SCS'19

Smart Cities Symposium 2019 **Program**

Jan 25, 2019	SCS'19	Proceeding services set up	chair, publication		late

	Sunday, March 24	Monday, March 25	Tuesday, March 26
8:00 - 9:00	R1: *Registration*	R2: *Registration-Day2*	R3: *Registration-Day3*
9:00 - 9:05	OC1: *Opening Ceremony: Welcoming to the 2nd SMART CITIES SYMPOSIUM*		
9:05 - 9:10	OC2: *Talk by His Excellency Professor Riyad Hamzah President of the University of Bahrain*	KS4: *Symposium Keynote Speaker-4: Smart Cities and Home Cares Sector*	KN8: *Keynote 8: W-AI-STE and ARCHITECTURE Waste Management in Buildings with the support of Machine Learning and Artificial Intelligence*
9:10 - 9:25	OC3: *Honouring Symposium Keynotes, by His Excellency Professor Dr. Riyad Hamzah, President of the University of Bahrain*		
9:25 - 9:50	KN1: *Keynote Speaker -1: Smart Cities and Banking- Financial Sector*	KS5: *Keynote Speaker -5: Smart Cities and Inspec Analytics, The IET Publishing Sector*	KS9: *Keynote Speaker 9: Smart Cities and Smart IOT, Safe-Roads & Transportation*
9:50 - 10:00	SB-1: *Short Break-1*	SB-2: *Short Break-2*	SB-3: *Short Break-3*
10:00 - 10:25	KN2: *Keynote Speaker-2: Digitization in Oil and Gas industry' Sector*	KS6: *Symposium Keynote Speaker-6: Smart Cities and Cyber- Security Sector*	SK10: *Symposium Keynote Speaker 10: Smart Cities and Geographic Information System (GIS) Sector*
10:25 - 10:50	KS-3: *Keynote Speaker 3: Smart Cities .. and the Smart Home Health Care*	KS7: *Keynote Speaker 7: Smart Cities and Home Cares Sector*	KS11: *Keynote Speaker 11: Smart Cities, and the Society Impact*
10:50 - 11:20	CB1: *Coffee Break-1*	CB2: *Coffee Break-2*	CB3: *Coffee Break-3*

11:20 - 12:40	SA02: *Cyber Security-1* SA03: *Smart Homes, Smart Hospitals, and Smart Campuses* SA01: *Internet of Things and Smart Applications-1*	SC02: *Internet of Things and Smart Applications-2* SC03: *New Technologies for Smart Cities-1* SC01: *Smart Urban Planning, & Design Solutions-1*	SE03: *Cyber Security-4* SE02: *Smart Transportation System-2* SE01: *Smart Homes, Smart Hospitals, and Smart Campuses*
12:40 - 13:00	ZB1: *Zuhr Prayer-Day1*	ZB2: *Zuhr Prayer-Day2*	ZB3: *Zuhr Prayer-Day3*
13:00 - 14:20	SB02: *Cyber Security-2* SB03: *Smart Transportation System-1* SB01: *Cloud Computing Applications for Smart Cities & New Technologies for Smart Environment*	SD03: *Energy & Smart Grid* SD01: *New Technologies for Smart Cities-2* SD02: *Cyber Security-3*	SF01: *Internet of Things and Smart Applications-3 & Technology Enabled Homes and Interiors* SF03: *Smart Urban Planning, & Design Solutions-2* SF02: *Smart Transportation System-3*
14:20 - 15:25	LB1: *Lunch & Prayer Break-Day1*	LB2: *Lunch & Prayer Break Day-2*	LB3: *Lunch & Prayer Break Day-3*
15:25 - 15:30	CD-1: *Closing of Day-1*	CD-2: *Closing of Day-2*	CD-3: *Closing of Day-3*

Sunday, March 24

Sunday, March 24 8:00 - 9:00

R1: Registration

Room: S45-Zain E-Learning Center-Ground Floor

Sunday, March 24 9:00 - 9:05

OC1: Opening Ceremony: Welcoming to the 2 nd SMART CITIES SYMPOSIUM

Room: S45-101-ZaS45-101-Zain E-Learning Center

Sunday, March 24 9:05 - 9:10

OC2: Talk by His Excellency Professor Riyad Hamzah President of the University of Bahrain

Room: S45-101-ZaS45-101-Zain E-Learning Center

Sunday, March 24 9:10 - 9:25

OC3: Honouring Symposium Keynotes, by His Excellency Professor Dr. Riyad Hamzah, President of the University of Bahrain

Room: S45-101-ZaS45-101-Zain E-Learning Center

Sunday, March 24 9:25 - 9:50

KN1: Keynote Speaker -1: Smart Cities and Banking- Financial Sector

Mr. Adnan Ahmed Yousif. (President and chief executive of Al Baraka Banking)

Room: S45-101-ZaS45-101-Zain E-Learning Center

Sunday, March 24 9:50 - 10:00

SB-1: Short Break-1

Room: S45-101-ZaS45-101-Zain E-Learning Center

Sunday, March 24 10:00 - 10:25

KN2: Keynote Speaker-2: Digitization in Oil and Gas industry' Sector

Mr. Yahya Alansari (Petroleum Geologist)

Room: S45-101-ZaS45-101-Zain E-Learning Center

Sunday, March 24 10:25 - 10:50

KS-3: Keynote Speaker 3: Smart Cities .. and the Smart Home Health Care

Dr Wafa Ebrahim Alsharbati (Director of Health Promotion, Bahrain)

Room: S45-101-ZaS45-101-Zain E-Learning Center

Sunday, March 24 10:50 - 11:20

CB1: Coffee Break-1

Room: S45-Zain E-Learning Center-First Floor

Sunday, March 24 11:20 - 12:40

SA01: Internet of Things and Smart Applications-1

Room: SS45-06-Zain E-Learning Center

Public Food Project - Framework for Public Food Network for Smart Cities

Kristian Dokic (Polytechnic in Pozega, Croatia); Tomislava Lauc (Faculty of Humanities and Social Sciences, Croatia); Bojan Radisic (Polytechnic in Pozega, Croatia)

This paper provides the Public Food Network framework for smart cities. Smart cities paradigm is a kind of answer to increased human density in urban areas, while the Public Food Network framework is a kind of improvement of urban gardening. The framework is based on the idea that city governments have to enable growing fruit and vegetables in public areas so citizens could take fruits and vegetables for free. City governments do not have to invest a lot of money to achieve this goal. The provided framework is based on artificial intelligence that takes care of plants irrigation and plant disease control. Public Food Nodes that are the basis of the provided framework are based on Internet of Things technologies and standards. The project concerning the provided framework is in development phase.

Human Ethnicity Recognition Using HOG Features Under Difficult Scenarios

Sadam Al-Azani (KFUPM, Saudi Arabia); El-Sayed M. El-Alfy (King Fahd University of Petroleum and Minerals, Saudi Arabia)

With the rapid advance of people globalization, analyzing nationality, and race/ethnicity groups is a popular research topic and has multi-discipline real-world applications such as surveillance systems and targeted advertisement. This paper presents an approach to predict citizens' ethnicities based on their facial characteristics extracted from a publicly available dataset of images. Several ethnicity groups are considered in this study including: Asian, Indian, and others like (Hispanic, Latino Middle Eastern). The proposed approach extracts features based on the Histogram of Oriented Gradients (HOG) texture descriptor. Then, it trains a support vector machine (SVM) to detect ethnicity. The preliminary results are promising and will be improved in the final version.

Internet of Things and Intelligent Peltier Cold/Hot Air Conditioning system

Mohammed Majid Al khalidy (University of Bahrain & Engineering College, Bahrain)

The objective of this paper is to minimize the size of the present air conditioning system and completely ecofriendly air-condition. Where, the present air-conditioning system produces a cooling effect by refrigerants like Freon, Ammonia, etc., using these refrigerants can get maximum output but one of the major disadvantages is harmful gas emission and global warming. These problems can be overcome by using thermoelectric modules (Peltier effect) air-conditioner to protect the environment. Thermoelectric modules working under the principle of Peltier effect. The proposed air conditioner can be used as an air-cooler in summer or as a heater in winter and it will not emit harmful or toxic gases like Hydro chlortoluron carbon etc. The project is on the line with the latest technology like the Internet of Things IOT where it uses a smartphone app to make the air-conditioner easy and very convenient with today standers.

Smart Wearable Health Device for Heart Rate and Temperature Measurements

Esraa Y Salem, Menna Yousri and Mera Alfons (Maadi STEM School for Girls, Egypt)

No wonder, communication is a blessing. So, when we lack communication, there is a problem, indeed. Communication lack can be seen in many aspects, such as public health, and recycling. After having a good look, we found that in public health people suffer from lack of facilities and it may sometimes lead to death, building new hospitals isn't the right solution, but communication is. To solve both problems with a simple solution, Internet of Things (IoT) had to be involved. So, we proposed a solution, which is a WHD (wearable health device) that measures temperature and heart rate for the patient and compare them to a database, it consists of Arduino Nano wired to both LM35 temperature sensor and pulse sensor, the readings are displayed on an OLED screen, beside a mobile application called ThingView, if the readings were beyond normal an action would be taken either to contact a relative or the ambulance, depending on its severity. It would decrease the trips to hospitals. We have tested for the device's efficiency and sensor calibration, and the results were promising.

SA02: Cyber Security-1

Room: S45-108-Zain E-Learning Cente

Chair: Aisha Bushager (University of Bahrain, Bahrain)

Improving Obfuscated key Generation Phase for Secret Pairwise Vehicular Communication Sessions

Sarah Al-Shareeda (University of Bahrain, Bahrain); Fusun Ozguner (The Ohio State University, USA)

Intelligent vehicles in vehicular networks can share secret communication sessions that no outsider decrypts. The hybrid encryption of Elliptic Curve Integrated Encryption Scheme (ECIES) and the symmetric encryption of the Advanced Encryption Standard (AES) are harnessed by the existing standards to accomplish this purpose. In addition, in a previous study, we introduced a third alternative: the Boneh-Goh-Nissim-Blom (BGN-Blom) scheme for confidentializing the communication in such secret sessions. BGN-Blom generates a somewhat homomorphically encrypted keys between any two involved communicating vehicles avoiding the critical length of AES keys and the need for pre-authentication in ECIES. This work extends the original BGN-Blom model by three extra modifications that achieve similar security measures and are more cost-effective in terms of computation and communication overheads.

Secure Smart Home Using Open Security Intelligence Systems

Hani H Qusa (Higher Colleges of Technology, United Arab Emirates)

The idea of creating smart homes is not a new one, it has been around since the early 1900s. however, the need to have more automated, and sustainable smart home, requires a high dependency on the internet, which created a new challenge of information security issues in addition to physical security issues that should be solved in the recent years. In this paper, we propose a prototype of a smart home that ensures the physical and cyber security of the new designed smart home. In our design, we support the design of open system where the owner can select multi-vendor of the smart home to deploy smart services and functions at home while ensure the security using System Incident and Event Monitoring systems. Our prototype uses security intelligence to improve the responsive way to both physical and cyber security threats and risks. The requirement of the proposed system has been collected in collaboration with Dubai Electrical and Water Authority (DEWA).

Implementation cryptanalysis of AES with hash function using Labview

Raaed Khalid Ibrahim (Foundation of Technical Education & Engineering, Iraq)

This implementation method presented of Advanced Encryption Standard (AES) and Secure Hash (SHA-1) by the use of LabView environment. this work is to merge AES and SHA-1. The output of the hash function is used as an input key for AES in order to improve data security. From the algorithm of AES and SHA-1 obtained in LabView, a project showed how it is simple in modelling hashing and AES algorithms, generating hash codes and plain texts in English plain text (small and capital letters), symbols, Arabic plain text and numbers.

Evaluation of Web Application Session Security

Ahmed M. Zeki (University of Bahrian & College of IT, Bahrain); Jasim Hasan (University of Bahrain, Bahrain)

Sessions variables are widely used in web applications, almost in every web application. It has been used to keep the state of logged in or authenticated users mainly, and to monitor the number of users currently using the web application. It has other useful usage as a security feature to logout the user automatically from the web application after the session timer expires. Due to the criticality of the information the sessions holds, it is important to evaluate its security. In this paper, some types of attacks on the sessions will be listed, different ways of storing sessions on the client, and the best utilization of the sessions. The outcome of this paper is whether to recommend using session variables or not, when to be used, and for what purpose it should or shouldn't be used.

SA03: Smart Homes, Smart Hospitals, and Smart Campuses

TOP

Room: S45-11-Zain E-Learning Center

Literature Review for Videoconferencing in Court "E-Justice-Kingdom of Bahrain"

Fadheela Hussain (Ministry of Health, Bahrain); Hessa Al-Junaid (University of Bahrain, Bahrain)

This literature review addresses the increasing use of videoconferencing as it become more popular and more reliable as a tool to bridge the distance gap, avoid bringing criminal defendants to court for certain proceedings; also this technique allows children to testify through the use of this technique without facing the criminal. Unfortunately, kingdom of Bahrain's courts is lacking of such remote testimonies technology. This article evaluates the implications of using videoconferencing technology and argues against the traditional practice especially for physical or sexual abuse children as witnesses of violent acts. It brings to bear the literature from other countries, mainly of the scientific literature addresses these specific situations.The literature suggests that videoconferencing have a positive impact on the way the court is practicing the justice system. Authors argue that kingdom of Bahrains' courts should start equipped their courtroom with reliance videoconferencing tools. Furthermore, they must undertake studies to explore the impact of the technology in criminal proceedings especially for children. Additionally, the authors advocate that the courts should take serious steps to apply a well-structure of videoconferencing systems and start designing a strategic plan of training needs of those who participate in video conference proceedings. Finally, the authors conclude by stressing that courts with videoconferencing equipment can enhance the communication between children and defendants and their attorneys and enhance the quality of procedures and suggest the use of such technology in children cases as a first area of videoconferencing application in kingdom of Bahrain courts.

The Smart Mosque of the Arabian Gulf: Solutions from the past for a sustainable, energy-efficient Mosque

Haifa Al-Khalifa (University of Bahrain, Bahrain)

This study examines the smart mosque as a concept, developed through innovations in materials and technologies adopted to provide thermal comfort conditions and energy- efficient environments, in order to promote a sustainable mosque. The paper first provides a theoretical underpinning of the smart solutions applied in historical mosques with a critical review of its philosophical and practical framework. Second, it will examine the efforts made by the Gulf states authorities in the last decade to pursue smart mosque projects in the region, by reviewing a number of possible smart solutions which can be applied to the mosques in order to achieve sustainability in design. Although this concept is relatively new, this paper will argue that there are many historical mosques in the Arabian Gulf, in addition to many examples drawn from the various Islamic regions, that responded to the prevailing environmental conditions, within the technological and scientific advancement at the time, and had the 'smart design concept' rooted in its design through its architectural and interiors programs.

Launching Smart Cities to Support the Economic Diversification in the GCC Region

Abdelmohsen Desoky (University of Bahrain, Bahrain); Gehan Abdel-hady Mousa (University of Bahrain, Bahrain & College of Business Administration, Egypt); Elsayed Elamir (University of Bahrain, Bahrain)

This study seeks to explore the initiatives of the Gulf Cooperation Council (GCC) countries to launch smart cities through developing a framework of smart cities consisting of five pillars namely: infrastructure, health and primary education, technological readiness, innovation and finally, macroeconomic environment. These five pillars are measured using data collected from the Global Competitiveness Report over ten years from 2009 to 2018. Concerning the first pillar, the infrastructure pillar, the results show that the GCC countries achieved a global advanced rank among 138 countries although there is a relative stability in the trend of the rank of the GCC countries during the study period from 2009 to 2018. However, the results reveal that there is an improvement in the rank of the GCC countries in two more pillars which are macroeconomic environment and health and primary education during the study period. Concerning technological readiness and innovation pillars, the GCC countries achieved significant improvement and progress in the trend of their global rank among 138 countries in the world. Furthermore, there is a rapid increase in the GCC countries in adopting modern technology. Finally, it can be argued that the GCC countries have initiatives and basic foundations to launch smart cities.

Design of smart home based on ESP 8266 arduino

Abdallah Zerroug (Ferhat Abbas University & Sétif Ferhat Abbas University, Algeria)

In this study research project, it has been decided to avoid the traditional approaches of theories when it comes to systems to adopt a more modern and unorthodox methods throughout applications and applied experiences. In this experimental project, a multidisciplinary fields were involved to build up this smart model. Basic scientific knowledge from different fields such as general electronics , power electronics, software programs algorithms and simulation has been used in the preparation of the model The aim of this project is to participate in making the daily life inside and outside of the house more comfortable by using new technologies. For example, the user may protect their house using a cell-phone application, opening and closing of doors and lights. Using an android application that allows users to control and manage their house on an international level using the internet web instead of the traditional national method (using GSM).

Sunday, March 24 12:40 - 13:00

ZB1: Zuhr Prayer-Day1

TOP

Room: S45-Zain E-Learning Center-First Floor

Sunday, March 24 13:00 - 14:20

SB01: Cloud Computing Applications for Smart Cities & New Technologies for Smart Environment

Room: SS45-06-Zain E-Learning Center

Scalable Parallel SVM on Cloud Clusters for Large Datasets Classification

Ghazanfar Latif (Prince Mohammad bin Fahd University, Saudi Arabia); Md. Arifuzzaman (University of Bahrain, Bahrain); Md Rafiul Hassan (King Fahd University of Petroleum and Minerals (KFUPM), Saudi Arabia); Md Sarwar Morshedul Haque (King Fahd University of Petroleum and Minerals, Saudi Arabia); Sakib Shahria (Lecturer, Saudi Arabia); Quazi Rahman (BUET, Bangladesh)

A support vector machine (SVM) is a supervised learning methods that analyzes data and recognizes patterns, which is used for classification and regression analysis. For testing and training of SVM using a multidimensional large dataset requires a lot of computing resources in terms of memory and computational power. In this paper we propose a scalable and cost-effective technique for training support vector machine in parallel on distributed cloud cluster nodes which reduces memory requirements and computational power. We divide the datasets in to n equal parts and process each dataset on distributed cluster. We combine produced support vectors (SVs) of all the clusters nodes onto master node and apply another SVM where the inputs are the SVs. We tested our solution on different datasets available online by using the local single node machine, High Performance Computing (HPC) clusters and Amazon Cloud Clusters and compared the performance of our proposed method with the single SVM in term of efficiency and accuracy. Our experimental results show that the proposed method is very efficient in terms of training time as compared to the existing stand-alone SVM and it classifies the datasets correctly with minimal error rate.

Evaluation of Bayesian Classifier for Salt Dome Detection in Seismic Data using Texture analysis

Galal M. BinMakhashen (King Fahd University of Petroleum and Minerals, Saudi Arabia); Hamzah Luqman (King Fahd University of Science and Technology, Saudi Arabia); Moataz Ahmed (King Fahd Uni. of Petroleum & Minerals, Saudi Arabia)

Seismic data analysis is an important operation to the oil and gas industry. Due to seismic published data scarcity, previous studies have relied on single seismic data source for method validation. Up to our knowledge, it is rarely found in the literature a study that uses two or more datasets to validate a machine learning model generalization to new seismic data. In this study, we investigate texture-based seismic data analysis using machine learning to recognize salt-domes. Three texture feature extraction methods are used; Gray-level co-occurrence matrix (GLCM), Discrete Cosine Transform (DCT) and Log Gabor filter bank. Moreover, this study tests statistically a machine model generalization. Our experiments show that using Log Gabor features, the trained model may distinguish salt-domes in testing data perfectly. On the other hand, testing a trained model on new datasets usually produced unacceptable results.

Designing of an immaculate smart city with cloud based predictive analytics

Nandita Sengupta and Ramya Chinnasamy (University College of Bahrain, Bahrain)

The major objective of a smart city is to provide ripest and rightest services to its residents with minimal human intervention. The data collected from various sensors, receptors and receivers can be stored in a reliable, cost effective and manageable cloud storage. Predictive analytics such as predictive modelling and machine learning can be used to analyze the latest and past data from the cloud to forecast the near and far future. The predictive analytics will immediately send notifications and the appropriate actions to be taken to the concerned system so that the residents can get equable life. Waste management such as sewage management and trash management are one of the major exertion in a smart city. In this paper, predictive analytics is applied on the cloud data collected from various sensors attached on the waste management resources such as trash bins and sewage pipes. Firstly, group of trash bins and sewage pipes are attached with radio wave sensors which in turn connected to an IoT enabled receiver to provide cost effective data collection. Secondly, the data from the receivers are stored in a cloud. Thirdly, predictive analytics are proposed for applying on the data in the cloud. Finally, actions like redirecting the trash collection truck and sewage clearing robot based on the priority can be done automatically and long term actions can be directed to the concerned authorities with notifications and alerts to take necessary actions. In this paper, designing of an immaculate smart city is proposed which can be achieved by developing IoT based trash collection and sewage cleaning system.

Magneto-Caloric-Effect-Based Static Cooling System

Zouhir Bahri (University of Bahrain, Bahrain)

This research aims at building a static cooling system that utilizes the magneto-caloric characteristics of Gadolinium. The proposed technique presents itself as an attractive choice for smart cities and a better alternative to the vapor-compression-based cooling systems used in the industry today. With its electromagnet-based novel static design feature, the system does not use any refrigerant or moving parts (except for valves), hence featuring environment friendliness, suppression of vibration, noise as well as wear-out, extended lifetime, and eventually reduced cost. A novel cycle of operation was tailored in order to accommodate the usage of an impressively compact custom-designed 0.45T electromagnet as the source of magnetic field, hence omitting the usual need of rotating machines. Computer simulations, estimated the system to deliver about 2 degrees of cooling from an ambient 20.4 degree Celsius to 18.68 degrees; and in heating mode, about 3 degrees of heating, from 20.4 to 23.33 degree Celsius. The experimental testing resulted in errors around 40 % in cooling mode and 65 % in heating. By using more efficient composite magneto-calorific materials (eg. LaFeSi), the merits of the proposed cooling system become more apparent contributing to the quiet, sustainable, and healthy environment characterizing smart cities.

SB02: Cyber Security-2

Room: S45-108-Zain E-Learning Cente

BlockChain Security Architecture

Latifa Mohammed AL-Abbasi (University of Bahrain & Information and eGovernment Authority, Bahrain)

Blockchain, the new trending revolution innovation that leverage business process and data sharing, by eliminating the centralization or intermediates. The technology has been attracting huge attention and many organizations welling to adopt. The decentralization, security immutability, data sharing and other blockchain advantages that have been explored. Decision makers needs to understand all potential risks to the blockchain technology to take the right decision for their business and users. The aim of this research is to study the blockchain technology Platform architecture, the security strength and weakness of the technology, how the technology addresses the information security key areas, Integrity, Availability and congeniality. The research also will try to demonstrate some proposed solution to improve the blockchain security

Privacy and Security Challenges in Smart Cities

Kahkashan Tabassum and Dr Sahar El Rahman (Princess Nourah Bint Abdulrahman University, Saudi Arabia)

The smart cities development is expected to enhance the quality of life within cities and countries. These will create huge pervasive interconnection of resources for digital data transmission thus providing increased accessibility and effective and efficient connectivity in cities. This enormous ubiquitous network of cities must authorize access through privacy and provide security in order to ensure civilian participation in a city or a country. It must also ensure advantages and benefits are provided to the individuals of a city. This research paper is an attempt to identify smart city challenges and present solutions make the digital data transmission to facilitate services to its individuals. Few challenges related to smart cities are data privacy, network security preservation, to create methods to trustworthy data sharing, utilizing advance technology features via smart communication network.

Centralized IoT Manager for Securing Vulnerable Home Based IoT Devices

Farooq Pervaiz Ali Baksh (University of Bahrain, Bahrain)

The rise in technology leads to the appearance of newer threat vectors for the cyber criminals. One such threat vector is attacking vulnerable IoT devices. The security related issues with the IoT devices has been, lately, a huge concern for the academics and manufacturers alike as the individuals possessing the IoT devices are constantly under attack from the cybercriminals who are targeting their devices because of lack of security. This has prompted various researches in the field of IoT security. This journal paper aims to view the challenges faced in the security of IoT devices and propose a centralized framework for IoT security. The framework set will be a foundation for future works in regard to communication and security for the IoT devices.

Architecture of IOT Security

Hamad Younis Ali Mohamed Abdulrahman (UOB, Bahrain)

With the fast advancement in Technology, it started to get in every aspect of our lives. Especially that devices are getting smaller, low power consuming and connects to the internet with other things all the time thus internet of things are created. With these devices a number of risks in term of security and to privacy are immerging, especially with data becoming so valuable for spying or profiting. This paper will explain privacy, its aspect and meanings to obtain a clear definition of types and ways privacy is invaded or violated. A number of laws in regard to information and data privacy, and example of old and recent court cases with corresponding rulings. The different Layers of IoT security architecture available and description in aim to protect the Availability, confidentiality and integrity of IOT devices, beside a few suggested areas that need to be considered or addressed. Types of data and information that can be collected, aspects and attacks to IoT devices and solutions recommendation.

SB03: Smart Transportation System-1 TOP

Room: S45-11-Zain E-Learning Center

MPC Track Follower for Self-Driving Cars

Wael Farag (American University of the Middle East, Kuwait)

In this paper, a comprehensive Model-Predictive-Control (MPC) controller that enables effective complex track maneuvering for Self-Driving Cars (SDC) is proposed. The paper presents the full design details and the implementation stages of the proposed SDC-MPC. The controller receives several input signals such as an accurate car position measurement from the localization module of the SDC measured in global map coordinates, the instantaneous vehicle speed, as well as, the reference trajectory from the path planner of the SDC. Then, the SDC-MPC generates a steering (angle) command to the SDC in addition to a throttle (speed/brake) command. The proposed cost function of the SDC-MPC (which is one of the main contributions of this paper) is very comprehensive and is composed of several terms. Each term has its own sub-objective that contributes to the overall optimization problem. The main goal is to find a solution that can satisfy the purposes of these terms according to their weights (contribution) in the combined objective (cost) function. Extensive simulation studies in complex tracks with many sharp turns have been carried out to evaluate the performance of the proposed controller at different speeds. The analysis shows that the proposed controller with its tuning technique outperforms the other classical ones like PID. The usefulness and the shortcomings of the proposed controller are also discussed in details.

Smart Emergency Response System for Road Accidents with Automatic Accident Detection

Lokesh Sharma, Sumit Srivastava, Aditya Shubham, Ankan Deogharia, Ajay Bundela and Anurag Chaturvedi (Manipal University Jaipur, India); Ayush Kshitij (Delhi Public School Varanasi, India)

Almost four hundred people lose their lives per day in road accidents in Indian subcontinent alone [1]. We know that the first few minutes play a vital role in deciding the fate of the victim involved in the accident. The Emergency Response Support System (ERSS) around the world are now improving their infrastructure to find the accurate location of the distress call. On the other hand, sometimes it is not possible for the victim to call the emergency services. Till now, most of the accident detection and response mechanisms focused on using specialised hard- ware solutions to detect the crash with a few exceptions. This paper presents a novel way of detecting road accidents through a smartphone that avoids false positives and works in most of the road accidents involving four-wheelers along with its prototype working on Android Smartphones.

Smart Traffic Sign Boards (STSB) for Smart Cities

Devershi Pallavi Bhatt (Manipal University Jaipur & Manipal University Jaipur, India); Manish Tiwari (Manipal University Jaipur, India)

Ubiquitous nature of smart cities requires multiple technologies to be implemented in this area. To develop the smart cities in practice there is huge need of "Smart Traffic Management". Smart traffic management is a system to monitor and control the traffic signals using sensors to regulate the flow of traffic and to avoid the congestion for smooth flow of traffic. Prioritizing the traffic like ambulance, police etc. is also one application comes under smart traffic management. Traffic sign board also plays important role to make the traffic in shape and control and manage the traffic on roads. The driver miss the sign boards while driving due to various reasons like insufficient light, fog, rain, traffic etc. In this paper, a framework of the smart sign boards is proposed, which can communicate with the system deployed in all the vehicles to make the drivers of those vehicles aware of speed breakers, speed limits, schools, or 'U' turn ahead, etc. before hand to avoid the mishap due to sudden appearing of such unusual features of the road during the road journey.

Machine Learning Based Model for Traffic Prediction in Smart Cities

Fatimah H Alshamrani, Hajra Syed and Mariam Elhussein (Imam Abdulrahman Bin Faisal University, Saudi Arabia)

A smart city can be defined as a city that uses distributed sensors to monitor and control the urban environment by collecting real-time information. Using such smart devices improves the quality of living and facilitates the process of decision making. Smart cities provide solutions to environmental issues such as amount of wastage, energy consumption, traffic congestion, and pollution. The traffic issue is a one important concern in any city due to the increasing number of populations using vehicles which lead to traffic congestions, accidents, and delays. Traffic issues can also cause a high level of pollution and fuel consumption. To solve such issues, roads should be managed by monitoring, analyzing and predicting the traffic flow. In this research, we propose a machine learning based model for traffic flow prediction in smart cities, particularly in the context of "NEOM" megacity that is born from Saudi Arabia's vision of 2030. The proposed model combines previous methods of traffic prediction to produce robust traffic prediction model that can be used in NEOM megacity to achieve better traffic management.

Sunday, March 24 14:20 - 15:25

LB1: Lunch & Prayer Break-Day1

Sunday, March 24 15:25 - 15:30

CD-1: Closing of Day-1

Monday, March 25

Monday, March 25 8:00 - 9:00

R2: Registration-Day2

Room: S45-Zain E-Learning Center-Ground Floor

Monday, March 25 9:00 - 9:25

KS4: Symposium Keynote Speaker-4: Smart Cities and Home Cares Sector

Mr. Mohamed Yousif Al-Binfalah (Chief Executive Officer of Bahrain Airport Company (BAC))

Room: S45-101-ZaS45-101-Zain E-Learning Center

Monday, March 25 9:25 - 9:50

KS5: Keynote Speaker -5: Smart Cities and Inspec Analytics, The IET Publishing Sector

Awni Battikhi

Room: S45-101-ZaS45-101-Zain E-Learning Center

Inspec Analytics provides a dynamic new solution for engineering professionals, librarians, researchers and students to dig deeper into the connected networks of scientific research, derive new insights and identify trends and patterns which were previously locked away.

Monday, March 25 9:50 - 10:00

SB-2: Short Break-2

Room: S45-101-ZaS45-101-Zain E-Learning Center

Monday, March 25 10:00 - 10:25

KS6: Symposium Keynote Speaker-6: Smart Cities and Cyber- Security Sector

Hakem Isa (Associate Partner at IBM Austin, Texas Part of the IBM Security Services with FOCUS on Security Strategy, Risk and Compliance Texas, UAS.)

Room: S45-101-ZaS45-101-Zain E-Learning Center

Monday, March 25 10:25 - 10:50

KS7: Keynote Speaker 7: Smart Cities and Home Cares Sector

Dr. Mohamed Bouri (co-PI) Adjoint scientifique Group Leader,

Room: S45-101-ZaS45-101-Zain E-Learning Center

Monday, March 25 10:50 - 11:20

CB2: Coffee Break-2

Room: S45-Zain E-Learning Center-First Floor

Monday, March 25 11:20 - 12:40

SC01: Smart Urban Planning, & Design Solutions-1

Room: SS45-06-Zain E-Learning Center

Chair: Abdulla Alqaddoumi (University of Bahrain, Bahrain)

Sustainable smart urbanism indicators in Bahrain

Fay Al khalifa (University of Bahrain, Bahrain)

Today, the majority of the world's population lives in cities. The damaging effect of urbanization on the environment is undeniable, and various technological advancements are developed to address such problems. Sustainable and Smart Urbanism is, thus, emerging as an important topic within the international research scene. This study investigates the interrelationship between the two concepts of "smart urbanism" and "sustainable urbanism" within the Bahraini context. The research examines the definitions, targets and indicators of the two concepts in relation to the goals of the Bahraini Government Plan of Action (GPA) and the country's urban sustainability reporting practices. The study results in recommendations to incorporate Sustainable Smart Urbanism Indicators to the GPA to improve the country's response to the global Sustainable Development Goals (SDGs). The results further suggest using a domain-based indicator framework to report on Sustainable Smart Urbanism and to create different groups and formats for the indicators to serve scientists and the general public, in addition to policymakers.

Smart Solutions and Architectural Design: a framework for building service systems' design

Wael Abdelhameed and Weldy Saputra (University of Bahrain, Bahrain)

In our digital age, the technology applications have been influencing all aspect of our life, and extending this effect to the way in which our professions are performed. Our goal of having smart cities is associated to the methods that govern our work. Smart design solutions have become essential part of the architectural design process in general. The digital media and the computer use have made their own importance and way inside the conventional ways of designing and thinking, to the extent that the digital design methods become inevitable. This paper investigates how building service systems can be successfully integrated in the architectural design and how the new digital methods used in the design process can benefit both the design of building service systems and the architectural design itself. The literature review covers the methods used to coordinate all building service systems. The paper methodology is to synthesize the extensive literature review as well as the data collected and analysed from the construction industry. Based on this basis, the paper proposes a framework of integrating the design of building service systems into the conceptual phases of architectural design, in order to avoid or detect any clashes or conflicts.

Smart Sustainable Neighbourhood Design: A Prototype for Bahrain

Fatima Nickahdar and Fay Al khalifa (University of Bahrain, Bahrain)

The harm caused by the inefficient designs of contemporary cities to the environment is abysmal. Demands for new cities continue to rise due to the growing global populations. The literature discussed the increasing harm caused by such growths on the environment and their negative impact on the physiological and psychological health of urban inhabitants. Can urban developments be designed as smart, dense and overall sustainable environments to enhance the inhabitants' quality of life (QoL) and encourage sustainable behaviours? This research attempts to answer this question by proposing a prototype for a smart, sustainable neighbourhood in Bahrain. The study uses LEED guidelines for neighbourhood development along with the concepts of smart cities to design the neighbourhood prototype. The research focuses on finding solutions to the current urban challenges faced at the neighbourhood scale in Bahrain. Those include the increasing populations, environmental harm and the negative social behaviours. The prototype presents a sentient architecture model that utilises technology to monitor and control the physical environment. The design introduces a new urban model where people's consciousness plays an essential role in maintaining sustainable behaviours and encouraging responsible actions.

The Role of Makerspaces and Smart Citizens in Shaping Bahrain as a Smart City

Nehal Ali Almurbati (University of Bahrain, Bahrain)

The industrial revolution and the technology race had engaged people in the development process of their own cities and spaces through makerspaces. Consequently, the maker movement in Bahrain started a decade ago but not yet empowered to take part in the economic development of Bahrain as a smart city due to several reasons discussed here. Interviews with 'makers' and experts along with observation of makerspaces around Bahrain helped in concluding the reality of these spaces and their potentials. The paper proposes a development plan and framework to better empower makerspaces and utilise the innovative potentials of local communities in harmony with Bahrain's Economic vision 2030.

SC02: Internet of Things and Smart Applications-2

Room: S45-108-Zain E-Learning Cente

Chair: Youssef Harrath (University of Bahrain, Bahrain)

Multi-Positions Control Using Smartphone

S Ali Al-Mawsawi, Mohammed Almakana and Fatima Alansari (University of Bahrain, Bahrain)

Engineering is of a great benefit in humans' lives. Engineering helped in the creation of technologies that are used to serve the society, making and the lives of individuals easier. Through applying the developed technologies such as the Smartphone, the objective of this paper is to connect the electric devices with the Smartphone to facilitate the control of machines that can serve humanity and their rapidly developing needs. This connection circuit is designed by using Arduino Uno, Raspberry pi 3 model B, driver, and two types of converters - buck converter and the Rx, Tx build-in converter. The Arduino Uno is central to the system used in the paper, as it is the main piece that controls all the motors and the arm. Whereas the Raspberry Pi 3 model B is important for the functioning of the application, which is further used in the Smartphone to send serial to the Arduino Uno. In addition, the Raspberry camera has been connected to the Raspberry Pi 3 model B in order to administer the whole process of the system used. Moreover, the drivers are used to essential in the functioning of the motors and regulate their directions. In regards to the converters, the Rx, Tx converts the voltage level between the two microcontrollers that have been used in the system - the Arduino Uno and the Raspberry Pi 3 model B. On the other hand, the buck converter has been used to reduce the DC voltage. Overall, this system

can be applied on a CNC machine that works as an auto store - "take the stuff to store it and give us the stock". Finally, the cost of implementing such a system is reasonable, and in regards for the design, it is a reliable and easily applicable design, regardless of the few challenges that appeared along the way.

mmWave Technology: An Impetus for Smart City Initiatives

Sanjiv Jaswal (Manipal University Jaipur, India); Devershi Pallavi Bhatt and Dinesh Yadav (Manipal University Jaipur & Manipal University Jaipur, India); Manish Tiwari (Manipal University Jaipur, India)

The sub 6 GHz bands are vastly congested in many communication and non-communication applications and in the future environment of Artificial Intelligence and IoT enabled devices will feature in many ways for development of cities with inherent security features and for monitoring of resources which are getting scarce with the rapid urbanization and migration of population to these centers. Networks will require to meet exclusive requirements of spectrum with complete user satisfaction demanding improved network efficacy and its ability to meet increased demands and capacities in enclosed spaces with dense inhabitation. Cities will need to induct and adapt technologies for monitoring resources viz water, energy, monitor movements of goods and assess security of people while ensuring that the quality of life is maintained below the threshold of human interference. In such an environment of the future 5G networks and communication systems, devices such as sensors in this region of the spectrum will assume importance as it inherently provides large bandwidths, efficient spectrum management for deployment of pico-nets over small community areas. The deployment of 5G network will provide a high speed low latency network on which Intelligent Transport Systems can be fielded for accident avoidance and mitigation of traffic congestions and making smart city functions fairly autonomous. Further it is relatively easier to sense range, velocity and angle of detection with great accuracy and also provide the robustness for continuous operation for various indoor and outdoor applications. In all these features a large array of sensors deployed will need constant and accurate data flow which will be feasible on future 5G networks based on mm Waves. The paper aims to identify the areas in which mm wave spectrum and devices can be gainfully utilized in the backdrop of smart cities of the future.

Towards A Cloud oriented Technological Reference Model of Bahrain

Ehab Juma Adwan (University of Bahrain, Bahrain)

Reference architectural models are coherent representations of the existing interrelatedness between homogeneous or heterogeneous groups of actors, information systems, and infrastructural technologies in complex business domains. The smart city domain should embrace a reference architectural model which integrates the existing coherent capabilities of the operating applications, and technological infrastructure, along with their relevant Business actors. Limited reference architectural models were proposed for smart city purposes. However, they lacked coherency, practicality, or quality. This paper enhances the previously proposed Bahraini Smart City- Technological Reference Architectural Model (BSC-TRAM), at which it considers a cloud business operating environment based on the insights of federal enterprise architecture framework. The newly generated BCSC-TRAM is developed based on multiple collected data sources including, literature review and previously carried out interviews and website content for the Bahraini public, semi-public, and private institutions.

Alliancing between the documenting and the renovation of historical buildings in accelerating economic growth in Bahrain

Islam Hamdi Elghonaimy (University of Bahrain & Alexandria University, Bahrain)

Bahrain is gifted with numerous cultural relics, thanks to its ancient civilization. No question, the worth and significance of these relics are acknowledged by virtue of the wide number of archaeological expeditions targeting Bahrain in respect of their multifarious missions. These expeditions have uncoated that Bahrain is rich with historic buildings and sites. These sites have proved to be worth preserving, for a grand summation of which dates back to 3000 years ago [1]. With the era of Smart Cities and the fast development of Engineering Concepts, IT and ICT sectors, a new-fangled conception has come to surface, absorbing a substantial attention for a while. Older buildings and historic sites have special needs, so to help the economy to find the right materials to illustrate probably its value [2]. Seeking economic advantage and historical legacy, it has been urgent to promote the concept of Smart Cities using the high level of documenting technology; as demonstrated in this research. This technology employs advanced techniques and data beforehand, to safeguard the sustainability and prosperity of the named cities, which will ameliorate a wide number of sectors in Bahrain. Alliance between the documenting and the renovation of historical projects in accelerating economic growth in Bahrain. Alliancing between the documenting and the renovation of historical projects has positive impacts upon social and environment, which influence positively the economic in Bahrain. In the era of smart technology, the proposal of alliancing between the modern technology in documenting and the renovation of historical projects is illustrated in the research. With the flourish of the manifold usages of computational technology; Smart implementation has been employed in drafting and documenting architectural images; Victor and Raster Images, data collection and retrieval; data base, saving and editing photos for authentication purposes; Photo Finish. The research discusses the application of the new series of programs have emerged such as Multimedia Design and management programs in documenting the renovation progress. Authoring Multimedia and the use of these smart systems will be varying between projects and other. Moreover, the research end with presenting guidelines in documenting the historical building to maximizing economic growth issues in Bahrain.

SC03: New Technologies for Smart Cities-1 TOP

Room: S45-11-Zain E-Learning Center

Evaluation of RDF metadata representation approaches in a distributed storage

Mouad Banane (University Hassan II, Morocco); Allae Erraissi (Hassan II University & Faculty of Sciences, Morocco); Abdessamad Belangour (University Hassan II, Morocco)

Experimentation and evaluation of RDF stores on the queries aspect in a context of representation of the provenance / temporal relations. Typically, we represent these metadata using RDF reification or named graphs. Recently, new approaches have emerged: singleton property [1] and RDF * [2]. And with the evolution of RDF data volumes, RDF stores are moving from a centralized architecture to a distributed architecture. In this article we present an evaluation of different RDF stores using these 4 approaches. This work consists of evaluating these approaches on different RDF stores. The experiment done makes it possible to highlight the most effective method on a given RDF. And also highlight the most effective RDF Store on the same approach.

Survey of using Mobile Cloud Computing in Education

Ahmad Alalawi (University of Bahrain, Bahrain); Alauddin Yousif Al-Omary (University of Bahrain & University of Bahrain, Bahrain)

The new technology called the Mobile cloud computing (MCC) is growing quickly, now used by many organizations, due to its dynamic scalability through the Internet. E-Learning is a model of learning that can benefited from MCC. To implement it in education E-Learning required hardware and software resources. Many of educational organizations investing in using the mobile cloud computing and they publish their education materials using the cloud. Hence, the education sector can benefit using the cloud due to its advantages in reducing the cost of hardware and software and students can access data from anywhere and at any time. This paper presents a literature review of mobile clouding computing, especially in the education field. This paper also focusses on the positive effect of using a mobile cloud computing in education and how can be augmented using intrusion detection system to overcome security challenges. The importance of MCC come from its ability to implement future smart education

Proposed Model for Efficient Bandwidth Utilization

Deepti Mehrotra (AMITY School of Engineering and Technology & Amity Univerisity, India)

Bandwidth is one of the major concern in developing a smart city where all devices need a mode of communication. TCP Protocol Suite is the major need for the time being's Internet. The exponential growth in the usage of web can be easily observed. The TCP suite has numerous arrangement deficiencies so far as Bandwidth use, Exchange Speed and congestion over network are concerned. The paper discusses the packet re-transmission issues related to the connection-oriented techniques in the Transport Layer. Along these lines, a model is proposed by taking examples from the real-time scenario for the analysis of the existing and proposed model to overcome the shortcomings and diminishing congestion in the network when contrasted with the current convention. Likewise, the model is thought about based on time and space complexity to the current strategies that is coming about as O(m) as opposed to O(m2) in time-space which is the best that can be accomplished.

A Review Paper on Batteries Charging Systems with the State of Charge Determination Techniques

Abdelhamed T. Mohamed (King Fahd University of Petroleum and Minerals, Saudi Arabia)

This paper proposed a comprehensive literature review on batteries and up to date techniques for charging methods. In addition, a state of art in the State of Charge Estimation Techniques have been introduced. With rising development of EVs, the research on batteries and its parameters had increase, and hence come the importance of this paper

Sustainability and GIS application in operating smart Campuses in the Smart Cities

Islam Hamdi Elghonaimy (University of Bahrain & Alexandria University, Bahrain)

A university campus designated, to serve various ends. Each is regarded; as a microcosm of an entire city homing the whole sum of the academic buildings of the entitled university. It is outlined, to encompass a central library, an educational hospital, different types of buildings and land uses. Regularly, university has unique facilities and introduce different services and facilities. No question, these facilities are aided by efficiently designed roads and housing services, to satisfy the users of the campus (students, employees and academic staff members' needs equidistantly). Moreover, these adjustments stipulate fortifying the enlisted facilities with an abundance of social services, public utilities; commercial services, infrastructure networks, plants and many other logistic services initial for an ideal human life existence. Nevertheless, there are cases of conflicts and contradicts that occurred in misusing organizing the maintenance which consequently leftover country resources. Therefore, there is a need to design smart system to manage the cooperation between university resources and to manage and control the operating and running of the university campus. Thusly, there has been an urgency, to develop an accurately designed system, for an effective university campus management. A meticulous, intact and most importantly trusted management should be authorized, to run such projects. This research casts a light on the GIS positive contribution in spatial data synchronization to non-spatial data, where both are documented for an efficient implementation and maintenance processes, ruling out the least probability of their overlapping; especially after the revolutionary progress of computational programing services. Introducing the proposed prototype of using modern technology of GIS in producing interactive e-controlling system for university campus.

Monday, March 25 12:40 - 13:00

ZB2: Zuhr Prayer-Day2 TOP

Room: S45-Zain E-Learning Center-First Floor

Monday, March 25 13:00 - 14:20

SD01: New Technologies for Smart Cities-2 TOP

Room: S45-11-Zain E-Learning Center

Advanced Composite Materials for Corrosion Free Infrastructure Construction

Md Shah Alam (University of Bahrain, Bahrain); Amgad Hussein (Memorial University of Newfoundland, Canada); Md. Arifuzzaman (University of Bahrain, Bahrain)

The corrosion behavior of steel reinforcement is a major concern for modern reinforced concrete infrastructures. Fibre Reinforced Polymer (FRP) reinforcement might be proposed as an alternate solution to this problem. This paper investigates the structural performance of FRP and steel reinforced concrete beams. The test results revealed that FRP reinforced beams showed parallel behavior to those of steel reinforcement beams. Before cracking, all beams exhibited identical behavior. However, after cracking the deflections of the beams increased with decrease in the axial rigidity of the reinforcement. The flexural rigidity varies linearly with the axial rigidity of the reinforcement. Also, the normalized shear capacity of the beams was found to be linear with cubic root of the axial rigidity of the reinforcement. Consequently, it can be said that the FRP reinforcement might be used in lieu of steel reinforcement for infrastructures where corrosive behavior is a concerned problem.

Smart City: A Review of Maturity Models

Batool Mohsin (University of Bahrain, Bahrain); Hayat Mohamed Abdulla Ali (, Bahrain); Reem AlKaabi (University of Bahrain, Bahrain)

Smart City is an emergent strategy and solution for the urbanization problems and the investments in its worldwide market are rapidly. However, the Smart City maturity model is discussed in very few scientific research papers and it is uncertain whether the existing maturity models can fulfil their proposed objectives. Also, there is a limitation in determining the next future level and providing a guidance to progress between the maturity levels. The objectives of this paper are to a) review the Smart City Concept b) identify and compare between the existing smart city maturity models using Pöppelbuß & Röglinger's design framework c) create consciousness towards the need for comprehensiveness when developing a maturity model.

Web and Mobile Applications' Testing using Black and White Box approaches

Zahra AbdulKarim Hamza (University of Bahrain, Bahrain); Mustafa Hammad (University of Bahrain & Mutah University, Bahrain)

Web and mobile applications become heavily used for different purposes. Such software applications need to be tested with different techniques and methods to make sure of its quality. In this paper, using test-key factors, we surveyed some of the current testing techniques and tools, which are based on black and white box approaches. This survey helps the software developers to choose the right testing approach and methodology to use in web/mobile applications testing.

Using of GPUs to Enhance CMS Event Detection: Current Challenges and Future Prospective

Abdulla Subah (University of Bahrain, Bahrain); Ahmed M. Zeki (University of Bahrian & College of IT, Bahrain); Abdulla Alqaddoumi (University of Bahrain, Bahrain); Mustafa Hammad (University of Bahrain & Mutah University, Bahrain)

The Compact Muon Solenoid (CMS)is a physics experiment held at the European Organization for Nuclear Research (CERN). CMS main role is to detect the events generated by colliding particles in the Large Hadron Collider (LHC). There are around 40 million collisions per second in the LHC, each collision generates billions of events. From each collision, CMS hardware and software events triggers are responsible of selecting the most interesting events with 1 kHz acceptance rate. Future upgrades to the detector will increase the number of selected events by at least seven times. This poses a major computing challenge. This paper discusses this challenge by exploring the current CMS data acquisition and triggering system and future upgrades. Its objective is to locate an opportunity to improve the current system. After going through some of the literature that covers the topic, the paper propose the use of General Propose Graphics Processing Units (GPGPUS) and Parallel Computing techniques as an opportunity to overcome this challenge.

SD02: Cyber Security-3

TOP

Room: SS45-06-Zain E-Learning Center

A novel approach to mitigate IoT Gateway disconnectivity using fallback mechanism

Hardik Tarpara and Jaidip Kotak (Gujarat Forensic Sciences University, India); Jatan Mahesh Pathak (Gujarat Forensics Sciences University, India); Yogesh Ashokbhai Chudasama (Gujarat Forensic Sciences University, India)

In the architecture of Internet of Thing(IoT), gateway plays a critical role which provides end node connectivity with the data center or the edge IT services. The central infrastructure provides commands or necessary data to the gateways or vice-versa to drive particular IoT application. However, this scenario require continuous availability of server and data center for smooth functioning of the IoT system. Any attack or deployment mistakes on server or data centers may keep gateway starving for commands to be pushed to end nodes. This kind of scenario are critical to handle in Industrial IoT because it deals with the critical infrastructure. In this paper, we are providing a fallback mechanism which can be incorporated within the IoT gateway to handle such disconnectivity issues with the central data server or IT Edge services to minimize the damage that can be caused by the critical end nodes.

Cyber-security: Future challenge for a safer and secure smart city

Akhil jabbar Meerja (Vardhaman College of Engineering & Vice chair IEEE Computer Society Chapter IEEE Hyderabad Section, India); Rajanikanth Aluvalu (Vardhaman College of Engineering, India)

Smart city is the integration of traditional infrastructure and modern technologies. With the increase of ICT, the extent of cyber attacks has increased. Smart cities are more prone to cyber attacks due to number of connected devices, and attacks are becoming more complex and are sophisticated to identify. Bahrain is investing heavily in the ICT infrastructure. In MENA Bahrain Ranked 1st in ICT readiness and adapting emerging technologies. The Kingdom as well as the overall region is a great target to many cyber attackers worldwide. In this paper, we provided a detailed overview of various cyber attacks, vulnerabilities and the solutions need to be taken to handle cyber attacks

A compartive analysis on security of MQTT brokers

Jaidip Kotak, Anal Sanjaykumar Shah, Ayushi Manishkumar Shah and Palak Harish Rajdev (Gujarat Forensic Sciences University, India)

In the era of rapid revolution of Internet of Things (IoT), the security of IoT devices as well as its application protocols has become significant. MQTT(Message Queuing Telemetry Transport) is a light weight protocol used for communication between IoT devices. It is being extensively used in a low bandwidth environment (e.g. smart cities, home automation,etc.). There are multiple vendors for clients and brokers which are used for publishing/subscribing to topics and which act as an intermediate server respectively. As different brokers are developed by different developers and so it may have different implementation flaws which impact the security of the communication between IoT devices in various ways. In this paper, we analyze the various brokers available on internet from security point of view by performing attacks on the broker, compare the outcomes and try to find out the least vulnerable broker that can be used for secure communication between IoT devices.

SD03: Energy & Smart Grid

TOP

Room: S45-108-Zain E-Learning Cente

Loss of Load Expectation Calculation for Power Plant

Isa Salman Qamber (UOB, Bahrain)

The reliability study is one of the major factor study to design, operation and maintenance of power system. Therefore, the reliability indices are important to be calculated. Based on the target of the study, the index required is calculated. Therefore, in the present study, the Loss of Load Expectation (LOLE) is required to evaluate the system reliability. The LOLE is defined as the number of days per year or the number of hours per year. The calculation of LOLE needs to know the Forced Outage Rate of each generating-unit. Finally, this will help for the smart cities which need to minimize the LOLE.

An Improved Grid Tied Photovoltaic System

Maamar Taleb (UOB, Bahrain); Khaled Zehar and Noureddine Mansour (University of Bahrain, Bahrain)

This paper presents an alternate improved setup of connecting a photovoltaic generator (PVG) with a power grid. The alternate improved setup uses a single phase full wave controlled bridge rectifier as shown in the one line diagram of figure 1. The controlled bridge rectifier operates in an inverter mode. That is to guaranty its contribution of real/active power to the power grid. The controlled bridge rectifier is also operated in such a way that it should be able to extract the maximum power from the PVG and inject it into the power grid at the different possible solar irradiation levels. The performance of the proposed improved setup has been simulated using MATLAB/SIMULINK toolboxes. The simulation results showed a positive active power contribution of the PVG to the grid and maximum possible power values extracted from the PVG source were noted. Unfortunately, quite distorted current waveforms were encountered at the AC side of the controlled bridge rectifier. Such distortion is definitely unacceptable by the power grid/ network. To overcome such distortion, an active power filter has been shunted, shown by the dashed blocks in figure 1, with the controlled bridge rectifier. The active power filter generated an out of phase current consisting of the sum of all undesired harmonic currents. In doing so, the power grid AC current ended up with nearly pure sinusoidal ac current waveforms. The simulations results proved the effectiveness of the shunt active power filter. The duty of the active power filter has been extended to reactive power compensation. In doing so, a quite reasonable power factor levels were reached in addition to the nice quality of the power grid current waveforms.

Electrical Characterization and Visibility Study of a Diesel -PV-Wind Hybrid Power System with the Addition of Storage Devices for a Remote Area

Abdelhamed T. Mohamed (King Fahd University of Petroleum and Minerals, Saudi Arabia)

This paper proposed a compound energy framework comprising of wind, photovoltaic and diesel generators, with the introduction of storage system, to provide the required demand for a continual electric load for a remote area in Saudi Arabia. The fundamental focus of the paper is to decide the ideal size of the

mixture framework with storage devices which have the most reduced Net Present Value (NPC), and set it side by side with the framework without storage devices. The general enhanced outcomes from the examination had an on over renewable energy penetration of 39%, which brought about diminishment of the emanation of CO2 by 8.95% from the traditional - without batteries-framework. Moreover, the proposed framework with batteries had a diminishment in the aggregate NPC by 12%. The widely known simulator for sustainable power source-based systems; HOMER was utilized to contemplate the financial viability and to construct the proposed designed system.

Characterization and Implementation of Battery Management System

Abdelhamed T. Mohamed (King Fahd University of Petroleum and Minerals, Saudi Arabia)

The security, operation reliability along with the assurance of optimal charging of any battery energy storage system (BESS), are the main objectives and the key features of the battery management system (BMS). This paper proposed a modern technique in controlling the charging of the battery by estimating and monitoring the state of charge (SOC), starting by considering one of the most complex and sophisticated battery model, that imitates the battery in real life, which is the second-order RC battery model, that uses the Open Circuit Voltage (OCV) in order to estimate the SOC. In addition to that, the model was enhanced with the introduction of hysteresis effect that would imitates the previous charging history. The Kalman Filter is a robust method that is widely applied in modern BMS by researchers, which can provide real time estimation for both battery parameters and states. In this thesis the Double Extended Kalman Filter (DEKF), which is the nonlinear form of the KF is used to determine battery's impedance parameters, as well as the battery's SOC. By combining the proposed model, with the power of DEKF to identify the circuit parameters and the estimation of SOC it was possible to develop more reliable and robust charging system. The efficiency of the proposed control strategy was confirmed through MATLAB simulation, along with the validation using Real Time Digital Simulator (RTDS) based system to achieve the best control of BESS within the required SOC.

Monday, March 25 14:20 - 15:25

LB2: Lunch & Prayer Break Day-2 TOP

Monday, March 25 15:25 - 15:30

CD-2: Closing of Day-2 TOP

Tuesday, March 26

Tuesday, March 26 8:00 - 9:00

R3: Registration-Day3 TOP

Room: S45-Zain E-Learning Center-Ground Floor

Tuesday, March 26 9:00 - 9:25

KN8: Keynote 8: W-AI-STE and ARCHITECTURE Waste Management in Buildings with the support of Machine Learning and Artificial Intelligence TOP

Mr. Kai Uwe Ernst Miethig - General Manager (United Arab Construction Co. WLL)

Room: S45-101-ZaS45-101-Zain E-Learning Center

Tuesday, March 26 9:25 - 9:50

KS9: Keynote Speaker 9: Smart Cities and Smart IOT, Safe-Roads & Transportation TOP

Mr. Mohannad AlHaj "The founder and CEO of Safe Road Information Technology, a Telematics'

Room: S45-101-ZaS45-101-Zain E-Learning Center

Tuesday, March 26 9:50 - 10:00

SB-3: Short Break-3 TOP

Room: S45-101-ZaS45-101-Zain E-Learning Center

Tuesday, March 26 10:00 - 10:25

SK10: Symposium Keynote Speaker 10: Smart Cities and Geographic Information System (GIS) Sector TOP

Dr. Anirudha Kale Chief Technology Officer of MicroCenter Group.

Room: S45-101-ZaS45-101-Zain E-Learning Center

Tuesday, March 26 10:25 - 10:50

KS11: Keynote Speaker 11: Smart Cities, and the Society Impact

TOP

Daneh Al-Rayes (vice president of Smart Way Consultancy, a leading Bahraini technology consultancy company)

Room: S45-101-ZaS45-101-Zain E-Learning Center

Tuesday, March 26 10:50 - 11:20

CB3: Coffee Break-3

TOP

Room: S45-Zain E-Learning Center-First Floor

Tuesday, March 26 11:20 - 12:40

SE01: Smart Homes, Smart Hospitals, and Smart Campuses

TOP

Room: SS45-06-Zain E-Learning Center

Chair: Ahmed M. Zeki (University of Bahrian & College of IT, Bahrain)

Electroencephalography Adaptive Classification and Decoding Techniques

Mohammed N Al Sallout (University of Bahrain, Bahrain); Ebrahim Abdulla Mattar (University of Bahrain & X-chair of Electrical and Electronics Engineering, Bahrain)

Electroencephalography (EEG) classification is an essential component of Brain Computer Interface (BCI), which allows to communicate from the human mind to computer, and thus to communicate even for subjects with physical disabilities. Recently, designed classification algorithms for EEG-based BCIs can be divided into main four categories: adaptive classifiers, matrices and tensor classifiers, transfer learning and deep learning. Given this background, this research framework provides an overview of the modern adaptive classification algorithms used in EEG's BCIs. As indicated to, the adaptive classifiers, are dynamic classifiers where there parameters are incrementally re-evaluated and updated over time as new EEG data become available. In addition, the research frame has picked to establish an overall review to this specific category of classifier since, adaptive classifiers were demonstrated to be generally superior to static ones, even with limited supervision or unsupervised adaptation.

A Smart Solution to Problems Observed in Partition-Room Setting in Saudi Universities: A Conceptual Model

Eyman Abdulrahman Alyahyan (Imam Abdulrahman bin Faisal University, Saudi Arabia); Taghreed Balharith and Mariam Elhussein (Imam Abdulrahman Bin Faisal University, Saudi Arabia)

The universities in Saudi Arabia are committed to the country's culture that prevents direct contact between male and female students and prohibits the direct interaction between female students and the male instructors. In the case of female students taught by male instructors, they attend lectures in partition-rooms. It is special rooms that allow students to see and hear the instructor and educational materials while at the same time preventing the instructor from seeing female students. These rooms consist of two sections separated by a wall. The first section is illuminated and dedicated to male faculty member and the other section is dark and reserved for female students. However, the instructor can hear the female students but cannot see them. It was reported that this setting caused many problems including: the absence of an interactive environment between the students and the teacher such as the inability of using the board by the student. Secondly, lack in the fairness and accuracy in recording participation grades in the classroom. Third, inaccuracies in recording student attendance. Finally, the light emitted when using digital technology in the classroom, exposes students and discourage technology utilization. The aim of this paper is to construct a conceptual model for smart partition-room which overcomes the previous problems. The solution is expected to address all four issues by using smart technology such as smart pen, smart board, finger-print scanner and sensors. The smart partition-room will present an enhancement to the learning environment for female students in partition-rooms while adhering to cultural and social standards.

Design of Wireless Sensor Network System for Real Time Drinking Water Quality Monitoring

Fadhel Abbas Yousif (University of Bahrain, Bahrain)

The recent advances in the field of wireless technology and sensor networking (WSN) have paved the way for their utilization in wide range of sectors such as military, industry, transportation, healthcare monitoring, environment monitoring and so on. Our focus in this work is using WSN for monitoring the water quality. Most of the methods used in Bahrain for measurement of water quality control at consumer sites are traditional. It involves the manual collection of water samples and then testing it to measure water quality. However, the drawbacks of this approach are time consumption, high cost and late contamination detection. In this work, we propose the design of effective and low cost system for continuous measurement of water quality with the objective of notifying the consumers on the status of water quality in their premises in real time. The system is composed of an array of low cost sensors to monitor water quality. Algorithms are used to fuse the sensors output data in order to infer possible contamination event. The systems consists of low cost microcontroller-based subsystems for processing, transmitting and notifying consumers at any time and location. The proposed system is partly implemented and evaluated on a locally built prototype and the results were successful. These results support a possible large-scale implementation of the proposal.

Smart Selection of Vendors in Health Services

Hessa Al-Junaid (University of Bahrain, Bahrain); Fadheela Hussain (Ministry of Health, Bahrain)

Pharmaceutical procurement is a multi-criteria decision-making process that deals with optimization of conflicting objectives. This paper presents a multi-criteria decision-making system, based on Fuzzy expert system to rank the suppliers. The main objective of carrying out this study was to improve pharmaceutical procurement practices in Ministry of Health (MOH) in Kingdom of Bahrain and to overcome many difficulties in this field. Therefore, the data used to construct the system was gathered using structured questionnaires and administered interviews. The research sample for this study comprised of members from drug committee and from procurement department in MOH. The responses analyzed using descriptive statistics (SPSS). Throughout the data

collection procedures, it was conformed to the researcher the current MOH state, pharmaceutical procurement practices, and the set of essential supplier selection criteria used. Data collected was fed to the constructed fuzzy expert system in MATLAB programming environment. Based on the results, supplier with the total highest score becomes the most suitable alternative. Numbers of recommendations offered to MOH, aiming to improve the procurement practices and trying to include modern business practices using IT and modern technological tools in healthcare procurement practices.

SE02: Smart Transportation System-2

TOP

Room: S45-11-Zain E-Learning Center

Chair: Jihene Kaabi (University of Bahrain, Bahrain)

An Advanced Road-Lanes Finding Scheme for Self-Driving Cars

Wael Farag (American University of the Middle East, Kuwait)

In this paper, an advanced and reliable road-lanes detection and tracking technique is proposed and implemented. The proposed technique is well suited for use in Advanced Driving Assistance Systems (ADAS) applications or Self-Driving Cars (SDC). The main emphasis of the proposed technique is the precision and the predictability in identifying the driving lane boundaries (linear or curved) and tracking it throughout the drive. Moreover, the technique provides fast enough computation to be embedded in CPUs with affordable GPUs that are employed by ADAS systems. The proposed technique is mainly a pipeline of reliable computer vision algorithms that augment each other and take in raw RGB images to produce the required lane boundaries, which represent the front driving space for the car. Moreover, some of the employed algorithms are working in parallel to strengthen each other in order to produce a sophisticated output. Each used algorithm is described in details, implemented and its performance is evaluated using actual road images and videos captured by the front mounted camera of the car. The whole pipeline performance is also tested and evaluated on real videos. The evaluation of the proposed technique shows that it reliably detects and tracks road boundaries under various conditions. The usefulness and the shortcomings of the proposed technique are also discussed in details, in addition to future projected improvements.

Analysis and Visualization Model for a GPS Dataset of Moving Vehicle

Deepti Mehrotra (AMITY School of Engineering and Technology & Amity Univerisity, India); Vikas Deep (Amity University Uttar Pradesh, India)

Smart transportation solution for smart cities need continuous collection and analysis of GPS data This research paper suggests a model for studying GPS data by drawing a comparison between different data analysis techniques and visualizing a model for GPS dataset of a moving vehicle. Different clustering technologies have been used to identify corresponding accuracies, i.e. of K-Means, hierarchical and DBSCAN clustering algorithm. Various data attributes have been used to cluster the longitude and latitude of the current position of the vehicle along with the direction the vehicle is moving in. This research paper provides an insight to the usage of DBSCAN for better clustering model, better visualization and to implement it in future models. The dataset used is of a city in Ohio named as Cincinnati, located at 39.1031° N, 84.5120° W and is provided by the department of public services.

An Advanced Vehicle Detection and Tracking Scheme for Self-Driving Cars

Wael Farag (American University of the Middle East, Kuwait)

In this paper, advanced and reliable vehicle detection and tracking technique is proposed and implemented and given the name "Real-Time Vehicle Detection and Tracking" (RT_VDT). The RT_VDT is well suited for Advanced Driving Assistance Systems (ADAS) applications or Self-Driving Cars (SDC). The main emphasis of the RT_VDT is the precision and fastness in identifying vehicles on the road and tracking them throughout the drive. In addition, the RT_VDT provides fast enough computation to be embedded in CPUs with affordable GPUs that are currently employed by ADAS systems. The RT_VDT is mainly a pipeline of reliable computer vision algorithms that augment each other and take in raw RGB images to produce the required boundary boxes of the vehicles that appear in the front driving space of the car. Additionally, some of the employed algorithms are working in parallel to strengthen each other in order to produce as accurate as possible output. Each used algorithm is described in details, implemented and its performance is evaluated using actual road images and videos captured by the front mounted camera of the car. The whole pipeline performance is also tested and evaluated on real videos. The evaluation of the proposed technique (RT_VDT) shows that it reliably detects and tracks vehicle boundaries under various conditions. The usefulness and the shortcomings of the proposed technique are also discussed in details, in addition to future projected improvements.

Traffic Management system using VANET on cloud and Smart Phone

Ali Jassim (University of Bahrain, Bahrain); Alauddin Yousif Al-Omary (University of Bahrain & University of Bahrain, Bahrain)

The increasing in the population comes proportionally associated with the increasing in traffic users, which was a major reason associated in creating traffic jamming that is reflected directly in increasing the number of accidents and casualties. For that reason, the road user safety is considered important, and today, most of the vehicle manufacturers are working to increase the safety standards and integrate them in the newer models. Unfortunately, the new safety technologies are not cheap, and not all vehicle models come equipped with it, it can be found mostly in luxury vehicles, how about the economic vehicle models that representing the Majority of the vehicles? After all every road user is considered important and peoples life cannot be measured in term of money. In this paper, we are highlighting some safety technologies that are available such as "Vehicle ad-hoc network" with listing some of its limitation, and providing a solution that overcomes some of those limitations, while focusing on making that solution applicable to be used in most of the vehicles that came unequipped with some safety features.

Smart Parking Solution for Congested Areas: Application of Vertical Rotary Systems

Uneb Gazder, Ateqa Shehabi, Khatoon Fardan, Hawraa Alkhabbaz and Zainab Ibrahim (University of Bahrain, Bahrain)

The aim of this study is to outline a methodology for finding a solution for parking crisis in congested areas with constrains. The methodology was applied to Isa Town campus of University of Bahrain. The campus has experienced increasing parking users with demands equivalent to 8750 vehicle-hours besides limited parking spaces. In addition, the University of Bahrain and Bahrain Polytechnic share same campus and facilities whereas the limited parking area (1356 parks) hardly meets the requirements of one university. Therefore, many students (22.9%) resort to parking outside. The study acquired the required information by survey to parking users (students) and collecting information from the study area. Several equations of parking studies (demands, supply and others) were applied to the information. The study adopted one of smart car parking systems (vertical rotary smart car parking). It will be providing the parking area with necessary parks through establishment of number of rotary devices (13 rotors from the most appropriate types) in different appropriate locations. The methodology adopted in this study can be adapted to any environment for solving parking management crisis.

SE03: Cyber Security-4

TOP

Room: S45-108-Zain E-Learning Cente

Block chain based IoT security for health care system

Kavitha Raju, Vijayalakshmi M and Umamakeswari A (SASTRA University, India)

Data security and privacy are one of the key concerns in the Internet of Things (IoT). Usage of IOT is increasing in the society day-by-day, and security challenges are becoming more and more severe. From a data perspective, IOT data security plays a major role. Some of the sensitive data such as criminal record, military information, the medical record of the patients, etc. Due to the size and other features of IOT, it is almost impossible to create an efficient centralized authentication system. The proposed system focused on IoT security for distributed medical record to provide perimeter security to the patient. Building trust in distributed environments without the need for authorities is a technological advance that has the potential to change many industries, the IOT is one among them. Furthermore, it protects data integrity and availability. It improves the accessibility of data by using the indexing method along with the blockchain. Moreover, it facilitate the utility of tracking the previous history of the patient record using the hyper ledger with authorization.

The Use of Data Mining Techniques in Crime Prevention and Prediction

Ahmed M. Zeki (University of Bahrian & College of IT, Bahrain); Waad Al Saidi (University of Bahrain, Bahrain)

Data mining can be used as a tool to model criminal behavior, detect it, and prevent it. This paper is a literature survey to recent related work done in the field of using data mining and machine learning techniques such as clustering and neural networks to prevent or predict crimes with different levels of severity, fraud detection, terrorist attack prevention, city crime prediction, and cybercrime detection.

Parents' Awareness and Readiness for Smart Devices' Cybersecurity

Ahmed Alnaser, Hessa Al-Junaid and Aisha Bushager (University of Bahrain, Bahrain)

Smart Devices technologies are evolving and introducing more cybersecurity challenges while developing. One of the cybersecurity challenges in the social aspect is the high level of smart devices exposure for children and teens, with the biggest burden of protecting the children lies on the parents. This paper presents an assessment of the current children level of exposure to cybersecurity threats and measuring the awareness and readiness of parents to deal with these threats. Searching through available literature, the research topic of children protection from smart devices revealed either limited or outdated content considering the nature of the topic field development over time. In addition, there is a lack of information found on the chosen focus which are children aged six years or below. This research directed to explore these areas by measuring the level of smart devices cybersecurity exposure for children with age six years or below using exploratory surveying methods and quantitative questionnaires to collect the data from parents. Results showed 98.2% of children are exposed to at least one smart device and more than 92.2% of children are exposed to social media applications. Around half of respondents allow their children to play games, which are not suitable for their age even though some are monitoring the children while playing and others are checking the content of the games. The key findings of this study shall be used to design strategies of child cyber protection and find a solution to help minimizing cybersecurity risks.

Survey of Balckhole attack on MANET

Ali Mohsin (University of Bahrain, Bahrain); Alauddin Yousif Al-Omary (University of Bahrain & University of Bahrain, Bahrain)

Mobile Ad-Hoc Network (MANET) is a type of network where an aggregation of mobile devices communicating together wirelessly without the use of access point or router. However, the security issue in MANET is still weak and need to be improved. There are many kinds of attacks that MANET could get, but blackhole attack is one of the most harmful attack among them. It happens when a malicious node declare that it got the best path to the destination, then it either discard or consume the packet once it received. While there are many recent researches to prevent this kind of attack, they still got some limitations and it could not bring a final solution to stop the attacker, especially when there is more than one node. In this paper, we are investigating the nature of blackhole attack in MANET in purpose to find an exhaustive algorithm to stop this kind of attack and protect the MANET from blackhole attack.

Tuesday, March 26 12:40 - 13:00

ZB3: Zuhr Prayer-Day3 TOP

Tuesday, March 26 13:00 - 14:20

SF01: Internet of Things and Smart Applications-3 & Technology Enabled Homes and Interiors TOP

Room: S45-108-Zain E-Learning Cente

Using Gabor Filter Bank with Downsampling and SVM for Visual Sign Language Alphabet Recognition

Galal M. BinMakhashen (King Fahd University of Petroleum and Minerals, Saudi Arabia); Hamzah Luqman (King Fahd University of Science and Technology, Saudi Arabia); El-Sayed M. El-Alfy (King Fahd University of Petroleum and Minerals, Saudi Arabia)

With the increasing advances in computer vision, the research on human gesture and sign language has attracted the attention of many researchers. It has many applications for human-computer interaction helping hearing-impaired persons in smart environments. In this paper, we focus on static hand visual features to build a system for recognizing different the sign language alphabets. After hand segmentation, the proposed method employs texture based features extracted by down-sampling the Gabor-transformed images. Then, a support vector machine is used for multi-class classification. The evaluation of the proposed approach on a benchmark dataset for the American sign language has reported over 95% overall accuracy with many signs perfectly recognized.

Smart cultural heritage: Technologies and applications

Manal J. Khalaf (University of Bahrain, Bahrain)

Technology is changing the face of our cities and the way we are interacting with them. Cultural heritage forms a large and growing part of every city today. This paper reviews a number of available smart technologies and looks at different examples of their application in the cultural heritage field. It also looks at the smart cultural heritage initiatives in the Kingdom of Bahrain and points out areas that needs further attention to achieve smarter cultural heritage for the Kingdom of Bahrain.

Multi Layered Antenna Design for Smart City Applications

Sri Sai Satyanarayana Damaraju and MVV Prasad Kantipudi (Sreyas Institute Of Engineering & Technology, India)

The key design issues of antenna for wireless communication applications are wide bandwidth, high gain and directivity. In order to cater the above needs of wireless communication system the electro geometrical modeling of antennas is highly necessary. In this paper, design and simulation for Multilayered patch

antenna with different substrates for wireless applications and to reduce the loss in metals. The numerical simulation analysis will be carried out in Computer Simulation. The propose antenna had five layers with operating frequency at 2.45 GHz. The multilayered antenna can be used for transmitting data in drones for security and patrolling connected to a control base station which can be achieved by integrating the drones with real time image processing for detection of objects

Smart Parking System using Sensors and Cloud Based Network for Smart Cities Applications

Vaani Rajvanshi and Swasti Chaturvedi (Manipal University Jaipur, India); Dinesh Yadav (Manipal University Jaipur & Manipal University Jaipur, India)

In today's world, time is the most valuable asset and this paper focuses on developing a smart parking system for smart cities. Its main objective is to assist users to find vacant location of car parking in a shorter time. The system displays occupied and vacant parking spots making it convenient for users to park. This parking system is based on sensors and cloud server integration. In the first phase, the ultrasonic sensor is used to detect vacant or occupied car parking space and display it on the screen using cloud technology. In the second phase, the improper parking of the car is also detected by IR sensors. It also alerts the user if the car is parked out of the parking boundaries.

SF02: Smart Transportation System-3

TOP

Room: SS45-06-Zain E-Learning Center

Chair: Zouhir Bahri (University of Bahrain, Bahrain)

Smart Transportation System: Mobility solution for Smart Cities

Samir Al-Shariff (Taibah University, India); Mohammad Alam, Zaurez Ahmad and Furkan Ahmad (Aligarh Muslim University, India)

Smart cities need an Intelligent Transportation System (ITS) which can meet their transportation requirements. Transportation in a smart city should be hassle-free, environment-friendly, and of connected and shared vehicles for better public transportation services. An ITS offer these through better traffic control, energy and fleet management. The best fit for this is the Electric Vehicle which also resolves the energy issues of the future. EVs equipped with intelligence i.e., Autonomous Electric Vehicles (AEVs) adds the connected and shared layer required by a smart city. These are capable of communicating the relevant transportation information with other relevant receivers through Vehicle-to-anything (V2X) communication. This work proposes an ITS, whose framework depends on the communication between these EVs and utilizes the applications of an IoT network. MQTT protocol is considered for data exchange within the IoT cloud. Availability information on public AEVs to passengers is shared through a mobile application. Moreover, these AEVs can also be utilized for the energy management of smart cities by connecting them with smart grids. An illustrative study is made to optimize and regulate the traffic and public transportation for the route between Masjid-e-Nabvi and Masjid-e-Quba of Madina city in Saudi Arabia which faces huge traffic during Hajj. The route discusses retrofitting for introducing smart transformations of existing structures like street lights and commercial building. Greenfield developments for innovation planning and implementation of establishments like smart grid, Level-2, and Level-3 charging stations. Centralized control is installed to monitor and regulate this ITS through an IoT network.

Distributed Hierarchical Approach Based Smart Parking system

Jissy Ann George (AMA International University, Bahrain); Binoy D M Panicker (APJ Abdul Kalam Technological University, India); Priyanka Surendran (AMA International University, Bahrain)

The number of cars in the cities keeps increasing as the population increases. This in turn poses another issue, which is to find a proper parking space. This shortage results in difficult in managing these areas as well. This also leads to a lot of traffic congestion and energy consumption. Hence, a smart based parking system allows users to reach the nearest parking are easily. In this research, a distributed hierarchical approach is proposed for finding a parking spot. Two levels of hierarchy are considered here. The first level of hierarchy involves finding the nearest car parks which have free parking slots. The second level of hierarchy involves finding nearest parking slots in the area selected in the first level.

Risks of Using Smart Devices for Drivers

Uneb Gazder, Yusuf Al-Malki and Md Shah Alam (University of Bahrain, Bahrain)

Advancements in technology have brought a lot of ease to modern day life. On the other hand, its abuse has some negative aspects as well. This study focuses on highlighting one such issue which is related to use of smart devices by drivers. The study was conducted in 2 phases using questionnaire surveys. It was found that mobile phones are the most hazardous distraction for drivers. Majority of the survey respondents agree that mobile phone use results in accidents or violation but in spite of this fact most of them reported using it. Mobile phones are reported to be used more commonly on intersections and traffic jams. Accident's experience was reported to be a highly influential factor to make the drivers abstain from mobile phone use. Other solutions, as preferred by survey respondents, include; awareness campaign through social media for awareness and use of accessories (Bluetooth, earphones, etc.) to avoid handling of mobile phones.

Structural Health Monitoring (SHM) of Ageing Infrastructures in Bahrain

Md Shah Alam, Md. Arifuzzaman and Yusuf Al-Malki (University of Bahrain, Bahrain)

There is a crucial need to investigate and monitor the situation of the existing infrastructures. Structural Health Monitoring (SHM) approach can be used to collect data from the ageing structures using non-destructive testing as well as sensors. This will provide some indications when there are some defects. The sensor system will continuously update the data about the current conditions of a structure including the detection of changes in the properties of materials related to degeneration, such as corrosion of steel and fatigue cracks. SHM can be used for pre-emptive maintenance and structural wellbeing information for huge and complex structures such as buildings, bridges and towers. Recently, computerized systems have been used to monitor the aging infrastructure for its safe and economical operation. The current study will focus on identifying the ageing infrastructures in Bahrain, assessment of their current loading scenarios compared with the original design, and develop SHM system by a centralized monitoring system. This will include instrumentation, data acquisition, communication system and procedure for diagnosis of infrastructural health.

Smart Emergency - A Contextual Framework for Cognitive Understanding of IoT Devices using Big Data Analytics

Faizal Hajamohideen, Jawaher Ahmed Al-Salmi, Ameera Ali Al-Foori and Athari Yasir Al-Jahwari (College of Applied Sciences, Sohar, Oman)

Smart city is a developed urban city that includes intelligent systems to improve the quality of citizens' life by providing the smart services. The smart services that are equipped and focused including mobility, transport, technologies, energies, buildings and governance. These services are enhancing the smartness of living at the same time we also need a smart service that handle the emergency situation smartly and in the area of smart emergency services are neither witnessed nor addressed in the smart city scenario. The road accidents are inevitable in the smart city though and it is contemplated to be one of the

emergency services that need to be given more important to save the life and require quick smart services. This project addresses the important of emergency services particularly at the time of road accident in the smart environment. This smart emergency services works in perceptive actions of IoT sensors and call for actions that required to save the life of injured and provide intelligent emergency supports to bring back the smart city usage for others rapidly. The system experiments and provide prototype of smart emergency services using IoT sensors, Arduino with Raspberry Pi setup, CoolTerm. The data that are observed during the experiments are analyzed using Apache Zeppelin Bigdata analytical tools. The conclusive result of analytical data to be transmitted wirelessly to enable the required smart emergency services ranging from hospitals ambulances, fire, traffic, cleaning services to services that are bring the smart city back to function normally. The project also emphasizes that the IoT and Big Data bonds closely woven prospects of smart emergency systems.

SF03: Smart Urban Planning, & Design Solutions-2

Room: S45-11-Zain E-Learning Center

Chair: Wael Abdelhameed (University of Bahrain, Bahrain)

EXPERIENCING THE CITY: Beyond the Material

Hawra Jaafar Shaikh Mansoor (University of Bahrain, Bahrain)

Cities in the Gulf region in general have been through major transformations throughout the last four decades. As a result, the urban space, which was mainly shaped by the tribal structure and the economy that is based on fishing, pearl trading and/or farming; has been modified beyond recognition. Nonetheless, cities around the world nowadays are becoming shapeless entities with a haunting sameness, trying to emerge as new centres of global economy and smart hubs. The world is witnessing rapid developments in the use of smart technologies, and this created a rich ground for the concept of Smart Cities to emerge within this region. However, while we are promoting the Concept of Smart Cities within Bahrain and the region, it is important that we look back at the meaning of a city as a physical container of people's everyday lives. This indicates reflecting on the way we understand, interact and experience our cities in the first place, which may prevent any loss of appreciation of spatial experience, or social alienation of the citizens, which might occur when we experience the city through the use of smart technologies. It acts as a call to rethink the way we experience our cities first, before delving into this smart era, where it is hoped that it could contribute in creating Smart Cities with better socio-cultural prospects.

Design Studios: Redefining Smart Learning Environment (SLE)

Anamika Jiwane and Farial Khan (University of Bahrain, Bahrain)

Smart Learning Environment (SLE) is the hourly need to satisfy the urge from new knowledge society. This includes a focus on physical and virtual learning methods to yield a required blend of learning environment that supports experience of effective and engaged learning. Authors identify the essence of 'SLE' as a space that enhances the learners' personalized and adoptive learning experience. For the students of design, 'Studio' is a physical space that allows them to accomplish their design learning in an innovative and creative manner. The main objective of the paper is to redefine the concept of 'Smart Learning Environment' in the context of Design education and suggest a model (framework) for the 'Smart Design Studio' based on the perception of learners. The methodology included an overview of various concepts in SLE, surveys for students and group discussion for faculty at the Department of Architecture and Interior design, University of Bahrain, to receive opinions from the design students as well as faculty regarding their perceptions for smart teaching-learning spaces and methods. An experimental study was performed with the voluntary participation of design students to measure the impact on the design learning methods as a result of modifications done to the tangible and intangible elements of their Design Studio. The experiment was centered on the theory of 'Identity Development' and 'Personalization of spaces'. The paper concludes with redefinition of SLE- as a learner-centered-environment without inclusion of ICT as a major tool and yet achieve a space that will allow multiple ways of learning to support the learners' development. Authors recommend a model/ framework for the Design Studio that will be constructed to achieve the effective, engaged and efficient learning. The key elements of the model are the disseminator and recipient of knowledge, learning methods, modes, tools and resources.

Old Al-Seeb Sector: A Contemporary Approach to Re-Design Major Urban Areas

Mohamed Al-Kazee, Roua Osman, Kathiya Al Munaijri and Nawf Al Naabi (University of Nizwa, Oman)

The recent years have witnessed a rise in the demand for the development of urban areas. For this reason, there is a great competition to provide case studies that deliver the required skills in different approaches to handle urban design and planning projects. This paper aims to present the concept of re-design major urban area in Muscat region from an academic perspective. Moreover, it presents the procedure of design development of Old Al-Seeb that offers a pioneering example of the applied methods. Findings of this paper highlight the importance of implementing proper urban design principles and rules. It also emphasizes the value of social, sustainable, economic, and design aspects in cities development.

The Effect of The Unplanned Expansion of The Urban Design of Omdurman City

Abeer Abubakr Ibrahim (University of Bahrain, Bahrain)

Omdurman is a Sudanese city located to the west of Khartoum State on the Nile River coast. It grew from a small village to one of the largest cities, known as the national capital. Al-Ardah North is one of the oldest neighborhoods of Omdurman, which is affected by the increased interest in urban renewal and business investments. Rapid city growth and urban sprawl created some environmental and planning problems. Construction of large residential neighborhoods took place without considering other aspects such as preserving local architecture and the environment. This study is to detect the effect of the urban renewal using the ethnographic method by identifying the existing pattern of Al-Ardah neighborhood and surveying residents' opinions on ways to develop their neighborhood. Study results showed that Al-Ardah neighborhood was originally planned to provide pedestrian pockets and suitable spaces for social activities. Then some planning guidelines were developed and some decisions were recommended.

Tuesday, March 26 14:20 - 15:25

LB3: Lunch & Prayer Break Day-3

Tuesday, March 26 15:25 - 15:30

CD-3: Closing of Day-3