced. Early diagnosis can reduce the damage. We have reviewed few papers and analyzed that Recent advances in Deep Transfer learning and applying Convolutional Neural Network pre-trained algorithms gives an effective and practical solution for this problem. This paper will give a quick overview of what trends were used in deep learning in disease and pest identification in food crops.



#### **Track-IV.4 15:15 A Survey on Pedestrian Detection System Using Computer Vision and Deep Learning**

[Souvik Pattanayak](#) (Sikkim Manipal Institute of Technology Sikkim Manipal University, India); [Chitra priya N](#) (Sikkim Manipal Institute of Technology, India); [Nitisha Pradhan](#) (Sikkim Manipal University, India)

Pedestrian detection is one of the most popular research areas in computer vision field. This research are used widely in many applications . The main idea of this paper is to study the different systems that are based on vision based pedestrian detection using deep learning frameworks. The paper also considered the performance of some methods over the data-set Caltech, INRIA and KITTI

#### **Track-IV.5 15:30 U-Net Based Optic Cup and Disc Segmentation From Retinal Fundus Images via Entropy Sampling**

[Arindam Chowdhury](#) (Burdwan University, India); [Rohit Agarwal](#) and [Alloy Das](#) (University Institute of Technology, India); [Debashis Nandi](#) (National Institute of Technology, Durgapur, India)

Accurate segmentation of optic disk and cup regions in fundus images have significant clinical importance. Diagnosis of severe ophthalmic pathologies can be made by proper detection of optical disc and cup. The color fundus image (CFI) is the most common modality used for ocular screening. From this CFI, the Cup-to-disc ratio can be calculated correctly after proper detection of disc-cup regions, and this CDR plays important clues for glaucoma detection. This paper presents an entropy-based deep learning approach to perform such accurate segmentation from digital retinal images. The performance of the proposed approach outperforms existing methods on two public data-set Drishti-GS and RIMONE V3 data-set.

#### **Track-IV.6 15:45 Artificial Face Sketch Drawing Categorization**

[Hiranmoy Roy](#), [Soumyadip Dhar](#), [Reema Hazra](#), [Rija Dey](#), [Riya Kirtania](#) and [Sumedha Sen](#) (RCC Institute of Information Technology, India)

This paper proposes a novel face sketch drawing categorization system. Usually, judges or experts are required to categorize the face sketch drawings. Here first time, we have tried to give an artificial measure for the categorization of face sketch drawings. We have measured the different facial landmark points to get some ratio measures which are very important for judging the quality of the face sketch drawn by an artist. Then, a weighted average measure is calculated to give emphasize some ratios. Finally, an error range is proposed to measure the final quality (good or bad) of the face sketch drawing. We have tested our results on CUFS and CUFSF sketch-photo databases to justify our proposed technique.



#### **Track-IV.7 16:00 Vehicle Tracking and Trajectory Estimation for Detection of Traffic Road Violation**

[Chemesse ennehar Bencheriet](#) (8 Mai 1945 University of Guelma, Algeria)

Intelligent Transport Systems (ITS) are part of our daily lives and are the future of modes of transport. They allow solutions to certain problems such as improving road safety and solving the problem of traffic congestion. This paper presents an effective vehicle tracking and trajectory estimation system to prevent road and highway accident. The system is composed of (i) moving object detection (ii) filtering of vehicle candidates (iii) vehicle tracking (iv) trajectory estimation and infraction detection. First all objects in movement are detected in the first frames. Then, the detected moving objects will be filtered by a set of appropriate processing in order to leave only the objects likely to be vehicles. Kalman filter considered as a good motion predictor will be used in vehicle tracking and trajectory estimation in order to detect offending vehicles. The tests carried out on several roads and highway scene have given very satisfactory results on detecting and tracking vehicle and detecting of continuous line crossing that can be exploited for accident prevention. In addition kalman filter gave good results regarding the cars tracking and provides a reliable region for eliminating the interference of shadows and decreasing the false detection rate.

#### **Track-IV.8 16:15 Mycobacterium Tuberculosis Detection Using CNN Ranking Approach**

[Vinayak Singh](#) (KIIT Deemed to be University, India); [Mahendra Kumar Gourisaria](#) (School of Computer Engineering, KIIT Deemed to be University, Bhubaneswar, Odisha, India); [Harshvardhan Gm](#) (KIIT Deemed to be University, India); [Vijander Singh](#) (Manipal University, India)

Mycobacterium tuberculosis (TB) is responsible for a large number of deaths due to chronic infectious diseases globally. Majorly, TB can be classified into two categories named as Active and Latent Tuberculosis. Tuberculosis diagnosis is a critical area and needs a high extent of accuracy for working. Mi-nor errors in diagnosis can result in disastrous repercussions. The ultimate goal of this paper is for detecting TB at right time and help combat the increasing number of cases by early treatment. In this paper, we implement CNNs of different configurations on a dataset for binary classification and mainly focus on the objective function value obtained from different CNN models with an LVCEL, MVA, and TT. The objective function can be a useful tool for physicians and our medical community for correctly identifying a TB patient. Experimental evaluation of the best architecture shows that a maximum objective function value of 6.503, with a validation accuracy score of 0.9671 and an AUC of 0.9733 in the Receiver Operating Characteristics (ROC) curve is achieved to correctly identify whether TB is present or not.



#### **Track-IV.9 16:30 Study of Various Types of Data Annotation**

[Chitra priya N](#) and [Tejbanta Singh Chingtham](#) (Sikkim Manipal Institute of Technology, India)

Labelling of digital data has made it easier for an algorithm to understand and process the dataset using Machine learning techniques. There are various methods that are used to add the necessary information to gather data and achieve a perfect ground truth. The objective of this paper is to discuss the types of digital data annotation viz image, audio, and video. After discussing the various types, the paper focuses on different models used for annotating and how it has been evaluated on various dataset.

#### **Track-IV.10 16:45 A Survey on: Facial Expression Recognition Using Various Deep Learning Techniques**

[Saswati Bhattacharya](#) (Sikkim Manipal University, India)

Facial Expression Recognition (FER) and its widespread applications is of immense interest to scientists. FER is used in various fields like human-computer interaction, behavioural psychology, medical treatment, self-driving etc. Research in this area focusses on developing techniques to interpret, code facial expressions and then to use these features to make useful predictions of facial emotions. Several studies are already available on FER, but the use of deep learning methods to predict facial expressions has recently inspired researchers. Deep learning algorithms are robust in nature and can effectively recognize human emotions by using images, text, or audio files. In the area of computer vision, the deep learning methods have state-of-the-art efficiency. The deep framework also provides fine tuning of real time facial data with greater accuracy rate. In this paper I have summarised and reviewed recent deep learning approaches used towards FER.

#### **Track-IV.11 17:00 A Study on Hand Gesture Segmentation Approaches**

[Jhuma SUnuwar](#) (Sikkim Manipal University & Sikkim Manipal Institute of Technology, India)

Computer vision is the study of making machines capable of understanding the input image and video using some algorithms or techniques. As for humans, understanding a scene given in an image or video is not a difficult task. Humans are blessed to understand images and videos effortlessly without knowing the complexities behind the process of image and video understanding. Making machines also capable of understanding their input image and video is not that simple. With ongoing research for making human-computer interaction more natural and realistic, lots of advancement has been done in different components of computer vision. The paper focuses on the image segmentation process used in computer vision and image processing which is a very crucial component while processing images and video. Image segmentation is the process of extracting only relevant content or information while removing irreverent content or information. Image segmentation is the most researched topic in image processing and computer vision. It is one of the major activities that will help the later process to ease its operation by filtering unnecessary and irrelevant contents. The paper aims to describe the segmentation process and highlight different types of segmentation approaches used in recent trends comparing their performances.



#### **Track-IV.12 17:15 Gallbladder CT Image Segmentation by Integrating Rough Entropy Thresholding With Contours**

[Nitya Jitani](#) and [Bhaskar Singha](#) (Tezpur University, India); [Geetanjali Barman](#), [Abhijit Talukdar](#) and [Binoy Choudhury](#) (B. Borooah Cancer Institute, India); [Rosy Sarmah](#) and [Dhruba Kumar Bhattacharyya, dkb](#) (Tezpur University, India)

Thresholding is one of the most widely used techniques for image segmentation, particularly, for medical image segmentation. The key idea is the selection of an appropriate intensity value to differentiate the background pixels from the object of interest pixels. In this paper, we propose a method for segmentation of the healthy gallbladder from a Computed Tomography (CT) scan image by integrating Rough Entropy Thresholding technique along with contour and convex hull operations. Our method has been found to perform significantly better than other competing methods.



Tuesday, March 23 14:30 - 16:30 (Asia/Calcutta)

## Track-V: Computational Intelligence

Dr. Siddhartha Bhattacharyya, Rajnagar Mahavidyalaya, West Bengal, India

Room: [http://bit.ly/ICACCP\\_Track-V](http://bit.ly/ICACCP_Track-V)

Chair: Siddhartha Bhattacharyya (RCC Institute of Information Technology, India)

Fuzzy Logic Artificial Neural Network Rough Set Theory Evolutionary Computation Learning Theory Probabilistics Methods Recommender and Collaborative Filtering Systems Multimedia Text mining Social media systems Adaptive hypermedia Crowd sourcing Personalization Control System Security, privacy and social impact Applications of Computational Intelligence techniques in Science, Engineering, medicine, finance and education etc.

### 14:30 *Prosodic Speech Synthesis of Narratives Depicting Emotional Diversity Using Deep Learning*

[Shloka Sanjay Shah](#) (Sardar Patel Institute Of Technology, India); [Rishika Anil Gupta](#) and [Parth Jardosh](#) (Sardar Patel Institute of Technology, India); [Anant V Nimkar](#) (Mumbai University, India)

Emotions are an essential part of speech or communication, which is why they cannot be neglected. The existing text-to-speech systems aren't the most appropriate at conveying the emotions present behind the text. The systems can speak out the text monotonically lacking expressiveness. In this paper, an Expressive Text-to-Speech Synthesis System (ETSSS) is proposed which considers the dominant emotions in the text provided. ETSSS works in two parts: first, it identifies the label behind the text, and second produces expressive speech. In the first part, the input text is given an emotional label. Later this label is used to generate expressive and prosodic speech. Labeling emotions in ETSSS is carried out using BERT which has an accuracy of 94%, 90%, and 90% for disgust, amused, and anger respectively. The speech synthesis with the emotion module of ETSSS achieves a good MOS of 3.8 for anger, 3.5 for disgust, and 3.2 for amused.



### 14:45 *Covid-19 Fake News Identification Using Multi-Layer Convolutional Neural Network*

[Shivangi Srivastava](#) and [Roushan Raj](#) (Netaji Subhas Institute of Technology, Patna, India); [Sunil Saumya](#) (IIIT Dharwad, India)

The COVID-19 pandemic has given rise to a new momentum of circulation of fake news over social media worldwide. It is of utmost importance to prevent the deluge of misinformation, that can otherwise lead to the spread of panic and public health hazards. Through this paper, we present our approach of different automated deep learning models like Convolutional Neural Network(CNN), Bi-directional Long Short Term Memory(BiLSTM), and a transformer-based BERT model to detect fake news on COVID-19. We used different pre-trained embeddings to convert high dimensional corpus into low dimensional vectors of real numbers. Our best model achieved a weighted avg f1-score of 91.95%.

### 15:00 *Comparative Study of Abalone Age Prediction Using Classical Machine Learning Algorithms and Extreme Learning Machine*

[Manjunath V](#) and [Shihabudheen KV](#) (NIT Calicut, India)

Abalone age prediction is a multi-class classification problem using the Abalone dataset from UCI machine learning repository. Extreme Learning Machine (ELM) is one of the randomization algorithm which uses the idea of least square estimation. In this paper, a comparative study of the performance of Extreme Learning Machine and three classical machine learning algorithms- MLP, KNN and Random Forests, is performed on the Abalone dataset. The performance of the algorithms is evaluated based on their accuracy scores and training times.

### 15:15 *Breast Cancer Classification Using Enhanced Binary Crow Search Optimization With Iterative Flight Length*

[Sannasi Chakravarthy S R](#) (Bannari Amman Institute of Technology, India); [Bharanidharan N](#) (Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, India); [Harikumar R](#) (Bannari Amman Institute of Technology, India)

In this world, the increase in sophistication of human lives leads to a decrease in their life-span. The mortality rate due to cancer is steadfastly raising every year. Among all types of cancer, breast cancer is a peculiar one that is responsible for more cancer deaths globally. With an eye to classify its severities, an appropriate and effective diagnostic methodology is therefore demanded. Accordingly, the work pitches light in designing a classification methodology that adopts an enhanced crow-search algorithm for feature selection followed by a k-nearest neighbor classifier for classifying the breast cancer severities. The basic novel idea of this proposed methodology is that the flight length of the metaheuristic original crow search algorithm is made to be adaptive for feature selection. Then the KNN algorithm is used as a classifier with grid search technique. In this regard, the paper exploits the standard benchmark Breast cancer Wisconsin (diagnostic) dataset for its analysis.

### 15:30 *Modified Crow Search Algorithm for Enhancing the Classification Performance in Diagnosing Dementia Through MRI Images*

[Bharanidharan N](#) (Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, India); [Sannasi Chakravarthy S R](#) and [Harikumar R](#) (Bannari Amman Institute of Technology, India)

Applying machine learning algorithms for classifying the medical images increases day by day. Finding the better optimized machine learning algorithm for medical images is very important. This paper proposes the modified crow search algorithm which is used as transformation technique for enhancing the performance of the machine learning algorithms in diagnosing dementia dis-ease through brain MRI images. The exploration capability of the crow search algorithm is increased through inserting appropriate randomness in the modified crow search algorithm. Four popular classifiers namely K-Nearest neighbor, random forest, C4.5, and linear discriminant analysis are implemented to categorize the subjects based on MRI images. MRI images of 50 non-demented and 50 demented subjects are obtained from Open Access Series of Imaging Studies data-base and grey values of MRI images are considered as features in this study. Out of the four above mentioned classifiers, C4.5 classifier performs better and produces accuracy of 0.58. Modified crow search algorithm boosts the accuracy of C4.5 classifier to 0.86 while original crow search algorithm results in accuracy of 0.74.

### **15:45 Energy Efficient Task Scheduling Using Quantum Inspired Genetic Algorithm for Cloud Data Center**

[Santanu Kumar Misra](#) (Sikkim Manipal Institute of Technology, India); [Pratyay Kuila](#) (National Institute of Technology Sikkim, India)

Cloud computing is a collection of heterogeneous autonomous systems to support the emerging computational paradigm with the help of flexible computational architecture. In order to support enormous computational load, it exhibits huge Energy Consumption (EC) which causes the degradation of system performance. In this paper, we have proposed an optimized energy efficient scheduling model using Quantum Inspired Genetic Algorithm (QIGA) to minimize energy consumption in the cloud data center. Our model establishes a trade off between execution time and EC without compromising system performance. A suitable comparison between our proposed model with some existing model has been performed to validate our task.

### **16:00 Feature Selection Using Elephant Herding Optimization Hybridized With Grey Wolf Optimization for Anomaly Detection in Wafer Manufacturing**

[Kondreddy Issac](#) and [Bharanidharan N](#) (Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, India); [Harikumar R](#) (Bannari Amman Institute of Technology, India)

Machine learning algorithms are commonly used in many applications and their usage in manufacturing industries is very crucial. Anomaly detection in manufacturing has to consider a lot of factors and it leads to high dimensional data. In general, either feature selection or dimensionality reduction technique will be used before classifying high dimensional data. In this research work, feature selection is proposed using a hybrid version of elephant herding optimization and grey wolf optimization. Here elephant herding optimization is used for selecting an ideal feature subset and grey wolf optimization is used to find the optimized control parameters for elephant herding optimization. The suggested feature selection method is examined for anomaly detection in industrial wafer manufacturing. K-Nearest Neighbor, Stochastic Gradient Descent and Decision Trees are tested as classifiers in this research work for categorizing the selected features. Notably, Stochastic gradient descent provides a balanced accuracy of 96% when the proposed feature selection method is used while it just provides a balanced accuracy of 73% if the proposed feature selection is not used.

### **16:15 A Novel Reversible Hybrid Cross-Over Based Efficient 3D Adder-Subtractor Design Using QCA Spin Technique**

[Rupsa Roy](#) (Sikkim Manipal Institute of Technology, SMU, India); [Swarup Sarkar](#) (Sikkim Manipal Institute of Technology, India); [Sourav Dhar](#) (Sikkim Manipal University & Sikkim Manipal Institute of Technology, India)

An emerging beyond "CMOS" based technology, named as "QCA Spin Technology" is utilized in this study to design a hybrid cross-over based 3D adder-subtractor using modified reversible universal gate (RUG) and reversible 3-input Thapial Gate (TS-3) Gate. The occupied area, latency and power dissipation of our proposed design is optimized in our work compared to previously published adder-subtractor designs due to the advancement of used above reversible gates in multilayer QCA spin platform with a collaboration of coplanar wire crossing and multilayer wire crossing. QCADesigner software is mainly used in this work to simulate the physical layout architecture of our proposed formation and this simulated output helps to calculate the latency and the output-strength of the presented design. The area-occupation and cell-count can be achieved by selecting the layout design and power-dissipation is calculated over here based on switching time, electron-tunneling rate and the cell-count.

**Tuesday, March 23 14:30 - 16:45 (Asia/Calcutta)**

## **Track-VII: Electrical and Electronics Devices and Power Systems**

**Dr. Atanu Kundu, Heritage Institute of Technology, Kolkata, India and Dr. Nitai Paitya, Sikkim Manipal Institute of Technology, India**

Room: [http://bit.ly/ICACCP\\_Track-VII](http://bit.ly/ICACCP_Track-VII)

Chairs: Atanu Kundu (Jadavpur University, India), Nitai Paitya (Sikkim Manipal Institute of Technology, India)

Cognitive Radios and White Space Networking Computer Architecture and VLSI Control Systems and Applications Homeland Security and Disaster Management Hybrid Intelligent Models and Applications Mathematical Modeling and Scientific Computing Medical Informatics QoS and Resource Management RFID and Sensor Network Satellite and Space Communications Embedded Systems Ubiquitous Computing Power Electronics Vehicular, Underground and Underwater Networks VLSI Circuit Design and CAD Tools Wireless Communication

### **14:30 Decoupling & PID Control of Four Tank MIMO System Based on Kharitonov Theorem**

[Sumit Kumar Pandey](#) (NIT Patna); [Jayati Dey](#) (National Institute of Technology Durgapur, India)

In this work decoupling control scheme of four tank multi-input multi-output (MIMO) system is explained. The four tank MIMO system is a laboratory setup with four interconnected tanks and two pumps. Firstly the relative gain array (RGA) based decoupler is designed to eliminate the coupling effects. Secondly based on Kharitonov theorem robust PID controller is designed. The performance of designed decoupling control scheme is tested through the simulation results. The robustness characteristics are examined through the output disturbances.



### **14:45 GPS Based Path Planning Algorithm for Agriculture Drones**

[Sriram Reddy Gade](#) and [Nippun Kumar Aa](#) (Amrita Vishwa Vidyapeetham, Amrita School of Engineering, India)

Drone technology is advancing in rapid pace in the past decade, particularly in agriculture and its allied fields it has been extensively used. Using drones, made farming productive and precise. They help in optimizing agricultural operations, monitoring crops and their growth, and help in monitoring soil health with help of sensors and digital image processing. Piloting a drone is not easy and requires some level of expertise. So, a novice user cannot pilot a drone without proper training. To overcome this, an autonomous drone can be used. In any autonomous mobile robot path planning is an important subsystem. In this work, a GPS based path planning algorithm is proposed which can aid farmers in various agricultural activities. The system takes inputs related to farm boundary and crop planting pattern and generates path output based on the type of agriculture activities like surveying, spraying, seeding and quick monitoring.

Cubic polynomial and spline function are used to calculate the path and its via points. The proposed algorithm is implemented in MATLAB.



### **15:00 Hybrid Approximate Adders Using Pass Transistor Logic and Transmission Gate**

[Sumit Raj](#), [Utkarsh Chaurasia](#), [Aayush Bahukhandi](#) and [Poornima Mittal](#) (Delhi Technology University, India)

In most digital applications like audio, speech, graphics and video, people can easily gather valuable data from output having small errors. Thus, it isn't important to give exactly correct output. Thinking about the benefit of unwinding in precision, several approximate adders made from different techniques are proposed in this paper for error resilient applications. Approximate adder has been designed to decrease circuit complexity at transistor level. By decreasing the transistor count connected in series, energy consumption can be decreased. The propagation delay in the circuit is significantly reduced due to low power. Simulation results for proposed adders indicate that in contrast to the traditional adder for the random inputs, the adder suggested can achieve reduction of up to 40 percent power delay product. The proposed adder minimizes the circuit area (number of transistors) substantially relative to current designs. All circuits are simulated with the gpdk 90-nm technology in Cadence Virtuoso.



### **15:15 Wireless Electricity Transfer Using Inductive Power Transfer System**

[Sourav Ghimirey](#), [Chitragada Roy](#) and [Anirban Sengupta](#) (Sikkim Manipal Institute of Technology, India)

A wireless electricity transfer (WET) method using inductive power transfer technique is discussed in this paper. The objective of this paper is to improve the power transfer capability in WET. A high frequency power inverter is used to produce a high frequency supply for the sending end circuit. High frequency switching signal is produced using Arduino. A series-parallel resonating arrangement is used in this paper to maximize the output voltage of the receiving end circuit. The results show that the setup can successfully transfer power from sending end side to the receiving end side. The variation of output voltage and the amount of power with change in number of turns in both primary and secondary circuit is also observed in this paper.

### **15:30 A PSO Based MPPT Controller for Solar PV System at Variable Atmospheric Conditions**

[Soumyarupa Saha](#), [Neeha Cintury](#) and [Chitragada Roy](#) (Sikkim Manipal Institute of Technology, India)

In this paper a Maximum Power Point Tracking controller using Particle Swarm Optimization (PSO) is imposed on DC boost converter of a solar photo voltaic system under changing physical conditions. The proposed PSO based MPPT controller guarantees the extraction of maximum power from the solar photo voltaic system by controlling the duty cycle of the DC to DC boost converter. It is ensured by determining the optimal value of current and voltage of solar PV system corresponding to maximum power. The entire system and the controllers (PSO and P&O) are implemented in MATLAB. The results show that even at variable atmospheric conditions, the proposed controller is able to track maximum power faster as compared P&O based MPPT controller.

### **15:45 Design of Optimal Fractional Order PID Controller for MIMO System Using TLBO Algorithm**

[Sumit Kumar Pandey](#) (NIT Patna, India)

In this article, an attempt is made to design the fractional order proportional integral derivative (FO-PID) controller for multi-input multi-output (MIMO) system using teaching learning based optimization (TLBO) algorithm. The control of MIMO system always offers a complicated control paradigm due to its structure. It is realized that dynamic systems can be effectively represented by fractional order dynamics which is based on fractional calculus. The PID controller is still the most reliable controller due to its uncomplicated structure and the FO-PID controller is predicted to have better performance as compared to conventional PID controller due to increment of two more parameters. The performance of non-integer PID controller depends upon the five constants, hence the tuning of these five constants are most important for the optimum performance. In the presented work TLBO technique is adopted for the tuning of the non-integer PID controller. The designed controller is implemented on the four tank MIMO system in MATLAB. The performance of the designed controller is also compared from the previous results available in literature.



### **16:00 Application of Internal Model Principle Based Plug-In Repetitive Controller in Artificial Cardiovascular System**

[Rijhi Dey](#) (SMIT, SMU, India); [Rudra Sankar Dhar](#) (National Institute of Technology Mizoram, India); [Ujjwal Mondal](#) (University of Calcutta, India)

In recent time, research in the field of biomedical instruments and its control plays a pivotal role in the development of assertive technology for mankind which results in improving the quality of life of human being. A typical example is the research on cardiovascular system where precise control of periodic heart rate is of major concern. Different techniques have been reported in literature by a number of researchers to control the periodic heart rate. Challenges to deal with such system have also been addressed. This present work envisaged to explore a method to track the repetitive heart signal continuously for an Artificial Cardiovascular System and also eliminate any periodic disturbances affecting the proper functioning of heart. Main control objective is to design a reliable and advanced control technique to keep on track the electrical activity of cardiovascular system. A Plug-in Repetitive Controller (RC) design based on Internal Model Principle (IMP) has been proposed in this paper. The simulation study is accomplished using available softwares in support of the proposed idea. Moreover, this chapter summarizes the design and implementation of proposed control algorithm along with a comparative study with the existing conventional controllers.

### **16:15 Design and Comparative Power Analysis of Conventional 6T SRAM With 7T2M Nv-SRAM at 180 nm Technology**

[Manisha Yadav](#) (Consultant, ARM, India); [Palak Handa](#) (Indira Gandhi Delhi Technical University for Women, Delhi, India)

Power-off mode is incorporated by developing chip technologies to narrow down the power dissipation of chips. During power-off modes, the non-volatile Static Random Access Memory (nv-SRAM) allows a chip to store data. The non-volatile behaviour of SRAM can be achieved through the use of memristors. This paper presents a 7T2M (7 transistors and 2 memristors) non-volatile SRAM cell design utilizing the Threshold Adaptive Memristor Model (TEAM) model with Joglekar window function. The 7T2M model consists of a conventional 6T SRAM cell unit with two memristors that are used for restore operation and a transistor that connects to the memory line which is used for recall operation. The proposed design has the benefits of low power consumption and it has the capability of restoring data when it goes through a power on/off operation. The power analysis of the proposed 7T2M model is done and based on

the output wave forms, it is found that the model is non-volatile in nature. Simulation is carried out using Cadence Virtuoso at 180 nm technology.

### **16:30 Control and Comparison of Power for a Variable Speed Wind Turbine Using Fuzzy-PID Controller**

[Satyabrata Sahoo](#) (Nalla Malla Reddy Engineering College, Hyderabad, India)

Output power fluctuation of a wind turbine depends on third power of wind speed, which leads to power quality problem. Pitch angle control method is one of the common methods that is employed for smoothing of the output power fluctuations. This paper focuses on design of Proportional-Integral-Derivative control (PID control), Fuzzy Logic Control (FLC) and Fuzzy PID control for control of wind energy conversion system (WECS) through pitch angle. The control objective here is that by controlling the pitch angle and generator torque, the generator power regulation is optimized. The MATLAB-SIMULINK models have been developed for simulation of the control schemes. From the obtained results it is found that controller exhibits excellent response

## Wednesday, March 24 10:00 - 11:00 (Asia/Calcutta)

### Invited Talk: Changing requirements from 4G to 5G with respect to the time criticality of the RAN transport

Mr. Avik Bhattacharya, Keysight Technologies Kolkata, West Bengal, India

Room: <http://bit.ly/icaccp-day3>

The operators adopting 5G are interested in moving to flexible Cloud RAN (C-RAN) architecture that enables them to address different application requirements by locating storage and compute resources either at the base of the cell site or at centralized hubs hundreds of kilometers away. The connection in RAN infrastructure between the baseband unit (BBU) and remote radio head (RRH) is called the fronthaul. Latency is a very important characteristic of the fronthaul network - in this talk we will explore why. We will also look at the different techniques being proposed to solve this need..

## Wednesday, March 24 14:30 - 17:00 (Asia/Calcutta)

### Track-I: Networking and Data Communications

Mr. Avik Bhattacharya, Keysight Technologies Kolkata, West Bengal, India, and Dr. Biswaraj Sen, Sikkim Manipal Institute of Technology, Sikkim, India

Room: [http://bit.ly/ICACCP\\_Track-I](http://bit.ly/ICACCP_Track-I)

Next-generation Communication Networks Network Protocols Mobile & Ubiquitous Communication Networks Mobile Cloud Cloud and Systems Management Cloud Computing and Networking Internet Technologies Information-Centric Networking Big Data Communication and Analytics Data Network Management Data as a Service Data Sharing and Infrastructures Modelling & Simulation of communication networks and Systems Network Monitoring and Control Traffic Measurement, Analysis, Modeling and Visualization Quality of Service (QoS) Network applications (Web, Multimedia Streaming, Gaming, etc.) Social Computing and Networks Software-Defined Networking Network Security Fault Tolerance, Reliability, and Survivability Flow and Congestion Control Internet Technologies Network Architectures Modelling & Simulation of communication networks and Systems Network Monitoring and Control Traffic Measurement, Analysis, Modeling and Visualization Quality of Service (QoS) Routing and Flow Control in LANs, WANs and PANs Sensor Nets and Embedded Systems Social Computing and Networks Software-Defined Networking Network Security High-Performance Networks and Protocols Virtual and Overlay Networks Network Simulation and Emulation

#### 14:30 Performance Appraisal of 6LoWPAN and OpenFlow in SDN Enabled Edge-Based IoT Network

[Rohit Kumar Das](#) (Sikkim Manipal Institute of Technology & Sikkim Manipal University, India); [Monica Jha](#) and [Subhas Harizan](#) (Sikkim Manipal Institute of Technology, India)

Edge computing has played a vital role in improving the performance of the Internet of Things (IoT) network. It provides computation locally at the edge of the network, placed near the field of data generation. It has significantly reduced some of IoT's significant challenges, such as scalability, availability, reliability, and resiliency. In this domain, researchers are further incorporating advanced technology such as Software-Defined Network (SDN) to improve the Edge-based IoT network's overall performance. Moreover, Edge-based IoT network's working depends on the type of protocol used for data delivery. Various data transmission protocols can be used to transmit a packet from source to destination. This paper aims to determine the performance of the two widely used protocols, namely IPv6 over Low-Power Wireless Personal Area Networks (6LoWPAN) and OpenFlow for SDN enabled Edge-based IoT network. The experimentation was carried out in a Mininet-WiFi emulator. The results indicate that SDN based OpenFlow protocol can improve the system performance in terms of average round trip time (RTT) of a packet, packet loss ratio, and jitter compared to the conventional 6LoWPAN protocol.



#### 14:45 HSA Based Sensor Nodes Deployment Strategy for Coverage and Connectivity in WSNs

[Subash Harizan](#) (Sikkim Manipal Institute of Technology & Sikkim Manipal University, India); [Pratyay Kuila](#) (National Institute of Technology Sikkim, India); [Rohit Kumar Das](#) (Sikkim Manipal Institute of Technology & Sikkim Manipal University, India)

A strategy of deploying/placing sensor nodes (SNs) efficiently not only reduced the cost but also increase the performance of the wireless sensor networks (WSNs). Coverage and connectivity are the most fundamental issues which directly impact the performance of WSNs. Therefore, to provide efficient coverage and connectivity by deploying the minimum number of SNs in WSNs with limited sensing and communication range is a very challenging issue. In this paper, we have proposed a metaheuristic algorithm called harmony search algorithm (HSA) to place the minimum number of SNs on selected potential positions (PPs) such that all the target points are covered with the sensing range of SNs and placed SNs must also ensure the connectivity amongst them along with base station (BS). We have formulated the linear programming problem (LPP) for the said problem along with an efficient fitness function. An extensive simulation is performed on the proposed algorithm and observed that it can improve the coverage and connectivity in the network.



#### 15:00 Analysis of Multipath TCP Schedulers

[Vidya S Kubde](#) (Mumbai University & Datta Meghe College of Engineering, India); [Sudhir Sawarkar](#) (Datta Meghe College Of Engineering, India)

MPTCP is an extension of Transmission control protocol, which transmits TCP segments on more than one path, in multihomed devices. It has noteworthy benefits of Bandwidth aggregation and redundant network. In this paper we analyzed MPTCP performance in different networks, by using three different interfaces Wi-Fi, LTE and Ethernet. We also compared four schedulers of MPTCP, that are implemented in Linux Kernel. Results showed that difference in Round Trip Times of sub paths affects MPTCP performance. Using results from our experiments we show that how heterogenous paths impacts MPTCP throughput.



### **15:15 Abnormal Behavior Detection of Students in the Examination Hall From Surveillance Videos**

[Roaa Mohammed ALairaji](#) (University of Babylon, Iraq); [Ibtisam A. Aljazaery](#) (Babylon University, Iraq); [Haider Th. Salim AlRikabi](#) (Wasit University, Iraq)

Video analytic is a method of video processing, data collecting, and data analysis for obtaining the information of a specific domain. In the recent trend, besides analyzing each video for retrieval of the information, analyzing live surveillance video for recognizing behavior that occurs in its covering region has become more significant. This paper aims to presents a methodology that will analyze and recognize the activities of students from the videos recorded by the surveillance cameras during the exam. Automated video surveillance provides an optimal method to help monitor the students and recognize the abnormal/suspicious behavior instantly. The abnormal behavior of students may be copies of the answers from hidden sources with him such as written answers on hands, mobile-phones, summary papers, and books, or copies of answers from other students such as exchange papers between students, and peeking at the others' answers papers. This work requires three main techniques: head movement detection, iris movement detection, and hand movement detection to identify the contact between the hands and face of the same student and that between different students. Automatically detect abnormal behavior will help reduce the error rate due to manual surveillance.



### **15:30 Cloud Based Smart Traffic Lights Monitoring and Controlling Using IoT**

[K J Naik](#) (National Institute of Technology Raipur, India); [Naveen Sundar](#), [Shristi Agrawal](#) and [Nilesh Singhania](#) (Graduate, India)

A new architecture called CSTMC which stands for "Cloud based Smart Traffic Monitoring and Controlling" and two approaches on top of CSTMC namely NLG [Next Light Green] and ALG [All Lights Green] respectively were proposed in this work. The proposed CSTMC addresses the limitations faced by the existing methods by using cloud computing and IoT cluster.



### **15:45 Exploring Live Cloud Migration on Amazon S3 Instance Using InterCloudFramework**

[Koushik S](#) (M. S. Ramaiah Institute of Technology, Visvesvaraya Technological University, India); [Annapurna P Patil](#) (M S Ramaiah Institute of Technology, India)

Cloud customers in many enterprises can migrate their virtual machines (VMs) live at a reduced cost through cloud service providers. By default, nested and hardware-assisted virtualization are disabled, making second virtualization installation difficult on IaaS platforms. The cloud consumers' VMs capable of deploying an application get closely coupled to IaaS providers, which hinders the live migration of VMs across various providers. The proposed work uses InterCloudFramework to demonstrate live cloud migration using file transfer. InterCloudFramework enables users to live migrate VMs with less hassle and disturbance to running services hosted on these existing VMs. We explore the live migration of VMs on Amazon S3 instance having high-performance processors. Also, explore three advanced options: transferring a file from local to cloud and cloud to local, moving files from one cloud to other clouds lively. The next option is transferring from cloud to regional and then cloud. The experimental results are conducted on different file sizes. The time taken for migration is evaluated and studied under implementation.



### **16:00 Unmanned Aerial Vehicle (UAV) Communications Using Multiple Antennas**

[Rajesh Kapoor](#) (GLA University, Mathura, India)

Military and civil applications of unmanned aerial vehicles (UAVs) are increasing at rapid pace. These applications range from battlefield surveillance to goods transportation. Despite their usefulness, UAVs typically require appropriate communication connectivity for their successful operation, which is a very challenging task. Therefore, to ensure enhanced utilization of UAVs in future, it is important to have reliable and high data rate wireless communication links between UAVs and their ground stations. For achieving this objective, UAVs can be integrated into existing cellular networks as aerial users. Cellular communication support to UAVs is generating new research challenges and opportunities. One way of enhancing the cellular communication support to UAVs is to use multiple antennas. In this article, we present an overview of this promising technology, by initially covering UAV cellular communications. We then carry out analysis of various multiple antenna techniques.



### **16:15 Degree of Proximity: A Novel Network Parameter to Maximize Lifetime of Wireless Sensor Networks Through Optimized Node Deployment**

[Kaushik Ghosh](#) (University of Petroleum and Energy Studies, Dehradun, India)

Lifetime maximization of Wireless Sensor Networks is a very prominent research topic. Different energy efficient protocols have been proposed over the years for maximizing network lifetime. However, proposing an energy efficient routing protocol alone is not enough to ensure prolonged lifetime of the network. Certain network parameters, that can regulate energy consumption of a network, too are required to be exploited for the purpose. Here, a novel network parameter called Degree of Proximity (DoP) has been proposed and an optimum value of DoP was found, whereby one can maximize network lifetime with deployment of optimum number of nodes. This way, running cost of the network can be amortized. For the present work, we have considered both two and three dimensional Wireless Sensor Networks where grid deployment of the nodes have been done.



### 16:30 Security Solution for the Internet of Things With the Innovative Lightweight Encryption Algorithm CurveCP

[Nguyen Tanh](#) (Vietnam National University Hanoi & VNU-IS, Vietnam)

With the development of Information Technology, Internet of Things (IoT) has been applied widely in human civilization, but it leads the increase of the risk about information security. The traditional security solutions has revealed the lack of compatibility with IoT because of the difference about complex communication protocol, low energy, processing ability and limited memory. Therefore, the suitable IoT security solutions needs the balance between energy and costs as well as wide adaption for the various network protocols. Our research team, after had been under a long process of analyzing theoretical documents and operating simulated experiments, recognized that the Lightweight cryptography is the most optimal solution in new network platform generation. Our team also improved and implemented CurveCP which is one of these Lightweight cryptographies in the Wireless sensor Networks (WSN) so as to enhance data secure and information security of IoT System. This study describes briefly the improvement of CurveCP Lightweight cryptography by reducing length of cryptographic key as well as implement in IoT System. It also includes the simulation experiment, solutions evaluation, conclusion and future development.



### 16:45 Analysis of Wormhole Attack on Network Based on RPL

[Abhimanyu Sharma](#) (5th mile Tadong & SMIT, India); [Kiran Gautam](#) (Sikkim Manipal University, India); [Sandeep Gurung](#) (Sikkim Manipal Institute of Technology, India); [Rabindranath Bera](#) (Sikkim Manipal University, India)

Due to the growth of internet literacy, the current world is transforming in a rapid way. The emergence of IoT has an important part to play in this growth. As the devices started to get smart a new concept was introduced, where objects and things could communicate with each other and was named Internet of Things. The growth was so rapid that the security aspects could not keep up with the technology. Security in IoT devices is one of the biggest concerns while implementing these devices. IoT devices works with constrain resources under constrain environments. To overcome such challenges RPL (Routing over low power and lossy network) was introduced. RPL uses distance vector routing protocol to deliver data/packets from one destination to other. RPL works with 6LoWPAN which stands for IPv6 over Low -Power Wireless Personal Area Networks). The two combined makes IoT protocol for routing over low power and lossy network, but these protocols do not provide any security to the IoT network. The main motivation of this paper is to observe the network behavior for RPL by simulating a Wormhole attack. Wormhole attack is a significant attack which disrupts the network topology by advertising itself as part of the network. The attack is performed by two nodes, one which creates a tunnel and sends data to its partner node and other node which receives it and sends it back to the network. It is mostly used to misguide packets or to create a false path for the packets to take, while disrupting the network behavior. The experimental evaluation is conducted using Contiki Operating system version 2.7 and the simulation is done using Cooja software.

## Wednesday, March 24 14:30 - 15:30 (Asia/Calcutta)

### Track-VI: Adaptive Computation and Machine Learning

**Dr. Swarup Roy, Sikkim University, Sikkim, India**

Room: [http://bit.ly/ICACCP\\_Track-VI](http://bit.ly/ICACCP_Track-VI)

Chair: Swarup Roy (North Eastern Hill University, India)

Association rule learning Artificial neural networks Deep Learning Inductive logic programming Support vector machines Clustering Bayesian networks Reinforcement learning Representation learning Similarity and metric learning Sparse dictionary learning Classical Genetic algorithms Rule-based machine learning Learning Classifier Systems Bio and Nature Inspired Computing Ant Colony for Neural Network Optimization Particle Swarm Optimization Genetic Algorithms for Hybrid Intelligent Systems Design Genetic Fuzzy Systems Genetic Neural Systems Quantum Inspired Meta-heuristics Hybrid Evolutionary Algorithm Hybrid Modular Neural Networks Hybrid optimization techniques Neuro-Fuzzy-Genetic Approaches Nature-inspired Smart Hybrid Systems Neuro-Fuzzy Models and Applications Hybrid Intelligent Systems for Pattern Recognition Hybrid Intelligent Systems for Data Analysis and Data Mining

### 14:30 Empirical Study of Predicting Critical Temperature of a Superconductor Using Regression Techniques

[Anish K Kulkarni](#), [Vedant Puranik](#) and [Radhika Kulkarni](#) (Pune Institute of Computer Technology, Pune, India)

Measuring the critical temperature of a superconductor experimentally is a very arduous process as critical temperatures of superconductors mostly lie on the extreme lower end on the Kelvin Scale. Estimating them with the help of high-end instruments and lab experiments incur high costs. In this paper, we employ and compare the performance of several regression algorithms which predict the critical temperature of superconductors based on the physical and chemical properties of the materials that constitute them, which are derived from the chemical formula of the superconductor. We compare state-of-the-art the algorithms based on their accuracy of prediction using metrics like MAE, MSE, RMSE and R2 score. Random Forest and XGBoost provide best results in this task of predicting superconducting critical temperature.



### 14:45 A Comprehensive Study on Diabetes Detection Using Various Machine Learning Algorithms

[Shweta Sharma](#), [Suraj Tiwari](#) and [Shahid Alam](#) (JC Bose University of Science and Technology, YMCA Faridabad, India); [Rewa Sharma](#) (JC Bose University of Science and Technology, YMCA, India)

Diabetes is one of the most common chronic diseases in modern times. A large portion of the population throughout the world is affected by this disease. This paper applies various machine learning-based classification models and discusses their outcome in predicting the possibility of a person being diabetic. The paper considers the PIMA Indian Diabetes Dataset available on the UCI Machine Learning Repository and tests the performance of seven different classification models on it. The sole purpose of the paper is to compare the performances of various classification models and figure out the best model among them. During the process, various parameters were used to compare the performance of the models, that include Precision, Recall, F1 Score, and Accuracy. All the models were tested on these parameters and the best model is determined. Even for models like decision trees, the paper takes into account

factors like pruning that may improve the overall efficiency of the model. This paper aims to use advanced science like machine learning in helping doctors to predict whether a person is suffering from diabetes or not.



#### **15:00 A Novel Intelligent Blockchain Framework With Intelligence Replication**

[Arijit Nayak](#) (Alumnus Software Limited, Kolkata, India); [Deepraj Chowdhury](#) (IIIT Naya Raipur, India); [Sourav De](#) (Cooch Behar Government Engineering College, India); [Siddhartha Bhattacharyya](#) (RCC Institute of Information Technology, India); [Khan Muhammad](#) (Sejong University, Korea (South)); [Sergey Gorbachev](#) (National Research Tomsk State University, Russia)

Nowadays, Blockchain Technology is being adopted at a large scale due to its inherent characteristics that make data de-centralized and immune to intentional tampering. Now that various Machine Learning (ML) techniques are in place, these techniques are being integrated into the blockchain to make it capable of intelligently validating a transaction. Central to these ML techniques is the process of training a model that is both processor hungry and time-consuming. Hence, the challenge is to make all the nodes in the blockchain intelligent by using the minimum processing capability of the network. In this paper, we propose an efficient mechanism to make an entire blockchain network intelligent using Multi-Layer Perceptron (MLP). At the time of the network formation, a single node has the model definition. This node gets trained. When the training is complete, both the model and the intelligence are replicated, so that every node becomes intelligent. A brand new node is also made part of a fully-functional blockchain network in a minimal time.

#### **15:15 A Review on Types of Machine Learning Techniques for Biosignal Evaluation for Human Computer Interaction**

[Tanuja Subba](#) (SMIT, India); [Tejbanta Singh Chingtham](#) (Sikkim Manipal Institute of Technology, India)

The technological evolution and need of human computer interaction in recent years has vastly increased. The wide and interdisciplinary nature of HCI made the possible use of human body signal for interfacing. Every electrical signals generated from human body gives an important information of physical and psychological structure. HCI deals with design, technology and easy approach for a machine and human to communicate with understandable, effective and cost driven interface. Biosignals are physiological information generated from any living body which gives vast information about physical and psychological state of a human being. This paper deals with classification of biosignals using various machine learning algorithm for HCI implementation.

## Wednesday, March 24 14:30 - 16:00 (Asia/Calcutta)

### Special Track-V: Geophysical Remote Sensing and Geographic Information System

**Dr. Saurabh Das, Indian Institute of Technology, Indore, India and Dr. Swastika Chakraborty, Sikkim Manipal Institute of Technology, Sikkim, India**

Room: [http://bit.ly/Special\\_Track-V](http://bit.ly/Special_Track-V)

Chair: Swastika Chakraborty (Sikkim Manipal Institute of Technology, India)

Optical Remote Sensing Microwave radiometry and its application Hyperspectral Image and Signal Processing GNSS Remote sensing and applications Electronics, sensor and platforms Digital Imaging, Imaging Systems, 3D and Multi-view Imaging Technologies related to Unmanned Aerial Systems (UAS) Hazards modelling and Disaster Mitigation Data Management and Education Analysis Techniques Big machine learning in remote sensing Spatial data science Geospatial Information and Technologies Education and outreach in remote sensing and geosciences Spectroscopy and Spectroradiometry Hyperspectral Imaging Earth Observation and Satellite Data RADAR and LiDAR Infrared Remote Sensing Urban Remote Sensing Remote Sensing of Agriculture Geographic Information Retrieval Geospatial Architectures and Middleware

#### **14:30 Smart Agriculture Using Polyhouse**

[Reshu Agarwal](#) (Amity Institute of Information Technology, Amity University, Noida); [Manisha Pant](#) (Amity University, India); [Raga Gangadharan](#) and [Suraj Regi](#) (Amity Institute of Information Technology, Amity University, India)

Agriculture plays a great role in the development of agricultural country like India. Issues related to agriculture have been always hindering the development of the country. Each year many crops go waste due to a lack of optimal climatic conditions to support the growth of crops. Losses of around 11 billion dollars are reported in India each year alone. The farmers in India suffer a lot due to the low productivity. The only way out to this problem is smart agriculture by modernizing the current traditional methods of agriculture. Hence it aims at making agriculture smart using automation, Machine learning and IoT technologies. Polyhouse is one such method in implementing smart agriculture. Automated polyhouses are very useful in maintaining most of the adverse factors. It includes various types of sensors connected with a database. Smart Agriculture is a solution for monitoring air temperature, soil moisture, humidity, sunlight exposure, water required etc. It becomes difficult for a human to maintain all these aspects at a time, thus smart agriculture becomes a necessary. This paper proposes a model for polyhouse using various sensors. Using this technology, data from various sensors will be analyzed to help in decision making.



#### **14:45 Suitability of Synthetic Storm Technique for Rain Attenuation Prediction at Ku Band Over Hill Tropical Location Sikkim**

[Pooja Verma](#) and [Swastika Chakraborty](#) (Sikkim Manipal Institute of Technology, India); [Bishal Paudel](#) (B. Tech (2017-2021), India)

Prediction of rain attenuation has been done using SST over high rainfall Indian tropical location Sikkim using different storm speed. For short term prediction this prediction method is found sensitive with the storm speed. For lower attenuation range over estimation by the SST method leads to unnecessary power wastage as found comparing measurement with prediction. For higher attenuation also underestimation is found comparing with experimental result over this region. Therefore, the method needs to be improved for this region.

#### **15:00 MeghNA: Cloud Detection and Motion Prediction in INSAT Images**

[Manan Suketu Doshi](#), [Jimil Shah](#), [Aumkar M Gadekar](#) and [Anish Dixit](#) (Sardar Patel Institute of Technology, India); [Shloka Sanjay Shah](#) (Sardar Patel Institute Of Technology, India); [Parth Jardosh](#) (Sardar Patel Institute of Technology, India); [Dhananjay Kalbande](#) (University of Mumbai & SPIT, University of Mumbai, INDIA, India)

Cloud detection is an important functionality of satellite-based remote sensing. Cloud motion prediction is essential for estimating the future positions of cloud masses. The ability to map cloud behavior is imperative to the successful operation of many on-ground endeavors. However, both processes encounter difficulties due to the non-linearized phenomenon of cloud formation and deformation. Hence, satellite imagery-based approaches are more conducive to better research techniques and accuracy. In this paper, we propose a set of algorithms for cloud detection and nowcasting using INSAT satellite imagery. Approaches using Mask RCNN and KMeans clustering for cloud detection have been implemented and compared. Further, a convolutional LSTM model is proposed for cloud nowcasting that achieves a similarity index of 0.6942 with test images.



#### **15:15 Mapping and Monitoring of Water Bodies Using Sentinel-1A Images**

[Manjula T R](#) (Jain University, India); [Sruthi Samyuktha Sathyan](#) (USA); [GuttiVaddi Navya](#) (Graduate, India); [Priyanka Saribala](#), [Prakash Reddy](#) and [Raju Garudachar](#) (Jain University, India)

Remote sensing is widely used for environmental monitoring including water bodies, forests and glaciers. Remote sensing technology has significant potential in the study of water bodies in terms of monitoring the distribution, change detection, and detection of contaminants. Since water resources has direct influence on various economic and developmental activities at regional and global level and further the global climatic change has prompted the regular monitoring and maintenance of water resources. Thus it is imperative to regularly monitor the spatial and temporal, changes and degradations in the water bodies. The main focus of this study is to monitor the seasonal dynamics of selected water bodies of the rural Bengaluru region with the help of Synthetic Aperture Radar (SAR) imagery of medium spatial and temporal resolution. The paper presents the processing of S-1A SAR imagery for water body mapping, extraction and determining the water surface area. The seasonal changes in water catchment area observed from the data could be correlated and validated with rainfall data and prevailing weather conditions during the period



#### **15:30 Temporal Variation of Glacier Melting Rate of Helheim and Gangotri Glaciers Using Sentinel 1A Images**

[Manjula T R](#), [Aishwarya Ramesh](#), [Lakshmisree Unnikrishnan](#), [Vishal c Reddy](#), [Goteet Sethia](#), [Nigun Nagarajan](#) and [Raju Garudachar](#) (Jain University, India)

As it is well known, there has been a significant melting of glacier from the last 20th century in the Himalayan as well as the Polar regions. But this activity has actually peaked since last few years, holding global warming the responsible factor. Glacier melt has a direct impact on the nature by contributing to the global sea level rise. Glacier velocity is the key indicator in monitoring glaciers movement and in the better understanding of the glacier dynamics that contributes to the rise in sea level. The Sentinel 1 SAR images are processed to estimate the motion of glaciers by co-registering two acquisitions. Sentinel 1A images of Helheim Glacier, Greenland from the Arctic region and Gangotri Glacier from the Himalayan region are processed for temporal analysis. Acquisitions for a period of 4 years are considered for Gangotri glacier (2016 to 2020) and 17 months is considered for Helheim glacier in HV polarization. The study presents the temporal variation of glacier motion rate in these two regions .



#### **15:45 An Overview of the Framework for Development of E-Classroom Towards E-Learning**

[Minakshi Roy](#) and [Raja Raju](#) (Sikkim Manipal Institute of Technology, India)

E-Learning has been a trending topic since the world has witnessed the uprising of COVID-19. Various institutions have been focusing mainly on conducting online classes for the students who are distanced geographically. A lot of institutes around the globe have started conducting their sessions over some of the existing online platforms like Zoom, MS-Teams, Google-Classrooms etc. But it has been too difficult for the students as well as the teachers to conduct/attend classes online due to which a lot of problems are being faced by both students as well as teacher like student assessment, proper class attendance, internet connectivity issue and vice versa. This article mainly focusses on the approach of solving the problems faced during online classes by focusing on some of the frameworks proposed by various authors and the technologies that can be used to create a product in a form of an application that may help educational institutes to efficiently conduct online classes and even for the upcoming times.