1st Engineering Graduate Student Research Symposium (EGSRS-1)

May 2nd, 2019

Abstract Booklet

PROGRAM

Thursdays May 2nd,2019, Al-Bayrouni Theater, M9- 007 and Exhibition Hall

10:00–11:00, Registration, M9- 007 and Exhibition Hall		
10:00–16:00, Graduate Students Posters, M9 and Exhibition Hall		
Time	Introductory Remarks	Speaker
11:05 – 11:15	Opening Ceremony and Welcoming Remarks	Prof. Khalil Abdelmawgoud

11:15 -11:45	**Keynote Presentation** The A-Z journey of Doctoral Research	Prof. Vian Ahmed American University of Sharjah

SESSION 1.A:		
Al-Bayrouni Hall M9 007		
SESSION CHAIR: DR. Khalil, DR. Fikri and DR. Udi		
12.00 -12.15	Joint Frequency Offset and Channel Estimation for Two-way Relays in the Presence of Timing Offsets	Eng. Ahmed Ibrahim Abdul Karim Salameh
12.15 -12.30	Development of the Effective Health and Safety Practicing Framework in United Arab Emirates Construction Projects	Eng. Abdelrahman Abdalla Alhelo
13.30 -13.45	Development and implementation of an innovation model for UAE Federal Government Service	Eng. Tariq Al Hawi
13.45 - 14.00	Biomimicry of Termite Bio-cementation to Inspire Eco-Building Envelope	Eng. Khalid Abdullah AlShuhail
14.00 - 14.15	A conceptual model illustrating the relationship between Lean Six Sigma intangible impacts and organizational innovation climate factors	Eng. Mohamed Alblooshi
14.15 - 14.30	Assessment of public–private partnership models for housing delivery in the UAE	Eng. Khalifa Musabeh Alteneiji
14.30 - 14.45	Virtual Organization-DNA: An Approach for Excellent Performance Realization	Eng. Alaa Mashan Ubaid
14.45 - 15.00	Development of Risk Management Framework in BIM enabled Design Process in UAE Projects	Eng. Deena Badran
15.00 - 15.15	Strategic Management Practices in Organizational Excellence Models Applied in Public-Sector: Dubai Municipality as a Case Study	Eng. Ola AlZawati

ABSTRACTS
INTRODUCTIVE SESSION

The A-Z journey of Doctoral Research

Vian Ahmed [a]

[a] Engineering Management program
American University of Sharjah, P.O. Box 26666, Sharjah, United Arab Emirates

Abstract

Engaging in a Doctoral study is a journey of scientific, academic and self-discovery, it is a journey. It is a journey that requires and inquisitive mind, independence, intuition, persistence and patience with the ultimate aim of making a unique contribution to knowledge. It is a fruitful experience that is worth every step. However, like all journeys, the Doctoral journey can be a bumpy experience that has its highs and lows, and acquires researchers to be equipped with a tool-kit of academic, interpersonal and survival skills.

This lecture intends to reach-out for Doctoral students and supervisors to share some insights & thoughts about the importance of research and the different phases of the A-Z journal of the Doctoral Study. The session will also help Doctoral students reflect on their own research and equip them with examples of good that can be followed and bad practices that can be avoided in order to enhance their research experience.

Development of the Effective Health and Safety Practicing Framework in United Arab Emirates Construction Projects

Abdelrahman Alhelo[a], Radhi AlZubaidi[a] and Hamad Rashid[a]
[a] Engineering Management program
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

Construction projects in UAE represent a major part and vast investment in the country. That is why, good attention is spent on the regulations of health and safety in construction. The aim of the present research is to develop, implement, and oversight modern and more effective regulations of H&S in UAE construction sector in order to decrease and prevent accidents. The set aim of this research can be achieved through three successive and interlinked objectives. The first objective is to develop a concrete unified strategy with validated supporting set of regulations and policies that can better empower health and safety practices of the construction industry in UAE and the region. This is to be achieved by carrying out an empirical action research that will involve examining all the existing health and safety regulations and compare them with international H&S regulations, with the target of improving current practice by concluding evidence-supported recommendations to improve the existing regulations.

The second objective is to design and develop a framework that can be used by various stakeholders of the construction industry to implement the improved regulations and policies. The third objective suggests the launching of a federal organization that can professionally execute the oversight function of H&S in the construction industry of the UAE. The suggested oversight function is one of the most currently needed issues in order to organize the health and safety regulation during the design and construction stages. An intensive and aimed questionnaires to be designed and distributed to well-reputed construction and design companies and other involved parties within the construction industry, also direct meeting and interviews with project managers to be conducted concerning the implementation and integration of the H&S regulations.

Blockchain Information Security Assurance Framework for Smart Government Services

Ahmed Alketbi[a], Qassim Nasir[a] and Manar Abu Talib[a]
[a] Engineering Management program
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

Blockchain, a Distributed Ledger Technology (DLT), is a disruptive technology that is playing a vital role in many sectors. It's a revolutionary technology transforming the way we think about trust as it enables transacting data in a decentralized structure without the need to have trusted central authorities. Blockchain promises to innovate new business models, overcome several existing challenges, increase efficiency, and show promising results in costs optimization. Many government entities such as United Kingdom, Estonia, Honduras, Denmark, Australia, Singapore and others have taken steps to unleash the potential of blockchain technology. By 2021, Dubai Government is aiming to become paperless by adopting the Blockchain technology for all transactions.

Blockchain promises to overcome some security challenges such as data integrity and trust, but it also introduces new security challenges that should be investigated and tackled. To the best of our knowledge, there are limited number of research studies focused on Blockchain security. This thesis is motivated by the lack of Blockchain security research, absence of security reference model or framework, and the absence of blockchain security assurance guidelines. Hence, the aim of this research is studying the Blockchain technology and investigating the possible ways in which blockchain can support Dubai government services with improving information protection and privacy. In addition, the aim of this research is exploring and analyzing the security threats and the risks associated with the use of Blockchain. As a result, this research proposes a framework and introduce guidelines to overcome these challenges to have resilient and trusted services.

A study on the Exploration and Evaluation of the Success Factors for Implementing Autonomous Driving in UAE

Mohamed Alawadhi [a], Khalil Abdelmawgoud [a]

[a] Engineering Management program
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

Technology has enabled various crucial developments in human history, with one such development under progress is the autonomous vehicles. UAE, is a rapidly emerging economy, has built its foundation on the concept of 'smart innovation,' which is applied across all public services found in the emirates. The inclusion of autonomous vehicles is regarded as a critical factor in the improvement of public and private transportation in the UAE. In this research, the aim is to explore and evaluate the success factors responsible for adopting autonomous driving in United Arab Emirates.

The literature reviewed in the area of autonomous vehicles examined various facets initiating from the conceptualization to development and evolution. The review is focused on exploring the various crucial elements that link to autonomous driving successful implementation. Taking in to consideration all aspects from policy and regulation, consumer acceptance, vehicles technology to marketing and advertisement. Then, evaluate these success factors based on their criticality and utilize them to help autonomous vehicles be in streets.

Virtual Organization-DNA: An Approach for Excellent Performance Realization

Alaa Ubaid[a], Fikri T. Dweiri [a]

[a] Engineering Management program
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

The performance excellence, excellence models, performance assessment methodologies, and performance improvement frameworks/methodologies researches were always at the center of researchers' interest. The review of 190 references and more than 50 EPRMs/frameworks/models from different business sectors, for 20 years' period, reveals that despite the effectiveness of V-DNA approach and using it in many applications, but yet it wasn't used in organizational excellence scope. Thus, the goal of this research is to develop an Excellent Performance Realization Methodology (EPRM) by use of V-DNA approach. It is expected upon completion of the proposed methodology to propose an approach that will help in presenting complete organization/unit structure with possibility of identifying the strengths and weaknesses of each process, which will help to have a focused performance development process with highest efficiency in term of time and resources management.

In addition, it is expected that the developed methodology will help organizations to identify the available alternatives for each defective genes (low performing process), which will help to create accurate and focused Research and development (R&D) process. The proposed methodology will open an opportunity to integrate it with the existing BEMs to create organizational best practices' database with unique DNA code for each organization.

An Exploration of Public Services Innovation Readiness Within the Emirates of Sharjah

Eman Al-Raeesi [a], **Gordian Ojiako** [a]

[a] *Engineering Management program*
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

The UAE's Vision 2021 predicts the improvement of an expanded and fixable knowledge-based economy that would be controlled and led by skilled and experienced Emiratis. The aim of the vision is getting the UAE into the top ten of the Global Innovation Index by 2021. The distribution of knowledge is key to the enhancement in public services, in order to add value through innovative ideas within the services delivered. Therefore, service innovation which is basically about improved services offerings, and knowledge management implementation has become vital, as a precondition of nation's success in fulfilling its visions, like: UAE's Vision 2021. This study proposes an examination of innovation readiness within the context of public services organizations in the Emirate of Sharjah, United Arab Emirates. The study will be undertaken in the form of a fine-grained exploratory case study.

The unit of analysis will be the public service unit of Sharjah. Data will be obtained from a combination of multiple exploratory interviews with key stakeholders involved in managing innovation readiness initiatives within these service units (Sharjah Municipality) and a questionnaire survey. The data will then be analyzed with the NVivo and IBM SPSS software packages. Findings from are likely to suggest the need for proactive consideration of national innovation priorities in the United Arab Emirates with dual tensions being experienced by the municipalities who on one hand seek to deliver on their traditional mandate and on the other hand seek to deliver on what may appear as a multiplicity of national priorities.

Development of Risk Management Framework in BIM enabled Design Process in UAE Projects

Deena Badran [a]**, Rahdi AlZubaidi** [a] ***and* Senthilkumar Venkatachalam** [a]

[a] *Engineering Management program*
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

In recent years, the United Arab Emirates has experienced a growing development in the construction sector. This development and continued adoption of complex, sustainable and lean projects, necessitate more research on challenges facing the construction sector; one of these challenges is managing project risks. Construction projects are subjected to unique features that increase the probability of risk occurrence and its impacting consequences on achieving the project objectives. Many Studies concluded that risks should be managed as early as possible in the project life cycle especially in the design phase. In doing so, key challenges arise from the facts that modern design has a numerous of interdependent, knowledge intensive multidisciplinary tasks, and the overall design process is inherently iterative in nature. Thus, the management of information exchange forms the basis for achieving the desired project objectives. Many tools and methods have been developed to manage the information exchange in the construction projects; however, these methods are not widely used except the Building Information Modeling (BIM).

This research aims to develop and evaluate BIM-based risk management framework to manage the project risks during the design phase of the design-bid-build (DBB) projects. The following objectives are contributed to achieve the aim; (1) identify the key design phase-related risks affecting the time, cost and quality of DBB projects in UAE (2) review the existing BIM-Based Risk Management Frameworks (3) Develop a risk management framework for BIM enabled DBB projects during the design stage (4) Validate the developed framework.

Modelling Interdependencies of Electrical Power Infrastructure by Using ISM-MICMAC Analysis

Hassan Al Zarooni [a]**, Hamdi Bashir** [a]

a Engineering Management program
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

Modern societies rely heavily on the operations of Electrical Power Infrastructure (EPI). Such infrastructure is characterized by direct or indirect interdependencies among its systems. In other words, EPI systems are interrelated. A disturbance in one part of those systems may lead to disturbances in the whole network. Therefore, in order to design a systemic plan for EPI protection, all system levels must be classified. This paper discusses the interdependencies of EPI through a real-life case-study to reveal the most critical parts of the network. By applying Interpretive Structural Modelling (ISM) method, the paper examines the physical interactions of thirty electrical sub-stations in EPI according to their influence. Furthermore, the paper identifies the driving sub-stations that can affect other sub-stations.

The proposed model uses MICMAC to analyse the driving power and dependence of that sub-station. Finally, based on the results of the study, the paper concludes that the suggested approach can shape the foundation of new analysis of EPI network.

Modelling and Analyzing Projects Interdependencies in Project Portfolio Management

Helal Alzaabi*a*, **Hamdi Bashir***a*

a Engineering Management program

University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

The field of project portfolio management (PPM) becomes rapidly popular in the previous several years. Several methods and tools have been developed to support the PPM process. However, only few of them have considered project interdependencies. Interdependencies between projects is a challenging area for PPM. Methods and tools that consider interdependencies can be classified into optimization models and visual tools. Visual tools are considered to illustrate better understanding of projects interdependencies. However, existing visual tools such as road mapping, nested options model, dependency matrix and visual projects mapping have drawbacks. Road mapping is a basic visual tool and leads to information overload. While, nested options model is applicable for small projects portfolios. Dependency matrix does not reveal accumulated or multilevel interdependencies. Visual projects mapping is often very complex and difficult to trace the interdependencies among the projects and classify the projects. Interdependencies strength in visual projects mapping is based on project managers' experience and judgment.

To overcome existing PPM tools, this research will be carried out to develop a simple model to visualize and understand project interdependencies and analyze interdependencies by quantifying them, classifying projects and measuring overall projects interdependencies.
The outcome of this research will be implemented in case studies in at least two different industries.

Selecting Maintenance Strategy Based on Environmental Sustainability Criteria; a Framework and a Case Study from Public Transport Sector

Iyad Alawaysheh[a], Imad Alsyouf[a]

[a] Engineering Management program
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

The selection of an appropriate maintenance strategy in Public Transport agencies can improve the life of assets; prevent costly breakdowns that may result in low availability, downtime in routs and negatively impacts customer satisfaction and the whole corporate image.
The aim of this research project is to develop a holistic maintenance strategy selection framework based on environmental sustainability criteria. The right selection of maintenance strategies based on the environmental sustainability perspective will in turn reduce costs and enhance productivity.
The research will assess the current maintenance strategy used by public transport agencies in the GCC; their selection criteria and the factors affecting the decision making process via questionnaires and interviews that will be developed for this purpose. Then a framework will be developed to consider the environmental sustainability criteria as the main criteria for selecting the maintenance policy. The developed framework will be validated in an action case study in Dubai Public Transport Agency.

To the best of the researcher knowledge, this is the first study that considers the concurrent involvement of environmental sustainability factors in maintenance strategy selection (MSS) decision. The study contributes to the knowledge area via bridging the gap existing in the literature. Moreover, the public transport sector will be able to use, and implement the proposed framework for better survivability and profitability. Further, by refining and revising current practices, the results will provide practitioners with different tools, guidelines, and good practices with a suggested sequential arrangement of use.

Biomimicry of Termite Bio-cementation to Inspire Eco-Building Envelope

Khalid Al Shuhail[a], Syrif Junidi[a] and Abdelsalam Aldawoud[a]
[a] Engineering Management program
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

Thermal energy analysis of passive solutions for reducing building cooling needs and thus improving indoor thermal comfort conditions. Termite have evolved and developed strategies in order to be energy efficient. In this view, thermal-energy performance of four different building envelope models. The first one from mimicry termite behavior inspiration level and the other three from regular local block materials, Concrete, Red Clay and Autoclaved Block. The house model's envelope ideal orientation that runs along an east-west axis with south door/window orientation so that wall areas receiving hot sun are minimized. Model a full -scale test room, having same internal and external dimensions and natural ventilated was continuously monitored under four seasons conditions. Infrared Thermography-IR and continuous monitoring was use as a methodology to assess the thermal performance of envelops models. A quantitative Analysis Descriptive Statistics, using thermography reading and monitoring data to measure performance of complete house envelope elements.

The variation of the inside relative humidity, temperature with period was analyzed graphically. The influence of material envelope on the thermal characteristic parameters such as relative humidity percentage, decrement factor, time lag and temperature difference ratio were investigated. As well, two thermal testing methodology data correlation are considered. Since a building's surroundings and internal conditions are constantly changing, there is a lot to learn about how inspiration from nature can substitute more adaptability of the envelope for enhanced building performance.

Assessment of public–private partnership models for housing delivery in the UAE

Khalifa Alteneiji[a], Sabah Alkass[b] _and_ Saleh Abu Dabous[a]

[a] Engineering Management program
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates
[b] UAE University (UAEU), P.O. Box 15551, Al Ain, Abu Dhabi, United Arab Emirates

Abstract

This study examines the role of public–private partnerships (PPP) as one of the potential solutions for financing and developing affordable housing in the United Arab Emirates (UAE). It also aims to identify the risks associated with such partnerships and how they are shared and allocated among the parties within the partnership. The research is based on a case study of the partnership models in housing finance implemented by the Directorate of Housing (DH) in Sharjah and the Mohamed Bin Rashid Housing Establishment (MBRHE) in Dubai. Preliminary data was collected using semi-structured interviews with representatives of relevant housing authorities and the banking sector. Other methods include a review of documents and published resources.

The paper concludes that the partnership model in financing alone is insufficient to provide an adequate supply of affordable housing, and risks should be reallocated in a more efficient and more appropriate manner.

A conceptual model illustrating the relationship between Lean Six Sigma intangible impacts and organizational innovation climate factors

Mohamed Alblooshi[a], Mohammad Shamsuzzaman [a]

[a] *Engineering Management program*
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

This study aims to propose a conceptual model that links the intangible impacts of Lean Six Sigma (LSS) with the factors of organizational innovation climate. It ultimately targets extending LSS range of applications by proposing it as a tool for fostering organizational innovation.
The study followed a qualitative research approach to identify, analyze, and categorize LSS intangible impacts by reviewing previous literature on its application and conducting in-depth interviews with its experts. Then, a detailed description of organizational innovation climate was provided highlighting its main factors. Accordingly, a conceptual model was developed to illustrate the relationship between the collected information.

LSS was found to have many intangible impacts categorized to organizational related and individual related. Organizational innovation climate is determined by a number of factors that were found to be positively influenced by many of LSS intangible impacts, based on which a number of hypothesized relationships between LSS intangible impacts and organizational innovation climate factors were proposed illustrated by a conceptual model. Studying the relationship between LSS and innovation by considering LSS intangible impacts and linking them to organizational innovation climate factors is relatively a new approach which makes the contribution of this research valuable and significant to academics and professionals.

Advanced Power Reactor (APR) 1400 Reliability and Risk Analysis for Regulatory and Decision-Making Process to Enhance Quality Assurance in UAE's Nuclear Power Plants

Saud BinKhadim [a], Muhammad Zubair [a] *and* Victor Gillette [a]

[a] Engineering Management program
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

Many regulatory bodies worldwide have developed realistic methods for plant assessment with which to monitor the safety of nuclear power plants and to improve public awareness of plant safety. The aim of this study is to develop a system model that is based on inputs from the relevant APR 1400 basic events (BE), that associates mitigating systems and components whose contributions are significant in the safety assessment using AIMS-PSA software to analyze Risk Achievement Worth (RAW) and Risk Reduction Worth (RRW) for APR1400 systems, structures and components systems (SSCs) and its contribution to Core Damage Frequency (CDF). When considering the application of such an approach to an inspection activity, a risk-informed inspection focuses on high risk items and applies greater regulatory attention to risk-significant findings and plants with identified performance problems. The proposed methodology of this study will be a simplified APR1400 model development, regulatory determination of inspection findings, analyses, and decision-making processes.

This study will provide a guideline to determine the appropriate inspection findings to specify any deficiency in licensee performance and identify regulatory issues or inspection findings and correlate them to the basic events to verify their contribution towards CDF.

Development and Implementation of an Innovation Model for UAE Federal Government Service

Tariq Al Hawi [a], **Imad Alsyouf** [a] **and Michael Gardoni** [b]

[a] *Engineering Management program*
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates
[b] *ETS , Canada*

Abstract

In 2015, the UAE federal government announced the national innovation strategy in an effort to achieve a highly productive and competitive economy. The emphasis was on elevating the quality of the services across multiple priority industries nation-wide with citizen happiness as an end goal. The innovation strategy highlighted its pillars and enabling factors, which are defined in four critical

domains: innovation regulatory framework, enabling services, technology infrastructure, investments and incentives. Alongside the innovation strategy, the federal government created a cohesive set of national key performance indicators (KPIs) as part of the national agenda that is centered around competitive knowledge economy and sustainable environment and infrastructure. The three main KPIs are Global innovation index, Networked reediness index and Online services index.

In order to align our research work with the above, a critical literature review will be conducted on the areas of innovation and specifically on innovation models. The aim of the research is to build and implement a state of art innovation model, which will assist in identifying creative services ideas and explore the possibility of launching them commercially. On successful implementation of the identified creative idea, the impact of the model and the novelty of the research will be assessed for usage in other major industries in the country such as renewable and clean energy, transportation, technology, education, health, water or space. The model will also include an innovation assessment toolbox. A case study will be conducted on the UAE Smart Government where the toolbox will be evaluated against the services offered. Analysis of the results produced by the evaluation of the proposed innovation model will be leveraged to further provide recommendations for the UAE federal government in the area of service innovation.

Developing Indicators for Governance Evaluation in Accessible and Inclusive Urban Developments

A systematic Literature Review

Amal AlKhamis[a]**, Fikri Dweiri**[a] **and Hasim Altan**[a]

[a] *Engineering Management program*
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

Accessible and Inclusive Urban Developments (AIUDs) are developments that ensure accessibility for and inclusion of persons with disabilities and elderly in all aspects of developments and follow universal design approach by removing barriers to the physical environment, transportation, employment, education, health, services, information and assistive devices such as information and communications technology (ICTs) to achieve fullest potential and dependency for all society members. AIUD are managed and operated by multi stakeholders and often form a challenge to governments and decision makers. Therefore, International Organizations have put this subject as a priority in its agenda such as Sustainable Development Goals (SDGs) by United Nations (UN), Call for action by Inclusion International and World Bank.

This paper respond to the concern of lack of governance evaluation in the field of AIUD and the need to develop governance evaluation model by presenting the first phase of data collection to obtain AIUD governance indicators. Proposed governance indicators are obtained from systematic literature review. The results of systematic literature review conducted from the year 2000 till 2018 to develop a list of indicators data base used in the literature for governance evaluation in different fields. The next phase, a group of experts will refine and revise the indicators and develop the final list. After that, a survey will be conducted for a wider group of experts who rank priority of the indicators and link them to the governance principles using Multicriteria Decision Making Tool.

Strategic Management Practices in Organizational Excellence Models Applied in Public-Sector: Dubai Municipality as a Case Study

Ola AlZawati[a], **Imad Alsyouf**[a] *and* **Hamdi Bashir**[a]

[a] *Engineering Management program*
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

With dominating globalization, rapid strategic transformation, information technology and advanced communications technology boom, and tough economic and social challenges facing governments, have enhanced competitiveness and demanded to further be narrowing the gap between developed and developing economies, as well as between public and private sectors. Excellence Models (EM), have been successful in its contribution to the attainment of this aim, when applied first at private

sector since early fifties of past century, which came as a result of the paradigm shift of organizational quality management culture. Therefore, public-sector, in its attempt to benefit out of private sector successful experience, had the choice of either adopting existing and established EMs, modify them, or to develop its own to suit its nature and culture. Researchers have studied the impact of EMs on organizational performance and the key influential factors that ensure their successful implementation. The reported early results indicated that there is a necessity to investigate major management practices and tools as improvement strategies and their correlation to guide the public sector in its quest for performance excellence.

This study aims to explore the common requirements between two of the EMs implemented by the public-sector, mainly the widely used model, developed and managed by the European Foundation for Quality Management (EFQM), and the recently developed and launched model by the Prime Minister's Office (PMO) at United Arab Emirates, named as the Fourth Generation Model of Government Excellence (4G). The related major management practices and tools will be investigated. The study will also discuss the correlation between these management practices and the results will be verified in one of UAE public-sector organizations. In order to answer the research questions, and progress with the thesis development, one conference paper has been submitted and approved and a draft of a journal paper resulted from the literature review and the exploration of the related studies; that will answer the first two research questions defined by the proposal, has been submitted for review by the supervisors. Different qualitative and qualitative tools and data sources will be used later on.

Joint Frequency Offset and Channel Estimation for Two-way Relays in the Presence of Timing Offsets

Ahmed Salameh[a], **Saeed Abdullah**[a] *and* **Mohamed Saad**[a]

[a] *Electrical and Computer Engineering*
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

This work investigates the problem of joint channel and frequency offset estimation for asynchronous amplify-and forward two-way relay networks. The presence of timing offsets between the two terminals, in addition to the frequency offsets, makes it necessary to develop signal sampling and joint estimation schemes that explicitly consider both offsets. We first consider pilot-based estimation and develop the maximum likelihood joint estimator. Then we consider semi-blind estimation, proposing a novel semi-blind estimator based on expectation maximization (EM). As an alternative, we also consider decision-directed (DD) semi-blind estimation.

The semi-blind Cramer-Rao bound (CRB) is also obtained as a benchmark. Extensive experiments show that the proposed algorithm yields significantly lower mean-squared error than both the pilot-

based estimator and the DD estimator and converges to the obtained CRB. It also yields much better symbol error rates. Furthermore, the proposed algorithm has reasonable computational complexity and only a limited number of EM iterations is sufficient to attain convergence.

Using Alkali-Activated Binders to Stabilize Surficial Loose Sand

Bara Jarah[a], Mohamed G. Arab[a] *and* Talha Junaid[a]

[a] Civil and Environmental Engineering
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

Soil improvement is a technique that improves the engineering properties of the treated soil mass. Several chemical and mechanical techniques have been developed over the last decades to alter or improve poor soil conditions. Many of these chemical techniques use either cement or lime. These traditional techniques have proven efficiency and durability over many years of use despite environmental concerns. Alkali-activated binders (AABs) have shown potential for low energy, low cost and high strength alternative to these traditional cementitious materials. In this study, the feasibility of using alkali activated binders to stabilize local sandy soils will be examined. Several micro- and macro-characterization techniques will be used to examine the suitability of these binders to improve these local soils. Advanced micro-characterization techniques will be conducted on the

treated soils in the University of Sharjah (UOS) laboratories such as the scanning electron microscope (SEM), energy dispersive X-ray analysis (EDX), backscattered electron image (BEI) and X-ray diffraction analysis (XRD).

Moreover, macro-characterization experiments will be conducted to examine the soils' strength properties including unconfined compressive test (UCS) and resilient modulus (RM) test. Durability experiments will be developed to test long-term performance of these treated soils.

Reconfigurable Analog Front End for the Detection of Biopotential Signals

Maha Diab [a], Soliman Mahmoud [a]
[a] Electrical and Computer Engineering
University of Sharjah, P.O. Box 27272, Sharjah, United Arab Emirates

Abstract

The detection and monitoring of biopotential signals such as Electrocardiogram (ECG), and Electroencephalogram (EEG), require dedicated analog front-end (AFE) consisting of amplifiers and filters tuned to a specific biopotential signal. Providing a single platform with reconfigurable characteristics can prove efficient in the detection of various biopotential signals through a reprogrammable AFE. The proposed platform to be used is a Field Programmable Analog Array (FPAA) built for biomedical applications using operational transconductance amplifier (OTA) as the building block. This allows the implementation of digitally controlled OTA-C filters and amplifiers. Furthermore, this work presents an improved programmable filtering stage for the AFE based on a modified fourth-order elliptic low pass filter for the detection of biopotential signals.

The low pass notch filter eliminates the powerline interference signal at 50 Hz through the notch positioned at 50 Hz with an attenuation of 51 dB, while the bandwidth of the filter is digitally controlled based on the detected signal. Moreover, an embedded variable gain amplifier provides the filtered signal with variable gain up to 18 dB. The proposed OTA-C filter structure and embedded amplifier are both mapped on the FPAA to provide a reconfigurable AFE which is simulated in LTspice using 90 nm CMOS model.