2022 International Conference on Innovation and Intelligence for Informatics, Computing, and Technologies (3ICT) Program – 20-21 November, 2022

Sessions are shown in time zone: Asia/Bahrain.

Time	Elsewhere
Sunday, November 20	
09:00- 09:05	OC-1: Opening Ceremony - Dr. Amal Alrayes
09:05- 09:10	OC-2: Quran Recitation By Dr. Ahmed M. Zeki
09:10- 09:20	OC-3: Talk by H.E. President of the University of Bahrain
09:20- 09:30	OC-4: Presentation for accepted paper statics by Dean of IT College
09:30- 10:15	KS-1: Keynote-1: Talk by Prof. Ayman El-Baz, University of Louisville, USA
10:15- 10:30	B-1: Break 1
10:30- 12:10	 S1-A: Machine Learning for Big Data Analytics, S1-B: Convolutional Neural Network, S1-C: Smart Cities, S1-D: Telecommunication and Networking-1, S1-E: Informatics-1, S1-F: Artificial Intelligence-1
12:10- 13:00	LB:: Lunch Break Day-1
13:00- 14:40	S2-A: Machine Learning in Finance, S2-B: Information Technology-1,

	S2-C: Cyber Security-1, S2-D: Software Engineering, S2-F: Informatics -2
	S2-F: Deep Learning-1
Monday, November 21	
10:30- 12:10	S3-A: Internet of Things, S3-B: Artificial Intelligence-2, S3-C: Deep Learning-2, S3-D: Telecommunication and Networking-2, S3-E: Robotics, Computer Vision, and HCI, S3-F: Cyber security-2
12:10- 13:00	LB: Lunch Break Day-2
13:00- 13:30	KS-2: Keynote Speaker-2: Artificial Intelligence Innovations for Better Medical and Healthcare Solutions: Supporting the medical professionals and improving the patient outcomes
13:30- 15:10	S4-A: Information Technology-2, S4-B: Deep Learning and Image Processing, S4-C: Blockchain & Cyber Security-3, S4-D: Deep Learning-3, S4-E: Cloud Computing, S4-F: The Role of Modern Technologies in Combating COVID-19
15:10- 15:30	CS: Closing Session

Sunday, November 20

Sunday, November 20 9:00 - 9:05 (Asia/Qatar)

OC-1: Opening Ceremony by Dr. Amal Alrayes **⊼**

Chair: Amal Alrayes

Sunday, November 20 9:05 - 9:10 (Asia/Qatar)

OC-2: Quran Recitation by Dr. Ahmed Zeki 🛧

Dr. Ahmed Zeki

Chairs: Amal Alrayes, Ahmed M. Zeki

Sunday, November 20 9:10 - 9:20 (Asia/Qatar)

OC-3: Talk by H. E. President of the University of Bahrain 🛧

Dr. Jawaher bint Shaheen Al-Mudhahki

Chair: Amal Alrayes

Sunday, November 20 9:20 - 9:30 (Asia/Qatar)

OC-4: Presentation for accepted paper statics by Dean of IT College ⊼

Dr. Hessa Al-Junaid

Chair: Amal Alrayes

Sunday, November 20 9:30 - 10:15 (Asia/Qatar)

KS-1: Keynote-1: Talk by Prof. Ayman El-Baz, University of Louisville, USA ⊼

Prof. Ayman El-Baz

Chair: Amal Alrayes

Sunday, November 20 10:15 - 10:30 (Asia/Qatar)

B-1: Break 1

Sunday, November 20 10:30 - 12:10 (Asia/Qatar)

S1-A: Machine Learning for Big Data Analytics

Chairs: Luisella Balbis, Ramzi A. Haraty

10:30 Scheduling Household Appliances using Genetic Algorithms 🖻

Maram Assi, Ramzi A. Haraty, Sanaa Kaddoura, Sergio Thoumi and Nahla Belal

Smart grids with their advanced communication capabilities and sensing methodologies introduce a smart manner for energy management systems. In fact, the fast development of smart grid technologies provide an advanced control over the energy offered and consumed by the suppliers and the consumers of the electricity, respectively. The growing usage of electricity is leading to an increased demand on the following scarce resources: energy, oil and coal. This will result in increasing electricity prices. Moreover, the continuing growth of electricity is negatively affecting the environment. Therefore, coming up with a planned schedule for household appliances for controlling Demand Side Management in smart grids is beneficial on the economic and environmental level. In this paper, we present a scheduling algorithm using heuristic optimization that will serve as a solution to schedule home appliances in a way to minimize the monetary expenses and protect the environment indirectly.

Presenter bio: Sergio Thoumi earned his B.S. in Computer Science in May 2022. He is currently a graduate student in Computer Science at the Lebanese American University in Beirut. He is interested in databases, machine learning, and algorithms.

10:50 Machine Learning and Big Data Based IDS System: Extensive Survey 🗟

Noora Al-Romaihi and Alauddin Yousif Al-Omary

Intrusion detection systems (IDS) keep a close eye on network traffic and logs for any suspicious activity that might indicate a breach of security. Machine learning algorithms are now used by IDS to enhance their ability to detect attacks even in the presence of large amounts of data. In this paper, the integration of machine learning, big data and IDS will be introduced. This integration will enhance the IDS system, widen its detection scope and capabilities, and produce more accurate IDS results.

Presenter bio: Student Master (Cyber Security) In University of Bahrain . Working as Developer

11:10 Damage Assessment and Recovery in Fog-based Computing Systems 🗟

Sergio Thoumi and Ramzi A. Haraty

Technological improvements have been exponential in the last two decades. The advancements in networking, fog computing, and artificial intelligence have allowed us to implement the "Internet of Things" starting from small sensors connected to the Internet to enormous "smart cities". However, what is common in all of these improvements is that without data, and more precisely correct data, they would be useless. For example, machine learning training and results will be useless once a malicious or affected transaction is done because it can spread throughout the entire database. The need for data integrity made scholars research different phases of data security such as detection, prevention, and recovery. In this paper, we present an effective damage assessment and recovery algorithm in fog-based systems that shortens crucial downtime caused by the recovery process after an attack.

Presenter bio: Sergio Thoumi earned his B.S. in Computer Science in May 2022. He is currently a graduate student in Computer Science at the Lebanese American University in Beirut. He is interested in databases, machine learning, and algorithms.

11:30 An Effective Galaxy Classification Using Fractal Analysis and Neural Network 🗟

Priyanka SIVASUDHAN Radhamani and Saeed Sharif

Astronomy is always in a quest of revealing the mysteries of our Universe. There is a vast amount of astronomical data collected and this information comes from stars, galaxies and other celestial objects. While exploring this type of astronomical data, we can identify some complex self-similar patterns. Such self-similar patterns are shown in our own galaxy and are called fractals. This research work has been developed for finding such self-similarity that can be measured from galaxy clusters and this feature can be learned through a suitable neural network. This research work gives an insight about calculating the fractal dimension of galaxy images using box counting algorithm and training the images using LeNet - 5. The box counting fractal dimension is a specified range of values for each particular class of galaxy. By using the fractal dimension as a primary feature of different classes of galaxy and with the help of LeNet-5 network model classifying the galaxy images in to ten specified classes according to its morphological properties.

11:50 Investigation of Credit Card Fraud Detection under the Lens of Comparative Machine Learning Models 🗟

Mohammad Sadman Tahsin, Neda Firoz, Shah Abul Hasnat Chowdhury, S Wasei, Musaddiq Al Karim and Mst. Yeasmin Ara Fraudulent use of credit cards is common and may result in significant financial losses. Using Trojans or Phishing, criminals may get the credit card numbers of innocent victims for their criminal acts. As a result, it is vital to have fraud detection technology that can catch a thief in the act of purchasing using a stolen credit card. One solution is to utilize machine learning algorithms to construct normal/fraud behavior characteristics from all historical transaction data, including legitimate and fraudulent ones, and then use these features to identify whether a transaction is fraudulent or not. In this paper, SVC, Multinomial Naïve Bayes, K-Neighbors Classifier, Logistic Regression, Random Forest, Bernoulli Naïve Bayes, and SVM algorithms were used for credit card fraud detection. The detailed results of all seven algorithms were studied. Then a comparison between these seven algorithms with their precise accuracy, ROC curve, train-test, validation scores, and the learning curve was discussed. Logistic Regression, Random Forest, Bernoulli Naïve Bayes, and SVM showed 100% accuracy in training dataset. While Random Forest algorithm outdid every other algorithm by scoring 100% for both train and test data, the result of the remaining algorithms for the train and test data were also satisfactorily ranging from 75.3% to 99.6%. Logistic Regression, Random Forest, Bernoulli Naïve Bayes, and SVM all 4 scored 100% in both train and test data, and Random Forest scored 100% leaving behind all the algorithms. Logistic Regression, Bernoulli Naïve Bayes and SVM scored 99.6% in test. The best-performing algorithm was selected according to its performance and discussed its AUC score and confusion matrix

S1-B: Convolutional Neural Network

Chairs: Faisal Alkhateeb, Hasna J ALsaeed

10:30 Real-time Arabic Sign Language Recognition using CNN and OpenCV 😼

Shaikhah Almana and Alauddin Yousif Al-Omary

Sign language is the way of interacting for hearing impaired people. Each Sign language has multiple dialects. The world suffers from a lack of interaction between impaired and hearing individuals. This work proposes an application that recognizes Arabic Sign Language (ArSL) using CNN and OpenCV. The CNN model is trained using ArSL2018 with over 5000 images with 32 categories. Next, the OpenCV is used to capture a real-time frame. After that, the CNN model and OpenCV method are combined to recognize the 32 letters. The

model shows a weighted-average F-measure of 95%. Similarly, the macro-average F-measure was 95%. Finally, the application is run and the prediction of the letters in real-time is successful.

Presenter bio: Shaikhah Almana, a Master student in Machine learning and computational intelligence at University of Bahrain. Almana holds a bachelor degree in Computer Science, Imam Abdulrahman bin Faisal University, Saudi Arabia. Her research focuses in deep learning.

10:50 Short-Term Aggregated Residential Load Forecasting Using BiLSTM and CNN-BiLSTM 🗟

Bharat Bohara, Raymond I. Fernandez, Vysali Gollapudi and Xingpeng Li

At the residential level, a higher penetration of renewable and smart home technologies presents a challenge to grid stability as utilitycustomer interactions add complexity to power system operations. In response, short-term residential load forecasting has become an increasing area of focus. However, forecasting at this level is challenging due to the high level of uncertainty involved. Recently deep neural networks have been leveraged to address this issue. This paper investigates the capabilities of a bidirectional long short-term memory (BiLSTM) and a convolutional neural network-based BiLSTM (CNN-BiLSTM) to provide a day ahead (24 hr.) forecasting at an hourly resolution while minimizing the root mean squared error (RMSE) between the actual and predicted load demand. Using a publicly available dataset consisting of 34 homes, the BiLSTM and CNN-BiLSTM models are trained to forecast the aggregated active power demand for each hour within a 24 hr. span, given the previous 24 hr. load data. The BiLSTM model achieved the lowest RMSE of 1.4842 for the overall daily forecast. In addition, standard LSTM and CNN-LSTM models are trained and compared with the BiLSTM architecture. The RMSE of BiLSTM is 5.60%, 2.85% and 2.60% lower than LSTM, CNN-LSTM and CNN-BiLSTM models respectively.

Presenter bio: I am a PhD student at the University of Houston. My research interests are in the field of machine learning, optimization, and deep reinforcement learning.

11:10 Reliability of Saliency Methods Used in Graph Neural Network Models 🗟

Faizan E Mustafa and Juan G. Diaz Ochoa

Graph neural networks (GNN) have recently been successfully used to combine data stored in electronic health records to identify individuals with similar phenotypes and model them to predict, for example, the discharge of patients from intensive care units or the best possible medical therapies based on similar patients' diagnoses. However, the explainability of the model is essential for a transparent and reliable application in medicine. This can be done using gradient-based methods such as saliency methods. While saliency methods in medicine are generally used in radiography to better understand what a model currently "observes" in regions of an image to find a prediction or make a classification, very little has been done in other areas also relevant in medicine such as GNNs applied in medical decisionmaking. To this end, we have tested gradient methods on GNNs and calculated their saliency scores with three different methods: i.) gradient, ii.) integrated gradients, and iii.) DeepLIFT. It is expected that the scores obtained with each method will be convergent. However, we found that less than 50% of the calculated scores converge. In addition, the quality of this convergence depends on whether the analysis is performed on the entire graph or on subgraphs. This result is relevant as it demonstrates that these methods are probably not fully reliable when applied to GNNs. Because of this, we propose an alternative strategy for using these scores: instead of using unique saliency scores, we suggest sampling the scores computed with different methods. In this way, it is not only possible to understand which input information influences the computation of the prediction, but it is also possible to compute a level of confidence of the predictions depending on the distribution of the scores, which makes it a human-centered method informing medical customers about the reliability of the model.

Presenter bio: I am an MSc Computational Linguistics student at the University of Stuttgart. During my job at QUIBIQ GmbH, I have worked on projects related to Natural Language Processing. My Master's thesis deals with the extreme multi-label classification of Medical Subject Headings (MeSH) using the text of biomedical research papers.

11:30 The Effects of Fully Connected Layers Adjustment for Lightweight Convolutional Neural Networks 🗟

Evangelos Nerantzis, Apostolos Kazakis, Georgios Symeonidis and George A Papakostas

Reducing the size and the computational need of a Convolutional Neural Network (CNN) is a crucial task that can be extremely important for the deployment phase of such models. In this work, we are quoting the most efficient techniques in order to reduce the size of CNNs while maintaining prediction accuracy. Through a case study, we investigate the effects, especially of the dense layers and how the number of nodes in each layer can change the weight, performance and training process of a CNN. Although there are lots of works around this subject, in our paper we are proving how and why the number of nodes in fully connected (dense) layers is the most important factor for reducing the size of a CNN.

Presenter bio: Evangelos Nerantzis was born on 6/23/78 in Xanthi. He carried out basic studies in the Department of Forestry and Natural Environment Management at the Faculty of Agricultural Technology and Food and Nutrition Technology at the Technical Educational Institution AMTH (2000 - 2003). He continues his postgraduate studies at the International University of Greece in the field of Advanced Technologies in Informatics and Computers (MPhil in Advanced Technologies in Informatics and Computers) and at the Hellenic Open University in the field of Pervasive and Mobile Computing Systems (Msc).

S1-C: Smart Cities **↑**

Chairs: Isa Salman Qamber, Amal Alrayes

10:30 An Estimation of the Multidimensional Energy Poverty Index in Pakistan 😼

Abid Rashid Gill, Najma Rasheed, Muhammad Abrarulhaq and Farheen Akram

The lack of access to modern energy resources restricts possibilities and widens the gap between affluent and poor people. Energy-poor households are those who do not have access to modern, reliable, and inexpensive energy. Therefore, the key aim of this study is to estimate the multidimensional energy poverty index in Pakistan. For this, the data has been taken from Pakistan Demographic and Health Survey 2017-2018 (DHS), and a total of 20103 samples were selected for the current analysis. The Multidimensional Energy Poverty Index (MEPI) was calculated using five dimensions and six indicators to estimate energy poverty in the household. MEPI was calculated for overall Punjab and its nine divisions separately. The study's findings depict that 32 percent of households in overall Punjab have energy poverty. Similarly, from Division Bahawalpur 54 percent, DG khan division 64.3 percent, Faisalabad division 28.3 percent, Gujranwala division only 10.5 percent, Lahore division 14.8 percent, Multan division 45.1 percent, Rawalpindi division 21.7 percent and Sahiwal division 54.4 percent and Sargodha division a total of 34.9 percent households have multidimensional energy poverty.

Presenter bio: .Ms Najma Rasheed is serving in Registrar office, the Islamia University of Bahawalpur. She completed her M.Phil degree in Economics from the Islamia University of Bahawalpur. She has published two research articles on Multidimensional Energy Poverty Index in Punjab, Pakistan in International Journal.

10:50 Future Energy Consumption Estimation for the Kingdom of Bahrain 🗟

Isa Salman Qamber

It is well known that one of the important issues in the Kingdom of Bahrain is the consumed electric energy which is taken into consideration. Hence, the estimated consumed electric energy is compensation for some elements and constraints. These elements and constraints are helping the research to plan the energy to be saved for the country's future. The major improvement and output of this research are to develop software that becomes an aspects model to determine the energy consumption estimation of the Kingdom of Bahrain with reference to the historical data of the country. The outputs lead to an accurate figure which has formed an energy consumption prediction model that works by searching, examining, and developing conditions of the system's energy. The investigated techniques aim to predict the annual peak energy that believes in finding satisfying values. This might assist to form examples of other countries' models.

Presenter bio: Isa Salman Qamber currently he is a Professor in Electrical Power Systems Reliability (University of Bahrain). He published more than a hundred Scientific Research papers in International refereed journals and Conferences. He obtained his BSc in Electrical Engineering, King Saud University in 1982. He obtained his MSc in Electrical Power Systems Analysis, UMIST in 1984 (UK). He obtained his Ph.D. in Markov Modeling of Equipment Behavior at, the University of Bradford in 1988 (UK). He was the Dean of Scientific Research, the Dean of Applied Studies (University of Bahrain), and also the Chairman of the Electrical and Electronics Engineering Department (University of Bahrain). Professor Qamber is a member of professional societies such as IEEE (USA), CIGRE (France), Society of Academics, and Bahrain Society of Engineers. He was the founder of the IEEE Bahrain Section and the Chairman of the section and currently the honorary chair of the section.

11:10 New intelligent system for proactive bearing fault detection in elcetric induction machines 🗟

Pascal Dore, Saad Chakkor, Ahmed El Oualkadi and Mostafa Baghouri

In the last decades, the monitoring of induction machines for electromechanical defects has reached a very high level. This is due to the enormous material and economic losses caused by their failures. Among these faults are the mechanical fatigue faults of the bearings, whose appearance and evolution are at the basis of these enormous losses. In this work, we present an approach, which by its complexity and efficiency would allow to monitor locally or remotely and in real time the mechanical fatigue of bearings used in rotating machines. The results of the combined set ensure acceptable levels of reliability and safety by allowing early detection when this defect is incipient.

Presenter bio: Pascal Dore, born in Guinea in 1996, is currently a doctoral student at the National School of Applied Sciences of Tangier in the Information and Communication Techniques Laboratory and works on the detection of electromechanical faults in inductive machines by spectral analysis by application of high-resolution signal processing algorithms. He holds a Master's degree in Communication and Embedded Electronic Systems and holds a Bachelor's degree in Mathematical and Computer Sciences.

11:30 Design of Urban Bus Alarm System (UBAS) 🗟

Salwa Baserrah, Mohsen A. Ghani, Ali Hussain Jassim, Murtadha Ali Abdulla and Mohamed Sadeq

The main goal of the system developed in this paper is to reduce fatalities caused by children being forgotten in buses. The study is particularly interested in designing and developing an alarm system that detects sitting and moving people inside a turned-off bus using affordable electronic components such as Arduino and sensors. The designed device can be plugged into any standard bus to create an alarm system suitable for urbanized buses and called Urban Bus Alarm System (UBAS).

Presenter bio: Mohsen A. Ghani is a BSc Electrical Engineering student at the University of Bahrain, and he will be graduating by the end of first semester 2022/2023. He participated in a GPIC challenge to rescue the environment by designing a tower that uses wind energy to cool sea water used in factories. He has extensive knowledge with programming, project design, and engineering solutions from his work at ENOVA Company. He competed in various robotics contests, including VEX robotics, and won first place for two seasons.

11:50 Application of Industrialised Building System in the Field of Construction toward Sustainability: Future Routes and a Theoretical Mapping

Aawag Mohsen Alawag, Ammar AL-Ashmori and Ahmed Tawfik Algadami

Industrialized Building System (IBS) is a construction system in which components are factory-made in a measured atmosphere (on or off-site), placed, conveyed, and collected on site with minimal additional site activities, according to the Construction Industry

Development Board Malaysia (CIDB). The application of IBS in construction projects could significantly improve site performance in terms of protection, quality, charge efficiency, production, sustainability and waste reduction. In the construction industry, sustainability has become increasingly essential. Meanwhile, due to the extremely difficult constraints that stakeholders encounter in adopting new technology and a scarcity of experienced labour, the degree of IBS implementation in Malaysia remains low. According to several studies, typical IBS is gradually being pushed to the background. However, no systematic study applying bibliometric examination of IBS studies to more investigate relevant study in this field was uncovered. This study offers an outline of the IBS current studies gathered from "Web of Science" database. To visualise the material included in the study scope, VOSviewer was combined with bibliometric analytic techniques. As a conclusion, six clusters were discovered that focused on these primary theme segments: IBS approach, prefabrication, construction, innovation, sustainability, and management. Based on the current gap, this paper makes recommendations for future IBS research. Assisting the IBS research community with research and development.

Presenter bio: Aawag Mohsen received his B.Sc. degree in Civil Engineering from Universiti Teknologi Malaysia (UTM), in 2012, and the M.Sc. degree in Construction Management from Universiti Tun Onn Hussein Malaysia (UTHM), in 2016. He is currently pursuing his Ph.D. degree in Civil and Environmental Engineering at Universiti Teknologi PETRONAS (UTP), Malaysia.

S1-D: Telecommunication and Networking-1 7

Chair: Faisal Buzaid

10:30 Planar Ultra-Wideband Antenna with Added GSM Frequency Bands 🖻

Umair Rafique and Syed Muzahir Abbas

A planar antenna design for ultra-wideband (UWB) communication with two additional GSM bands is presented i this study. A beveledshaped patch with a quarter-wavelength transformer is utilized to provide UWB response. Two capacitive-loaded resonators (CLRs) are utilized in conjunction with a partial ground plane to create resonance in the GSM frequency bands (900 and 1800 MHz). The designed antennas' prototype is fabricated and measured, and it is noticed that both the results are well in agreement. Furthermore, the proposed antenna design produces good radiation characteristics for the bands of interests.

Presenter bio: Mr. Rafique received his BS degree in Electronic Engineering from Mohammad Ali Jinnah University (MAJU), Islamabad Campus, Karachi, Pakistan in 2011 and an MS Electronic Engineering degree in 2017 from Capital University of Science and Technology (CUST), Islamabad, Pakistan. Currently, he is pursuing a Ph.D. degree in Applied Electromagnetics from Sapienza University of Rome, Rome, Italy. His research interests include MIMO antennas for sub-6 GHz and mm-wave applications; UWB and SWB antennas; frequency selective surfaces; metamaterials and metasurfaces; RF front-ends and circuits; electronic system design and integration; and semiconductor device modeling. He has published a number of research articles in reputed international journals and conferences, and holds a research impact factor of 50.409 with a citation index of 359. He is a graduate student member of the Institution of Electrical and Electronics Engineering (IEEE, USA; IEEE Antennas and Propagation Society (IEEE APS), USA; IEEE Microwave Theory and Techniques Society (IEEE MTTS), USA; and a Registered Engineer with the Pakistan Engineering Council (PEC).

10:50 Trust-Aware Security system for Dynamic Southbound Communication in Software Defined Network 🗟

Fatema Salman and Ahmed Jedidi

The vast proliferation of the connected devices makes the operation of the traditional networks so complex and drops the network performance, particularly, failure cases. In fact, a novel solution is proposed to facilitate the management of the network resources and services named software defined network (SDN). SDN separates the data plane and the control plane by centralizing all the control plane on one common platform. Further, SDN makes the control plane programmable by offering high flexibility for the network management and monitoring mostly in failure cases. However, security is one of the major challenges in SDN which is presented as the first barrier for its development. Security in SDN is presented at various levels and forms, particularly, the communication between the data plane and control plane that presents a weak point in SDN architecture. In this article, we propose a novel security framework based on the combination between the trust and awareness concepts (TAS-SDN) for a dynamic southbound communication SDN. Further, TAS-SDN uses trust levels to establish a secure communication between the data plane and control plane. As a result, we discuss the implementation and the performance of TAS-SDN which presents a promote security solution in terms of time execution, complexity and scalability for SDN.

Presenter bio: Ms Fatema Salman is Teaching and Lab assistant working at Ahlia University. Ms Fatema holds a Master Degree in Information Technology & Computer Science (2016) and a Bachelor's Degree in Mobile & Network Engineering (2011), both from Ahlia University, Bahrain.

11:10 Polymer Optic Fibers: Potential of Development and Application in Networks 🗟

Myroslav Panchuk, Andrii Panchuk, Marek Szkodo, Alicja Stanisławska and Igor Prunko

The paper analyzes the current state of polymer optic fibers and shows the progress and potential of their development and areas of application in network technologies. It has been established that polymer optic fibers have their advantages due to such material properties as high flexibility, lower Young's modulus (which provides high sensitivity to mechanical parameters), higher elasticity limits, impact resistance, compatibity with biomedical materials, biodegradability, and low weight. At the same time, the optical properties of polymer optic fibers tend to improve. These advantages can be well applied for short-range networks, which are currently being intensively developed. In transportation networks, polymer optic fibers can be successfully used to reduce vehicle weight and fuel consumption, improve traffic safety, and can be the basis for taking the vehicle to a new, much higher, level of quality. The application of polymer optic fibers opens new ways in medicine and helps to overcome the barriers to the existing healthcare system. Polymer optic fibers dominate local communication networks with a relatively small signal transmission radius. Polymer optic fibers have quite a high application potential in renewable energy systems and transmission of sunlight into the premises The conducted research has resulted in the development of a new approach, which consists in the fact that polymer optic fibers are a driving force in the development of short-distance networks.

Key words - Networks applications, telecommunications, polymer optic fibers, protocols.

Presenter bio: Myroslav Panchuk - Associate Professor of Welding Department of Ivano-Frankivsk National Technical University of Oil and Gas (Ukraine). Scientific interests: the use of computer systems in decision making, sustainable development, improvement of welding processes, the use of welding processes in medicine, polymer materials science, the use of polymer optical fibres for information transmission.

11:30 Multiband Millimeter Wave Phased Array Antenna Design for 5G Communication 🗟

Baye Zenebe Chekole, Ayodeji Olalekan Salau and Habitamu Endalamaew Kassahun

Despite the fact that commercial 3G and 4G deployment is already underway in many nations, the introduction and development of 5G and 6G wireless communication technology is the result of the demand for ultra-high-speed communications and rapidly rising data rates. This paper presents the design and analysis of a multiband antenna array for 5G communication. The proposed antenna is 9.8x6x0.8mm3 in size and operates at 27GHz, 36GHz, and 49GHz, frequencies that are within the consideration range of 5G wireless

communications. This antenna is made of a copper conductor and a Rogers RT5880 substrate, and it has a permittivity of 2.2 and tangential losses of 0.0009. There are eight geometrically linear parts in a phased array antenna. The results show that the developed antenna exhibits high bandwidth, acceptable gain, efficiency, and good beam steering at the operational bands.

Presenter bio: Lecturer at University of Gondar in Communication Engineering. My research interest is Antenna and wave propagation and Wireless communication

Presenter bio: Ayodeji Olalekan Salau received the B.Eng. in Electrical/Computer Engineering from the Federal University of Technology, Minna, Nigeria in 2010. He received the M.Sc. and Ph.D. degree in Electronic and Electrical Engineering from the Obafemi Awolowo University, Ile-Ife, Nigeria in 2015 and 2018, respectively. His research interests include computer vision, image processing, signal processing, machine learning, power systems engineering, and nuclear engineering. His research has been published in many reputable international conferences, book chapters, and major international journals. He is a registered Engineer with the Council for the Regulation of Engineering in Nigeria (COREN), a member of the International Association of Engineers (IAENG), and a recipient of the Quarterly Franklin Membership with ID number CR32878 given by the Editorial Board of London Journals Press in 2020 for top quality research output. More recently, Dr. Salau's paper was awarded the best paper of the year 2019 in Cogent Engineering. Currently, Dr. Salau works at Afe Babalola University in the Department of Electrical/Electronics and Computer Engineering.

Presenter bio: In 2015, I graduated with bachelor of science in Electrical and Computer Engineering at University of Gondar, Gondar, Ethiopia. July 8, 2015- October 3, 2017: Worked as an Assistant Lecturer at the University of Gondar. In 2019: I graduated with master of science in Power Systems Engineering at Bahir Dar Institute of Technology, Bahir Dar University, Bahir Dar, Ethiopia. November 1, 2019- Up to now, worked as a Lecturer at the University of Gondar.

11:50 UAV-Assisted Wireless Communication System with Reconfigurable Intelligent Surfaces: Outage Probability Approach

Emre Hanbay and Gökhan Altın

Reconfigurable intelligent surfaces (RIS) are considered as a useful method for improving performance of wireless communication networks by controlling electromagnetic wave transmission. In this paper, a communication network based on the reflective role of the unmanned aerial vehicle (UAV) equipped with RIS between command-and-control center on the ground and another aerial vehicle is presented for the improvement of the network coverage and the total system performance of the communication framework supported by the UAV. The scenario in which the UAV equipped with RIS acts as a reflective relay is designed in order to prevent obstacles between the ground-based command and control system and the aerial vehicle and to ensure uninterrupted communication. Channel modeling of the RIS supported UAV communication network is designed and the outage probability of system is analyzed. Performance of the communication network according to the position parameters of the UAV and the number of RIS reflective surface elements is investigated using Monte-Carlo simulations. In addition, the presented scheme is compared with traditional cooperative communication systems (amplify-and-forward, decode-and-forward). The obtained results showed that coverage of the proposed RIS-UAV supported architecture is improved efficiently and the RIS-UAV structure is a useful candidate for the future communication networks.

Presenter bio: Phd student at national defence university

S1-E: Informatics-1 **↑**

Chair: Ali H Zolait

10:30 Evaluating customer usage and satisfaction in Bahrain towards AI-enabled e-commerce websites 🐱

Eman Almohsen, Hussain Salman, Tara Henari, AbdulRahman Isam Al Rawi and Mohamed Fardan

With the development of technology, online shopping has become popular, especially in countries with high internet penetration rates. In Bahrain, the internet penetration rate reached 99 percent, which directly impacts the e-commerce market's revenue, which is projected to reach USD 1.434 million in 2022. The use of artificial intelligence in e-commerce helps businesses to target customers better and generate sales. Knowing that customers are using the AI features as predicted and satisfied with them is very significant for online businesses to assist them while adjusting their marketing strategies. This study aimed to measure customer usage and satisfaction in Bahrain towards the AI features in the two largest global e-commerce platforms - Amazon and Alibaba. The study focused on the most common AI features used in e-commerce websites: recommendation systems, chatbots, virtual assistants, search engines, image recognition technology, augmented reality, and product reviews. It also examined if customer's demographic attributes, namely, age, gender, and highest education level, influence the levels of customer usage and satisfaction. The IS Success Model was adapted to formulate the research model and hypotheses. Using a CSAT survey, data were collected from a random sample of 126 Bahraini customers. The findings were analyzed using Pearson coefficient, T-Test paired samples, and one-way ANOVA. The results showed differences in usage, customer satisfaction, and purchase experience. It also demonstrated that the demographic attributes and different business strategies might affect the use, customer satisfaction, and purchase experience. Managerial implications are discussed based on the results of the study.

Presenter bio: Mrs. Eman Khalil Almohsen, is a Lecturer at the Faculty of Technical Programs, University of Bahrain. She is interested Al, digital marketing, eapplications, m-applications, and QA in Higher Education. She graduated with a Master degree with distinction in E-Commerce from Middlesex University, the UK, in 2006; and with a Bachelor with distinction in Computer Science from University of Bahrain in 2004. She got the Post Graduate Certificate in Academic Practices from York John University, the UK, in 2012. She is a Fellow of the Higher Education Academy, a Microsoft Certified Educator, and a Certified Microsoft Office Specialist.

Presenter bio: Ph.D., Information and Communication Security, Dublin Institute of Technology, Ireland. M.Sc., Computer Science - Image processing, University of Baghdad, Iraq. B.Sc., Computer Science, Zarka Private University, Jordan. Published several publications in international journals and conferences. Granted AdvanceHE fellowship in teaching and learning support in higher education. Teaches various IT, graphics design, web and multimedia, and networking courses

10:50 Voice Command AI Assistant for Public Safety 🗟

Swarnamouli Majumdar, Sonny Kirkley and Mayur Srivastava

This study presents a robust voice command virtual assistant that enables law enforcement professionals to communicate and handle mission-critical crises more effectively. A chatbot powered by artificial intelligence has been proposed and designed to bridge the gap between police officers and dispatchers and to give assistance and connection to critical emergency services such as fire and EMT through voice commands. The intended users are law enforcement personnel and emergency responders who need technology that is both intuitive and timely. In a larger perspective, this Al-enabled voice command feature is envisioned to operate in conjunction with IoT sensors to collect data and instantly send it to first response networks in times of crisis. Our solution provides for hands-free device control through voice commands built with cutting edge Al solution. Time and resources are critical for emergency responders, especially when they perform the operations in time-sensitive situations where they need to protect their safety, their co-workers, and the public. Even a few seconds of delay can put live at risk. Our main objective is to reduce the operational inefficiency of communication for safeguarding frontline first responders while performing day-to-day operations and to provide a highly reliable Al-driven Voice Assistant device. In this regard, the architecture of the IoT cloud network will enable the Al-driven systems to be customized according to the emergency at hand.

Presenter bio: Experienced Data Scientist/Product Analyst with 6+ years of experience in wrangling data, and deriving business reports with actionable insights from complex datasets. Skilled at analyzing and interpreting large data sets to provide action-oriented and data-driven approaches to drive business growth. An inquisitive problem-solver with critical thinking skills and demonstrated ability to lead teams in delivering solutions addressing real-world challenges and expanding business opportunities. Currently pursuing a Ph.D. in Management Information Systems with focus on Machine Learning and Business Analytics.

11:10 The Moderating Effects of Managerial Competencies and Organization Capabilities on ERP Implementation by Service Sector Enterprises in Saudi Arabia

Marzouq AlGhamdi and Ali H Zolait

Researchers attempted in this study to examine the moderating effects of factors that proposed to impact the ERP implementation in the service companies. The moderating effects of Managerial Competencies (MC) and the dimensions of organization capabilities were examined on the existence of User Satisfaction (US) in the ERP successful implementation. The researchers adapted the quantitative approach in which a survey questionnaire was distributed to a target sample of 1000 contacts. The achievable sample was 408 with an approximate response rate of 41%, representing respondents of executives, managers, and end users. Data were analyzed using linear structural relations (LISRL) and SPSS techniques to test the results. The results and findings show that innovation capabilities and skills competency moderate the relationship between user satisfaction and ERP implementation. On the other side, networking capability, financial capability, and knowledge competency have no moderated impact on the relationship between user satisfaction and ERP successful implementation. The research results may lack generalisability since they consider only the service enterprises. However, the study's model can be replicated in other countries to support and further validate the developed research model. The research findings brought a reasonable implication by emphasizing an organization's Innovative Capability (IC) more than other proposed factors. Therefore, IC must be considered by any enterprises seeking to shift their firm's orientation toward being more entrepreneurial and achieving successful ERP implementation in Saudi Arabia's services companies. This paper fulfills identified newly moderating factors that examine the successful implementation of ERP.

Presenter bio: Dr. Ali Hussein Saleh Zolait (Known as Dr. Zolait) is the Assistant Professor of Management Information Systems (MIS) at the College of Information Technology - Department of Information Systems at the University of Bahrain from 2010- the present. Dr. Zolait was the stoops distinguished assistant professor of E-commerce and Management Information Systems at the Graduate School of Business- University of Malaya - Malaysia. He served as a researcher Visiting Research Fellow affiliated with the Faculty of Business and Accountancy from 2007 until September 2010. Dr. Zolait is a prominent scholar and leader in the field of Information systems. He is the author of more than sixty published and scholarly research in Information Systems and Information Technology. Dr. Zolait's research was published in leading and indexed ISI and Scopus, International Journals such as Government Information Quarterly, Behaviour & Information Technology, Journal of Systems and Information Technology, Journal of Enterprise Information Management, Journal of Information Security and Applications. In addition, Dr. Zolait has published three books, Dr. Zolait supervised hundreds of undergraduate, postgraduate, executive development program MBA, MM, and doctoral students. Dr. Zolait's current and future research include IS Performance Analysis, Smart Cities/ Big Data / Cloud Computing / Internet of Things (IoT), IS Maturity, Information Systems Security, and Cybersecurity. Dr. Zolait served as an external examiner for many master's and Ph.D. theses in information systems and e-commerce. He has been invited keynote speaker at several conferences and seminars. Dr. Zolait was the primary delegate and representative to the IEEE Region 8 meeting and talks. The Belgium government Supernova conference-2019 Belgium, INCONET-GCC 2 is a European Commission-funded project. He acted as a conference program chair for several successful conferences. The Fourth International Conference on E-learning: Best practices in management, design, and development of e-courses: standards of excellence and creativity (IELC 2013), 7th-9th May 2013, Manamah, Kingdom of Bahrain. He acted as Technical Program Chair: The Fifth International Conference on E-learning: Cognitively informed technology, 5th to 8th of October 2015, Manamah, Kingdom of Bahrain. He acted as Publication Chair at: the 9th IEEE-GCC conference and exhibition, 8-11th November 2016, in Manama, Bahrain, and also 10th IEEE-GCC conference 2019, Kuwait. He served as Program Chair for the International Conference on Fourth Industrial Revolution, ICFIR 2019, Manama - the Kingdom of Bahrain. Dr. Zolait is a Senior Member of SMIEEE and was elected Chair of the IEEE Bahrain Section from October 2020 – December 2022. He is the Editor-in-Chief of the International Journal of Technology Diffusion (IJTD). Founder & Member of Board of Directors: Society of Excellence & Academic Research, Kingdom of Bahrain. He serves in many academic committees at the department, college, and university levels. In addition, he is acting as a referee to many international journals and conferences.

11:30 Non-Immersive Virtual Reality Umrah Simulation: A Functionality Test 🗟

Siti Nuramalina Johari, <u>Nor Syahirah Nadri</u>, Nurul Hidayah Mat Zain, Anita Mohd Yasin, Zainab Othman and Siti Rahayu Abdul Aziz

Umrah is an Islamic pilgrimage that Muslims can perform at any time. Umrah will take place at the holy place, Mecca. Usually, before performing the umrah, the pilgrims will attend umrah courses to learn how to practice step-by-step procedures. However, the Covid-19 outbreak stopped the pilgrims from attending the live umrah course. This scenario causes difficulty for pilgrims to visualize the umrah practice. Therefore, we have developed a Non-Immersive Virtual Reality Umrah Simulation (NIVRUS) to help the pilgrimage visualize the umrah practice. This study has implemented a Waterfall Model as a development methodology in which phases are divided into

sequential phases. Each phase must be completed before proceeding to the next phase. In this present study, the focus is on evaluating NIVRUS through a functionality test. The findings indicate that all the functions in NIVRUS properly function as expected.

Presenter bio: Nor Syahirah binti Nadri. Undergraduate student of Bachelor of Computer Science (Hons.) Multimedia Computing.

11:50 Digital Skills of Public Sector Employees for Digital Transformation 🗟

Thandeka Manana and Tendani Mawela

Technology is changing rapidly and digital skills are increasingly used in our daily life and as such they are in demand. Digital skills are important as they support new ways of working, and they help organizations to develop a competitive advantage, increase revenue and improve business productivity. In the public sector digital skills are essential for driving digital transformation efforts towards improved service delivery. The objective of the study was to investigate the digital skills required for employees within the public sector. The study reviewed the required digital skills and the state of digital skills within the public sector. Additionally, it aimed to understand the barriers and enablers towards the acquisition of digital skills by public sector employees. The study adopted a multiple case study and the data was collected via a questionnaire and interviews from government organizations. The study found that there is a lack of advanced digital skills such as those related to Artificial Intelligence, Big Data and Internet of Things (IoT) as compared to a lower proportion of a lack in intermediate digital skills amongst employees. It was also noted that there is still a shortage of qualified people with the appropriate digital skills to fill various positions in the sector. The results highlighted key enablers for developing digital skills such as financial resources, access to technology tools and formal training. Whereas the barriers towards acquiring digital skills were noted as budget constraints, infrastructure and a lack of agility in organizations. The study offers several recommendations for driving digital skills development in the public sector to support digital transformation.

Presenter bio: Thandeka Manana is a MIT (ICT Management) graduate from the University of Pretoria. She is currently working as a Senior Business Analyst with a specialization in business process analysis at the University of Pretoria. She had previously worked at a management consulting firm as an analyst consultant.

S1-F: Artificial Intelligence-1 7

Chair: Hadeel Alobaidy

10:30 Future Glycemic Events Prediction Model Based On Artificial Neural Network 🗟

Muhammad Syafrudin, Ganjar Alfian, Norma Latif Fitriyani, Tony Hadibarata, Jongtae Rhee and Muhammad Anshari Predicting future glycemic events such as hypoglycemia, hyperglycemia, and normal for type 1 diabetes (T1D) remains a significant and challenging issue. In this study, an artificial neural network (ANN)-based model is proposed to predict the future glycemic events of T1D patients. We utilized five T1D patient datasets to build the models and predict future glycemic events with a prediction horizon (PH) of 30 and 60 minutes ahead of time. We applied the data preprocessing method based on the sliding window approach by sliding the blood glucose time-series data from the past 60 minutes (the last 12 data points) as input and using the next 30 and 60 minutes (the next 6 and 12-th data points) as output. All the numeric blood glucose output data are then transformed into a multi-class classification label, such as hypoglycemia, hyperglycemia, and normal. Our proposed model is then used to learn and create the prediction model from the preprocessed blood glucose dataset. Four performance metrics such as accuracy, precision, recall, and f-1 score were utilized to measure the performance of the classification models used in this study, such as Naïve Bayes (NB), Decision Tree (DT), Support Vector Machine (SVM), and K-Nearest Neighbour (KNN). The results showed that our proposed ANN-based model performed better at predicting future glycemic events than other models, with an average accuracy, precision, recall, and f-1 score of 88.649%, 76.661%, 71.731%, 72.609%, and 83.364%, 60.437%, 61.345%, 60.62% for the PH of 30 and 60 minutes, respectively. As a result, knowing this future glycemic event sooner can help patients avoid potentially dangerous conditions and can eventually be used to improve diabetes management.

Presenter bio: He is currently Assistant Professor at Sejong University Seoul, Korea. He carries out research and development (R&D) in Industrial artificial intelligence (AI), Machine learning, Deep learning, IoT, Information systems, Big data, Health informatics, Edge computing and etc.

10:50 Mechanism of Network Traffic Detection using Count vectorizer 🗟

Mohammad Nadeem, Surendran R, Saravanan M S and Madhu sundar N

This research article's main objective is to categorise the network traffic using a count vectorizer with an improved accuracy rate by using a Comparing the novel Materials & Methods: Support Vector Machine (SVM) to the Naive Bayes (NB) Classifier The data set in this paper utilizes the publicly available Kaggle network traffic data set and UCI machine learning repositories. The sample size of classifying the network traffic with improved accuracy rate was sample 5000 (Group 1=2500 and Group 2 =2500) and calculation is carried out utilizing G-power 0.8 with alpha and beta qualities are 0.05, 0.2 with a confidence interval at 95%. Classifying the network traffic using a count vectorizer with improved accuracy rate is carried out by Support Vector Machine (SVM) whereas various samples (N=10) and Naive Bayes (NB) where the (N = 10) Sample size. The Novel Support Vector Machine (SVM) classifier has 92.123 higher accuracy rates when compared to the accuracy rate of Naive Bayes (NB) is 89.123. There exist a statistical major distinction between the two groups (p=0.013; p<0.05) with confidence interval 95%. Novel Support Vector Machine (SVM) provides better outcomes inaccuracy rate with improved accuracy rate.

Presenter bio: R.Surendran was born on 10th May 1983 at Kumbakonam, India. He completed his Bachelor's Degree in Information Technology in the year 2005 from Anna University, India. He completed his Master degree in Information Technology and doctorate degree in Computer Science and Engineering in the year 2009 and

2014 from Sathyabama University, India. He is having 12 year 7 months of teaching experience in india, Oman and Bahrain Universities. He has published many papers in reputed International Journals and Conferences. His research interests include Cloud Computing and IoT.

11:10 Prediction of Defective Products Using Logistic Regression Algorithm against Linear Regression Algorithm for Better Accuracy 🗟

Vasantha Vasu, Surendran R, Madhu sundar N and Saravanan M S

The aim of the research investigation is being done to increase precision and prediction of defective online products using management to find the defective online products using a machine learning classifier Novel algorithm for logistic regression. A novel Logistic regression classifier is applied to the online products dataset that consists of 3197 records with 10 attributes and sample size=102. A framework for finding defective products in New defective online products logistics comparing Novel logistic regression and linear regression algorithms has been developed. The accuracies and precisions of the models were evaluated and recorded. The linear regression algorithm gives 76.0% accuracy in predicting the defective rate whereas the Novel logistic regression algorithm predicts the same with 84.2% accuracy. There exists a statistically different in a way that Both (p=0.03; p0.05) Linear regression and logistic regression). The performance of Novel logistic regression is significantly better and gives more appropriate results than the linear regression in finding defective rates for online products.

Presenter bio: Vasantha Vasu is a student in the department of computer science and engineering, Saveetha school of engineering, Saveetha Institute of Medical and Technical Sciences, Chennai, India. He is interested on Machine learning application and Big Data analytics.

11:30 A Supervised Learning Classifier for Replayed Voice Attack Detection 🖻

Najla Abdulrahman, Sarah Al-Shareeda and Dalal Samer Ali

Google's voice assistant has the voice match feature, which can only recognize its user's voice. However, it cannot distinguish between an authentic human voice or an audio-replayed replica of the same person's voice. This work develops a Gaussian shallow learning Naive Bayes (GNB) voice-replay detector to add such a missing layer of verification. In the front-end feature extraction stage, the model extracts the Mel frequency Cepstrum Coefficients (MFCC) and Constant Q Cepstrum Coefficients (CQCC) from the input voice signal. The gathered attributes are given to the developed GNB classifier to classify the input speech as either genuine from a live source or replayed from a previously recorded source. The GNB classifier is trained using extensive datasets of labeled speech feature samples from both classes. The Equal Error Rate (%EER) statistic measures the classifier's performance. The trained GNB classifier is exposed to extensive development and evaluation datasets to optimize performance in various reduction, normalization, and filtration situations and settings. The top %EER values for the GNB classifier are 14.3553% for the development set and 19.8722% for the evaluation set. A real-time experiment is conducted with the developed learning model to support the obtained performance results.

Presenter bio: I am an Electronics Engineer fresh gradute from the University of Bahrain.

11:50 Evaluating the Stressful Commutes Using Physiological Signals and Machine Learning Techniques 🗟

Saeed Sharif, Madhav Raj Theeng Tamang and Cynthia Fu

Stress can be described as an alteration in our body that can cause physical, emotional, or psychological strain. It is our body's response to anything that requires attention or action. It can be caused by various reasons depending on the physical or mental activity of the body. Commuting on a regular basis also acts as a source of stress. This research aims to explore the physiological effects of the commute with an application of a machine-learning algorithm. The data used in this research is collected from 45 healthy participants who commute to work on a regular basis. A multimodal dataset containing medical data like biosignals (heart rate, blood pressure, and EEG signal) plus responses obtained from the questionnaire PANAS. Evaluation is based on the performance metrics that include confusion matrix, ROC/AUC, and classification accuracy of the model. This research employs a number of machine learning algorithms to design a model that can predict the impact of a commute. The results obtained from this research suggest that whether the interval of commute was small or large, there was a significant rise in stress levels including the biosignals (blood pressure, heart rate and EEG signal) after the commute. The result obtained by the fused machine-learning techniques predict that the Systolic BP will be higher when the EEG Beta low power exceeds Alpha low power after the commute. The Random Forest algorithm showed the best performance with an accuracy of 91%, while the Support Vector Machine and the K-Nearest Neighbor showed the accuracy of 80% and 78% respectively.

Presenter bio: Ph.D. student in the field of Artificial Intelligence and Machine vision at University of East London, United Kingdom. Working as Teaching assistant at University of East London. Research interests: Artificial intelligence, Big data, Machine learning and Intelligent system.

Sunday, November 20 12:10 - 13:00 (Asia/Qatar)

LB: Lunch Break Day-1 🛧

Sunday, November 20 13:00 - 14:40 (Asia/Qatar)

S2-A: Machine Learning in Finance

Chairs: Ahmed M. Zeki, Reem AlKaabi

13:00 Speaker Identification through Gender Detection 🖻

Mir Md. Taosif Nur, Sumaiya Sultana Dola, <u>Apurba Kishore Banik</u>, Tanzeem Akhter, <u>Nafees Hossain</u>, A. B. M. Alim Al Islam and Jannatun Noor

In modern technological advancement, voice recognition has played an integral part in many machine learning algorithms, having diversified application areas such as speech recognition, building better access control systems and security systems, etc. The goal of this research is to compare the results of two voice recognition methods, the first method involves identifying a speaker by first determining his/her gender using various machine learning techniques and then cross-matching the voice sample with the detected genders in the dataset using a pattern recognition algorithm. The second method uses the same pattern recognition algorithm on the voice sample without performing gender detection. To do so, we have utilized Mel Frequency Cepstral Coefficients (MFCC) for extracting audio features and used machine learning algorithms such as MLP, RBFN, Random Forest, KNN, Gradient Boosting, Decision Tree, Naive Bayes, Logistic Regression, and SVM for gender detection then compared the results between the nine classifiers. Then, pattern recognition algorithm GMM is applied for the detection of an individual. A dataset of our own and a ready-made dataset from Kaggle were used for the research. Gradient Boosting and Random Forest showed high performance in both datasets in case of gender detection. Subsequently, combining gender detection algorithm with GMM led to improved accuracy in some instances.

13:20 Customers' perceptions and behavioral intentions regarding mobile banking usage 🗟

Alaa S. Jameel and Ahmed S. Alheety

The Iraqi banking industry may benefit from the widespread usage of mobile phones and the government's promotion of cashless transactions to hasten the adoption of mobile banking. The aim of this study is to understand the behavioral intention to use mobile banking among mobile users. The study deployed a convenience sample to collect the data from the users in Iraq. Furthermore, 198 valid questionnaires were analyzed by Smart-PLS. the results indicated the perceived usefulness, perceived ease of use, social influence and self-efficacy statistically able to enhance the behavioral intention to use mobile banking among users. In contrast, awareness showed an insignificant impact on users' behavioral intention to use mobile banking.

Presenter bio: Alaa S. Jameel is a lecturer in the Department of Public Administration at Cihan University- Erbil, Iraq. He received his Master's Degrees From Infrastructure University Kuala Lumpur (IUKL), Malaysia. He obtained his Ph.D. from Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia.

13:40 A Model for Forex Market Price Prediction using Deep Learning 🖻

David N Makiya and Bernard Shibwabo Kasamani

Forex markets are full of uncertainties largely influenced by the forces of demand and supply. The rates usually adjust depending on the prevailing status of the economy, politics and the monetary policies. The forex market consists of multiple dealers and online forex trading platforms. Predicting forex market prices is a complicated process and subjective in nature for forex dealers, economists and businesspersons. The potential to make losses due to poor speculative guesses is quite high for multinational corporations located in more than one economy. The aim of this study is to develop a model for forex market price prediction. We develop the model using the Data-Driven modelling technique. We source the Central Bank of Kenya's (CBK) historical dataset to achieve this. The dataset is divided into training and testing data by a splitting of 80-20. We construct the model by combining time series regression with resilient back-propagation neural networks on the select currencies. The unique behavior of each of the currency necessitated separate implementation of the model output. This realized increased accuracy and lower error levels hence efficiency and optimality. Successful predictions are conducted up-to eight months forward. We realize accuracy levels ranging 88-98% and SSE of 0.496-2.667. The wider the historical data range, the higher the accuracy and consequently, the longer the prediction horizon.

Presenter bio: David Makiya is a PhD Student in Informatics at the University of Lisbon in the Department of Informatics, Faculty of Sciences. His key research has been surrounding application of AI to solving real world Financial Problems. He is currently focused on simulating Multi-Agent Systems on Neural Networks in creating Financial Prediction Models, identification of Terrorism Financing, Money Laundering, Banking. This is supported by his professional backing as a Certified Public Accountant and Certified Investments and Financial Analyst. He also graduated with a Masters of Science in Information Technology from Strathmore University in Nairobi following a BSc. in Mathematics & Computer Science from Jomo Kenyatta University of Agriculture and Technology. His concept proposition paper on applying Multi-agent systems to Combat Terrorism financing in East and Central Africa was ranked top 15 at the 2021 GCSP Prize for Innovation in Global Security hosted by the Geneva Centre for Security Policy. He currently works in tandem with the Research and Development Committee of the Institute of Certified Public Accountants of Kenya in Conference preparations, paper reviews and driving/developing new technologies for the Accountancy profession in both East Africa and Africa at large. He has overseen the mentorship of Diploma and Certificate students at Jomo Kenyatta University of Agriculture and Technology for over 4 years.

14:00 Financial Impact of IFRS on Indian Telecommunication Sector 🗟

Abhijit V. Chirputkar, Prasanna Kulkarni and Pankaj Pathak

International Financial Reporting Standards (IFRS) were formulated to bring about harmonizing and unifying global accounting practices. They became compulsorily applicable in India from financial year 2016-17 for consolidated published accounts listed companies. In India, only Bharti Airtel Ltd. had voluntarily applied these standards from financial year 2010-11. The other Indian companies adopted IFRS from 2016-17. This study analyses the financial impact of IFRS on India's telecom sector by using financial ratios appraising cash resources, ability to make profits, proportion of debt and equity, working capital, and company's performance. It has two separate parts. The first one conducts pre-IFRS and post-IFRS analysis of financial ratios of Bharti Airtel Ltd. The years studied in this part are from 2003-04 to 2009-10 (7 years pre-IFRS) and from 2010-11 to 2016-17 (7 years post-IFRS). The other makes an analytical comparison of the effect of IFRS on Bharti Airtel Ltd. and some select, listed non-adopters in the telecom sector. Years considered are: 2010-2011 to 2016-17 (7 years). Non-parametric tests evaluate statistically significant differences of ratios. Many ratios are found to be significantly different, in both parts of the study. This study is the first of its kind pertaining to the Indian telecom sector.

The outcomes provide important guidance for companies in the Indian telecom sector which are listed on Indian stock exchanges, various stakeholders in such companies, and corporate accounting and auditing regulators.

Presenter bio: Dr Prasnna Kulkarni is an associate professor at Symbiosis Institute of Digital and Telecom Management. He is a chartered accountant from India and pH. D. From Symbiosis International (Deemed University), Pune, India. He has presented and published papers at national and international conferences.

14:20 A Blockchain Enabled System for Enhancing Fintech Industry of the Core Banking Systems

Sameer AlJishi, Ahmed Tarafa, Hasan Alaswad and Chitra Balakrishna SCADA Security System Architecture to Detect System Intrusions SCADA Security System Architecture to Detect System Intrusions

S2-B: Information Technology-1 7

Chair: Amal Abu Hassan

13:00 The Role of Artificial Intelligence in Asset Management of Enterprise Systems 🖻

Abimbola Adebayo and Saeed Sharif

Initially, when artificial intelligence is mentioned in conjunction with the phrase 'Asset Management', what springs to mind is how AI is used for investment assets and financial portfolios. However, even more than the management of Investment portfolios is the use of AI in Asset Management. Information Asset Management plays a key role in cyber security and AI can also aid in the efficient running of this sub-process. This paper discusses the various ways in which AI can help manage Information Assets and contribute to the strengthening of security postures of a network with numerous IT assets. It also proposes a method for the identification of rogue assets in asset list using the Isolation Forest algorithm. Results of the research showed that in the detection of outlier assets based on chosen attributes, with an accuracy of 90%, the algorithm accurately identified assets with anomalies indicating its usefulness in identifying rogue assets in Asset Management.

13:20 Assessing Gender Inclusive User Preferences: A case of Urban Public Spaces in Chandigarh 🗟

Prateek Dhasmana, Kanika Bansal and Mehardeep Kaur

Various global studies have brought out the different advantages of preferred usability for inclusive urban public spaces with a special focus on varying age-groups. However, a knowledge gap exists in identifying the parameters that impact the preferred choice of using urban public space based on gender preferences. Though the essence of public spaces lies in its accessibility and usability to people of diverse cultures, backgrounds and races, the needs of certain gender-defined user groups such as women are often ignored. In view of the same, this study presents the issues associated with gender inclusiveness in urban public spaces in the context of Chandigarh, a utopian city, north of India. The aim is to evaluate the various attributes of urban public spaces that impact the user's choice. The city's master plan encompasses a wide variety of urban public spaces of scales varying from the city level to neighborhood to street level. Based on the existing literature review, study validates four constructs namely comfort, image, usage and vitality to analyze the user preference of urban public spaces in Chandigarh. Qualitative research methodology through questionnaire surveys and interviews was adopted for the present research. Study sample comprised of people from five diverse neighborhoods of Chandigarh, each possessing unique socio-economic characteristics. Data was compiled through an intensive mapping activity carried out in the identified neighborhoods including markets to evaluate the user preference based on the identified parameters. The findings of the present study suggest that user-preference by female users is dominantly governed by comfort because of the safety concerns faced by women, while vitality took dominance in case of male user preferences for public space that offer vivid mediums of entertainment and variety of activities. The study concludes that the identified parameters can prove to be vital in making public spaces more gender inclusive. It will further help the planners and designers to discover novel solutions for amplifying the inclusivity and accessibility of public spaces, and thus boosting the recreation levels for a wider range of people.

Presenter bio: Kanika Bansal is presently working as a Professor & Dean Academics with the Chitkara School of Planning & Architecture, Chitkara University, Punjab, India. She is pursuing PhD from Guru Nanak Dev University, Amritsar and her area of doctoral research is "Built Heritage Conservation in the Colonial Hill Towns of India". She did her Bachelors in Architecture in 2003 and Postgraduated in 2014 from Chitkara University (Silver Medalist). She has received a number of awards for her contribution as an academic of high merit like the Emerging Leader - Excellence Awards 2019 by Chitkara University, Punjab and the A3 Foundation Teacher's Award - 2018, Chandigarh. She has to her credit a number of research publications in reputed national & international Journals and conferences. Her doctoral research revolves around impact that the urbanization process has on the historic cores and the built heritage of hill towns in India.

Presenter bio: Prateek is an Assistant Professor and a Ph.D. Research Scholar in Chitkara School of Planning and Architecture, Chitkara University, Punjab, India. Prateek has done his B.Arch from Dehradun Institute of Technology, Dehradun, and M.Ekistics from Jamia Millia Islamia Central University. He has worked as an assistant architect in Occulus Design and Shunya Abhivyakti, Dehradun (Uttarakhand). He has a keen interest in policy assessment/ analysis, and strategy formulation in planning/development and has worked on regional plans, zonal plans, and area development plans in his master's program. Prateek has taken "hill outmigration in the watershed regions of Uttarakhand" as his doctoral research topic.

Presenter bio: Mehar Deep Kaur is an architect and urban designer by qualification. Her enthusiasm for research and academics has led her to become an assistant professor in various departments of design at renowned universities. In an endeavour to disseminate knowledge on obscure topics, Mehar helms an eponymous academic blog for architecture aficionados which showcases content on variegated topics in the colossal fields of design that revolve around the unification of creativity with societal values. An avid reader and researcher, Mehar extends her love for words beyond reading onto architectural content writing with various award winning architects and organizations. An innovative designer at heart, she has filed 3 patents under her name. The young academician believes in pursing everything with Meraki, in order to live a life that is deeply fulfilling and worthwhile.

13:40 An Effective Random Generalised Linear Model to Predict COPD 🖻

Linah Saraireh, Saeed Sharif and Muna D S AlSallal

Chronic obstructive pulmonary disease (COPD) is a type of chronic lung illness that worsens with time and leads to a restriction in the outflow of air from the lungs. According to the World Health Organisation, The World Health Organization ranks COPD as the third leading cause of death. Clinically, the diagnosis of this disease is relatively difficult; therefore, early identification of individuals at risk of developing COPD is vital for implementing preventative strategies. This research work has developed a generalised linear model (GLM) to predict the COPD status of the patients. A dataset of 1262 patients (688 COPD cases and 574 controls) was used. Exploratory data analysis (EDA) was utilised to observe how potential covariates were related to the response variable (COPD status). By employing rigorous model selection techniques (forward selection and backwards elimination) according to (AIC) which stand from Akaike information criterion and (BIC) which stand from Bayesian information criterion (BIC), a consensus was reached that the most suitable model is a binomial logistic regression model which includes the smoking history, gender, and age. The model was validated using an independent test set with an accuracy of 73%. Such a model, once fully validated, has the ability for predicting the risk of developing COPD in patients with existing lung conditions, including but not limited to, asthma.

14:00 Hardware Trojan and Countermeasures for Internet of Things

<u>Ali AlAali</u>

Nowadays we are living a new era where most of our usable devices are connected to the internet. The Internet of Things (IoT) that how we call this technology. It is used in many segments in our life such as healthcare, industries, shopping and even in our houses. The IoT includes smart machines embedded with sensors to collect data. Those devices are able to communicate and interact with the surrounded area, human, objects and even the other machines to transfer the collected data. The security is one of the most concern for the IoT devices. Some of the collected data by those devices are very critical, thus it should be accessible only by the authorized person. The security at this point is not for the device as an appliance only, it must include the software, network and applications to be protected from any sophisticated attack. Most of the researches discussed software, network, cloud security and overlook hardware security. Hardware Trojans (HTs) are major threats to the IoT hardware. This paper will discuss the security on the hardware level of IoT devices, nature of HTs, the insertion method. Also it will clarify side channel attacks and how they are extremely dangerous when they carried out with Hardware Trojan.lastly it will provide countermeasures to detect infected circuses and methods to prevent HT insertion to secure hardware level of IoT devices.

14:20 Lightweight Encryption Algorithms for Internet of Things: A Review on Security and Performance Aspects

Hesham Hasan, Ghassan Juma and Chitra Balakrishna

Continuous Compliance to Ensure Strong Cybersecurity Posture Within Digital Transformation In Smart Cities Continuous Compliance to Ensure Strong Cybersecurity Posture Within Digital Transformation In Smart Cities

S2-C: Cyber Security-1 **↑**

Chair: Muhammad Waqas

13:00 Reconfigurable Cyber-Security Architecture for Small Satellite with Low Complexity and Power 🗟

Aysha Khaled Alharam, Yaqoob Alqassab, Reem Senan, Muneera Al-Malki and Wael M El-Medany

Small satellites are extensively developed to serve a wide range of space missions, from exploration to defense. They are becoming a promising replacement for large spacecraft due to their low development cost and lead time. Small satellites are widespread in the Low Earth Orbit (LEO) and are operated by governments, space agencies, universities, and companies. Satellite communications are vulnerable to cyberattacks, and their security cannot be less important than any other industry because their missions could jeopardize national security. Thus, satellite communication cybersecurity has become crucial in the sustainability of satellite systems, where some of these vulnerabilities can negatively impact the mission. The design of small satellites has many challenges, such as low power consumption, limited data rate, and limited design area. This research paper proposed a revised onboard cyber-security architecture for small satellites. A hardware implementation of a modified Advanced Encryption Standard (AES) algorithm was implemented to optimize the design Complexity and power consumption. The optimized AES algorithm was implemented using a reconfigurable Field Programmable Gate Arrays (FPGA) device, Spartan6 to evaluate the performance, resource utilization, and power consumption compared to existing Commercial off-the-shelf components (COTS). The results show high performance for securing data and images with low power consumption and complexity, making it suitable for small satellites.

Presenter bio: MSc.Electrical and Computer Engineering in Space System and Technology from Khalifa university of science and technology. MSc.Information Technology from University of Bahrain BSc.Computer Engineering from University of Bahrain

13:20 Cybersecurity Threats and Solutions of IoT Network Layer 😼

Ali AlAali and Abdulla Alateeq

Internet of Things (IoT) is a combination of technologies with many applications that attempt to enhance the quality of humans' life. IoT appliances gather data without human direct interaction and analyse it to be used without complexity. This advantage leads the IoT to become the main key to operate the smart city applications. Most of the large cities are involving IoT to support smart city applications such as traffic control, weather monitoring, or water and electrical services management. However, some IoT appliances gather private

and critical data, which turn them into a target for adversaries whom work on exposing this data either for personal gain or perform attacks on the system to damage the city's infrastructure. There are several challenges in using IoT regarding data confidentiality, integrity, and authentication. Robust security solutions are essential requirements for IoT devices and their applications. Nevertheless, there are some IoT devices certified and secure, but they need to be updated once a breach has been detected or the version became outdated. Within this paper, we provide and discuss some of these challenges related to network layer of IoT architecture, how we can overcome them to ensure confidentiality, integrity, and authentication to prevent potential threats. Additionally, provide directions for future researches that aim to address security issues, and introduce new applications to achieve the goals. In addition, we proposed security frameworks to be standardized for IoT devices.

13:40 Privacy and Security Issues in Blockchain based IoT Systems: Challenges and Opportunities 🗟

Wafa Abdullah Alzuabi and Yasser Ismail

The Internet of Things and Blockchain technology will be the focus of this research. This study looks into issues of security and privacy. The main challenges it faces, as well as the possibility of using it to better bitcoin transactions for businesses, are the focus points. The blockchain concept is a distributed ledger with decentralization and data that is dispersed evenly across all nodes in the chain. In terms of data security, the blockchain ensures all three components of the CIA trinity by maintaining data confidentiality, integrity, and availability. Initially, the significance of this technique was limited to cryptocurrency because it is a one-way function that prevents any type of record fabrication. This concept is currently widely used in medical and public health data security, and many financial institutions, such as Citi Bank, are exploring employing block chain technology to create a breakthrough in the financial realm. This research is a comprehensive review of the literature on the significance of blockchain technology, as well as the security and privacy issues that this technology now faces.

14:00 A Cybersecurity Architecture to Mitigate Shamoon Attacks 🖻

Theyab Alrubaie, Nedal Ababneh, Sherali Zeadally and Kevin Curran

Shamoon attacks are one of the most recent Advanced Persistent Threat (APT) attacks that target several Saudi Arabian organizations. In this paper we analyze the historical, tactical and technical aspects of the Shamoon attacks. Our analysis explores the various methods of attack and the different stages through which the attackers achieve their penetration to the targeted organization network. By conducting such an analysis, we reveal the weaknesses of the cybersecurity architecture that were exploited by the attackers. Finally, we propose an enhanced cybersecurity architecture that will help halt the chain of attack at any stage and mitigate Shamoon attacks

14:20 Anomaly-based detection Technique using Deep Learning for Internet of Things 🗟

Hussain Ismaeel

Cyber-attacks are increasing dramatically and becoming an inevitable threat which is challenging to eliminate. These attacks include broad range of internal intrusions and external intrusions as well as to new (zero-day) form of attacks which make the conventional security techniques obsolete. The growth in the volume of emerging cyber threats plays a critical factor that impedes the advances in technologies such as the Internet of things (IoT). IoT has significantly evolved in recent years to improve several aspects of every Industry. However, the vast acceleration toward adopting IoT technology has exacerbated the size of attack surface and magnetized plenty of cyber-attacks. Deep learning (DL) characteristics has motivated investigations to explore the capabilities of DL in perceiving the security of IoT architecture. This paper focuses on DL approaches used for IoT anomaly-based attacks detection and their effectiveness in conquering the security challenges in IoT environment. In addition, a comparative study is presented to highlight the performance indicators and architecture of each DL technique. Several DL models are used to detect malicious attacks in different IoT areas. Implementing DL methods with relevant vast datasets can significantly resist different security and privacy concerns.

S2-D: Software Engineering **T**

Chair: Fawzi Abdulaziz Albalooshi

13:00 The Use of UML Diagrams to Enhance Dynamic Feature Location Techniques 🖻

Faisal Buzaid, Fawzi Abdulaziz Albalooshi and Wael M El-Medany

Unified Modeling Language (UML) is an efficient technique that can be implemented to model and visualize an object-oriented system that suffers from lack or poor documentation. UML diagrams enhance the developers understanding the software system to apply software maintenance, software evaluation, or Dynamic Feature Location Techniques (DFLTs). The construction of UML diagrams is based on dynamic or static analysis. Dynamic analysis refers to collecting data when the system executes to generate execution traces, while static analysis refers to collecting the data from the source code. This paper implements UML diagrams in both directions, dynamic and static analysis, to enhance the software programmers applying DFLTs. A use case scenario diagram is used to specify the inputs of the DFLTs based on static analysis. In contrast, class diagrams and object diagrams are used to locate the required software artifacts of source code to construct the exercised feature based on dynamic analysis. Each created use case scenario generates an execution trace. The collected execution trace is analyzed to build class and object diagrams. The implemented case study illustrates the process of the proposed approach and shows that using UML diagrams increases the accuracy of applying DFLTs.

Presenter bio: Faisal Buzaid received the BSc and MSc degrees in Computer Science and Web System Engineering from University College Cork (UCC), Ireland, in 2015 and 2017, respectively. He is currently working as a teaching assistant in the Computer Science Department at the University of Bahrain, and a Ph.D. candidate at the

College of Information Technology, University of Bahrain. His research interests include software metrics to measure the impact of using Junit testing to exhibit software features functionalities. He has experience in dynamic code analysis, specifically using Dynamic Feature Location Techniques (DFLTs) to enhance software comprehension activities.

13:20 Design and Analysis of Cpm and Cpmk Indices for uncertainty environment by using Pythagorean fuzzy sets 🗟

Selin Yalçın and İhsan Kaya

Process capability analysis (PCA) is a statistical analysis tool to examine variability of the process that causes faults for outputs and reduces customer satisfaction level. So, it is a completely effective method to improve the process' quality. One of the effective methods is process capability indices (PCIs) that are used to analyze the capability of any process by using specification limits (SLs) and process' variation. Especially in real case problems, there are many factors that causing uncertainty for the process. Although traditional PCIs are effective tools to analyze variation of process, they caused some misleading results and incorrect interpretations when the process has uncertainties. To overcome the problem, the PCIs have been re-designed under uncertainty to increase their effectiveness by using fuzzy set theory (FST). In recently, some fuzzy set extensions have been derived to deal with uncertainty and they can model uncertainties of process capability bu improving some PCIs based on PFSs. For this aim, two of well-known PCIs named C^{*}_pm and C^{*}_pmk are re-designed by using PFSs as the first time in the literature. The mathematical structures of these two indices are re-formulated and PCIs based on PFSs (PFPCIs) have been derived. Additionally, an application related with dimensions of a gear for a piston is also applied to analyze usage of proposed PFPCIs. The obtained results confirmed that the indices C^{*}_pm and C^{*}_pmk based on PFSs are more capable for modelling uncertainty, include more information and have more sensitiveness than the traditional PCIs.

Presenter bio: Selin Yalçın was born in Turkey, 1992. She received PhD degree in Industrial Engineering from Yildiz Technical University in 2022. She receives her MSc in Industrial Engineering from Sakarya University in 2017. She is now an Assistant Professor at Beykent university, İstanbul, Turkey.

13:40 Performance analysis of PRIME Technology based on QPSK and 16/64-QAM of power line communication 🗟

Shaimaa Mudhafar Hashim and Israa B Al-mashhadani

Data transmission over power lines as a medium for information transmission over a traditional grid system is a relatively new area of telecommunication. This study investigates one of the power line communications (PLC)technologies categorized within a physical layer PRIME (Power line Intelligent Metering Evolution) tested in MATLAB. The performance of PRIME data is modulated using QPSK (Quadratic Phase Shift Keying), and 16/64 QAM (Quadratic Amplitude Modulation) with additive white gaussian noise (AWGN)based on which of these modulations is the best performance system based on the bit error rate (BER)and signal to noise ratio Eb/N0 (dB). The results reveal that the performance of the proposed approach generated a superior signal quality model when using 64-QAM compared with that of 16-QAM and QPSK where the BER is 0.0198, the Eb/N0 is 0 dB in QPSK modulation, whereas it is 2.4 dB when using 16-QAM modulation. Then tested many cases for comparison of the BER is 0.01 and Eb/N0 when using just QPSK modulation with Reed-Solomon coding (RS coding) is 5.3 dB. It was proved that the tested case of QPSK with RS coding has the best signal quality compared to other cases.

Presenter bio: is an M.Sc. degree student in the research level at the Department of Computer Engineering, Al-Nahrain University, Baghdad, Iraq, and completed a B.Sc. degree in 2018 in the Department of Computer Engineering, Al-Nahrain University, Baghdad, Iraq. Miss. Shaimaa is interested in power management, Electrical and Electronic Systems, and Control of smart meter grid systems by using wireline technology. She can be contacted at email: shaimaa.mudhafar@gmail.com.

Presenter bio: Israa Badr Al-Mashhadani was born in Baghdad, Iraq, in 1977. She received her B.Sc. degree in electronics and communication engineering from Al-Nahrain University, Iraq, in 1998. the M.Sc. degree in Electronic Circuits and Systems from Al-Nahrain University, Iraq, in 2001, and the PhD degree in electronic systems from the University of Reading, U.K, in 2017. Currently, she is a lecturer in computer engineering at the College of Engineering, Al-Nahrain University, Baghdad, Iraq. Her research interests include Non-Linear Circuits Analysis, Port-Hamiltonian Formulations, Memristive elements, and Smart Cities. She published several papers in different scientific journals and conference proceedings. She can be contacted at email: israa.b.al-mashhadani@nahrainuniv.edu.iq

S2-E: Informatics -2 **↑**

Chairs: Mazen Ali, Abdul Fattah Salman

13:00 Proposed a model to evaluate mGovernment service quality from the perspective of Perceived Ease of Use (PEU) 🗟

Abdulla Jaafar Desmal, Suraya Hamid, Mohd Khalit Othman and Ali H Zolait

This study aims to propose a model to evaluate the service quality at mobile government from the perspective of Perceived Ease of Use (PEU). The model discussed and analyses based on the service category of Government To Citizen (G2C). Using the systematic literature review, the study conducted a theoretical analysis on PEU and proposed the quality attributes that were extracted from the Decomposed Theory of Planed Behavior (DTPB), E-S-QUAL, and other relevant theories at the field of online service quality. The proposed model of PEU classified into three quality dimensions of psychological, technical, and structural. Each of the three dimensions were discussed with relevant quality attributes. Recommendations to conduct further studies on other relevant quality dimensions of mGovernment services.

Presenter bio: Abdulla Jaafar Desmal is a researcher in the field of Mobile Government and e-Service Quality. He has been published as author of over 15 papers in highly regarded, peer-reviewed journals. He completed the requirements of PhD on July, 2022 from the Faculty of Computer Science and Information Technology, University of Malaya, Malaysia.

13:20 Automating Arabic Tags Creation for Annotating Web Contents 🖻

Amjad W Hawash, Shahd Sulaiman, Batool Barham and Jana Alhasan

Web Annotation becomes an important collaboration technique for users of the web. In order to increase universal collaboration, it is vital for annotators to contact the most related people that share the same interests. Although annotations themselves can be used to exchange ideas and experts, the improper writing of their attached notes could decrease the intended collaboration due to the lack of expressing ideas clearly. Adorning annotations with proper tags makes it easier for annotators to express their feelings, emotions, and interests through their submitted annotations. The ability to use the tags in searching for annotations leads to reaching the most related tags to one's interests and this indeed increases changing ideas between annotators and hence their collaboration. However, expressing the ideas in annotations with proper tags is not an easy task for most annotators. On the opposite side, attaching improper tags loses the soul and the intention of creating annotations which decreases the amount of collaboration. This work is related to automating the process of tags' suggestion by studying the texts selected by annotators over the web. Suggesting proper tags takes into account the part of speech of the annotated texts. The experimental results conducted in the work are related to finding the most suitable threshold for the percentage number of tag suggestions.

Presenter bio: Jana in her last bachelor year of computer science program in An-Najah National University/Nablus/Palestine. She has good experience in crossplatform coding. Has enough collaboration skills to work in groups. She had a training course in Swift PS company.

13:40 Ease of access to healthcare services: Developing a telehealth application prototype 🗟

Douniazed Amira Toumi, Ines Dermeche and Ghalem Belalem

The mHealth field is witnessing remarkable development and widespread use in developed countries. Nowadays, mHealth proposes many solutions to some of the problems challenging the healthcare industry such as remote monitoring, virtual care, etc. In order to help patients, especially those who cannot access healthcare services easily, to manage and control their health condition more effectively and efficiently. The aim of this paper was to propose a prototype of a mHealth application to help patients access these services easily from the comfort of their homes just by using their smartphones. Moreover, the focus of this application is to offer the maximum of services that the patient can possibly need in a secure and reliable manner.

Presenter bio: Amira Douniazed Toumi: Student researcher at Oran1 University (Algeria) in the field of health technology, has areas of interest in mobile application, e-health, cloud computing, medical data security, and Big Data.

14:00 Empirical Study for Improving Project Allocation on Freelancing Platform 🗟

Muhammad Zohaib Siddique, Muhammad Basit and Iqra Fatima

Freelance provides a platform for users to work online. There are jobs of each category on freelancing platform. Companies hire developers for their tasks, and freelancers work on same principle. Strategies used in freelancing for selection of ideal candidates have not changed much. The same processes are being utilized in traditional hiring remain in place. This led into lower employee rate and projects being remained un-awarded. This study will highlight some of the important aspects in freelancing, why some projects remain unawarded? Is freelancing a proper platform for all the projects? What changes are required to make this third-party platform more effective? This survey will help both the employee and employer to work in better environment. Moreover, it will help to remove uncertainties in making decisions while selection of candidates and awarding of projects.

Presenter bio: Muhammad Zohaib Siddique completed MSCS degree from the Riphah College of Computing, Riphah International University Pakistan, 2020, and Master degree in Computer Science from Virtual University of Pakistan in 2012. His research interests include high-performance computing, grid computing, cloud computing, networks, and network security.

14:20 Harnessing the Power of Games for E-learning in Higher Education 🗟

Fatima Vapiwala and Deepika Pandita

Learners nowadays are susceptible to stress and boredom due to the prevalence of e-learning. Young adults form their personalities in the context of dynamic networks that heavily depend on technological advances. As a way to involve learners, game-based learning refers to the adoption of some gaming ideas and their adaptation to actual contexts. Computer and video games can give e-learners the opportunity to engage in educational strategies that emphasize practical immersion and are accompanied by frameworks that foster competence, professionalism, and creative thinking. Through this study, the authors explore the use of game-based learning in the higher education sector in India. The authors aim to understand e-learners' perceptions regarding game-based learning especially as e-learning is growing in popularity and to bring out the various factors that contribute to the success of game-based learning in higher educators can use. The model will enable faculty members to effectively utilize game-based learning to keep the e-learners motivated and engaged throughout the e-learning process.

Presenter bio: Ms. Fatima Vapiwala is a Junior Research Fellow at the Symbiosis Institute of Business Management, Pune, India.

S2-F: Deep Learning-1 **⊼**

Chairs: Hesham Alammal, Nabil Benamar

Hatim Bamoumen, Anas Temouden, Nabil Benamar and Yousra Chtouki

Internet of things (IoT) enables the integration of smart and intelligent systems in our lives, subsequently creating an Al-powered society, where the latter is a substantial ingredient in the realization of a variety of tasks, be it industrial, personal, or economic. The emergence of embedded machine learning, or more specifically TinyML, opens a gate for a plethora of new applications that would extend the impact of technology on society. The ability to implement complex machine learning algorithms on low-powered devices can also be exploited to tackle one of the most fearful challenges encountered by the world, which is the environmental challenge. This challenge is currently threatening the entirety of the world on a very large scale, from global warming to climate change, drought, natural resource scarcity, and pollution. In this paper, we underline the contributions of Tiny-ML to the efforts deployed to surmount these challenges; and elaborate on how these tiny devices could be efficiently exploited to protect the natural world. Finally, we point out some challenges that limit Tiny-ML applicability in the environmental domain.

Presenter bio: Anas is an 18-year-old student pursuing his bachelor's degree in Artificial Intelligence and Robotization at AI Akhawayn University in Ifrane, Morocco.

Presenter bio: My name is Hatim Bamoumen, I am 18 years old. I am currently an undergraduate majoring in General Engineering in Al Akhawayn University in Ifrane.

13:20 Review on Reinforcement Learning in CartPole Game 🗟

Yusuf Mothanna and Nabil Hewahi

Last recent years, reinforcement learning has been one of the machine learning approaches commonly used in many fields. Reinforcement learning applications can be in games, resource management, personalized recommendations, and robotics. The applications of RL implementation in the game increase rapidly. Therefore, ensuring the best performance of RL applications in games is one of the challenges that should be considered. The reinforcement learning methods can be used to achieve the highest scores in the game in the minimum time possible to win. This work presents an overview of RL focusing on Q-learning and State Action Reward State Action (SARSA) models. Also, this work describes RL on CartPole Game and applies an experiment to measure and compare the implementation performance of Q-learning and SARSA in CartPole Game.

13:40 Graph Deep Clustering using Cluster Graph Conventional Network 🖻

Amal Shaheen, Nabil Hewahi and Riyadh Ksantini

Graph Deep clustering aims to have an effective representation of the graph data structure into multiple groups. Most of the studies in graph clustering move to apply deep learning because of the effectiveness of the combination for feature extraction, dimensionality reduction and clustering. However, the graph area is very wide and always has a lot of varieties and possibilities for new approaches and models. The different types of graphs and networks in addition to the type of the data and graph structure will cause that variety and the increase in the graph deep clustering models. Thus, it is important to gather all the new and latest approaches and compare the performance according to the benchmark datasets. This study focuses on two things, the various approaches for graph clustering using different methods for deep learning and evaluate a cluster graph conventional using different parameters. In our study, we used two main benchmark datasets that are used in measuring the performance of the process. The best accuracy results in our experiment are 75.25% and it is shown when we use the Pubmed dataset. This result is the highest accuracy compared with other graph clustering models using Pubmed dataset.

Presenter bio: Amal Shaheen PHD candidate Computer science, information of technology

14:00 Dimension Reduction Techniques for Image Classification 🗟

Nabil Hewahi, Hasna J ALsaeed and Riyadh Ksantini

Nowadays, the world is surrounded by a huge amount of data increasing day by day. The increase of data leads to the presence of complex high-dimensional datasets, with huge volumes and sizes. Thus, the high-dimensional data becomes a challenge in data mining as it becomes costly while it needs more computation time and more memory space to be stored. Moreover, high-dimensional data can affect the classification accuracy of machine learning algorithms because of the existence of redundant and irrelevant features, and that can cause the Curse of Dimensionality problem. To solve the problems caused by high-dimensional data, the concept of Dimensionality Reduction has been introduced to decrease the size of high- dimensional datasets into lower-dimensional datasets, either by feature selection or feature extraction techniques. Due to the lack in the performance of some machine learning models because of high-dimensional data, this paper introduces some common dimensionality reduction methods. Besides, the pa- per conducts an empirical comparison between PCA and Auto- Encoders dimension reduction methods and studies the effects of the two experimented methods in improving the classification performance of classification. The study uses three classification models, KNN, RF, and SVM to perform the classification in the MNIST, and Fashion-MNIST datasets before and after dimension reduction by PCA, and Auto-Encoder. The result has been compared and analyzed. The results show that AE has a better effect on improving performance of KNN, and SVM classifiers on MNIST dataset, as the SVM accuracy has been improved by AE from 91% to 95%, when dimension is reduced with a percentage of 95%,90%, and 50%.

14:20 Effective Machine Learning Based Techniques for Predicting Depression 🗟

Saeed Sharif, Abin Zorto, Abisha Thayyath Kareem and Rasha Hafidh

Depression is a global disorder with serious consequences. With more depression-related data and improved machine learning, it may be possible to build intelligent systems that can detect depression early on. This research uses the burns depression checklist as the gold standard for diagnosing depression and the support vector machine, decision tree, and light gradient boosting method as algorithms to create models capable of diagnosing depression on a dataset of 604 surveyed Bangladeshi students. This research demonstrates the efficiency of machine learning algorithms within the field of mental health. This research has found the decision tree classifier to be the best tool for predicting depression with an accuracy rating of 95.66%, while that of the support vector machine classifier and the light gradient boosting method classifier are 91.48% and 94.58%, respectively. The techniques presented in this paper perform better than those being used in current machine learning research. This study may help in determining what attributes are most crucial in diagnosis of depressed individuals as well as improve the health of the general populace.

Monday, November 21

Monday, November 21 10:30 - 12:10 (Asia/Qatar)

S3-A: Internet of Things **T**

Chair: Jafla Al-Ammari

10:30 Efficiency optimization of vehicle routing problem with considering IoT - a case study in Slovakia 🖻

Mohammad Zaher Akkad, Tamás Bányai, Sameh Haidar and Rana Rabee

Due to its complexity, vehicle routing is considered a challenging problem in the transportation and logistics area, because finding the best solution is considered almost impossible due to the amount of consumed time and limited resources. Therefore, optimization algorithms are used to find the optimal value or best possible solution within a relatively short time to reach the most effective and cost-efficient result, especially in the vehicles sector where cost and quality are both considered important factors. Optimization algorithms evolved from conventional mathematical methods to modern developed ones that use heuristic and metaheuristic approaches. IoT applications and developments show an interesting step forward in city logistics and transportation algorithms next to present and potential for raising energy efficiency since it provides strong involvement as effective tools to get data and interact with it. In this article, the authors present a study that describes the effectiveness of four metaheuristic optimization algorithms next to present and analyze a case study in Slovakia where thirty locations in the city center of Kosice are used to solve the vehicle routing problem in two applications, direct TSP application and MTSP application with consideration for the IoT involvement. The optimization algorithms are analyzed and discussed by five benchmarks to compare the minimization results and execution time. The used model in the case study is described, and the four metaheuristic algorithms (GA, PSO, SA, and ACO) are compared against the nearest neighbor algorithm where they showed better results.

Presenter bio: arned an MSc degree in Mechanical engineering in 2019 from the Faculty of Mechanical Engineering and Informatics at the University of Miskolc. PhD student starting from 2019. His PhD is about optimisation of logistic systems in Industry 4.0 environment. His research area is related to the following topics: waste management, sustainable logistics, circular economy.

10:50 An IoT-based Condition-Boosting Solution for the Oil Upstream Industry 🖻

Wael Farag, <u>Hussain K. Mohammad</u>, Mohammed AlEad, Ahmad Abdullah, Abdullah Hussain and Ahmad Mohammad In this paper, a smart solution is proposed to enhance the performance and monitor the condition of the Upstream Oil equipment. The upstream equipment includes the Electrical Submersible Pumps (ESPs) and Horizontal Surface Pumps (HSPs). Interruption of the operation of oil-extraction pumps due to failures results in lower production with negative economic consequences. Therefore, the main objective of the developed system is to boost efficiency and mitigate the failures of the production system. The design is using an Internet of Things (IoT) framework which mainly incorporates wireless sensors and explanatory visual dashboards. The idea is to provide the oil-production-site manager/officer with the ability to monitor the operation of upstream oil equipment of all oil wells under his authority at his fingertips using a web portal or through his smart mobile phone. The site manager can then take correct, prompt, and proactive decisions to overcome any foreseen problems in production continuity. The proposed solution incorporates several intelligent algorithms and sophisticated techniques to continually check the health of the upstream system and report its effectiveness as well as detect potential malfunctions and abnormal situations. Several test scenarios are developed to evaluate the proposed solution that has been implemented as an upstream oil-extraction prototype. The testing results show that failures that can occur can be predicted ahead of their occurrence.

11:10 Real-time implementation and evaluation of the LEACH protocol by PROWLER Simulator 🗟

Mostafa Baghouri, Saad Chakkor, Zineb Cheker and Ahmed El Oualkadi

LEACH is one of the famous hierarchical wireless sensor network protocols to prolong the network life cycle. Many changes have been made since the introduction of LEACH for more energy efficient consumption. However, there are few that deal with real-time network performance. In this article, a real-time implementation and evaluation of the LEACH protocol was presented to study the channel impact on the network performances. The simulation results by PROWLER simulator, show that LEACH has better real-time performance compared to direct protocols: Span tree, AODV and Flood 2D.

Presenter bio: Ingénieur biomédical, Doctorante à l'ENSA - Intelligence artificielle - science de l'ingénieur

Salma Hani Nova, <u>Shafquat Mahmud Quader</u>, Saumitra Das Talukdar, Mubtasimur Rahman, Md. Shaba Sayeed, A. B. M. Alim Al Islam and Jannatun Noor

With time, the world is getting populated, which results in a lack of parking space for people. With the development of the Internet of Things (IoT), numerous parking plans have been proposed. By evaluating the previous works, our study makes a comparative analysis based on user experience, hardware, and software systems. Finding flaws in previous works, a system is proposed that focuses on implementing parking systems using IoT in a cost-efficient manner. The system combining WiFi-Module and Arduino determines whether the driver parks the vehicle in an inappropriate area and thereby instructs the driver to park the vehicle in the proper location.

Presenter bio: I am Shafquat Mahmud. I am a Computer Science Graduate from BRAC UNIVERSITY.

11:50 Low-Cost, Low-Power, and Low-Compute Based ECG Monitoring Systems: Comparative Analysis and Beyond 댪

Md Abu Obaida Zishan, H M Shihab, Sabik Sadman Islam, Maliha Alam Riya, Gazi Mashrur Rahman and Jannatun Noor According to WHO, cardiovascular disease (CVD) is the leading cause of death globally. Unfortunately, these diseases are difficult to diagnose without proper equipment which is not cheap. One of the reasons for such a high cost of treatment is the use of expensive technologies like ECG or electrocardiograph monitoring systems. These monitoring systems are usually implemented using expensive high-compute hardware and proprietary algorithms. Conventional ECG systems cost between \$2000 and \$10,000 [1]. But in theory, these systems can also be developed through low-compute hardware (such as microcontrollers or FPGA) and machine learning. This paper performs a comparative study on the implementation of low-cost, low-power, and low-compute-based ECG systems and analyzes better approaches for future design. Additionally, it also proposes a designed prototype developed based on that approach.

Presenter bio: Undergraduate student of Computer Science and Engineering at BRAC University, Dhaka, Bangladesh.

S3-B: Artificial Intelligence-2 7

Chair: Abdulla Alqaddoumi

10:30 Lung Cancer Classification and Model Interpretation with Novel Gene Biomarkers using Explainable Artificial Intelligence

Karthik Sekaran, Ashwini Karthik and Shanmugam S

This paper proposes a machine learning pipeline to find novel genetic markers of lung cancer. The gene expression profiles of the individuals with regular and Small Cell Lung Cancer (SCLC) tumor tissues are statistically analyzed. The accession number of the dataset is GSE50412, fetched from the gene expression omnibus repository. The differentially expressed genes (DEGs) are identified based on the significance score calculated with the p-value <0.05. The candidate gene subset from the top 100 DEGs using Wolf Search Algorithm. The biomarkers are trained with supervised machine learning classification algorithms, and the model performance is validated using 10-fold cross-validation. The proposed model attained 92.7\% accuracy, 92.6\% precision, and 92.7\% recall on a multilayered perceptron neural network classifier, exhibiting the efficacy of the study. The scores of the model outperformed the state-of-the-art machine learning algorithms benchmarked with the study. Furthermore, interpretation of the model prediction results is analyzed using SHapley Additive exPlanations (SHAP) after training the data with an extreme gradient boosting (XGBoost) algorithm. The result shows that gene probe cg00565075 act as a potent marker in discriminating the lung cancer samples.

Presenter bio: Dr. Karthik Sekaran is a Research Associate with the School of Bio Sciences and Technology, Vellore Institute of Technology, Vellore. His work focuses on bioinformatics, next-generation sequencing, machine learning and data science, including theoretical research and various applications in the life sciences. Currently, he is mainly active in insilico drug discovery, drug repurposing, and AI-based biomarker prediction. In previous work, ideas from other domains have been included, such as soft computing, statistics, and explainable artificial intelligence.

10:50 Experimental Evaluation of Boosting Algorithms for Fuel Flame Extinguishment with Acoustic Wave 🗟

Raj Gaurang Tiwari, Ambuj Agrawal, Rupesh Jindal and Anshbir Singh

Automated classification and regression tasks are often improved by using ensemble approaches. Both bagging and boosting fall within this category. Combining multiple weak and incorrect rules into one highly accurate prediction rule is known as "boosting" in the field of machine learning. A fire may start for a variety of different causes, making it a multifaceted natural catastrophe. The classification of flame extinction and non-extinction was accomplished by the application of six distinct boosting approaches in this research. Results from this testing demonstrate that the Hist Gradient Boost, Light Gradient Boost Machine, and Cat Boost algorithms had the best classification accuracy of the models tested.

Presenter bio: Dr. Raj Gaurang Tiwari received Ph.D. (Computer Science) in 2013, M. Tech. (Computer Science and Engineering) in 2010 and Master in Computer Application in 2002. He has teaching and research experience of 20 years. He is presently working as Professor and Dean in the Department of Computer Science and Engineering at Chitkara University, Punjab. He also worked as Associate Professor in the Department of Computer Science and Engineering at Sri Ramswaroop Memorial Group of Professional Colleges, Lucknow and as Assistant Professor at AZAD Institute of Engineering and Technology, Lucknow. His research interests primarily embrace Knowledge-Based Engineering, Web Engineering, Ad-hoc/Sensor Network, Recommender Systems and Data Science. He has authored more than 70 International and national journal and conference papers. He is member of Programme Committee / Technical Committee /Reviewer for many international conferences/journals. He is also Life member of various professional societies ISTE, IET, IAENG, IACST, CSTA etc.

11:10 Two-Dimensional Uncertainty Analysis for Cp and Cpk Process Capability Indices 🗟

Selin Yalçın and İhsan Kaya

Process capability analysis (PCA) is a completely efficient statistical analysis technique for measuring the ability of a process to meet predetermined specification limits (SLs). Measurements and evaluations for PCA may be vague, incomplete or inaccurate in the real-case problems. In that cases, the capability of the process can be successfully analyzed by using fuzzy set extensions to model uncertainties of process. One of fuzzy sets extensions named Pythagorean fuzzy Sets (PFSs) that also contains the non-membership function can be employed as an effective tool to model uncertainty better than traditional fuzzy sets (TFSs). In this paper, a novel approach based on PFSs is suggested to increase flexibility and sensitivity of the PCA and to succefully model the uncertainties. For this aim, two of wellknown process capability indices (PCIs) C_p and C_pk, have been analyzed based on PFSs. Then, the Pythagorean fuzzy process capability indices (PFPCIs) have been derivate respectively for C_p and C_pk. and they have been developed for the first time in the literature. The proposed indices C_p and C_pk. have been applied on a real-case problem and the obtained PCIs based on PFSs provide additional flexibility and information. Moreover, it is demonstrated that the proposed PFCPIs can be applied to PCA effectively.

Presenter bio: Selin Yalçın was born in Turkey, 1992. She received PhD degree in Industrial Engineering from Yildiz Technical University in 2022. She receives her MSc in Industrial Engineering from Sakarya University in 2017. She is now an Assistant Professor at Beykent university, İstanbul, Turkey.

11:30 Efficient Solution to Develop an Exercising Algorithm using Model-Centric and Data-Centric Artificially Intelligent Approaches

Mitisha Agarwal, Vishesh Mittal and Surya Prakash

Data is an integral part of any Artificial Intelligence (AI) based application, and improving the data iteratively can provide more precise outcomes, as opposed to iteratively improving the models. A paradigm shift is underway where the go-to approach for developing AI incorporated products is gradually moving from model-centric to data-centric. The objective of this research work is to provide an efficient solution based on dataset parameters/features by exercising model-centric and/or data-centric AI approaches. In this novel method, data is subjected to both the approaches, either individually or to their hybridizations, and the results are compared

quantitatively against a common ground. The CIFAR-10 dataset has been processed by the proposed method and concluded that the model-centric approach gives better performance than the data-centric approach with the same hyperparameters. The solution proposed in this work can be employed to develop an automated framework for image classification. Similarly, such frameworks can be developed for other computer vision-based tasks such as object detection, object localization, and so on.

11:50 Perceptive Classification for Crystal Structure of ABO3 perovskite-type Oxides Using Machine Learning 🗟

Neha Ujjwal, Anshbir Singh and Raj Gaurang Tiwari

The goal of machine learning is to teach a computer system to execute tasks on its own. Without being expressly programmed, machine learning is the capacity to learn and fulfill a certain set of tasks. A machine learning algorithm may be found practically everywhere these days. The sheer volume of data makes it very difficult to manage it manually. A frequent application of machine learning algorithms is to extract data and uncover patterns in the data that reveal correlations between different components. supervised, unsupervised, semi-supervised, and reinforcement learning are all forms of machine learning. Classification, regression, and clustering issues may be solved using ML techniques. Machine learning techniques will be used in this work to predict the lattice type of ABO3 perovskite-type oxide lattices and to determine which approach does this job with the best accuracy. ABO3 perovskite-type oxides of 4,165 samples were used to train the system (calcium titanium oxide mineral). There are 13 columns of data for each observation, with a single class column indicating whether the structure is cubic, tetragonal, orthorhombic, or rhombic.

Presenter bio: Dr. Raj Gaurang Tiwari received Ph.D. (Computer Science) in 2013, M. Tech. (Computer Science and Engineering) in 2010 and Master in Computer Application in 2002. He has teaching and research experience of 20 years. He is presently working as Professor and Dean in the Department of Computer Science and Engineering at Chitkara University, Punjab. He also worked as Associate Professor in the Department of Computer Science and Engineering at Sri Ramswaroop Memorial Group of Professional Colleges, Lucknow and as Assistant Professor at AZAD Institute of Engineering and Technology, Lucknow. His research interests primarily embrace Knowledge-Based Engineering, Web Engineering, Ad-hoc/Sensor Network, Recommender Systems and Data Science. He has authored more than 70 International and national journal and conference papers. He is member of Programme Committee / Technical Committee /Reviewer for many international conferences/journals. He is also Life member of various professional societies ISTE, IET, IAENG, IACST, CSTA etc.

S3-C: Deep Learning-2 **T**

Chair: Riyadh Ksantini

10:30 Detection of Sesame Disease Using a Stepwise Deep Learning Approach 🖻

Bekalu Tadele Abeje, Ayodeji Olalekan Salau, Esayas Tadesse and Aleka Ayalew

Sesame, along with coffee, is Ethiopia's most exported product and the country's main source of foreign exchange. It is mostly cultivated in the northern parts of Ethiopia. The products derived from sesame vary from year to year due to different factors. Among the factors are weather condition and disease. Sesame crops are susceptible to a variety of diseases, and this is one of the main reasons why farmer output is declining. The several disease kinds that result from a large sesame farm are difficult to distinguish with the necked eye. Therefore, in this paper, we propose a stepwise deep convolutional neural network approach to easily identify sesame disease. In the proposed approach, image-processing steps mainly image acquisition, preprocessing, segmentation, data augmentation, feature extraction, and classification were considered. Images were collected from the northern part of Ethiopia, mainly the Amhara region using Samsung A32 and iPhone 6s phone cameras with a 450x680-pixel resolution. 540 infected plant images were collected of Bacteria Blight, Phyllody, and Healthy plants to enable the convolutional neural network to extract important features from the segmented images. Finally, SoftMax fully connected layers was employed to classify the images into their respective classes of sesame disease. The proposed model achieves 99% training accuracy and 98% testing accuracy.

Presenter bio: Bekalu Tadele, [2/17/2022 7:49 PM] Biography : Mr. Bekalu Abeje completed his BSc Degree In Information Technology From Haramaya University in 2015. he obtained his MSc Degree In Information Technology from University of Gondar 2020.Mr Bekalu is Currently serving as Lecturer in Haramaya University Department of Information Technology. His Research Interest Are Digital Image Processing, Deep Learning, Sentiment analysis, Data science and Artificial Intelligence.

Presenter bio: Ayodeji Olalekan Salau received the B.Eng. in Electrical/Computer Engineering from the Federal University of Technology, Minna, Nigeria in 2010. He received the M.Sc. and Ph.D. degree in Electronic and Electrical Engineering from the Obafemi Awolowo University, Ile-Ife, Nigeria in 2015 and 2018, respectively. His research interests include computer vision, image processing, signal processing, machine learning, power systems engineering, and nuclear engineering. His research has been published in many reputable international conferences, book chapters, and major international journals. He is a registered Engineer with the Council for the Regulation of Engineering in Nigeria (COREN), a member of the International Association of Engineers (IAENG), and a recipient of the Quarterly Franklin Membership with ID number CR32878 given by the Editorial Board of London Journals Press in 2020 for top quality research output. More recently, Dr. Salau's paper was awarded the best paper of the year 2019 in Cogent Engineering. Currently, Dr. Salau works at Afe Babalola University in the Department of Electrical/Electronics and Computer Engineering.

10:50 Railway Condition Monitoring and Fault Detection Based on YOLOv4 🖻

Merve Yilmazer and Mehmet Karakose

Regular maintenance of the line is critical for safety in railway transportation, which constitutes an important part of the transportation system. Due to the high error rate of manual fault detection methods, non-contact fault detection methods have been developed. Railway switch state and level crossing faults are frequently encountered in the occurrence of train accidents. A new method based on YOLOv4 has been proposed for condition monitoring and fault detection in these rail sections. The YOLOv4 deep neural network was trained using four class label datasets consisting of real railway visual data. The model was tested using test data. Performance evaluation was made using evaluation metrics. Experimental results showed that the model could detect correctly with 96.8% accuracy.

Presenter bio: I'm Merve Yilmazer I graduated from Firat University Computer Engineering. I am doing my master's degree at Firat University. I am working as a research assistant at Munzur University Computer Engineering Department.

11:10 COVID-19 mRNA Vaccine Degradation Prediction By Using Deep Learning Algorithms 🗟

Nian Chze Ooi and Azian Azamimi Abdullah

The worldwide coronavirus (COVID-19) pandemic has accelerated substantially in the 2020, necessitating a global collaborative from various entities to create and speed vaccine development to prevent illnesses and deaths. Because of its fast development, high efficiently, safe administration, and low-cost production, messenger RNA (mRNA) has emerged as a significant technology in this epidemic. However, due of the inadequate in vivo distribution of mRNA, its chemical qualities make it difficult to use the vaccine. As a result, the goal of this study is to create and construct a sequence deep model that will be used to predict the degradation rate of the COVID-19 mRNA vaccine using five reactivity values for each place in the mRNA sequence. The probability degradation rate with/without magnesium at pH10 and 50°C was one of four of these values. The fifth reactivity value shows the likelihood of the RNA sample's secondary structure. The numerical and categorical properties of the deep learning model are the most important. Categorical features are referred from the structures, sequences, and predicted loop of the mRNA sequence, while numerical features are extracted via mathematical computations. 6 models of bidirectional layers models (LSTM, GRU, LSTM+GRU (L_GRU), GRU+LSTM (G_LSTM), LSTM+GRU+LSTM (L_G_LSTM), and GRU+LSTM+GRU (G_L_GRU) give trustworthy projected outcomes because it comprises five reactivity values and validate by mean columnwise root mean square error (MCRMSE). The MCRMSE results are then used to evaluate the performance. The stronger the prediction model, the smaller the values are. The best-fitting model is L_G_LSTM with the MCRMSE difference of 0.007 will be implemented and developed into a Graphical User Interface (GUI) prediction system.

Presenter bio: Dr Azian Azamimi Abdullah has obtained her degree and master's degree from The University of Tokushima, Japan in Electrical and Electronic Engineering. She also has completed her PhD from Nara Institute of Science and Technology (NAIST), Japan in 2017. Previously, she worked as an engineer at Toshiba Electronics and currently serves as a senior lecturer at University Malaysia Perlis. Her research interests are bioinformatics, artificial intelligence, big data and machine learning.

Presenter bio: Ooi Nian Chze is a recent graduate from Universiti Malaysia Perlis in Biomedical Electronic Engineering. She wishes to contribute what she has learned from Uni to society.

11:30 Exploiting Deep Learning-Based LSTM Classification for Improving Hand Gesture Recognition to Enhance Visitors' Museum Experiences

Nabil Zerrouki, Houacine Amrane, Harrou Fouzi, Riadh Bouarroudj, Mohamed Yazid Cherifi and Ying Sun Hand gesture recognition (HGR) has been considered as one of the crucial research fields of Human-Computer Interaction (HCI). And computer vision is a very active dedicated research area. However, traditional vision based methods, like using fixed camera to collect videos or images of the hand gestures, have some serious drawbacks inherent to the fixed camera location, complex lighting conditions and cluttered backgrounds. Motivated by these potential limitations, the present paper addresses detection and classification of hand gestures based rather on wearable video monitoring data. A new feature extraction strategy based on five hand's partial occupancy areas in images is provided. And a deep learning formalism, using the LSTM algorithm, has been implemented to build an effective model for identifying hand gestures. To analyze the performances of the proposed method, experiments are conducted on the publicly available data sets, and both virtual and real museum scenarios are considered. The obtained results demonstrated that the combined five area ratios and LSTM classification was not only able to recognize different hand gestures but it was also able to distinguish between actions with high degree of similarity (like slide left and slide right classes). The use of deep learning based LSTM algorithm in the classification phase played a key role in reducing significantly the number of misclassifications, and achieving an outstanding recognition performance when challenged with real-world data.

Presenter bio: Nabil Zerrouki received the Ph.D. degree in signal and image processing from the University of Sciences and Technology Houari Boumedienne (USTHB), Algiers, Algeria, in 2018. He is currently a Scientist with the Center for Development of Advanced Technologies, Algeria, Algeria. His main research interests include computer vision, machine learning, pattern recognition, and image processing.

11:50 A Novel Deep Learning-based Framework for Blackhole Attack Detection in Unsecured RPL Networks 🗟

Wijdan Choukri, Hanane Lamaazi and Nabil Benamar

The routing protocol for low-power and lossy networks (RPL) was designed specifically to support constrained communication. Considering its constrained nature, RPL-based Networks can be accessible by trusted and untrusted global users via the Internet and can be subject to serious attacks. Routing attacks are especially difficult to be identified when they occur. However, Deep Learning techniques can be leveraged in detecting network intrusions. This paper proposes a new deep learning-based framework for routing attack detection in unsecured RPL networks. It allows analyzing and processing the network traffic, extracting features, and defining target-based intrusion thresholds, which leads to the detection of routing attacks. The proposed model has been compared against baseline Machine learning methods. Extensive simulation results confirm our model's efficiency in terms of detection accuracy, precision, recall, and F1 score, with 98.70%, 98%, 99%, and 98%, respectively with a reliable error rate.

Presenter bio: CHOUKRI WIJDAN is a Ph.D in Computer Sciences, from Moulay Ismail University. Faculty of Sciences, Meknes, Morocco. She obtained her Master degree in Security of Information Systems in 2020, from Ibn Tofail University, National School of Applied Sciences, Kenitra, Morocco. Her research interests focus on deep learning to strengthen routing protocol security for low power and lossy networks (RPL) in heterogeneous IoT.

S3-D: Telecommunication and Networking-2 7

10:30 Evaluating the Seriousness of Flooding-based DoS Attack 🖻

Moaiad Ahmad Khder, Huda AlBadi, Samah Wael Fujo and Tasneem Mohamed Yousif

The denial of service (DoS) attack has evolved into one of the most serious security threats on the Internet, aimed at preventing a service from being available. To launch a distributed denial of service (DDOS) attack, a group of compromised machines is used. This paper discusses and analyzes certain flooding-based DoS attacks, which flood a network or a specific system inside a network with unwelcome traffic. Finally, we assess the severity of distinct DoS attacks by comparing each attack type to a set of criteria

Presenter bio: Eng. Tasneem Yousif, is currently a Ph.D. researcher Candidate at the University of Nottingham. She was working as a Senior System Administrator at The BENFEIT Company in Bahrain. Besides, she is working as a part-time lecturer at the University of Technology Bahrain. She has 5 years' work experience in software and hardware engineering. Her research areas are IoT, GNSS receivers, and Reconfigurable computing using FPGA. Known for her multiple awards such as being one of the scholars of the Developing Solutions Masters Scholarship at the University of Nottingham in the UK. She graduated from the University of Nottingham in 2019 with achieving distinction and obtaining the second highest-class mark. Also, she has been nominated to be the student representative during her MSc degree. During her undergraduate studies in Bahrain, she achieved Excellence and second honors GPA and best senior project. She is the current vice-chair of IEEE Young Professional Affinity Group in Bahrain.

10:50 Comparison Between High Throughput and Efficiency of 802.11 Wireless Standards 🗟

Mohamed Darwish, Mustafa Belras Ali, Mahmoud Altaeb, Salem Omar Sati and Mohammed Salem Elmusrati The High-Efficiency standard is considered as Wi-FI 6 which is improvement of lagecy 802.11 standards The target of the new Wi-Fi 6 of 802.11ax standard is to improve throughput and minimize latency. This 802.11ax standard is targeted for employment in dense wireless scenarios such as in the Internet of Things applications. The question arises concerning the main target of different 802,11 standards which is improving the throughput. How much 802.11ax as HE improves the throughput compared with HT of 802.11n standard. This paper compares 802.11ax with 802.11n based on throughput parametres. This performance comparison will be based on throughput parameters such as MCS and Channel Bounding and Guard Interval. The paper compares the throughput of the 802.11ax and 802.11n standards for two bands of 2,4 and 5 GHz. The NS3 simulator is conducted to compare the throughput between the HE and HT standards. The results show that the 802.11ax standard has higher throughput four times than the 802.11n standard.

Presenter bio: Mohamed Abdalla Darwish, born on December 22, 1999, in Misurata city of Libya, he is an undergraduate student in the Information Technology Faculty at Misurata University since 2018. Currently, he is preparing his graduation project, which is studying and analyzing the new generation of wireless data communication (Wi-Fi). Furthermore, he is also interested in the area of cyber security, as well as the Internet of Things (IoT).

11:10 Planar Absorbing FSS Unit Cells for Radar Cross-Section Reduction 🖻

Mustafa B. Jasim and Khalil Hassan Sayidmarie

This paper investigates proposed unit cell designs for absorbing FSS intended for radar cross-section reduction. For such applications, the design should fulfill two requirements. The first is there should be a conducting ground plane that represents the surface of the object whose RCS is wanted to be reduced. Moreover, the thickness of the absorbing FSS should be kept minimal. Three designs of the double square rings were proposed to obtain a low reflection coefficient, wide band, and low reflection are investigated using the CST Microwave Studio Suite. The FSS cell of a closed outer ring plus a split inner ring showed the best performance (0.132 GHz bandwidth at -10 dB reflection) compared to the conventional and meandered double ring cells. The three designed FSS cells have a 0.016 λ thickness. Keywords- Rada cross-section reduction, frequency selective surface, unit cell.

Presenter bio: Mustafa Basim Jasim Al-Obadi, is communications engineer. He received a B.Sc. degree in Communication Engineering from the college of Electronics Engineering/ Ninevah University, Iraq, in 2019. He worked as RF engineer at Nokia Projects in Ninevah for Korek Telecom Company in 2019, and at Huawei projects in Ninevah for Zain telecom company for 2 years. He is now pursing his M.Sc. study in Communication Engineering at the college of Electronics Engineering/ Ninevah University. His research interests include microwave, FSS, and radar cross-section reduction.

11:30 Energy Efficient Channel Coding for Terahertz communications in 6G Networks 🗟

Mohamed El jbari and Mohamed Moussaoui

For the 6G system, THz communications are the key wireless technology that meets several demands as well as being able to support wireless links up to several terabits. The terahertz band (0.1-10 THz) is on the horizon, with an ultra-wide bandwidth and a wavelength of less than a millimeter. However, suffers from problems of range limitation, molecular absorption, attenuation. Due to the low battery capacity of nano-sensors, energy consumption i.e. the energy efficiency (EE) is a very important aspect of nano-communication THz band, along with bandwidth expansion. To surmount this fundamental problem, it is aimed at enhancing the energy efficiency of the network by dynamically selecting the channel modeling and efficiently minimizing energy coding for terahertz communication, we propose a channel coding approaches Low-Weight Coding (LWC) and Minimum Energy Code (MEC). In this paper, we analyzed the performance of EE and Spectral Energy (SE) channel in THz band. Numerical simulation results show that the utilization the two methods in the THz band gives better data rate, channel capacity, EE, SE, and the low complexity of design the nano-devices.

Presenter bio: Mohamed El Jbari is a PhD Student in Information and Communication Systems, at the Laboratory of Information & Communication Technology (LabTIC), Abdelmalek Essaadi University, Tetuan, Morocco. He is a Telecommunication System Engineering Master's Degree, graduated in 2018 from Faculty of Sciences, Abdelmalek Essaadi University. He got a Bachelor Degree on Electronics in 2014 from Faculty of Sciences, Abdelmalek Essaadi University, Tetuan. His curren research interests include fiber optic communication, information and communication technology & signal processing, electronics and wireless communication engineering, digital signal processing, and telecommunication systems. E-mail: mohamed.eljbari2@etu.uae.ac.ma

11:50 DQN-based Reinforcement Learning for Vehicle Control of Autonomous Vehicles Interacting With Pedestrians 🗟

Badr Ben Elallid, Nabil Benamar, Nabil Mrani and Tajjeeddine Rachidi

Autonomous Vehicles (AVs) have become a popular research topic in recent years due to their ability to improve road safety by reducing traffic accidents and human injuries. Vehicle control is the most significant part of autonomous driving, which adjusts the steering angle and velocity of AVs during driving. Recently, vehicle control has seen consequential progress using effective Artificial Intelligence (AI), especially Deep Learning (DL) techniques. Recent works have been limited to using Reinforcement Learning (RL) techniques to control AV to follow only its path without taking into consideration other road users, especially the pedestrians. In this paper, we propose a Novel Reinforcement Learning (RL) based model using Deep-Q Networks to control the AV in a complex scenario involving vehicles and pedestrians. AV learns the policy of several actions in order to reach its destination without accidents with other road participants. Our approach in tested and validated using the CARLA simulator. Our results show that the proposed approach achieves better performances in terms of average reward, success rate, and collision rate over time.

S3-E: Robotics, Computer Vision, and HCI 🔨

Chair: Fatema Albalooshi

10:30 Enhancement Techniques for Improving Facial Recognition Performance in Convolutional Neural Networks 🗟

Saeed Sharif, Matthew Olusegun Afolabi and Abin Zorto

The advent of convolutional neural networks to the development of face recognition system has been a game changer in the field of computer vision and pattern recognition. This project uses a pre trained MobileNet-V1 model to develop an effective CNN model capable of high performance while combating several common facial recognition challenges which include occlusions, illumination variations, make-ups, pose variation and ageing through the use of several improvement techniques. The techniques include adopting a less computationally costly approach, transfer learning and hyper-parameter fine-tuning. The Top-1 accuracy 70.6% and Top-5 accuracy 89.5% of the base MobileNet-V1 model was improved using these techniques to achieve training accuracy of 95% and accuracies of 96.4%, 98.0% and 99.1% on the Pins face recognition data-set, FaceScrub data-set and LFW data-set respectively. The work done so far illustrates the need for further research into improvement techniques for Convolutional Neural Networks.

10:50 Design and Development of Light Weight and Low-Cost Quadruped Robot for Spying and Surveillance 🗟

Aravind Swaminathan, Surendran R, Jaswant V and Joel Benjamin J

Legged robots are much more effective and useful in uneven terrains than wheeled robots because they can easily climb rocks and rough surfaces. Because their mechanized legs are designed for these surfaces, legged robots such as Quadruped robots can easily climb terrains such as rocks, sludge, incline and de-cline surfaces. Quad Bots can be built in a variety of shapes and sizes. The first quad robot was designed in the appearance of a dog. The spider-shaped quadru-ped robot shown below was created. This is a basic quadruped robot prototype. These robots can also be controlled via Wi-Fi or Bluetooth, and Al can be used to automate them. This concept depicts the use of various creeping walks to achieve coordinated robot innovation. The purpose of the project is to create a dependable framework for integrating reliable and secure walking on smooth or off-road terrain. This also has a variety of sensors embedded in it for detecting the situation of the environment in real time and transmitting it to the ground station via a receiving set module.

Presenter bio: Aravind Swaminathan was born on 10th April 2001 at Kumbakonam, India. He completed his Bachelor's Degree in Electronics and Communication Engineering at Chennai Institute of Technology, India in the year 2022. He is currently doing his Masters Degree in the field of Data Science at Middlesex University, Dubai. He has published around four Research Publications in reputed International Conferences and Journals. He has gained different domain knowledge by completing many internships in various domains. His research interests include Data Analytics, Machine Learning, IoT and Artificial Intelligence.

Presenter bio: R.Surendran was born on 10th May 1983 at Kumbakonam, India. He completed his Bachelor's Degree in Information Technology in the year 2005 from Anna University, India. He completed his Master degree in Information Technology and doctorate degree in Computer Science and Engineering in the year 2009 and 2014 from Sathyabama University, India. He is having 12 year 7 months of teaching experience in india, Oman and Bahrain Universities. He has published many papers in reputed International Journals and Conferences. His research interests include Cloud Computing and IoT.

Presenter bio: Joel Benjamin J was born on 21st November 2000 in Chennai, India. He completed his Bachelor's Degree in Electronics and Communication Engineering in 2022 from Anna University, India. He is pursuing his Master's Degree in Data Science from Middlesex University, Dubai. He has completed his internship at Virtusa in the AIMS domain. He has also completed his ITIL certification. He has numerous papers published in internationally recognized journals and conferences. His research interest includes Data Science, Artificial Intelligence, Cloud Computing, and IoT.

11:10 Non-Linear Filters with Edge Preservation to Aid Glioblastoma Detection in CT and MRI Brain Images 🗟 Leena Chandrashekar

Noise is inevitable source of distortion in CT and MRI image, caused due to various reasons limitations of the imaging machine, low image resolution, patient condition and lack of skill of imaging professionals. The deficient visual quality of acquired images lead to incorrect detection of tumors thereby leading to differential diagnosis. Hence, denoising is mandatory computer aided process after acquisition of the images to remove the noise without much loss of significant information. The Non-linear Filters remove the noise from these images, at the same time, preserve the structural information. A detailed study of non-linear filters is made with analysis on the choice of filter parameters and its impact of image quality. Experiment is performed on more than 100 CT and MRI images containing Glioblastoma. Non-Local Means filter works well for CT and MRI images.The PSNR of 45dB and 38dB for CT images and MRI

images respectively is obtained. SSIM of 0.99 is achieved by the filter for images corrupted by Gaussian noise and Rician Noise of different noise variance.

Presenter bio: Leena Chandrashekar is Assistant Professor with Electronics & Communication Engineering Department, R N S Institute of Technology, Bangalore, India. She has her Bachelor's degree in Telecommunication Engineering from R V College of Engineering and Master's degree in Technology from Visveswaraya Technological University, Belgaum. She has completed her PhD in the area of Biomedical Image Processing from R V College of Engineering in July 2022. Her research interests are Computer Vision, Medical Image Fusion, Image Registration, Machine Learning, Deep Learning, Artificial Neural Networks, Data Fusion, Sonar Signal Processing, Embedded Systems, Sensors and Instrumentation, Analog Electronics, Robotics.

11:30 Development of Efficient Ensemble Model based on Stacking Learning for Automated Sleep Staging Santosh Kumar Satapathy

Sleep plays a vital role in maintaining good physical and mental health. Improper sleep causes many critical diseases; sleep-related disorders are significant global challenges. The primary diagnosis step for such disorders is a classification of sleep stages. Compared to traditional complex manual sleep analysis, automated sleep staging methods using single-channel electroencephalography (EEG) signals more practical benefits for analyzing the changes characteristics in different sleep stages. In this work, we consider an effective ensemble learning algorithm for improving the classification accuracy of sleep stages. Previous research works have not performed satisfactory classification performance, ignoring some compelling features and not identifying suitable ones. This work extracts different feature extraction to obtain valuable features from EEG signals. Meanwhile, an effective classification performance of the proposed to improve the classification results automatically. Experimental results show that the classification performance of the proposed method is incomparably enhanced compared to the state-of-theart works. This sleep stage classification framework is expected to assist the medical professional in diagnosing the different types of sleep-related disorders.

11:50 Investigating HCI of the LMS Blackboard Ultra using WAMMI during COVID-19: Usability and Design Interactivity 🗟

Hussain Salman, Eman Almohsen, AbdulRahman Isam Al Rawi and Safwan Mahmood Shatnawi

Many higher education institutions moved to online learning settings due to the COVID-19 pandemic and continued using online settings entirely or in a blended learning format. Usability and design interactivity are essential components of Human-Computer Interaction (HCI), which need to be frequently measured and studied to ensure successful users' adoption of learning management systems (LMS) for higher education institutions and to achieve deep learning and improve students' engagement. This paper examines the usability level of the Blackboard Ultra interface perceived by two groups of users, faculty members and students at the College of Applied Studies (CAS) at the University of Bahrain (UoB). It investigates if a correlation exists between the results of each group. In addition, it studies demographic factors influencing users' perceived usability. This study uses a usability metric called Website Analysis and Measurement Inventory (WAMMI) to evaluate perceived usability. WAMMI measures five usability sub-scales: Attractiveness, Controllability, Efficiency, Helpfulness, and Learnability. Results indicate that Blackboard Ultra achieved an acceptable level of global usability score by both groups. Moreover, no significant differences were found between students' and faculty's perceptions of usability except for the efficiency sub-scale. Furthermore, the learnability sub-scale scored the least among students and faculty members, resembling a neutral usability level. The study also found that a higher frequency of BB usage resulted in higher levels of perceived usability. Based on the findings, the study proposes recommendations to improve Blackboard Ultra's usability level further among students and academic faculty members.

Presenter bio: Hussain A.Rasool Salman is a Lecturer in Computer Science at the University of Bahrain. Research focuses on Machine Learning, Human-Computer Interaction, E-learning challenges, Digital Transformation, and IT Solutions. Hussain received his master's degree in computer science from the New York Institute of Technology and his bachelor's degree from the University of Bahrain.

Presenter bio: Mrs. Eman Khalil Almohsen, is a Lecturer at the Faculty of Technical Programs, University of Bahrain. She is interested Al, digital marketing, eapplications, m-applications, and QA in Higher Education. She graduated with a Master degree with distinction in E-Commerce from Middlesex University, the UK, in 2006; and with a Bachelor with distinction in Computer Science from University of Bahrain in 2004. She got the Post Graduate Certificate in Academic Practices from York John University, the UK, in 2012. She is a Fellow of the Higher Education Academy, a Microsoft Certified Educator, and a Certified Microsoft Office Specialist.

S3-F: Cyber security-2 **↑**

Chairs: Abdulla Alasaadi, Yusuf Mothanna

10:30 Eagle-Eye: Open-Source Intelligence Tool for IoT Devices Detection 🗟

Yusuf Salah Almahmeed and Saeed Sharif

The use of Internet of Things (IoT) devices has been growing in recent years making these devices available in every household and organization. This significant rise of usability led to misuse, especially by non-technical people, making it an easy target for attackers to intrude on these networks. Therefore, the conventional thinking of protecting the information technology devices needs to embrace these frequent changes. Open-Source Intelligence (OSINT) is one of the modern techniques that can be used to keep track of these new systems by harvesting publicly available information. Collecting the needed information can be challenging for the IoT devices manufacturing companies and clients. This paper proposes an Open-Source Intelligence tool for IoT devices detection called Eagle-Eye which is integrated with Shodan search engine to perform OSINT queries and display it in user-friendly format. With the use of this tool companies, clients and researchers can automate their task of identifying and searching for different IoT devices statics that can be utilized and analyzed to harden these devices.

10:50 New perspectives for cyber security in software development: when End-User Development meets Artificial Intelligence

Vita Santa Barletta, Fabio Cassano, Alessandro Pagano and Antonio Piccinno

End-Users Development (EUD) techniques aim to support users to develop pieces of software artefacts according to their needs in a wide range of situations, and recent studies have shown how those techniques can be applied to a variety of domains to let user reach their goal in the fastest and most accurate way. Additionally, with the growing involvement of the entire world in development activities, people share their software solutions on the Internet, creating huge databases of multi-connected software artefacts which are usable by everybody, with few clicks. At the same growing pace, Artificial Intelligence (AI) techniques are capable of analyse and learn from multiple data sources, providing more and more accurate predictions. In this paper, we want to discuss if time is mature enough to merge EUD and AI worlds in order to support final users to generate custom pieces of software artefacts.

To reach this goal we consider a couple of scenarios: in the former users need to develop their pieces of software and we consider an approach that combines machine learning and data mining algorithms. Al and EUD can help end-users to reach their development goal, using as a training dataset based on what other users have done previously to solve similar problems. The latter describes how EUD and Al support users to find the best configuration settings to secure their devices from external cyber attacks.

Presenter bio: Alessandro Pagano is a Computer Science Reesearcher and Assistant professor at University of Bari. He has a PhD in Computer Science and was graduated in Economy with a final thesis "Development of innovative e-learning infrastructure based on Open Source Software". He is involved in many international research projects. His research field is about the evaluation of the development and implementation of Open Source Software and Technologies in Enterprise Application for training. He is ICT Department chief of Osel Consulting s.r.l. (spin-off Company of University of Bari). Free Software Foundation Europe member and he's an Open Source philosophy supporter and active member of Open Source community. [More information on http://www.alessandropagano.net]

11:10 An Efficient Approach to Reduce the Encryption and Decryption time Based on the Concept of Unique Values 🗟

Zainab Salman and Alauddin Yousif Al-Omary

Data security has become the most important issue in every institution or company. With the existence of hackers, intruders, and third parties on the cloud, securing data has become more challenging. This paper uses a hybrid encryption method that is based on Elliptic Curve Cryptography (ECC) and Fully Homomorphic Encryption (FHE). ECC is used as a lightweight encryption algorithm that can provide a good level of security. Besides, FHE is used to enable data computation on the encrypted data in the cloud. In this paper, the concept of unique values is combined with the hybrid encryption method. Using the concept of unique values contributes to decreasing the encryption and decryption time obviously. To evaluate the performance of the combined encryption method, the provided results are compared with the ones in the encryption method without using the concept of unique values. Experiments show that the combined encryption method can reduce the encryption time up to 43% and the decryption time up to 56%.

Presenter bio: Zainab Salman is currently a Ph.D. candidate at the University of Bahrain and studying in Computing and Information Sciences program. She received her Master's degree in Computer Science from Al Ahlia University, Bahrain in 2010 and her B.Sc. in Computer Science from the University of Bahrain in 2005. Her research interests include cloud computing, security, and big data analytics.

11:30 Mobility-Aware RPL Network Assessment under a Blackhole Attack 🗟

Saloua Ibrahimy, Hanane Lamaazi and Nabil Benamar

The speedy evolution of IoT technology is leading to a large-scale deployment of Low power and Lossy Networks (LLN). These constrained networks rely on tiny devices with limited computing and storage capabilities that connect to the internet using mainly the RPL routing protocol. However, this protocol can be an easy prey for attackers that can disrupt the network and degrade its performances by means of modification, isolation, or injection of malicious information. In this paper, we identify the impact of malicious nodes on mobile RPL- based networks by integrating a blackhole attack. The current study is benchmarked with static RPL networks in normal conditions. A set of routing metrics are evaluated, including resource consumption, control messages, and network stability. Our study highlights the degradation of network performances in a static environment compared to a mobile network in the presence of misbehaving (attackers) nodes.

Presenter bio: Saloua IBRAHIMY is a Ph.D student in computer sciences, from Moulay Ismail University, Faculty of Sciences, Meknes, Morocco. She obtained her MSc degree in Security of Information Systems in 2020, from Ibn Tofail University, National School of Applied Sciences, Kenitra, Morocco. Her research interests focus on the Security of Internet of Things (IoT) and attacks in routing protocol for low-power and lossy-networks (RPL).

11:50 Prediction of Cyber-attacks and Criminality Using Machine Learning Algorithms 🗟

Aravind Swaminathan, Bala Murali, Kanishka M and Surendran R

Cyber-attacks are quickly becoming one of the world's most serious problems. Every day, they wreak havoc on the economies of nations and individuals. The rise in cyber-attacks is accompanied by an increase in cybercrime. Finding cyber-crime culprits and understanding attack techniques are key components in the bat-tle against cybercrime, corrupt activities, and criminals. It is tough to detect and avert cyber-attacks. Nonetheless, scholars have lately tackled these issues by con-structing authentication methods and forecasting using hypocritical intelligence technologies. The literature has an increasing number of offensive projection strategies. They, on the other hand, are susceptible to cybercrime and cyber-attack strategies. This crisis can be avoided by using real-time data to identify an attack and its perpetrator. The information can be obtained from the implementations of individuals who were subjected to cyber-attacks in forensic units. The information includes the criminal activity, the perpetrator's gender, impairment, and at-tack methods. In this journal, we use supervise ML methods to investigate cyber-crime in four distinct models and predict the effects of the defined traits just on identification of the threat technique and the perpetrator. In our system, we uti-lized three machine learning methods and predicted

that their precision ratios would be close. One of its primary advantages is the ability to encapsulate ex-tremely large datasets. Our two algorithms can read hundreds and thousands of data sets and then spit out an extremely accurate depiction for machines to recog-nize. In this paper, we investigate digital misdoings in three distinct models using AI and ML techniques, and we forecast the impact of the characterized attributes on the spot of the electronic assault tactic and the perpetrator. In this investigation, we will use three ML algorithms, Logistic Regression, Random Forest, and KNN, and compare their efficacy in two different models before concluding with the model that has the best survivability for every type of information index. Ma-chine learning allows cyber security systems to assess and learn from patterns in order to detect and prevent terrorist acts and adapting to different behavior. It can assist cyber security teams in being more proactive in terms of preventing threats as well as reacting to malicious activities in real time.

Presenter bio: Aravind Swaminathan was born on 10th April 2001 at Kumbakonam, India. He completed his Bachelor's Degree in Electronics and Communication Engineering at Chennai Institute of Technology, India in the year 2022. He is currently doing his Masters Degree in the field of Data Science at Middlesex University, Dubai. He has published around four Research Publications in reputed International Conferences and Journals. He has gained different domain knowledge by completing many internships in various domains. His research interests include Data Analytics, Machine Learning, IoT and Artificial Intelligence.

Monday, November 21 12:10 - 13:00 (Asia/Qatar)

LB: Lunch Break Day-2 🛧

Monday, November 21 13:00 - 13:30 (Asia/Qatar)

KS-2: Keynote Speaker-2: Artificial Intelligence Innovations for Better Medical and Healthcare Solutions: Supporting the medical professionals and improving the patient outcomes

Dr. Mhd Saeed Sharif

Chair: Abdulla Alasaadi

Monday, November 21 13:30 - 15:10 (Asia/Qatar)

S4-A: Information Technology-2 7

Chairs: Taher Homeed, Amjad W Hawash

13:30 Digital Data Extraction for Vehicles Forensic Investigation 🗟

<u>Corey Stathers</u>, Musa Abubakar Muhammad, Alex Fasanmade, Ali H Al-Bayatti, Jarrad Morden and Saeed Sharif In a criminal investigation, vehicles are quickly becoming another crucial source of digital evidence. When a car is involved in a criminal offensive such as road traffic accidents, drunk driving even a robbery or a terrorist attack, investigators typically focus on the capture of DNA, fingerprints, and other non-digital identifying materials. (e.g. calls, contacts, messages, pictures, videos and even web history). This paper is to present our findings undertaken on a 2008 Mitsubishi colt with non-factory fitted equipment which in the 2000s many drivers wanted extra comfort while driving to their own music and even connect the mobile device to their vehicles to call others. By using Mobile forensic techniques and On-board Diagnostics (OBD) software to read the vehicles engine status we can show what data is stored within a vehicle and if there is enough to support a case. This Investigation involves a Maxtek Dashboard camera, Ankeway Head unit, the ECU within the vehicle and a Samsung galaxy Android tablet.

Presenter bio: Corey Stathers received a 1st class degree in bachelors of Science Cyber Security while studying at De Montfort University. He is currently working at National Merchant Buying Society as a Cyber Security and Software Engineer. He has a keen interest in in all that is IT system security and Digital forensics.

13:50 Design of a Prototype Local Smart Weather Station Based on Wi-Fi 🖻

Ahmed A. Radhi and Fawzi Mohammed Munir Al-Naima

Weather status measurement and prediction have become an important part of human life because of their many applications such as educational, industrial, and military applications. The conventional methods of operating such weather stations need expert workers which adds extra cost to running such stations. In this paper, a local wireless weather station suitable for installation in a university campus or other similar establishments has been designed and implemented based on a microcontroller for the measurement of needed environmental parameters such as temperature, rainfall, humidity, wind speed, and wind direction. These measured parameters are sent to the web server which broadcasts the weather status over a wireless local area network (Wi-Fi) to the clients as a webpage. The obtained results of such parameters observed over one week from this designed station were found to be in good agreement with the standard weather measurements recorded via a standard installed station.

Presenter bio: Ahmed Ali Radhi is a University teacher(Senior Lecturer) at Al-Ma'moon University College BSC Computer engineering\ Middle Technical University, 2006 MSC Computer engineering\ Middle Technical University, 2009 fields: Network security, Internet of Things(IoT), Embedded system, RFID, Wireless sensor network, Microcontrollers, Computer interfacing circuits, Robotic systems design, Artificial Intelligence (Al).

14:10 A Fuzzy Decision-Making Methodology for Assessment of Solar Energy Plant Location Selection Criteria 🗟

Emine Bozkuş, Fatma Kutlu Gündoğdu, Ali Karasan, İhsan Kaya and Gürkan Işık

According to the current technical knowledge, renewable energy sources (RES) have a crucial place for both industry and environment considering their carbon emission values, risks and damage to the environment compared to fossil fuels and nuclear energy. Among them, solar energy (SE) is one of the cleanest RES due to their sustainable production environment and low carbon emission rates. Considering these advantages, solar energy plants (SEPs) have also some disadvantages such as land use, geographical conditions, and the supply of the components. Through that, SEP location selection is an important and critical issue for the investors, which is related with many conflicting criteria. Moreover, exact evaluations for these criteria are not realistic when the locations and the investment ecosystem of the system are considered. So, the problem should be considered as a decision making problem. Therefore, in this study, a preliminary investigation for the determination of the importance of the criteria for SEP location selection is analyzed by using cognitive mapping method (CMM). To involve the uncertainty of the input data, spherical fuzzy sets (SFSs) is used to the fuzzy CMM to increase the flexibility of the proposed method. As a result, the criteria, Land Acquisition, is determined as the most important criterion for the Türkiye ecosystem.

Presenter bio: F. Kutlu Gundogdu is an assistant Professor at Turkish Air Force Academy in the Industrial Engineering Department. Her research areas are quality control and management, statistical decision-making, multi-criteria decision-making, spherical fuzzy sets, fuzzy optimization and fuzzy decision-making. She published many journal papers and conference papers in the mentioned fields. She is the editor of Journal of Aeronautics and Space Technologies.

14:30 A Model Proposal for Smart Campus Investment Prioritization by Using Data Envelopment Analysis 🗟

Murat Colak, Fatma Kutlu Gündoğdu, Emine Bozkuş, Gürkan Işık, Ali Karasan and İhsan Kaya

Smart campus (SC), one of the most highlighted concepts in the education system, is the utilization and combination of smart physicaldigital spaces to provide improved, intelligent, and responsive services in a sustainable, productive, and creative environment for universities. Considering its multi-dimensional structure, investment in this area is a crucial strategic decision with many conflicting aspects. On the other hand, Data envelopment analysis (DEA) is a linear programming (LP) technique that quantifies the relative efficiency of decision-making unit (DMU) inputs into their outputs through a trial-and-error model. Through that, in this paper, by using the capability of the DEA model, an SC investment efficiency problem is considered in multiple ways. According to the literature review and experts' evaluations, four cost-based inputs are determined for the SC ecosystem. Based on the six outcomes, an application for the SC investment problem is carried out. Based on the results obtained, investments prioritized with the spending on classes and online teaching fulfilled the efficient rate input have the efficiency rate with one for all scenarios. Moreover, a scenario with equally distributed investments has the desired efficient rate equal to one.

Presenter bio: F. Kutlu Gundogdu is an assistant Professor at Turkish Air Force Academy in the Industrial Engineering Department. Her research areas are quality control and management, statistical decision-making, multi-criteria decision-making, spherical fuzzy sets, fuzzy optimization and fuzzy decision-making. She published many journal papers and conference papers in the mentioned fields. She is the editor of Journal of Aeronautics and Space Technologies.

14:50 AI-powered Collaborative Geo-tagging and Visualization of Touristic and Social Activities on Smartphones 🗟

Maha Yaghi, Lana Qamhieh, Doaa Abueida, Maha Abueida, Farid Ibrahim, Mohammad Alkhedher and Mohammed A. Ghazal

In recent years, utilizing smart technologies to enhance tourists' experience and increase their overall happiness has become a trend. Cities and tourist organizations devote significant resources to smart system efforts due to the importance of technological advancements to a city's attractiveness as a travel destination. Individuals' main interest nowadays became to post pictures on their social media accounts of places they visited with their loved ones on special occasions or for tourism. However, finding measures that can improve the tourist attractiveness of a city is the main difficulty and an area of research. In this paper, we propose a multiplatform Al-powered mobile application that provides people with a guide on where to go to their various events. The application uses collaborative geo-tagging and visualization of touristic and social activities through heat maps and images. The proposed application mainly consists of two features; uploading pictures of an attraction and visualizing the most visited locations through a heat map. Our results show that the proposed method is low-cost, user-friendly, and reliable and can be used to improve tourism and tourist attractiveness of a city.

Presenter bio: Lana Qamhieh is a Senior Computer Engineering Student in Abu Dhabi University.

S4-B: Deep Learning and Image Processing

Chairs: Nabil Hewahi, Alauddin Yousif Al-Omary

13:30 Light-Weight Food Image Classification For Egyptian Cuisine 📴

Salma Zakzouk, Aya Saafan, Menna-allah Sayed, Mustafa Elattar and M. Saeed Darweesh

Food image classification is essential for various applications, including dietary analysis and medical management. Furthermore, Egyptian cuisines' food identification hasn't been explored as much as generic food categories. Deep convolutional neural network (DNN) architectures have been used as the foundation for the most recent food recognition implementations yet are computationally exhausting. Therefore, it was decided to train the lightweight model with a dataset biased towards Egyptian plates. Consequently, the proposed lightweight model (Enhanced MobileNet) achieved top-1 accuracy of 75%, which outstands other related work in this area.

Presenter bio: "Salma is graduated in July 2022 from the computer engineering program at the School of Engineering and Applied Sciences, Nile University. She was an intern in the Wireless Intelligent Networks Center (WINC), Nile University, working in machine learning, and she was a junior teaching assistant in Linear Algebra course at Nile University. Her technical skills include machine learning, data analysis, and embedded systems. She published 2 papers while she was undergraduate in February 2022 titled "Rice Leaf Diseases Detector Based on AlexNet" and "A Comparative Study of Machine Learning Techniques for Automatic Rice Crop Irrigation".

13:50 Systematic Mapping Study on Different Approaches for Detecting the Femoral Fracture Types using X-ray Images 🗟

Minuja Kanthasamy, Senthan Prasanth, Kuhaneswaran Banujan and Banage T. G. S Kumara

Doctors use X-ray images to diagnose where bone fractures occur. To avoid further injury or causing more harm to the injured area, it is crucial to treat any broken or fractured bones as medical emergencies and seek the necessary treatment right away. In the event that a bone breaks, a fracture is identified. The break will be put back in place as soon as it is treated, allowing for proper healing and preventing any future issues that an improperly healed break may bring about. Instead of wasting time searching for or entering information, machine learning enables healthcare professionals to concentrate on patient care. The improvement of diagnosing accuracy is machine learning's second significant contribution to healthcare. A computer that learns from its errors might be more successful, dependable, and effective than a human physician. Data scientists can use machine learning to find correlations between different characteristics and features of patients with the labeled disease when they have a large amount of data at their disposal. Doctors can develop prevention strategies using these correlations to better understand the underlying patterns of disease. Medical image processing's main advantage is that it enables a thorough, non-invasive investigation of internal anatomy. Medical digital image processing can improve the quality of the image and lessen the impact of noise. Up until 2022, the information will be published in six electronic archives, including IEEE Xplore, Springer Link, Science Direct, Research Gate, and ACM Digital Library. Studies based on the classification of the type of femoral neck fracture have not yet been published. 200 studies were initially chosen, and 12 papers were shortlisted for in-depth analysis. Numerous studies have been done on the identification of bone fractures. There have been attempts to use Artificial Neural Networks (ANN), Support Vector Machine (SVM), and Local Binary Patterns (LBP) approaches. Future studies that are interested in conducting research in the chosen domain will gain a great deal from this study.

14:10 Detection of Lettuce Plant Conditions Based on Images using Backpropagation Method 🗟

Casi Setianingsih

In farming various ways can be done, one of which is using the hydroponic method. Lettuce is included in plants that can be grown using this method. To produce good lettuce, it takes care of and good plant management. Direct monitoring requires a lot of energy and takes a lot of time because you have to check the condition of the plants one by one. With these problems, a system was designed to detect the condition of the lettuce leaves using a camera as an image capture tool. This research aimed to create a desktop-based system for detecting the condition of lettuce using the Backpropagation classification method. The conditions of lettuce plants are divided into two classes based on lettuce leaves with healthy green tips, and lettuce leaves with less good leaf tips with yellow color and brown spots. Detection of lettuce plant conditions using images taken with a Raspberry-pi camera. The result of this research is the system can detect healthy leaf condition class and leaf condition class with yellow color and brown spots. The output of the system is in the form of class labels and probability values from the classification results. With a parameter in the form of a training data partition of 90% and 10% test data, the accuracy rate is 98%.

Presenter bio: Obtained her B.Sc. in Telecommunication Engineering at the Telkom University, Indonesia. She obtained her M.Sc. in Computer Engineering at the Bandung Institute of Technology. She is a lecturer in Telkom University with a research focus on Artificial Intelligence.

14:30 Light-Weight Face Mask Detector 🗟

Mohamed Tarek, Rashed Al Numan, Kareem Moussa and M. Saeed Darweesh

People's lives have been severely disrupted recently due to the COVID-19 outbreak's fast worldwide proliferation and transmission. An option for controlling the epidemic is to make individuals wear face masks in public. For such regulation, automatic and effective face detection systems are required. A face mask recognition model for real-time video streaming is provided in this research, which categorizes the pictures as (with mask) or (without mask). A dataset from Kaggle was used to develop and assess the model. The collected data set contains exactly 12,000 images and has a 98.1% performance training accuracy and a validation accuracy of 98.2%, which is achieved by using MobileNetV2.

Presenter bio: He is Mohammed Tarek Ahmed Abdelaziz, a fourth year senior Electronics and Computer Engineering undergraduate student in Nile University, Egypt. He is interested in the field of Machine learning and Artificial Intelligence as well as data mining.

14:50 Traffic light Detection using OpenCV and YOLO 😼

Noor Hussain Sarhan and Alauddin Yousif Al-Omary

Traffic lights detection importance is increasing every year as the world is focusing on self-driven cars. Traffic lights detection is a vital task of any autonomous vehicles to ensure safety and effectiveness. In this paper, two models are built to detect traffic lights using images and videos. A dataset is created to contain data collected from Bahrain streets. Both models are evaluated and compared to introduce the most effective one. The first model is based on analyzing still images while the second model is used to analyze video frames using YOLO algorithm weights and OpenCV library. It was found that the second model was able to detect all traffic lights in video frames with high accuracy as compared with first model that analyzes still image.

Presenter bio: Noor Sarhan, an UOB graduate student UOB with BSc degree in Business Information System in 2010. She worked as IT support in CIBAFI for three years and since 2014 she became a computer teacher in Khawla Secondary Girls school. In 2018, Sarhan had higher diploma in education from BTC. In 2021, She

started higher education journey by joining Machine learning and computational intelligence program.

Presenter bio: Holds B.Sc. in Electronic and Communication, University of Mosul, Iraq in 1980 and M.Sc. in Communication Engineering from University of Technology, Iraq in 1986. He got his Ph.D. degree in system and information engineering from Toyohashi University, Japan, 1994. Since 2005, he is an associate professor at the Department of Computer Engineering, College of Information Technology, University of Bahrain. His research interests include Hardware/Software co-design Telematics system, Machine-to-Machine Communication, Mobile Network performance, ASIC and embedded system design using VHDL and FPGA. He is a member of the Institute of Electrical and Electronic Engineers (IEEE), the Japanese Information Processing Society and the International Association of Computer Science and Information Technology (IACSIT). Dr. Al-Omary is the founder and managing editor of the International Journal of Computing and Network technology (IJCNT) published by the research deanship of University of Bahrain.

S4-C: Blockchain & Cyber Security-3 🔨

Chair: Sarah Al-Shareeda

13:30 Design and Implementation of New Collision Resistant Fast Hash Function Family for IoT Healthcare Blockchain Ledger

Ahmed Ali Fayez, Ammar Ibrahim Elsayed, Emad Othman, Emad Elsamahy and Bassam Aboshosha

Blockchain is a novel technology that is being utilised to provide innovative solutions across a wide range of sectors, including healthcare. A blockchain network is used in the healthcare sector to store and distribute patient data across hospitals, diagnostic laboratories, medication firms, and clinicians. In the medical profession, blockchain technologies can accurately identify major mistakes, even possibly fatal ones. It may thereby improve the efficiency, security, and transparency of medical data exchange in the healthcare industry. With the use of this technology, medical institutions may gain insight and enhance the analysis of patient data. In this paper, we demonstrate how blockchain technology could enhance the security of IoT devices used in the healthcare sector. The development of a novel hash function is based on the Unpredictability principle. Given that the IoT has constrained resources and power, we employed an S-box of AES-256 with an XOR operator. We also created a collision proof, lightweight, and fast hash function. The outcomes of the suggested hash functions are as follows: (256, 384, and 512). Index Terms-S-box-Hash -Internet of Things-EHR

Presenter bio: Ahmed Ali Fayez received the bachelor's degree in information systems program from the Higher Institute of Computer Science and Information Technology, El-Shorouk Academy, Cairo, Egypt, in 2013. Studied Postgraduate Diploma in Information System of AAST Arab Academy for Science Technology and Maritime Transport, Cairo, Egypt, in 2018 He is currently pursuing the master's degree in information System program with AAST Arab Academy for Science, Technology and Maritime Transport, Cairo, Egypt. He is also a Teaching Assistant with the Higher Institute of Computers and Information Technology, El-Shorouk Academy. His research interests include Security, IOT, Blockchain, artificial intelligence, and related topics.

13:50 Blockchain and NFT: a novel approach to support BIM and Architectural Design 🗟

Mario Casillo, Francesco Colace, Brij B. Gupta, Angelo Lorusso, Francesco Marongiu and Domenico Santaniello Digital design is becoming more advanced by the year, the software more sophisticated, and the products of ever-increasing quality. In the design and implementation processes of structural works, Building Information Modeling (BIM) has now established itself as a standard process in professional and non-professional environments. In particular, the creation of BIM families is a topic of great interest to engineers and designers who can focus on describing a single object in every detail before it is included in a larger, more complex project. Since they are digital products, they are, however, subject to certain problems, particularly copyright management of a particular family and certification of digital files, which must be able to be shared within the entire reference project, which is sometimes large and complex. This paper has precisely the goal of going about solving these issues by going about leveraging what is Blockchain technology used as a tool for certification and attribution of authorship and/or ownership of a particular file. Non-Fungible Tokens (NFTs) represent a great opportunity for the digital design world as they were born precisely for the purpose of managing the ownership of digital assets in a secure manner certified by the Blockchain. The results show how BIM and Blockchain technologies can work together and benefit from each other.

14:10 Analysis of Real-Time Applications of Blockchain 🗟

Ashis Kumar Samanta and Nabendu Chaki

Data security and data transparency are achieved in various application domains by incorporating blockchain technology. However, the blockchain shows underperformance, scalability issues, and security threats at the time of operation in real life. This paper's objective is to analyze the blockchain applications in the different technological domains and discuss the various issues that direct the research directions to provide suitable solutions to upgrade and enhance the blockchain application in the near future. In this paper, we analyze the blockchain application in healthcare, smart contacts, digital certificate, crime- records, land records, Finance, agriculture, education, the internet of things (IoT), and the logistic system like the supply chain. It also analyzed the utilized area of blockchain in different domains and highlighted the issues still to be addressed. This paper aims to unearth the existing gaps and identify the scope of the future direction of works.

Presenter bio: I am an associated with the university of calcutta and working as Database Administrator and a Research Scholar of university of Calcutta at the Department of Computer Science and Engineering.

14:30 User Awareness of Wearable IoT Devices Privacy Issues 🖻

Amal Alrayes, Ghada Alrabia, Baneen Alhaddad and Reem AlKaabi

Over the last decade, wearable devices' popularity and range of uses have increased and are continuing to grow significantly. It is a type of low-processing technology device that may be worn by a user with the aim of providing information and easy access to the master devices with which it is paired. This study determines the level of privacy awareness among IoT wearable device users. A quantitative and descriptive online questionnaire of 30 questions was used to collect data from users via email, WhatsApp, printed QR codes, and other social media platforms. The participants provided a total of 316 responses from Bahrain citizens in age ranges from under 18 to over 35. The TAM and KAB Models were applied, and Statistical Package for Social Sciences (SPSS) software was used to appropriately analyze the data and to perform the data validity, reliability, and hypotheses testing. The research findings confirmed that all the research hypotheses were valid and approved.

14:50 How Personality Traits Impacts on Cyber Security Behaviors of SMEs Employees 🖻

<u>Shadab Kalhoro</u>, Ramesh Kumar Ayyasamy, AbdulKarim Kanaan Jebna, Anam Kalhoro, Kesavan Krishnan and Suresh Nodeson

Human behavior is seen as the primary risk within small enterprises. Attackers aim to achieve their destructive goals by exploiting endusers flaws, and they prefer to attack people rather than systems. As a result, human vulnerabilities endanger electronic systems, data confidentiality, and reliability. Because of their recognized susceptibility to cyber security, cyber-attackers are increasingly targeting small and medium-sized enterprises (SMEs) rather than large organizations. Previous studies have shown that employees are the weakest point in cyber security. For successful cybersecurity practices in companies, security risks and employees' decision-making processes should be considered more attentively. Personality is one of the most important psychological characteristics influencing human conduct. Personality traits influence people's decision-making processes and boost the performance of employee behaviors. The research discusses psychological aspects, end-point cyber-attacks, personality traits, high and low scores of employees' behaviors, and risk-taking behavior; this study further provides implications for SME employees to enhance security behaviors based on personality traits experiences. This research helps SMEs in better understanding the causes behind employees' cyber security behavior.

Presenter bio: She received her Bachelor of Engineering (B.E) Degree in Telecommunication Department from Mehran University of Engineering and Technology (MUET) Jamshoro, Pakistan, and Master of Engineering (M.E) in Information Technology Department (IT) from (MUET). She is currently pursuing his Ph.D. in Computer Science from Universiti Tunku Abdul Rahman, Kampar, Malaysia (UTAR), Perak, Malaysia. Her research interests include Cyber Security, Cyber Security Behavior, wireless communication, wireless sensor network, and cognitive radio networks.

S4-D: Deep Learning-3 🛧

Chair: Amal Shaheen

13:30 Arabic Speech Recognition Using Deep Learning and Common Voice Dataset 🖻

Nourredine Oukas, Algérie, Taha Zerrouki, Samia Haboussi and Halima Djettou

Speech recognition is critical in creating a natural voice interface for human-to-human communication with modern digital life equipment. Smart homes, vehicles, autonomous devices in the Internet of Things, and others need to recognize various spoken languages. Meanwhile, the Arabic language has a shortage of speech recognition systems. This study comes to develop an Arabic speech-to-text tool for Arabic language. Our solution uses DeepSpeech model which is a deep learning approach and uses a data set from the Common Voice Mozilla project. The results showed a 24.3 percent Word Error Rate and a 17.6 percent character error rate. So, the proposed model reduces the Word Error Rate by 11.7\% compared to Bakheet's Wav2Vec model. Index terms: Arabic language; Automatic Speech recognition; Deep learning; Mozilla Common Voice.

Presenter bio: OUKAS Nourredine is a researcher at Akli Mohand Oulhadj University of Bouira- Algeria. He is a doctoral student at the University of Boumerdes-Algeria and a member of LIMOZE laboratory in the same university. He received his Engineering degree in Advanced information systems at the University of Boumerdes, and his Magister degree in Mobile Informatics from Houari Boumediene University of Science and Technology (USTHB-Algeria). His area of research includes Wireless sensor networks, Systems Modeling, Systems Optimization, and Natural language processing.

13:50 Multi-classification Network for Detecting Skin Diseases using Deep Learning and XAI 🗟

Fahima Hasan Athina, Sadaf Ahmed Sara, <u>Quazi Sabrina Sarwar</u>, Nishat Tabassum, Mun Tarin Jannat Era, Faisal Bin Ashraf and Muhammad Igbal Hossain

This study compares four deep learning models in order to find the best performing model to construct a skin disease detection system for diagnosing three dangerous but uncommon skin conditions: Stevens-Johnson Syndrome, Erythema Multiforme, and Bullous Pemphigoid. Due to the ambiguity of these models, this work also makes an effort to explain these models' predictions using Explainable Artificial Intelligence that is based on LIME. For feature extraction, the four pre-trained models ResNet50V2, VGG16, InceptionV3, and InceptionResNetV2 have been employed whose top layer has been replaced with a custom-made 10-layered architecture made up of Convolution, BatchNormalization, Dropout, and Dense Layers. An unprecedented hybrid dataset made up of colorful images of the diseases gathered from various sources (to subject the models to a plethora of varying images) served as the training ground for these models. Additionally, other machine learning classifiers, including Support Vector Machine, Random Forest, and Logistic Regression have been employed to identify the images in order to see how well they perform in comparison to a neural network approach. To determine which of the tried deep learning methods performs best, their accuracies have also been compared to one another. According to the analysis, the InceptionResnetV2 model has a 99.06 percent accuracy rate, whereas InceptionV3, VGG16, and Resnet50V2 have accuracy rates of 90.27 percent, 95.92 percent, and 98.26 percent, respectively.

Presenter bio: Completed BSc. in Computer Science and Engineering (CSE) from BRAC University in Spring 2022. Currently working as a contractual lecturer in the department of computer science and engineering of BRAC University. Research interests: Machine learning, Artificial Intelligence, Neural Networks, Data Science, Big Data etc.

Presenter bio: Department : Computer Science and Engineering University : BRAC University Research Interest : Machine Learning related fields

14:10 Cancer Diagnosis based on Artificial Intelligence, Machine Learning, and Deep Learning 🗟

Haval Sadeeq, Siddeeq Yousif Ameen and Adnan Brifcani

Since cancer is a genetic disease induced by the gradual accumulation of several genetic modifications, it will provide a better forum for understanding the cancer formation and development process to recognize the variations in the expression profile of cancer cells compared to their normal counterparts. Developments in computer science have allowed many scientists to use computer techniques. For instance, multivariable analysis in order to assess the accuracy of the disease is substantially higher than the accuracy of empirical forecasts. As the most common applications have been discovered in recent years in clinical cancer research, artificial intelligence (AI), and specifically machine learning (ML) and deep learning (DL), the success of new levels of cancer prediction have reached based on the selection of genes and in the study of microdata. This paper discusses and summarizes the literature on AI's application for three cancer diagnoses and projections, namely oral, lung and breast cancer. Different experiments are analyzed for the various types of systems that are used to detect cancer early. This article, therefore, gives a new insight in Al technology in order to enhance the diagnosis and prediction of cancer and further increase health.

Presenter bio: Haval Tariq Sadeeq Ph.D. candidate at Technical College of Informatics/ Duhok Polytechnic University Duhok, Iraq

14:30 Visual Inference through YOLO v4 integrated Perspective Localization of Obstacles and Path Mapping in AGV 🗟

Suman Deb and Rapti Chaudhuri

Perception of a specified environment and a respective position of the mobile robot relative to the indoor on-path obstacle are absolute necessary contexts for smooth way finding. V-SLAM (Visual Simultaneous localization And Mapping) is an emerged technology in the significant domains of research in modernized intelligent habitat. It even finds an impactful application in MRN (Mobile Robot Navigation). This paper basically aims to detect and identify on-route obstacles using Adversarial network in an efficient and precise manner for avoiding collided point-to-point robot navigation. It is further accompanied with simulation of 2D LiDAR SLAM (Two Dimensional Light Detection And Ranging Simultaneous Localization And Mapping) for visual inference of the trajectory travelled by the customized mobile agent. The speciality of the research consequence lies in combination of 2D SLAM with ML (Machine Learning) mediated object identification for smooth locomotion. The data collected using 2D LiDAR are passed into data modeling layer for model formation based on which the considered mobile robot would take further actions in case of making decisions for choosing the optimized linear path from start point to the desired goal point. The final filtered data obtained would be an important referential citation for future researchers to carry out with the constructed SLAM algorithm and mentioned way of perspective localization.

Presenter bio: Rapti Chaudhuri, CSE Department, Specialization in Artificial Intelligence, NIT Agartala

14:50 An Intelligent Handwritten Digits and Characters Recognition System 😼

Ahmed Mokhtar, Ahmed El-Sharkawy, Sara Mahmoud, Habiba Samy, Baher AbdelMawla, Kareem Moussa and M. Saeed Darweesh

The process of giving machines the ability to recognize human handwritten digits and characters is known as handwritten digit and character recognition. Handwritten digits and characters are imperfect, vary from person to person, and can be constructed with a variety of flavors. Therefore, it's not a simple assignment for the machine. In this paper, a machine learning algorithm has been made to detect handwritten digits and characters with high accuracy relative to the past models. The MNIST dataset is used to provide the model with the training and test datasets for its variety of data. Another dataset is Kaggle's A-Z Handwritten Alphabets dataset, which is used for the English letter's dataset. It contains a total of 370,000 images of English letters. The paper's output is a GUI that allows users to draw a digit or character and instantly see a digital version of it along with an accuracy %. The convolutional neural network (CNN) approach was applied as a deep learning method. The suggested CNN model is based on the Keras model, which classifies handwritten digit pictures using an RMSprop optimizer. With epoch 10, the suggested CNN model achieves 98.80 percent accuracy during testing and 99.06 percent accuracy during training. Average macro accuracy of 0.99 was attained. It has a 0.98 average macro recall. The macro average F1 score reached 0.99.

Presenter bio: He is Ahmed Ayman, a 21-year-old electronics Engineering student in Nile University. He joined NU in 2019 and then a plot twist happened to his life. Out of the feeling of gratitude for NU he tried his best to develop himself besides developing NU Community. He joined many students' activities some of them were technical and some were not. He joined RPM and IEEE where he boosted his technical skills in robotics, electronics in addition to programing. Later, he competed in some competitions like "Space Summit and Undergraduate Research Form". He participated in Nile International Model United Nations Conferences several times which boosted all his soft skills, specially, when debating alongside the international delegates, then he became a Secretariat which had a huge impact on him in leadership skills. Finally, he is thankful for all the experiences he has been through and proud with all his ups and downs.

S4-E: Cloud Computing **T**

Chairs: Jalal Khlaifat, Bidah Alkhaldi

13:30 HBalancer: A machine learning based load balancer in real time CPU-GPU heterogeneous systems 🗟

Taha Abdelaziz Rahmani, Ghalem Belalem and Sidi Ahmed Mahmoudi

Graphical Processing Units (GPUs) are increasingly being incorporated to High-performance computing (HPC) systems alongside Central Processing Units (CPUs). As a result, HPC systems turned into heterogeneous systems. The unequal distribution of computing loads to the devices of a heterogeneous system is a major issue. It is caused by the variation of computing power between these devices. Balancing the load of such systems is a very complex task. In this context, we provide HBalancer, a CPU-GPU heterogeneous system resource manager. HBalancer distributes computing loads on the devices at runtime in a manner that minimizes the system imbalance. We define a new metric to estimate the system imbalance using execution time prediction. We provide mathematical formulas to calculate it. Experiments were conducted on a CPU-GPU heterogeneous system. We used multiple OpenCL applications as workload. Results show that HBalancer outperforms the Device Suitability and Round Robin approaches in load balance and execution time.

Presenter bio: I am Taha Abdelaziz Rahmani, a PhD student in the department of computer science ; Faculty of Exact and Applied Sciences, University of Oran1, Algeria. I received my M.S. degree in 2019 from the University of Oran1. My current research interests are distributed system, cloud computing, Load balancing, CPU/GPU, machine learning, Deep learning, fault tolerance, resource management, energy consumption, IoT, Decision support systems, High Performance Computing.

13:50 Kubernetes Performance Analysis on Different Architectures 🖻

MD Badsha Faysal, Sheikh Amin, Bushra Tabassum, Tamim Raiyan Khan and Jannatun Noor

Since web 2.0, the entire world has been getting smaller and smaller in terms of communication. Everything is now connected. The introduction of the cloud was the initial step of centralized computing. However, the cloud is cheaper than on-prem infrastructure in the short term. In the long run, it is not that cheap. So many of the companies try to host their services on-prem. Or move to a hybrid solution. Though computing is comparatively cheaper nowadays, mass storage is costly on the cloud. The web as we know it is continuously evolving and changing its shape rapidly. And every day the rate of new technologies being introduced is also increasing. Kubernetes is an excellent tool for cloud computing. Kubernetes is still in its early days. Developers are changing their deployment strategy to use Kubernetes. Kubernetes is a powerful tool for horizontal scaling. Currently, most of our computing infrastructure is based on x86. ARM is a comparatively new and power-efficient platform. We want to find out a more efficient and cost-effective implementation of Kubernetes. For our analysis, we are going to compare the Kubernetes performance of two platforms, x86 and ARM. Kubernetes services are available on Cloud platforms such as GCP and AWS. They provide both x86 and ARM solutions. We will compare their products and find out the price-to-performance. Index Terms-Kubernetes, x86, ARM, GCP, AWS

14:10 Comparative Analysis of Ant Colony Optimization and Particle Swarm Optimization for Test Case Prioritization 🗟

Stalin Subbiah, Yash Renwa, Tushar Totla, Mugilan A, Charanya R, Dharmaraj T B and Om Prakash

To boost the efficiency of testing and save time and money in the construction of the testing program, the test case prioritization technique prioritizes a subset of the full test suite and optimizes the execution order of the test cases. The goal of this paper is to classify and compare the performance of two nature-based test case prioritization techniques: To overcome the problem of needing to perform the whole test suite at some point, resulting in time and expense limits, we used Ant Colony Optimization and Particle Swarm Optimization. We chose a sample test suite and prioritized the test cases for our research. An experimental investigation of the acquired data will be useful in selecting the best prioritizing technique under various environmental constraints. For our analysis, we selected a sample test suite and prioritized the test cases. In various environmental restrictions, an experimental study of the findings collected will be valuable in determining the optimum prioritization strategy. The findings of both algorithms showed high global optimization abilities, with the ant colony strategy outperforming the particle swarm optimization approach

14:30 Implementation of Blockchain Technologies to Avoid Fraud in Supply Chain 🗟

Rohit Chowdary, Pankaj Pathak and Vimal Kamleshkumar Bhatt

In recent times, with technological advancements, businesses are looking at the digital transformation to create lucrative and sustainable methodologies to gain a competitive advantage over the competitors. With the awakening of consumers and stakeholders about the visible fraud in the operational activities and supply chain, the expectations from consumers regarding the supply chain are rapidly changing. Supply chain transparency, traceability, sustainability, and resilience have gained a lot of attention in recent years to end-users which potentially enables them to trace the goods and services flow and all the processes involved in manufacturing the raw materials to the final products. Maintaining a transparent supply chain has become a necessity rather than an additional service provided to the government, consumers, and other stakeholders. Companies around the globe are shifting towards technological advancements in the supply chain for effective utilization of resources and processes to gain an advantage by provisioning visibility in the Supply Chain Management (SCM). With the ability to maintain an immutable, distributed, unalterable ledger, Blockchain can be considered as one of the revolutionizing technologies in digital supply chain management. Blockchain technology can be used to overcome potential threats and vulnerabilities by channelizing the flow of information, thereby enhancing transparency and traceability in the process. Its potential can drive the SCM operations less costly and enrich the customer experience through transparency and traceability.

Presenter bio: Rohit is an MBA student MBA from Symbiosis Institute of Digital & Telecom Management, with Systems and Finance as his specialisation. He has done his B.Tech from the Indian Institute of Information Technology, majoring in Electronics and Communications Engineering. During his B.Tech course study, he was a part of the Smart Transportation Research Group, where he worked on the Advanced Driver Assistance System and Vehicular Platooning. He did his internship with a startup HugoByte Al Lab; he worked with the CEO to start and launch a new business unit by understanding emerging markets and market shifts and developing revenue-generation and penetration streams. Addressing real-world problems and managing finances efficiently is what he wants to do in the longer run.

14:50 Challenges and future directions for security and privacy in vehicular fog computing 🗟

Ossama Nazih, Nabil Benamar and Hanane Lamaazi

Cooperative Intelligent Transportation System (CITS) has been introduced recently to increase road safety, and traffic efficiency, and to enable various infotainment and comfort applications and services. To this end, a bunch of technologies has been deployed to maintain and promote ITS. In essence, ITS is composed of vehicles, roadside infrastructure, and the environment that includes pedestrians, and other entities. Recently, several solutions were suggested to handle with the challenges faced by the vehicular networks (VN) using future internet architectures. One of the promising solutions proposed recently is Vehicular Fog computing (VFC), an attractive solution that supports sensitive service requests considering factors such as latency, mobility, localization, and scalability. VFC also provides a virtual platform for real-time big data analytics using servers or vehicles as a fog infrastructure. This paper surveys the general fog computing (FC) concept, the VFC architectures, and the key characteristics of several intelligent computing applications. We mainly focus on trust and security challenges in VFC deployment and real-time BD analytic in vehicular environment. We identify the faced

challenges and future research directions in VFC and we highlight the research gap that can be exploited by researchers and vehicular manufactures while designing a new secure VFC architecture.

Presenter bio: I'm ossama nazih and I'm a PhD student and I'm working on resource allocation and resource management in Vehicular fog computing Environment: game theory as approach

S4-F: The Role of Modern Technologies in Combating COVID-19 7

Chairs: Ehab Juma Adwan, Ali Hasan

13:30 Developing Modern Agent Technologies in Combating Covid-19 Exposure: An Application in a Healthcare Facility 🗟

Mohammad A. Shbool, Ammar Al-Bazi, Layth Zuraigat and Azmi Mahafzah

This study aims to identify the impact of adherence to Non-Pharmaceutical Interventions (NPI) such as facemask and social distancing on the rate of COVID-19 exposure in waiting areas inside an emergency department. A Multi-Simulation methods model capturing the flow of patients inside the emergency department was developed in this research. The purpose is to quantitatively evaluate the performance of preventive measures based on the agent's proximity and exposure time. The number of infections was affected by the application of facemask. Infections were reduced when facemask adherence and social distancing were applied. The study showed that the application of social distancing solely has a similar effect to a 20% adherence of agents wearing a facemask. The model also reveals that more agents adhere to facemask, and the time required to get an agent to the state exposed increases. Waiting areas are a potentially significant contributor to the transmission.

Presenter bio: Mohammad A. Shbool is an assistant professor of industrial engineering at The University of Jordan in Amman, Jordan. He received his Ph.D. in industrial engineering from the University of Arkansas - Fayetteville, USA, in 2016. He mainly teaches Simulation, Logistic Engineering & Supply Chain Management, and Engineering Statistics classes for IE students. Dr. Shbool is mainly interested in doing research in Simulation Modeling (discrete, Agent-based, & system dynamics), multi-criteria decision analysis, and Machine Learning applied to healthcare and manufacturing systems. He is EFQM (European Foundation for Quality Management) certified. Dr. Shbool is a member of both the IISE Institution and Alpha Pi Mu American honor society.

13:50 Classification of Respiratory Diseases and COVID-19 from Respiratory and Cough Sounds 🗟

Md. Mubtasim Ahasan, Mohammad Fahim, Himadri Mazumder, Nur E Fatema, Sheikh Mustafizur Rahman, A. B. M. Alim Al

Islam and Jannatun Noor

Infectious and non-infectious respiratory diseases are among the primary reasons for deaths, financial and social crises around the world. In this study, we present a comparative analysis of various deep learning techniques for respiratory disease and COVID-19 identification methods from respiratory and cough sound recordings. Our experiments demonstrate that artificial intelligence can help tackle the global crisis by providing an alternative disease diagnosis method. We conduct numerous experiments using deep learning models and model training techniques to find the most efficient disease detection and classification system. We first propose procedures to extract image representations of audio features such as Mel-Spectrograms and Mel-frequency Cepstral Coefficients (MFCC) from each sound recording. Afterward, we compare the performance of the audio features and ten different convolutional neural network (CNN) models on disease classification. We also compare and analyze the performance of various model training methodologies, such as the 1cycle policy, transfer learning, and balanced mini-batch training, to determine the most effective way to train the models. In our experiment, we classify respiratory diseases with 94.57% accuracy and Area under the Receiver Operating Characteristic Curve (AUC) value of 0.93 and COVID-19 infected and healthy patients' cough recordings with 85.62% accuracy and 0.84 AUC value.

Presenter bio: Md. Mubtasim Ahasan is an undergraduate student at Brac University, Bangladesh. He is doing his major in Computer Science and Engineering at the School of Data & Sciences. His research interests include deep learning, computer vision, and audio processing. His ambition is to apply Al in areas such as healthcare to benefit society and advance well-being.

14:10 Convolutional Neural Network based COVID-19 Recognition from X-Ray Image 🗟

Sujana Saha, Ragib Mehedi and Rafiqul Islam

To halt extreme spread of Coronavirus(COVID-19), proper detection is the need of the hour. The number of physicians is negligible to serve the immense number of COVID-19 affected patients. For this reason, it is essential to automate the detection system of COVID-19 disease. In this proposed work, a convolutional neural network (CNN) based COVID-19 diagnosis system is developed to automate COVID-19 disease detection using images of chest X-rays. The proposed model can differentiate three varieties: COVID-19, pneumonia and normal (healthy) from the X-ray images. Experimental process has been performed upon two publicly available datasets: COVID-19 Radiography Database and COVID-5K. Five deep convolutional neural network architectures: Xception, ResNet-50, Inception-v1, Inception-v2, and Inception-v3 are discretely used to train the system. The evaluation of the proposed system proves that Xception has provided the best performance with 99.47% accuracy, 99.21% sensitivity, 99.60% specificity, and 99.21% F1- score. The resultant of the experiment illustrates an improvement in the performance compared to some existing research works.

Presenter bio: SUJANA SAHA received the B.Eng. degree in computer science and engineering from Khulna University, Bangladesh, in 2022. Her research interests include deep learning, natural language processing, machine learning, computer vision, and data mining applications.

14:30 Challenges of Machine Learning for Covid-19 Diagnosis based on Blood Tests 🗟

Bayrammyrat Myradov

This study discusses such challenges of solving a problem of machine learning for Covid-19 diagnosis from blood tests as a) preparation of a relevant and correct dataset and b) development of a machine learning model(s) with generalisation performance. This study demonstrates the shortcomings of some public datasets used in many previous studies. These shortcomings lead to the futility of the models based on such datasets in practice if even these models were developed using the best algorithms and achieved high metrics. Therefore, in this study, another dataset is proposed. Its features are discussed. It has a sample size of 3148, 2621 with negative and 527 with positive SARS-CoV-2 RT-PCR tests. The dataset has an imbalanced data structure and splits into training and testing sets by stratification. Machine learning modelling has been carried out after the preparation of these sets. The modelling results on the testing set have demonstrated that all developed models - Gradient Boosting Classifier with SMOTE and ADASYN, TensorFlow and Gene Expression Programming - handle negative Covid-19 diagnosis perfectly since they have high precision (76%-89%) and high recall (92%-95%). However, the modelling has given mixing signals for positive Covid-19 diagnosing. TensorFlow and Gene Expression Programming models have high precision (72% and 78%) and relatively low recall (41% and 39%) for positive Covid-19 diagnosing. It means these models can't detect Covid-19 well enough but are highly trustable when they do. Gradient Boosting Classifier models do not have enough high precision (59% and 60%) and recall (53% and 49%) for positive Covid-19 diagnosing perfectly.

Presenter bio: Bayrammyrat Myradov is Doctor of Technical Science. His research areas include modelling and optimisation of complex systems under uncertainty. He has developed various linear, nonlinear, mixed integer deterministic and stochastic optimisation models, simulation ones, and modern machine learning approaches for different fields. In addition, he has been providing studies on the modelling and synthesis of integrated renewable energy systems, supply chains and logistics optimisation, and machine learning on different systems, including health care. Now, as an independent consultant, he presents a study on machine learning for Covid-19 diagnosis based on blood tests.

14:50 Students' Satisfaction with Online Learning Environments - Post COVID-19 🖻

Amal Alrayes, Ons Al-Shamaileh, Nishara Nizamuddin and Fatima Aljazeeri

With the outbreak of COVID-19, several countries have requested the closure of all educational institutions; many universities have shifted to online mode during this period. Previous studies showed the need for a continuous assessment of student's satisfaction with the online delivery methods to improve the teaching and learning experience. This paper is framed with the motivational needs and social presence theories to review students' perceptions of various online learning environment tools, social presence, and satisfaction with online courses. 846 students in higher education institutes from different backgrounds and cultures participated in the online survey. Results show that the learning environment has a positive, substantial, and significant relationship with social presence. Moreover, factors influencing the learning environment that was significant to student satisfaction are presented.

Monday, November 21 15:10 - 15:30 (Asia/Qatar)

CS: Closing Session **⊼**

Dr. Hessa Al-Junaid

Chair: Abdulla Alqaddoumi

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