UAEU College of Engineering

جامعة الإمارات العربية المتحدة
United Arab Emirates University

# Annual Research and Innovation Conference 2018

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# *Abstract: Oral Presentations*




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# Merath calculator

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Islam has a comprehensive system to calculate and divide Merath. It consists of dividing the belongings of a person after his death, which should be inherited by his surviving family members in a specific and well defined way based on Islam law. It is widely recognized that the Merath calculation system is a complex and sophisticated task involving a lot of information with noisy constraints and complex cases. Indeed, the Merath system is hard to master by most people requiring a significant knowledge. Even with expert people, the Merath calculation is time-consuming, and error-prone when done manually. Thus, a handy and automated calculator tool to solve Merath case problems can be very useful before people refer to a tribunal thus avoiding several familial and social problems. In this work, we develop a friendly-user mobile application to support people in calculating their Merath based on Islam system and Emirati law. In addition to providing the basic Merath calculation, our application assists also the user to communicate online with experts/specialists from different domains to make a consultation in valuing the inherited things (cars, properties, jewelry, etc.) to its monetary value. Furthermore, the application allows to share and discuss the resulted Merath information with each member of the family.



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# High speed photographing of flame propagation of biofuels in a combustion bomb

Mohamed Selim, Dina Al Jamal, Aysha Al Shamsi, Afraa Al Mehairi, Ashrakat Abdelkhalek

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No one can deny that using biofuels for energy production is an effective solution to fight the global warming effect on the environment. In our research, flame propagation is tested with the help of high speed photographing camera to visualize the combustion of different biofuels in the combustion bomb hereafter. This was done through a well-designed methodology. Firstly, the bio-diesel and bio-gasoline is produced by distillation of the raw fuel. Bio-diesels and bio-gasolines shall be derived from the same raw oil which is jojoba oil. The combustion bomb test is used to burn specified amount of fuel with air under fixed conditions. The bomb has pressure and temperature sensors to measure the partial pressure of both the air and the fuel. The bomb has another sensitive pressure sensor and thermometer to get the pressure / temperature history during the combustion. Two electrodes give an electric spark to ignite the fuel- air mixture, then high speed camera is fixed near the bomb to record the flame propagation, where a trace of these pictures with time enables the calculation of needed variables. The uniqueness about this topic is that it includes flame speed measurements of new bio-diesel and bio-gasoline fuels that are not currently available. This is especially important to the UAE, since bio-diesel and bio-gasoline are promising fuels for vehicles used in transportation and power plants.


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# Supramolecular carbohydrate for light energy harvesting

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Host-guest complexes between CB8 and dequalinium chloride hydrate (DCH) in neutral water are studied by using UV-visible absorption spectrophotometer, steady & time-resolved fluorescence spectrometers, and NMR spectroscopy. While emission intensities increased and shifted to red upon the addition of CB8, the absorption spectra displayed several isosbestic points, establishing the host-guest equilibrium with an equilibrium (binding) constant that is much lower than that previously reported by another research project student on the interactions of DCH with CB7. The binding constants were K = 3.9 × 103 M-1 and K = 1.46 ×103 M-1. NMR data showed CB7 shifts proton signals to lower ppm for the alkyl protons and duplicates all DCH proton resonances. This confirms shuttling of CB7 along the guest alkyl chain stalk while the aromatic is positioning outside the cavity. Contrarily, DCH partially enters the CB8 from its aromatic site, resulting in a weaker interaction. NMR titration of DCH with CB7/8 confirms formation of complexes in a 1:1 ratio in both cases. Exited-state lifetimes extracted from the single-exponential fitting of all emission decays traces collected from 350 to 550 nm (excitation at 320 nm) increased by 3 folds versus 1.5 folds upon the addition of CB8 and CB7, respectively, due to suppression of Cl- quenching. This can be rationalized by the selective binding of CB8 to the aromatic ring of DCH (fluorophore). It is concluded by our results that CB8 is more useful than CB7 in inducing energy transfer between DCH and other acceptor molecules.



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# Rapid manufacturing of microstructures using mr-DWL negative photoresist

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With development of maskless lithography techniques, direct laser writing is widely used and implemented for microstructures manufacturing to serve various applications such as microfluidics, MEMS, and micro-photonics. The time consumed manufacturing process using maskless lithography system depends on the system and material parameters. The main system parameter contribute in time consumption is the writing speed and the main material parameters are the prebake and post bake timings. The mr-DWL negative photoresist material developed by Micro Resist GmbH Company (and used in this work) is mainly for direct laser writing implementation. An experimental study carried out using direct laser writing setup and mr-DWL negative photoresist material showed that mr-DWL material is very sensitive and suitable for rapid manufacturing. The results show that, both prebake and post bake timings of this material are in the range of 5 to 10 minutes depending on layer thickness. Therefore, using this material will limit the time consumed to only system parameters. When the material was used without prebake and post baking steps, good quality patterning was observed with faster development rates. This further reduced the total time of microstructures manufacturing. Finally, this material showed more predictable results with respect to variations in the writing velocity.



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# Optimizing the curing conditions and nanofiller contents for manufacturing high performance Kevlar KM2 Plus/ epoxy nanocomposites

Abdel-Hamid I. Mourad, Mouza AlMansoori, Lamia AlMarzooqi, Farah Genena and A.C Nizamudeen

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Fiber reinforced epoxy nanocomposites are having high impact on the current scientific and industrial world due to its exceptional properties. In the current research, we have utilized Kevlar KM2 Plus (Aramid fiber) for the production of high quality high performance nanocomposite sheets. The curing conditions such as curing temperature, curing time and applied pressure during hot pressing are optimized for maximizing the nanocomposite performance. In addition, multiple nanofillers such as MWCNT, Graphene oxide etc. is added to the epoxy matrix for improving the mechanical and thermal performance. Thermal stability and optimal curing conditions are determined using DSC and TGA tests. Tensile, flexural and drop weight tests are carried out to investigate the mechanical performance. The results show that, when the curing temperature of the nanocomposite sample is under 100$^{o}$C, the Kevlar layers are bonded very weakly and delamination is observed during cutting. The optimal curing temperature observed is around 150$^{o}$C. In addition, the mechanical strength of the composites is enhanced by optimizing the curing conditions and nanofiller contents.


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# Game simulation of smart taxis

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College of Information Technology

Our problem definition was derived from a real-life context. For example, within our campus, golf carts are used to transport faculty, staff, and students from one location to another. However, after investigating the use of these carts we found out that they are facing issues, such as underutilization. Scheduling and allocation processes of these cars are carried out in an ad-hoc fashion. Thus, no real-time information about what is happening on the field is available, resulting in inefficiencies, such as delays and suboptimal use of cars. We address this problem by exploring alternative automated approaches to improve service quality and to effectively manage the scheduling and allocation of transportation request by implementing a software simulation of a system of autonomous (self-driving) cars. Consequently, we developed a software model to simulate the pickup and delivery transportation system using cooperative autonomous cars. Having computing power and being autonomous, the vehicles are capable of evaluating current transport conditions and make quick decisions when they receive requests from passengers. The decisions are efficient, which means they should minimize the waiting time, travel time, battery consumption, and the cost of the ride. It is well-established that the complexity of the pickup and delivery problem (PDP) is NP-hard. Our prime strategy to address this complexity is to design a decentralized architecture to distribute computing over components of the system and to develop a set of heuristics to find optimal solutions without an exhaustive search. Our process followed Software Engineering principles to derive a sound implementation.



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# Networking and connectivity on internet of nano of things

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The advent of nanonetworks promises an elegant alternative to some traditional technologies such as wireless body area networks. Nanomachines can be deployed inside or on the human body, plants, or environment to reach otherwise unreachable organs, tissues, etc. One of the several applications of nanomachines is to deliver drug doses or provide real-time monitoring of human organs or plant's parts such as the human heart or plant roots. Development and design of nanoscale components and executing simple tasks has become a reality through nanonetworks, which hold much greater communication and processing potential than standalone nanomachines by managing their cooperation as a single unit. Real-world implementation of nanonetworks is not yet possible since it is still in early stages of research and development. This work brings us one step closer to making it a reality by investigating and implementing seamless connectivity between the nanonodes in one hand, and extend this connectivity to Internet creating what is known as the Internet of Nano-Things. To enable the functionality of IoNT, we need to design protocols that allow for nanonodes connectivity and dissemination of sensed data within the nanonetwork, and the ability to receive directions or orders from external networks to the nanodevices to perform certain tasks such as drug delivery or supervised water irrigation. In this research, we intend to investigate the challenges of networking and connectivity in IoNT. We will evaluate current proposals for IoNT networking and connectivity bearing in mind the IoNT peculiar characteristics such as the very high data rates in the Terahertz (THz) band, limited transmission range, constraint energy, storage and processing power, and very dense network deployment.



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# Thermal and Structural Testing of Geopolymer Concrete Integrated with Foamed Phase Change Material

Ahmed Hassan, Abdel Hamid I. Mourad, Yasir Rashid

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Alkali activated geopolymer concrete (GPC) is enhanced thermally by incorporating macro-capsules of phase change material (MPCM). Three different quantities of MPCM 25%, 50% and 75% by volume were added to cast GPC cubes for thermal and structural tests. A same proportion of foam was also cast into GPC to benchmark the thermal and structural performance. U-value was also measured of the developed specimens. By incorporating 75% MPCM, a temperature drop of 12.5°C was achieved with respect to reference, though, addition of foam increased the surface temperature up to 5.9°C which may be attributed to the degradation of foam into low molecular mass constituents in the presence of alkali. Addition of same foam as a sandwich layer between two GPC cubes is also tested which is beneficial for reducing heat transmission. Finally, compressive strength is tested to check its compatibility in the building components.



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# Analysis and synthesis of electrical equivalent circuit of a microfluidic channel for cell characterization

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In recent days, numerous biological activities including disease progression are understood by understanding the electrical properties of living cells. Number of techniques were developed to study the electrical properties of cells with focus on single cell analysis. This budding interest was supported by the emergence of various microfluidic techniques to accomplish low analysis time and reduced equipment cost for characterization of cell's electrical properties, as compared to conventional bulky techniques. In this work, the method for electrical analysis of a microfluidic set up that is used for electrical characterization of living cells is presented. This analysis forms the basis for obtaining the electrical equivalent circuit and hence the electrical characterization of the biological cells. The microfluidic setup consists of a microfluidic channel with biological suspensions such as cells. The choice of elements and their values in the electrical equivalent circuit depend on various parameters, to name a few: the electrical and geometrical properties of the cell, the electrical properties of the fluid flowing in the microfluidic channel and the electrical and geometrical properties of the channel. Apart from these parameters, the type of flow and other fluidic parameters such as viscosity also have substantial contribution in altering the value of electrical parameters of the equivalent circuit.



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# Modelling and simulation of low power lithium-ion battery and super-capacitor

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Currently, there is strong emphasis to produce renewable energy on a small level due to environment friendly and cost effectiveness. The behavior of renewable energy sources is much fluctuating, so they are not reliable and can cause problems in power flow. In response to the intermittent nature of such energy system, there is strong need for energy storage systems which can make it stable. Batteries and super capacitors provide the solution to such problems by limiting the gap between load and production. However, due to various operational constraints it is much challenging to estimate the performance of battery and super capacitor in such system. The integration of batteries and super capacitors with the energy generation is not so easy. Various factors can increase the overall cost of the system. Therefore, modelling of batteries and super capacitors have gained much importance. In this paper modelling of lithium-ion battery and capacitor/super- capacitor which can reproduce the dynamic behavior of these components is presented. Grey box methodology is considered for modelling purpose which accounts the chemical and electrical behavior of the identified model. Model order is selected by using the system identification tool box in MATLAB. The developed model is composed of differential equations and the electrical representation is also given. The model parameters are identified by using experimental data and regression is applied for identification. The identified model is validated through the loading pro file tests. Two types of estimators are used for the estimation of battery internal states such as state of charge (SoC). The comparison of their performance is also discussed.



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# Toxicity studies in hepatocytes using date pit activated carbon

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Nanotechnology is a rapidly emerging subject in the field of medical, industrial, environmental and agriculture applications. Nanomaterials from activated carbon is widely used for different applications such as adsorption of materials in health and industrial application. Our studies deal with the characterization of activated carbon (AC) from date pit and screening of cytotoxicity assay with carbon nanoparticles on liver cells namely, THLE2 and HepG2. The AC was obtained by physical activation method at 900˚C in a tube furnace. The surface morphology analyzed by SEM showed that after activation the porosity increased and the produced pores had uniform sizes. In the biological assays, cytotoxicity test of the THLE2 cells and HepG2 cells showed these particles were toxic in a meager amount.


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# Wind tunnel testing a vehicle mounted wind turbine for energy harvesting applications

Emad Elnajjar, Aysha Rashed Awad Alshamsi, Rafeea Sultan Mohammed Alkhyeli, Mouza Abdulrahman Mohammed, Buthaina Helal Mohammed Almaskari, Aaisha Khamis Al Yahyaai

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With the increase of the world's population, the limited fossil fuel resources and major negative environment impact, a clear international demand toward utilization of all renewable resources of energy such as solar thermal, wind energy farm, geothermal, wave and tidal. Wind energy is one among the renewable energy sources which is implemented in large and small scale energy production. The purpose of this proposal is to carry out a wind tunnel experimental study to evaluate the performance of using vehicle mounted wind turbines to co-power a moving vehicle. Specifically, the effect of different wind turbine types, configuration, size and rotation on the power output and the generated aerodynamic forces. The cons and prose of using such approach for power generation on the overall vehicle performance will be addressed in this study.


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# Enhanced oil recovery by nitrogen and low salinity water flooding in tight carbonate reservoir

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Enhanced Oil Recovery techniques are one of the top priorities of technology development in petroleum industries nowadays due to the increase in demand for oil and gas which cannot be equalized by the primary production or secondary production methods. The main function of EOR process is to displace oil to the production wells by the injection of different fluids to supplement the natural energy present in the reservoir. Moreover, these injecting fluids can also help in the alterations of the properties of the reservoir like lowering the IFTs, wettability alteration, a change in pH value, emulsion formation, clay migration and oil viscosity reduction. The objective of this research is to investigate the residual oil recovery by combining the effects of gas injection followed by low salinity water flooding for low permeability reservoirs. This is done by a series of flooding tests on selected tight carbonate core samples taken from Zakuum oil field in Abu Dhabi by using firstly low salinity water as the base case and nitrogen & $CO_2$ injection followed by low salinity water flooding at reservoir conditions of pressure and temperature. The experimental results revealed that a significant improvement of the oil recovery is achieved by the nitrogen injection followed by the low salinity water flooding with a recovery factor of approximately 24% of the residual oil.


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# Modeling and simulation of hydrogen production via membrane reactor

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The membrane reactor is a promising device to produce pure hydrogen and enrich $CO_2$ from syngas. A simulation study of a double tubular catalytic membrane reactor for the water-gas shift reaction (WGS) under steady-state operation is presented in this work. The membrane consists of a dense Pd layer (selective to $H_2$) deposited on a porous glass cylinder support. The reaction side was filled with a commercial iron-chromium oxide catalyst, designed as Girdler G-3. The weight amount of catalyst was 12.1g and height of the catalyst bed was 8cm. The WGS model was carried out with and without the membrane under a temperature of 673K, pressure of 2 atm, argon flow rate of 400$cm^3min^{-1}$ (STP) and steam to carbon ratio of 1. The membrane reactor was able to achieve up to 93.7% of CO conversion, while a maximum value of only 77.5% was attained without using membrane under the same operating conditions. The WGS membrane model was tested under different operating conditions.



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# Narrowing the gap between residents lifestyles and the goals of the sustainable, government sponsored housing program in the UAE

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In accordance with UAE national sustainability agenda, housing authorities are increasingly adopting sustainable house designs and introducing energy savings and conservation strategies in the housing development they sponsor. The intent is to promote sustainability-oriented lifestyles among Emirati citizens and thus establish a broader sustainability culture. However, it has been observed that once citizens assume ownership of such houses, the integrity of the sustainable design strategies is often compromised as the new residents will likely engage in a process of changes and alteration, that involves replacing energy-saving lighting and plumbing fixtures and may often involve enlarging or replacing windows with less energy efficient windows. This research presentation explores the nature of such changes and proposes a solution to address this gap between the intent of the green housing program and the lifestyle practices once house ownership is assumed. It develops a six-tier approach for addressing this issue by identifying areas where both the process and the outcome of the green housing program can be effectively initiated, executed and managed toward maximizing the efficacy of the professed sustainability goals. The approach we develop also considers the process at the policy level and proposes a restrictive deed and incentives approach that involves energy pricing and future housing upgrade options. Thus, it will enable both the decision makers and the residents to work together toward the realization and effective contribution to the national sustainability agenda.



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# Constructed wetlands (CWs) performance for wastewater treatment and reuse in the Gulf Cooperation Council Countries

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Constructed wetlands (CWs) are simple, cost-effective, robust, chemical-free, and efficient technology to treat the wastewater. They became one of the best alternative technologies for wastewater treatment and the prospect of reuse for a sustainable management of water resources. CWs are highly efficient in organic matter, suspended solids and nutrients removal with very low maintenance and operation costs Moreover, CWs became attractive in eco-tourism and recreational areas, especially in arid areas; they also introduce landscaping and establish natural vegetation in the surrounding areas. Wetlands and ponds also provide a valuable habitat for migratory birds. This study attempts to investigate the existing CWs in GCC countries and compile the performance data under these harsh environmental conditions. Furthermore, this work also introduces this technology as a potentially efficient wastewater treatment process in this region and semi-regions. CWs technology started to be used in the Gulf cooperation council (GCC) countries since 15 years ago and most of these systems were built for private customers. GCC are containing not less than 24 constructed wetlands system for different wastewater types. The largest CW in GCC is in Oman (7 $Mm^2$) at Nimr location which is designed to treat 45,000$m^3$/d of produced water generated by the oilfield. It was also found that, both vertical subsurface flow (VSSF) and horizontal subsurface flow (HSSF) CWs are working efficiently in this arid environment. However, it has been found that, the temperature in arid environments enhances the performance of wetlands and wetlands showed a better removal than these systems in moderate areas. The effluent water from these systems may become one of the best attractive options for non-potable water



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# Conformation and tautomerization effects on the photoacid behavior of 6-Thienyl-Substituted lumazine chromophore

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In this work, we characterize the excited-state proton transfer (ESPT) dynamics of 6-thienylumazine (TLm) in water at pH from 2 to 12. The insertion of thienyl group into lumazine (LM) introduces cis and trans conformers while keeping the same tautomerization structures. The interpretation of the photophysical properties of TLm has considered not only the various prototropic and tautomeric forms of TLm but rotameric species in excited states. Global and target analysis are employed to fit the time-dependent emission data to resolve the true spectra of the species. In the pH range 2-4, 38-N form (the notation is based on the numbers where the hydrogen is attached), which emits at 390 nm is deprotonated on the order of 250 ps. The resultant 3-A species emit at 455 nm, whose lifetime occur around 7.4 ns. 13-N tautomer has a lifetime of 3.3 ns with emission band at 420 nm. The spectra and lifetime extracted in MeOH indicate no sign of time-evolution giving the rate of ESPT in water to be 3.2 ns-1. In the pH range 4-7, 38-N is no longer persists, and species 1-A become apparent with lifetime 470 ps and peak position at 405 nm. While deprotonation of 13-N forms 3-A species in this pH range, deprotonation of the same species has formed 1-A forms in the higher pH range from 7 to 10 with no signs of ESPT activity in both ranges. At pH above 10 and up to 12, the second deprotonation of 1-A, producing D forms, has a rate of the ESPT around 4 ps-1. The observed red-shifts in pH range from 7-10 correspond to a mixture of two different components with almost identical decay times, presumably assigned to cis and trans isomers of 13-N and 1-A. Importantly, we demonstrate that only the short-lived species tautomer (38-N and 1-A) have ESPT activity in agreement with the previous results.


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# Infrared thermal imaging diagnosis; residential building envelope insulation versus construction quality and the way ahead

Boshra kahaled Akhozheya, Rahma Mohammed Abdelghani, Monaya Syam, Kheira A. Tabet Aoul

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The electricity consumption per capita in the United Arab Emirates (UAE) is one of the highest in the world. The built environment accounts for 70% of the energy consumption, with the residential sector leading the way. Hence, the existing building stock is a prime target for an energy efficient retrofit. Through infrared thermal imaging diagnosis of the building envelope energy leakage, the weakest points can be identified and mitigation strategies explored. Hence, this paper reports an innovative field study that investigated, in a representative housing unit in Al Ain city, the impact of building age, workmanship and construction quality on the building thermal efficiency. First, thermal leakage through the building envelope was audited through infrared thermography in two units built ten years apart. The auditing highlighted several common thermal behavior and variances, including a critical need for building envelope insulation. Newer units, had significant thermal anomalies around building's junctions, indicating that building's age may not be the main referent for a retrofitting priority. Workmanship and construction quality may be a more impacting factor, calling for construction quality assurance beyond the specification of minimum values of insulation. Next, optimum retrofitting opportunities were explored through simulation. The building envelope retrofit upgrades included walls and roof insulation and glazing. The results indicated potential annual electricity savings up to 48.6% through building envelope insulation primarily leading to a 50% reduction of $CO_2$ emissions. Finally, this study indicates optimum retrofitting scenarios for the existing building stock in the UAE based on assessment and optimum envelope upgrades.



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# The effect of daylighting on patients recovery and well-bring in hospitals

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The individual biological need of lighting is different from the primary visual need such as viewing objects and performing work or movement. The insufficient daylighting for biological stimulation can cause health problems like an imbalanced circadian rhythm. Daylighting is an essential element for hospital patients under physical and/or psychological stress. Since many patients stay indoors for 24 hours, they might be vulnerable to the absence of daylight which is vital for health improvement. Hence, daylight can be an active design component in a therapeutic environment to assure good health and stimulate clinical recovery for patients. The relationship and connection between daylight environment and individuals' responses are complicated and are still not fully understood. Results found by previous researchers have made daylighting implementation strategies significant in the architectural design of hospital in-patient rooms, mainly for therapeutic purposes. Strong information must be established to build a foundation for both architects and policymakers to integrate the therapeutic effect of daylighting in patient rooms. This review paper presents information to architects from previous research papers for incorporation of therapeutic effect of daylight in the design of in-patient rooms in hospitals.



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# Emirati household behavior and energy usage in villas; exploratory investigation

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The existing residential and commercial buildings in the United Arab Emirates (UAE) account for over 65% of the total energy consumption, with the residential sector leading the way with around 40%. Further, the energy demand trend is expected to keep rising. Factors such as population growth, economic development, along with building characteristics, climatic context and occupants' behavior have resulted in high-electricity demand, ranking the UAE as one of the highest energy consumption per capita in the world. The UAE government has taken serious actions to curb the excessive energy consumption. Building regulation and codes emerged as well as energy saving campaigns. While actions and studies are flourishing in terms of building energy efficiency, very little is known about occupant's behavior and energy usage in their home, despite the vast body of literature acknowledging that occupant's behavior is a driving factor in determining building energy consumption. Further in the UAE, there are evidences that Emirati or nationals housing occupants carry a higher energy usage in their homes than non-nationals. Hence, this research paper reports on an exploratory qualitative study that aims to investigate nationals' behavior and its impact on energy consumption in their detached houses (villa) in Al Ain city, UAE. The methodology is based on semi-structured interviews, addressing occupants' daily energy usage patterns, cultural aspects and their awareness level of energy consumption in their homes. Housing characteristics and electricity bills have been considered. An exploratory pilot study with a small number of units was carried out in the month of June. This paper presents preliminary results of this investigation, where the expected findings will contribute to a



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# Evaluation of building period expressions for seismic design

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Evaluating the dynamic properties of structures is an essential part to analyze their structural behavior under seismic loading. One of the main dynamic properties for the seismic design of structures is the fundamental period. During the last few decades, many expressions for the calculation of the fundamental period of vibration were presented. However, further analysis for the fundamental periods is needed to provide more general and reliable formulas. In this study period, data for 147 buildings with different lateral resisting systems are analyzed and evaluated with different formulas from building codes and previous studies. These instrumented buildings are collected from databases worldwide. Another set of period data were considered from selected simulated structures. Different lateral resisting systems are considered in this study including RC moment resisting frames (RCMRFs), steel moment resisting frames (SMRFs), RC shear walls (RCSWs), braced systems and masonry structures. The evaluation of the derived formulas with the code formulas results in a conservative code prediction for the periods of the following systems: (i) SMRFs, (ii) concentric bracing frames, (iii) masonry structures and (iv) pre-cast structures. The code formula for RCMRFs, RCSWs and eccentric braced frames describes well the lower bound periods of medium to high rise buildings, while it slightly overestimates the periods of low rise structures. The study sheds lights on a recommended design parameter to arrive at more efficient and cost effective seismic design of buildings.



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# An assimilated approach to optimize oil recovery and reduce asphaltene deposition during $CO_2$ injection for improved oil recovery

Ilyas Khurshid

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Carbon dioxide is the most severe and harmful greenhouse gas that is polluting our environment. To avoid its release into the air from different sources mainly coal fired power plants etc. It can be injected and captured into the depleted oil and gas reservoirs in order to protect the environment. Whenever, hydrocarbon gases or $CO_2$ with miscible gas injection processes are considered for the increasing the oil recovery. Their operators usually overlook the possibility of asphaltene precipitation/deposition or they anticipate that they will be no asphaltene because of its minute concentration and the reservoir had no past experience of asphaltene precipitation during its production phase. They are often bewildered and surprised when they experience the appearance of asphaltene. In this study, our objective is to develop an assimilated technique to minimize asphaltene precipitation and to increase oil recovery. We developed a numerical model in MATLAB with finite difference method and performed a detail study to control asphaltene precipitation. It is observed that when $CO_2$ is injected at immiscible conditions asphaltene precipitation is low with less recovery. However, when the conditions were miscible, recovery increased but it also triggered asphaltene deposition. After detail analysis we found three minimum miscibility pressures (MMP). They are near, at and above MMP. For the first two MMPs we have high asphaltene. However, when the pressure was above the MMP, we found that the deposited asphaltene is removed from the reservoir. The reason is that the gas developed contact with asphaltene at high pressure leading to its dissolution and removal. We also compared our results with waterflooding and experimental data and found a very good match.

# Quantitative social sustainability analysis of residential built environments using space syntax: Two case studies in UAE

S. M. Hossein Alipour Yazdi, Fanan Jasim Jameel and Khaled Galal Ahmed

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Social sustainability still requires more investigation, especially for residential built environments. Space Syntax theory has been utilized to analyze social phenomena in the built environment through quantifying social dimensions that used to be qualitatively measured. In this research, Space Syntax has been employed to quantitatively analyze the social sustainability aspects of two case studies representing both the building and urban levels in residential built environments in UAE. After establishing conceptual frameworks for social sustainability dimensions on both scales, the DepthmapX was used to analyze the defined social sustainability design aspects of, first, a students' hostel at UAE University, including Social interaction, Social integration, Accessibility, and Privacy. The analysis revealed that the most connected, integrated, and accordingly accessible spaces are concentrated within certain areas in the outdoor communal space and ignoring others. Meanwhile, in the indoor spaces of each typical floor plan, the lounge spaces were the least connected, integrated, and equitably accessed spaces which increase their unintended isolation and negatively reduce desired privacy for bedrooms. As for the urban case study, a recent neighborhood center design in Dubai that is supposed to embed the services and facilities as a social hub was analyzed. The analysis revealed that the neighborhood center is spatially disintegrated undermining the overall accessibility and legibility of its urban context. Moreover, the dispersed urban form contributed to the long distances between houses and the center. The results indicate that Space Syntax is a reliable method for social sustainability analysis for residential designs on both building and urban scales in UAE.

# Effectiveness of seismic mitigation approaches for improving the performance of buildings with varying heights

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The pre-code reinforced concrete (RC) buildings designed before the implementation of current design standards in the UAE may be vulnerable to structural damage under strong seismic events. This reflects the pressing need for studying the seismic performance of existing buildings in this region when retrofitted with efficient mitigation approaches. In this study, the effect of using FRP overlays and RC jacketing of columns for improving the seismic performance of frame structures with different heights is investigated. The reference structures are selected to represent the low-to-medium rise pre-seismic code buildings in the UAE. The adopted 3D fiber-based numerical models allow for the realistic prediction of inelastic response. Both carbon and glass fiber reinforced polymers (FRPs) are implemented within the plastic hinge regions or throughout the column length. The parametric study also involves investigating different thicknesses of RC jacket and FRP overlay. Several inelastic pushover and response history analyses are performed before and after implementing the retrofit alternatives. It is concluded that RC jacketing is an efficient technique for controlling lateral drifts even when the minimum jacket thickness is used. Excessively increasing the number of FRP overlays does not proportionally improve the seismic performance of structures, particularly with increasing the building height. FRP wrapping of columns is more effective in improving ductility compared with enhancing the lateral strength, considering the overstrength recommended by design provisions. The analytical study points toward the need for a comprehensive confirmatory testing program to support the outcomes of this investigation, aiming at providing more safety to the existing structures in the UAE.

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# Wireless power monitoring plug

Eslam Al-Hassan, Hussain Shareef

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A worldwide trend nowadays, is to reduce the energy usage in the residential units, after the latest increments in the electricity tariffs. Thus, the first step should be getting the consumption data aggregated into one readable graph by the user, who will base his reducing plan on it. That is why; this paper is introducing a design of power plug, who is accountable of providing the necessary data wirelessly to a coordinating device, which will perform the data plotting to deliver the readable graph to the user. Besides, the design was further experienced using a home appliance, and the results were acquired and compared with a power monitoring device to validate the credibility of the power plug, by graphing both collected monitoring data from these two sources on the same figure, to find high similarity that profess the reliability of the design.

# Bridging the gap between technical education and ethical commitment to a sustainable built environment

Kheira Anissa Tabet Aoul

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The role of building professionals in shaping a sustainable built environment is an internationally agreed agenda. Educating and training tomorrow's professionals who abide by and deliver an ecologically sensitive design is a critical mission that has been extensively embraced by architectural, design and engineering schools worldwide. Similar to many schools worldwide, the Architectural Engineering program at the United Arab Emirates University has embedded sustainability throughout its curriculum, resulting in students technically knowledgeable and well prepared to design green and or Zero energy buildings through building energy efficiency optimization, material selection and integration of renewable energy systems. However, while the program has increased and deepened the knowledge, the analytical and problem-solving skills in these areas, it has not necessarily translated into a higher awareness level and ethical commitment to sustainability. This may be particularly evident in the Gulf countries, where high earnings coupled with subsidized energy, do not reflect the true energy usage. The ethical commitment to the sustainable development in the built environment remains yet to be fully reached. This context may not be representative of most but it stresses the need for a contextually grounded sustainable education. This paper presents first briefly, the Architectural engineering program's achievements in this focused targeted area along the identified awareness gap. Then it highlights some course activities developed to raise awareness and reinforce commitment to green design. The course content and objectives are outlined but more importantly it describes some activities that seem to have had an impact and triggered responsiveness. Above all, this paper aims t

# Building integrated photovoltaic façade design: A analysis of decision criteria

Daniel Attoye Kheira Anissa Tabet Aoul

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From classical to contemporary architecture, building façades have been designed to meet certain default design objectives such as environmental control and aesthetics. Technological advancement in Building Integrated Photovoltaics (BIPV) has converted the building envelope into an energy generator. BIPV facades are therefore designed to provide energy generation along with conventional design objectives. The authors of this paper have developed an Index to reflect the extensive customisation potentials of BIPV facades from a literature review on BIPV materiality. However, it was observed in the process that literature on decision criteria guidelines for BIPV façade design to meet specific design objectives in hot climates is lacking. This paper seeks to develop a hierarchical list for decision criteria evaluation to meet the three (3) default BIPV façade design objectives i.e. the goals -Environmental Control, Aesthetics and Energy Generation. Using three separate applications of the Analytical Hierarchy Process, weights were deduced for photovoltaic elemental components i.e. the criteria -Cell Technology, Cell Shape, Module Design and Arrangement). Then, a comparative analysis of the three results was carried out to reflect the variations in decision criteria for component selection in each case. Critical application of the results was then used to guide a multi-objective scenario where the design objective is a combination of two and not one default façade design objective. A review was made of this scenario and recommendations proposed for future studies in BIPV façade design to meet multi-objective prototype designs. The unique benefit of this study is the guideline provided for architects and developers in decision making regarding the component requirements for B

# Stand-alone educational center

Asalah Elnaffar, Batoul Hittini, Aisha Obaid, Hind Rida, Rashid Al Shali, Ghulam Qadir

College of Engineering

The world is suffering from the worse refugee crises since World War II as Syria alone has 7.6 million. Out of which 85,000 people (December 2015) are living at Al Zaatari camp located in Jordan near to Jerusalem. A need to design and build a sustainable self-sufficient educational center for the school children was felt. A district wise study and site analysis was performed using geographical information and climate analysis computer tool, Climate Consultant 6.0 to figure out important factors like quantity of ground water, rainfall intensity, solar radiation and sun path at the site. Building plan was developed by integrating different sustainable active and passive strategies for energy generation. The model was simulated using annual whole building energy modeling software (Safeira â„¢), Photovoltaics can produce 50% of the required energy, natural ventilation and geothermal heat pump can reduce the annual energy consumption by 9.28% and 2% respectively, if used in months in which they are more useful whereas the remaining energy can be covered by wind turbines. With skylight enough daylight was provided (unlit areas were reduced to 10%) and providing natural ventilation as well. It was concluded that a Stand Alone refugee center for Syrian refugees at Al Zatari camp is possible and could well be constructed if proper support from international community is provided.

# Characterization and identification of novel α-amylase, pancreatic lipase and dipeptidyl peptidase-IV inhibitory bioactive peptides from camel milk protein hydrolysates

Priti Mudgil, Hina Kamal, Sajid Maqsood

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Camel milk is gaining immense importance as a source of novel peptides possessing health promoting properties. In this study, in vitro inhibitory potential of camel milk derived bioactive peptides against dipeptidyl peptidase-IV (DPP-IV), pancreatic α-amylase (PPA), and pancreatic lipase (PPL) were explored. Hydrolysis using papain enzyme showed higher degree of hydrolysis (DH) followed by alcalase and papain. Upon hydrolysis by different enzymes, camel milk bioactive peptides displayed a dramatic increase in inhibition of DPP-IV and PPL, however, only a slight improvement in PPA inhibition was noticed. Among the enzymes, alcalase (9h) and papain (3h) were most effective in inhibiting DPP-IV and PPL. Peptide sequencing revealed that after 9h of hydrolysis 471 and 317 peptides were sequenced in alcalase (A9) and bromelain (B9) hydrolysates. A total of 20 and 3 peptides for A9 and B9, respectively, were categorized as potentially active peptides based on their peptide ranker score of 0.8 or more. All peptides mentioned above were found eligible to be DPP-IV inhibitor peptide. KDLWDDFKGL in A9 and MPSKPPLL in B9 were identified as most potent PPA inhibitory peptide. For PPL inhibition out of 20 and 3 peptides identified in samples A9 and B9 respectively, only 7 and 2 peptides qualified as PPL inhibitory peptides. To the best of our knowledge, the present study is the first report on PPA and PPL and only second for DPP-IV inhibitory bioactive peptides generated from camel milk protein hydrolysates.

# Robot-avatar for autism treatment and assessments

Fatima Alneyadi, Fady Alnajjar, Massimiliano L Cappuccio, Mariam Alkabi, Fatima Almazroui

College of Information Technology

We are proposing a potential treatment tool for children with Autism Spectrum Disorder (ASD). The approach was made of an assistive system and an automatic scoring system. The assistive system uses a robot-avatar controlled by the therapist's body movements though artificial neural networks (ANN) as an intermediate. The automatic scoring system uses Kinect-camera to provide quantitative assessments of the patient's engagement level. The scores were used to feedback the therapist on the engagement status of the patient. From a pilot study involving three ASD and five neurotypical development children, we could empirically prove that the proposed tool is superior to the traditional human therapist and pre-programmed robot approaches in increasing the children engagement, the key to ensure proper outputs from the planned treatment by the therapist. More importantly, our system is adaptable based on the individual patient's need.

# Innovative sustainability to treat domestic industrial aircraft waste disposal

Ali Hilal-Alnaqbi, Waleed Ahmed, Aamna Almazrouei, Dina Al Jamal, Farah Genena, Lamia Almarzooqi

College of Engineering

Aircraft industry is one of the most important sectors of the economy which is constantly developing. With this rapid growth, new challenges have been created. The most important is the preservation of environment sustainability in order to provide a better future for humankind by treating and eliminating any consequent wastes and pollution that follow in a safe manner. This issue raised the demand for the usage of various technologies and innovative methods to ensure the sustainability of this industry. In general, the composites used are usually based on prepregs. Large quantities of waste are produced during the production of prepreg-based composites such as offcuts, scrap, and defective material. This paper shall address the legislation and a method of re-using the aircraft wastes in a safe acceptable manner. The methodology employed by our research is put by the Environmental Agency in Abu Dhabi, which aims to minimize the pollution cause by non-biodegradable waste. Two techniques have been proposed to treat the pre-preg waste: Hot Press and the AutoClave. The carbon fiber was divided into four sample sets; shredded into fine and not fine shreds without the protective nylon sheet, fine shreds with the protective nylon, and cut by scissors into rectangular strips. A sample of the fine shreds (without the nylon layer) was pressed into a circular mold using a hot press machine. A uniform layer of the fine and not fine samples was prepared separately to be treated using the AutoClave. Two different approaches were used to investigate their effect on the mechanical properties of the samples. Industrial waste was used to avoid resin adhesion on the Aluminum plates during curing process. This project was funded by Mubadala through aerospace program (fourth round UGRO).

# Analysis of Methylcitrate in dried urine spots using liquid chromatography tandem mass Spectrometry

Nahid Al Dhahouri, Osama Al Dirbashi, Fatma Al Jasmi

College of Medicine and Health Sciences

Methylcitrate is as pathognomonic marker for propionic acidemia, methylmalonic aciduria and cobalamin metabolic defects. In biochemical genetics laboratories, this marker is traditionally analyzed using gas chromatography mass spectrometry as part of urine organic acid profiling without quantification. In this work, we describe a new quantitative method for methylcitrate using dried urine spots. Urine samples were spotted onto filter paper. Methylcitrate contained in 3.2 mm disc of dried urine spot was derivatized with 4-[2-(N,N-dimethylamino)ethylaminosulfonyl]-7-(2-aminoethylamino)-2,1,3-benzoxadiazole (DAABD-AE) in a single step in the presence of N-(3-dimethylaminopropyl)-N′-ethylcarbodiimide hydrochloride and 4-(dimethylamino) pyridine by incubation at 65°C for 45 minutes. After derivatization, samples were analyzed using liquid chromatography and detected by tandem mass spectrometry. Dried urine spot calibrators and quality control samples were prepared using control urine spiked with standard methylcitrate solution. The DAABD-AE derivative methylcitrate was well separated and eluted at 3.8 min with a total run time of 8 min. Linearity was established in the range of 0.5-500 mmol/L. Intra-day (n = 17) and inter-day (n = 17) reproducibility assessed at 7.5, 75 and 500 µmol/L representing low, intermediate and high concentrations was satisfactory with coefficient of variation ranging between 8-24%. In this work we developed and validated a novel, simple and robust method to determine methylcitrate in dried urine spots. The short sample preparation and chromatography time permits integration of this lean assay as part of the diagnostic or monitoring workup of patients with propionic acidemia, methylmalonic aciduria.

# Geospatial modelling of carbon sequestration in palm-tree plantations: A case study from Abu Dhabi

Salem Issa, Taoufiq Ksiksi, Nazmi Saleous, Basam Dahy

College of Science

Date palm trees have been considered an important part of the farming systems in United Arab Emirates - UAE. It is strongly believed that palm tree plantations in Abu Dhabi are benefiting both the economy as well as the environment through the huge amounts of carbon sequestrations. Afforestation and plantations - such those relating to palm trees - contribute to reducing emissions resulting from deforestation and land degradation. Palm tree species are good source of carbon sequestration in such arid ecosystems. The study assessed the amount of carbon being sequestrated by date palm plantations in the Emirate of Abu Dhabi, UAE by determining the above ground biomass (AGB) and belowground biomass (BGB), estimating the total carbon content and evaluating the $CO_2$ sequestered. Geospatial techniques and the non-destructive field observation methods were used. The current and dynamics of soil organic carbon (SOC) was estimated with a spatially-enabled database of Abu Dhabi's climate. Several numbers of field plots of date palm plantations were selected for analysis and building allometric equation related to AGB of date palm biomass according to their variables (crown cover and height) plus direct sampling of soils in these plots. Empirical regression models based on field plot data were established to determine wet and dry biomass ($kg.m^{-2}$) of date palm plantations using different spectral bands and vegetation indices. Model evaluation and validation was conducted to determine overall accuracy.

# Opportunities and challenges of mobile learning that university students encounter in the UAE

Ghadah Al Murshidi , Ahmed Al Zaabi , Mughair Abel Aziz, Assma Abdel Jalil

College of Education

This study presents preliminary results based on a survey administrated to a sample of 400 students enrolled in undergraduate courses offered at a Higher Education Institution in the United Arab Emirates (UAE). The paper examines opportunities and challenges university students face when instructors introduce "structured" mobile learning in higher education. In part, this study presents qualitative findings of the larger study involving a subset of the sample, to gain in-depth data. Closed-ended and open-ended questions probed students' experiences and perceptions about the use of mobile devices in academic work. Findings reported in this paper focus on students' perceptions on opportunities and challenges. The analysis revealed that a majority of students used iPads, cell phones, and laptop computers to study anytime and anywhere. Respondents reported that these technological devices enabled students to meet deadlines faster than students without mobile devices. In addition, students indicated that they faced difficulties accessing Internet networks in most places. This phenomenon has afflicted students' productivity and efficiency levels, since most academic work required Web searches and Internet connectivity. Nevertheless, students benefited a great deal in using such mobile technological devices and admitted that the benefits outweighed the challenges they encountered.

# Investigation of feed-forward back propagation ANN using voltage signals for the early prediction of the welding arc stability

Dinu Thomas Thekkuden, Abdel-Hamid Ismail Mourad

College of Engineering

The research paper investigates the prediction capability of the stability of the welding arc from the captured voltage signals using artificial neural network in a gas metal arc welding process. The bead-on-plate welds and v-groove welds with altered parameters such as stickout distance, gas flow rate and travel speed were conducted. The voltage signals of each weld were captured using data acquisition system having 8 KHz sampling frequency. The extracted descriptive statistics such as mean, standard error, median, mode, standard deviation, sample variance, kurtosis, skewness, range and maximum of bead-on-plate welds and v-groove welds are used for training and testing respectively. The quality of the weld was determined by the visual inspection of the welds, and from control charts plotted using voltage data. The feed-forward back propagation neural network predicted the quality of test v-groove welds accurately with 100% prediction rate. The results proved that the developed approach is promising for the immediate prediction of the quality of the weld.

# Durability of E-Glass epoxy composite in seawater environment at different temperature

Amir Hussain Idrisi, Abdel Hamid Ismail Mourad

College of Engineering

The composite materials are being used in many industrial applications such as automobile, aerospace and marine industries due to its high strength to weight ratio. These composite materials degrade due to different environmental factors which include, UV rays, temperature, moisture etc. The major objective of the study is to evaluate the effects of seawater and temperature on the structural properties of E-glass epoxy composite materials. These effects were studied in terms of seawater absorption, permeation of salt and contaminants, chemical and physical bonds at the interface, degradation in mechanical properties, and failure mechanisms. The specimen immersed in seawater at 230ºC, 650ºC and 900ºC for different duration of time and results were compared for different factors affecting the durability. This comparison shows that seawater absorption increased with immersion time and with temperature. The matrix in composites was efficient in protecting the fibers from corrosive elements in seawater; however, moisture cause swelling and breakdown of chemical bonds between fiber and matrix at the interface. It is also observed that high temperature accelerates the degradation mechanism in the E-glass epoxy composite. At 900ºC, the tensile strength of E-glass epoxy sharply decreased by 90.86% but no significant change is observed in modulus of elasticity the composites.

# Impact of reciprocating wear on $NiAl_2O_3$ mixed with graphite and PTFE coatings prepared by detonation gun method

John Victor Christy, Abdel-Hamid Ismail Mourad

College of Engineering

As the friction and wear properties of a material are very much influenced by the tribological variables, a testing system is used which permits the use of a wide range of test speeds, loads conditions on coatings. In our previous work, the thermal spray ($NiAl_2O_3$) with inclusions of solid lubricants (Graphite and PTFE) coats were developed on bakelite and the condition of the coatings were evaluated for different wear rate against abrasive, erosive and adhesive wear. This research shows the impact of reciprocating load on the coats and the study of wear rates. Reciprocating scratch tester Taber 5900, was used to estimate the wear rate of coated bakelite. Normal load of 1N, 2N, 2.5N, & 3N with varying reciprocating speed of 20, 50, 55 and 70 cycles per minute were the test conditions observed. Keeping the stroke length constant, wear rate was observed on PTFE and graphite based thermal coatings and the tests show that graphite inclusions in $NiAl_2O_3$ is more stable than PTFE.

# Spatial development and everyday commuting behaviors in the UAE: The case of Dubai

Sahera Bleibleh, Nasma Hannawi

College of Engineering

History of cities reveals much about patterns of urban development. Travel behavior dynamics is associated with available modes within the physical environment. Sustainability requires profound analysis of transport paradigm shift aligned with spatial transformation over time. This paper explores the correlation between spatial development in the UAE context and everyday commuting behaviors over the last 50 years. Dubai is selected as a pilot case study to address the interrelationship between spatial development and commuting behaviors of its residents. A structured survey was designed to collect data on commuting patterns from 1950-2017. Primary socio-economic and demographic data of the selected case study was collected using manual and online surveys to enlarge the sample group for those who don't have access to any network. The research findings support the initial research assumption with respect to existing correlation between travel-based pattern and spatial development in Dubai during the last 50 years. The investigated relation is proved to be valid to study the city physical evolution and transformation. The research concludes by mapping spatial development of Dubai to evaluate possible scenarios to connect historical data with anticipated patterns for future development using two approaches; travel and trip based approach.

# Does student answering behavior on multiple-choice question examinations provide useful information?

Tahra AlMahmoud, Regmi Dybesh, Margaret Ann Elzubeir, Frank Christopher Howarth, Sami Shaban

College of Medicine and Health Sciences

Despite the fact that MCQ is considered a reliable and widely acceptable assessment method in various professionals' education, it still lags behind from the feedback utility perspective. Evaluating students answering behavior may help identify deficits in students' efficiency or question answering effectiveness and perhaps leading to improvements in performance based on evidence-based educational findings. 1. "Don't change the answer; the preselected answer in MCQs is commonly right." 2. There are no differences in examination performance between male and female medical students. Our approach was to use electronic assessment system that generates comprehensive log files to examine students' behavior during high-stakes final exit examination- College of Medicine & Health Sciences. The results of 228 students from four high-stakes undergraduate medical degree graduating examinations totaling 400 single best-answer multiple-choice questions were available for analysis. Descriptive statistics of answered question results as well as t-tests, ANOVA and correlation coefficients were calculated using SPSS. Male and female students spent the same amount of time on questions ($p = 0.67$), however, females performed significantly better ($p = 0.00$). There was a significant difference in the average time spent on questions answered correctly, compared to questions answered incorrectly ($p = 0.00$). The percentage of questions that had answers changed by examinees was 13.7% of which 5.8% changed from incorrect to correct and 2.8% changed from correct to incorrect. Students spent significantly more time on questions that were answered incorrectly. Reviewing and re-answering questions was beneficial to student marks.

# What happens to the renal functions in the long-term following the initial recovery after the relief of ureteric obstruction?

Fayez T. Hammad, Loay Lubbad

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Following release of short periods of ureteric obstruction (UO), renal functions recover by time e.g. in the rat, release of 3-day unilateral UO (UUO) was associated with total recovery of renal functions by 14-days post-reversal despite the ongoing interstitial fibrosis which continued up to 28 days post-reversal. Interstitial fibrosis causes deterioration in glomerular filtration rate (GFR) and it is not known if it results in an ongoing slow deterioration in the renal functions despite the apparent recovery post-reversal. Wistar rats underwent 72 hours reversible left UUO. Renal functions of the right non-obstructed (NOK) and left obstructed (OK) kidneys were measured one month (G-1), 4 months (G-2) and 18 months (G-3) post-UUO reversal. In G-1, all renal parameters in OK were similar to NOK. This include renal blood flow, GFR, urine volume, total urinary sodium and potassium excretion and fractional excretion of sodium and potassium (6.39 ± 050 vs. 7.04 ± 0.59, 0.83 ± 0.06 vs. 0.93 ± 0.09, 17.1 ± 1.8 vs. 18.7 ± 2.7, 3.02 ± 0.38 vs. 3.86 ± 0.58, 1.17 ± 0.11 vs. 1.52 ± 0.09, 0.04 ± 0.003 vs. 0.04 ± 0.003 and 0.54 ± 0.03 vs. 0.68 ± 0.05, respectively, $P > 0.05$ for all). Up to 18 months, the functions of OK did not show any deterioration as shown by the similarity of the renal parameters between the OK and NOK in G-2 and G-3. Despite the prolonged interstitial fibrosis, both hemodynamic and tubular functions did not deteriorate in the long-term post-UUO reversal indicating a large reserve in kidney function to withstand certain periods of UO.

# War friendly fire: A systematic review

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The aim of this study is to systematically review the literature on war friendly fire, its causes and outcome. All MEDLINE, PUBMED papers on friendly fire, their causes, and effects on war victims were studied. Papers were critically appraised regarding their design and outcome. A total of 99 papers were found in the search. 15 relevant papers were critically appraised, 11 papers were relevant and included in this review. The term of "friendly fire" needs to be more precise. It is replaced by "fratricide" injury by U.S. Army. About quarter of the American soldiers were killed by friendly fire in the Gulf war and 70% of these injuries were caused by ground to ground fire. Air-to-ground fire incidents have major impacts, especially if they hit hospitals. Friendly fire deaths remain high despite advances in technology. They can be caused by inexperience, lack of communication or coordination, situational stress, or misidentification. Friendly fire is a human error, which is similar to medical errors, may have dramatic effects on the health care of war zones.

# Transcriptome analysis of Arabidopsis WRKY33 mutants in response to Botrytis cinerea

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Botrytis cinerea is a necrotrophic fungus that causes plant diseases on a wide range of crops. The WRKY33 transcription factor was reported for resistance to B. cinerea. We compared Arabidopsis WRKY33 overexpressing lines and wrky33 mutant that showed altered susceptibility to B. cinerea with their corresponding wild-type (WT) plants using the high-throughput microarray gene expression analysis. In WT, about 1660 genes (7% of the transcriptome) were up-regulated and 1054 genes (5% of the transcriptome) were down-regulated at least twofold at early stages of inoculation with B. cinerea, confirming previous data of the contribution of these genes in B. cinerea resistance. The expressions of B. cinerea-regulated genes, encoding for proteins and metabolites involved in pathogen defense and non-defense responses, seem to be dependent on a functional WRKY33 gene. The expression profile of OPDA- and PPA1-treated Arabidopsis plants in response to B. cinerea revealed that cyclopentenones can also modulate WRKY33 regulation upon inoculation with B. cinerea. These results support the role of electrophilic oxylipins in mediating plant responses to B. cinerea infection through the TGA transcription factor. Further investigations to elucidate the function and mechanism of cyclopentenone metabolism during B. cinerea and other necrotrophic pathogens infections are underway.

*UAEU Annual Research and Innovation Conference 2018*

# University Students' views of working under supervision of faculty members on research

Ghadah Al Murshid, Ahmed Al Zaab, i Asma Abdel Jalil, Mughair Abdel Aziz, Mohamed Chiekhi

College of Education

This study examines the major benefits and challenges of UAE University students who were integrated in different research projects under the supervision of their faculty members. Based on surveys and interviews conducted with nearly 400 students, a mixed methods approach was used to analyze responses from participants who responded to some closed ended and open ended questions, especially in terms of their experience in working with faculty members and the benefits they gained from them and from the research. The results of these methods revealed that, the majority of students found that, their opportunities in the job market widened and they were able to cope up with deadlines when under pressure. Apart from this, studies showed that, students faced some difficulties in terms of duration of the work due to their other course works that conflicted with their research work. The survey indicated that, the majority of students faced challenges like, communicating with other research assistants, especially due to lack of meetings with one another and to know about the work of each one and the way they were proceeding in the research work. Majority of the students preferred to participate in future researches if they had an opportunity to work with some faculty members. However, the interviews results indicated that, the language challenges prevented the students to participate in the research work due to the fear of being wrong in some tasks. The interview of students revealed that, writing was one of the most difficult aspects faced while working under the research, specifically in terms of scientific research writing style, in order to counter this challenge, most preferred certain courses that would enable them to become familiarized with such writing styles.

# Quantile dependence between developed and emerging market stock returns: Evidence from a cross-quantilogram approach

Chiraz Labidi, Md Lutfur Rahman, Axel Hedstorm, Gazi Salah Uddin

College of Business and Economics

We use the cross-quantilogram approach developed by Han et al. (2016) to capture the higher-moment dependence between developed and emerging market stock returns and examine its time-varying characteristics, using rolling sample estimations. The result reveals a heterogeneous quantile relation for US, UK, German, and Japanese stock returns to those of emerging markets. Systematic risk generally does not explain the cross-country dependence structure, since it remains essentially unchanged when controlling for financial, geopolitical, and economic uncertainties. Moreover, the cross-quantile correlation changes over time, especially in the low and high quantiles, indicating that it is prone to jumps and discontinuities, even in a seemingly stable dependence structure. These results are important for institutional investors and market observers.

# Understanding social media usage using at two theory approach based on flow and dissonance

Ananth Chiravuri, Wala Salim Khalil, Safaa Lulu, Reem Al Mujaini

College of Business and Economics

The average time that a teen is spending on social media has been increasing exponentially over the last few years. This online behavior is contrary to the existing negative attitudes on social media usage. One possible explanation for the high amount of time spent on social media can be traced to flow from the flow theory (Csikszentmihalyi 1975 and 1977, Csikszentmihalyi and Csikszentmihalyi 1988), a psychological state where people are not aware of the time spent online since the activity is very enjoyable. However, it is not clear whether all dimensions of flow are valid in the context of UAE as the conceptualizations of flow have been inconsistent. Also, on the other hand, based on the cognitive dissonance theory (Festinger 1957), it could be argued that the dissonance created between attitudes and behavior is leading to a change in attitudes leading to more time spent on social media. Consequently, we are suggesting that cognitive dissonance may also be a factor in explaining the high usage of social media. This factor has been missing in studies on social media thus far and needs further review. This study is positivist and quantitative. Data will be collected randomly from a sample of students because students represent teens who are most likely to spend most time on social media. We will administer a questionnaire to a randomly selected student sample that will measure the time spent on social media, the dimensions of flow and their attitudes. Data so collected will be analyzed using appropriate statistical techniques. The outcomes of our study will contribute to the human-computer interaction (HCI) domain in MIS and will help policy makers, educators, and IS/ social media managers in UAE devise better strategies.

# Sovereign wealth funds and equity pricing: Evidence from implied cost of equity of publicly traded targets

Jocelyn Grira

College of Business and Economics

We investigate the impact of sovereign wealth fund (SWF) investment on ex ante (implied) cost of equity capital of targeted firms. Using an international sample of 264 targets involved in 343 SWF deals and their matched firms, we find that targeted firms exhibit, on average, higher cost of equity financing than their peers after the announcement date. Firms involved in domestic deals and deals concluded during the Global Financial Crisis exhibit lower implied cost of equity financing, while those involved in cross-border deals are associated with higher implied cost of equity capital.

# Design and implementation of a platform for the processing of urban data stream

Ashjan Muhsen, Fatima Salem, Meera Saeed, Nouf Ali, Badidi Elarbi

College of Information Technology

Over the last few decades, many cities are experiencing great pressure caused by urban growth and migration waves. Their infrastructures need to respond adequately to the increasing demand for the supply of water, energy, transportation and ensure quality healthcare and education services. To deal with these pressing issues, city stakeholders are relying on digital technologies to enhance the efficiency of various city systems, improve the quality of services delivered to citizens, reduce costs and balance budgets. Urban data streams originate from various sensors deployed in smart cities as well as from social media sources such as Twitter and Facebook. This paper describes our proposed data pipeline for the acquisition and processing of urban data streams. The proposed platform will facilitate real-time event detection, correlation and notification of alerts, combined with rich visualization tools to help build monitoring dashboards. A prototype of the platform is being implemented by relying on the Kafka messaging platform. A scenario of usage will consider detecting various events taking place in a smart city, examine the spatial and temporal pattern of an event, and conduct sentiment analysis by mining the opinions of citizens regarding the governance of their city.

# Automatic generation of interactive stories

Asmaa Alawadhi , Hessa Al Shamsi, Amnah Aldhanhani, Boumediene Belkhouche

College of Information Technology

Whether at home, campfires, or market squares, storytelling attracts diverse audiences willing to be transported into magical worlds. Storytelling is a social and cultural activity used to convey stories in words, sounds, and images. Stories capture, preserve, and transmit culture in its various dimensions. Whether at home, campfires, or market squares, storytelling attracts diverse audiences willing to be transported into magical worlds. Transforming prose stories into interactive ones is carried informally and is yet to be formalized. Consequently, there is a need for a methodology to support the automatic translation from the prose story into its digital form. Given this state of affairs, our major objective is to develop such a methodology by investigating issues associated with the process of transforming traditional prose stories into interactive digital stories. The process will provide the necessary tools to developers to systematically carry out the transformation. Also, it will give opportunities to researchers to discover new techniques. Our major contribution is the development of a process and its associated tools to support the automatic transformation of traditional prose stories into interactive digital stories. The resulting framework provides the necessary CASE tools to developers to systematically carry out the transformation. Our implemented system takes the script of the written story as an input and transforms it into a game-like digital format. To automate this process, we designed two formal languages, the source language (L1) and the target language (L2). L1 is a scripting language that allows the designer to express stories in a formal way. L2 is the game language that is processed by the game-engine to animate the story.

## An application for language learners

Saad Harous, AbdelRahman Al Harahsheh

College of Information Technology

The advancement made in information technology makes it easy to create simulated communities. We plan to develop a learning tool that is based on the creation of communities in which a learner can immerse. Of course the characteristics of these communities should be suitable to learners' personalities. These communities form an online network that connects people who want to practice the same language with each other. Becoming a member of this network is like entering a new virtual world. Each member will create his/her own avatar, and will have a level to start with. The tool supports many creative, unique and fun activities. Each activity has a different way to make members interact with each other. There will be activities that require little interaction or no interaction at all for people who do not like to interact very much. Every time a member succeeds in finishing an activity his/her level will increase. Different tasks and challenges are rewards based, in other word if a learner performs these task or challenges he/she will earn awards. This will make the members compete and get motivated to do more and more activities which increase their language skills.

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# Does Diabetes Mellitus affect the recovery of renal dysfunction and glomerular permeability following reversible 24-hr unilateral ureteric obstruction?

Omran Bakoush, Loay Lubbad, Carl M Öberg, Fayez T. Hammad

College of Medicine

Following reversal of relatively short periods of ureteric obstruction (UO), renal functions recover within a certain time. Diabetes Mellitus (DM) affects glomerular functions and ultimately leads to renal impairment. The ability of the diabetic kidney to recover from UO and the time frame for recovery is not known. DM was induced in Wistar rats by intraperitoneal streptozotocin. All diabetic rats and age-matched controls underwent reversible 24-hour left unilateral ureteric obstruction (UUO). Renal functions of right control and left obstructed kidneys were measured 3 hours, 7 days and 30 days post-UUO revresal. The glomerular permeabilty was also asseseed by measurng glomerular sieving coefficients for FITC-Ficolls (molecular radius 20–90Å). DM caused exaggerated early alterations in glomerular hemodynamic and tubular functions and in size selectivity dysfunction of small and large pores of glomerular filtration barrier (GFB). By 30 days post-UUO reversal, despite the return to baseline of glomerular hemodynamic and tubular functions and size selectivity dysfunction of small pores in both diabetic and control kidneys, diabetic kidneys had more severe and residual size selectivity dysfunction of large pores compared to control kidneys. DM causes exaggerated early alteration in renal functions and size selectivity dysfunction of GFB but this had ultimately returned to baseline apart from the more severe and prolonged residual dysfunction of the large pores selectivity indicating a more ominous outcome in diabetic kidneys following UO.

# Neurological basis of skeletal deficit in type I diabetes mellitus

J. Sunny, M. Abdalla, M. Hussain, S. Alhajeri, H. Chafqa, E. Al Tamimi, O. Alajlouni, S. Shehab, S. Mohsin

College of Medicine

Diabetes Mellitus (DM) is the most common chronic metabolic diseases, which is on the rise globally. DM adversely affects the skeleton through variable mechanisms. Previous studies have addressed the question of how DM induces osteoporosis; the exact underlying mechanism is still elusive. Bones undergo continuous remodeling throughout life. Bone remodeling implicates the coupling of osteoclastic bone resorption and osteoblastic bone formation. This process is controlled by numerous genetic, hormonal and neurogenic mechanisms. Osteoporosis is a result of bone loss that occurs by uncoupled remodeling. Regulation of the neurological system plays an important role in many physiological and pathological processes in bone remodeling. A number of neuropeptides, such as substance P (SP), calcitonin gene-related peptide (CGRP), vasoactive intestinal peptide (VIP), neuropeptide Y (NPY) and tyrosine hydroxylase synthesized in sensory neurons and sympathetic nerves are implicated in the control of bone remodeling. Neuropathy is a common complication of DM and studies have shown that these patients are at an increased risk of osteoporosis, arthritis and fragility fractures. We investigated the distribution of sensory and sympathetic nerve fibers in bones of streptozotocin- induced model of type I diabetic male rats using silver staining, immunohistochemistry and fluorescence microscopy techniques on decalcified bone sections. We quantified the expression of neuropeptides in bones by using ELISA (enzyme-linked immunosorbent assay) technique. Results of our study showed decrease in the number of both sensory and autonomic nerve fibers in type I diabetic osteopathy. Thus neuropeptides are involved in the pathogenesis of skeletal abnormalities in type I DM.

# The mechanical properties of bones from Wistar rat

Husain Chafqa, Abdel-Hamid Ismail Mourad, Sahar Mohsin

College of Medicine and Health Sciences

Mechanical testing has been regarded as the gold standard to investigate the effects of various pathologies on the structure-function properties of the skeleton. Wistar rats are commonly used as an experimental animal model to study biomechanical properties for such studies. The aim of the current study was to determine the mechanical properties of normal rat bones from an appendicular and axial skeleton. Bones can be compared to a composite material which undergoes a variety of forces such as compression, tension, and shear. In this study, we determined the flexural strength of long bones from 10 Wistar rats using MTS Universal Testing Machine. Three-point bending test was carried out for whole bone specimens using the 100kN load cell. All tests were conducted at room temperature and under 0.2 mm/min overhead speed. We determined the ultimate load/force and maximum flexural strength for rat's femur, tibia, humerus, radius, and ulna. Results of the study show an average maximum flexural strength of 103 ± 25, 151 ± 41, 275 ± 62, 93 ± 44, 81 ± 51 MPa for femur, tibia, radius, ulna, and humerus respectively. The data obtained will be helpful in assessing the mechanical properties of bones in different pathologies and will also help in understanding the mechanism and management of fractures and design of orthopaedic appliances.

# Study of the prevalence and risk factors of parasite (Helminths and Protozoa) amongst labors in Al Ain district

Zakeya Al Rasbi, Tom Loney, Rami Al Rifai, Sumaya Zoughbor, Suad Ajab, Mohamud S. Hussein

College of Medicine and Health Sciences

The United Arab Emirates is a multicultural country and approximately 65% of the population are expatriates from low- and middle-income developing countries that have a high burden of intestinal parasitic (helminths and protozoan) infections (IPI). The primary aim is to estimate the prevalence of, and factors associated with IPI in an occupational sample of expatriates in Al-Ain. The research hypothesis is that IPI prevalence will be greater than previous UAE estimates. This study utilized an observational analytical cross-sectional study and recruited a representative sample of expatriate employees. Participants completed a questionnaire; and provided a fresh stool sample. Fecal specimens were analyzed for a range of IPI species using microscopy and polymerase chain reaction (PCR) amplification techniques. 25% of participants harbored intestinal parasites; 15% with protozoa, while 10% had helminths infection according to microscopy diagnosis. Higher incidents of protozoa and helminths infection were identified using PCR. There is a dearth of research on the burden of IPI in the UAE and the last study was published almost 10 years ago. Thus, this study is of great importance in understanding the pattern of disease in the UAE.

# Analytical solution of the Reccati equation by using modified residual power series method

Muhammed Syam, Alaa Haroun, Marwa Al-Refai, Khatema Albraki, Asia Almenhali

College of Science

In this paper, we study the singular Riccati equation with fractional order: The modified fractional power series method (MFPS) is employed to compute an approximation to the proposed problem. The validity of the MFPS method is ascertained by presenting several examples. We prove the existence of the solution of the Riccati equation with fractional order. The convergence of the approximate solution using the proposed method is investigated. The results reveal that the proposed analytical method can achieve excellent results in predicting the solutions of such problems. Theoretical and numerical results are presented.

# ATP13A2 gene silencing in Drosophila affects autophagic degradation of A53T mutant α-synuclein

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Parkinsons disease (PD) is a progressive neurodegenerative disorder and mutations in ATP13A2 gene causes juvenile-onset Parkinsonism. α-synuclein (α-syn) is a presynaptic neuronal protein, whose aggregation is associated with PD. Since ATP13A2 is implicated in autophagic mechanisms, we studied the role in ATP13A2 in the autophagic flux of α-syn and the role of m-TOR in it. We developed drosophila with ATP13A2 gene knockdown (RNAi) that simultaneously expresses wildtype (WT) or mutants A30P or A53T α-syn. Western blot was performed to study the α-syn aggregation, autophagic flux and the role of mTOR in the autophagy of synuclein. Confocal microscopy was used to examine DA neuronal loss. Drosophila activity monitor (DAM) system was used to study the sleep and circadian locomotor activity in these flies. Western blot analysis showed that ATP13A2 RNAi A53T α-syn flies (30 days old) had an increased level of Triton insoluble synuclein (that corresponds to α-syn aggregates) compared to corresponding A53T flies without ATP13A2 RNAi (control). There was a decreased autophagic flux with increased LC3 and Ref (2)P accumulation in ATP13A2 silenced A53T flies and our preliminary results show a possible role of m-TOR. ATP13A2 silencing caused a decrease in neuronal loss in PPL2 cluster of old flies expressing α-syn WT, A30P and A53T under Ddc-Gal4 driver. ATP13A2 silencing also alters the circadian defect of flies expressing A30P and A53T mutants. ATP13A2 silencing causes an increased aggregation of mutant α-syn A53T, decreased autophagic flux that is possibly m-TOR dependent. ATP13A2 thus plays a significant role in mutant A53T α-syn degradation through autophagic mechanisms mediated through m-TOR.

## How resilient is biodiversity to climate change in hot regions?

Thomson, AlShamsi, Ghosh, Li, Musa, AbuShawish, Jaradat, Faraj, Akkad, AlMarzooqi, et al.

College of Science

Temperatures in hot regions are not rising as quickly as temperatures in the higher northern latitudes, but here we explore whether small temperature increases in regions which might already be too hot could have more negative impacts than larger temperature increases in regions which may still be too cold. We have studied a wide range of species in both hot and cold regions, looking at whether they have already reached their thermal optima or whether they are still living below them. We have indeed found several species from hot regions which have already reached their optima, and several species from cold regions which are still living below them. These findings lend weight to the idea that species in hot regions could be much more vulnerable than previously thought, but our studies have also uncovered remarkable variability between species and even between individuals within species. Thermal performance curves appear to be highly flexible, even within some species, and as the environment changes, this variability may confer some resilience with some species, and some individuals within some species, performing better as conditions change.

# Thermal limits to life, and the ecological impact of rising temperatures in hot regions

Sounak Ghosh, David L. Thomson

College of Science

As global temperatures rise, there is increasing concern that organisms may be pushed above the thermal limits they can withstand. Over 99% of the world's research on climate impacts has however been focused on cooler non-tropical regions; not because these regions are hot but because temperatures there are rising rapidly. Here, by collating extensive data from the published literature, we look at where life's upper thermal limits lie, and we look at whether species in hot regions might be more at risk of reaching these limits than species in cold regions. Across 557 published estimates we found that $T_{c,max}$, the Upper Critical Temperature, varied widely between species, but we found that very few species reach their thermal limits below 30°C, and very few species have not reached them by 50°C. If temperatures rise, most species will be lost not in cold temperatures but between 30°C and 50°C. When we simulated the impact of a 3°C temperature increase, we found that the percentage of species lost increases markedly depending on the initial temperatures. In other words, cool regions would lose very few of their species but hot regions like the UAE could lose most of theirs.

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# The effects of climate change in tropical regions: studies on the thermal performance of Tinfoil Barbs and Three-Spot Gouramis

M. Musa, A. AbuShawish, A. Jaradat, S. Faraj, S. Alkaabi, R. AlKaabi, A. Alhammadi, D. Thomson

College of Science

This work has been done as part of the SURE Plus program. We studied the physiological performance of two tropical fish species from South-East Asia in order to look at whether organisms in hot regions may be especially vulnerable to climate change. Less than 1% of the world's research on climate change impacts has been done in the Tropics, but here we looked at whether species in hot regions might already have reached their optimal temperatures, beyond which the impacts of warming will be negative. The biggest temperature increases are taking place in higher northern latitudes, and it has been widely assumed that this is where the most negative impacts will be felt, but here we looked at whether small temperature increases in regions which may already be too hot could be more damaging than the larger temperature increases in regions which may still be too cold. By observing breathing rates, we quantified performance over a range of temperatures and looked at how the optimal temperature compares with temperatures in the native range. In the Three Spot Gourami (Trichopodus trichopterus) we found the optimum temperature was 25$^{o}$C, and in the Tinfoil Barb (Barbonymus schwanenfeldii) we found an optimum of 29$^{o}$C. Temperatures in the native habitat of these two species ranges from 22$^{o}$C in winter to 30$^{o}$C in summer. This means the current temperatures are reaching their optima and for both species it becomes too hot in summer. If temperatures rise further then both species will spend more of the year above their optima and the effects could be negative.

# 3D-focusing of micro-scale entities in microfluidic devices

Salini Ramesh, Fadi Alnaimat, Anas Alazzam, Ali Hilal-Alnaqbi, Waqas Waheed, Bobby Mathew

College of Engineering

This work presents a validated mathematical model of a dielectrophoresis based microfluidic device capable of 3D-focusing micro-scale entities at any lateral location inside the microchannel. The microfluidic device employs planar, independently controllable, interdigitated transducer (IDT) electrodes on either side of the microchannel. This electrode configuration is key to achieving 3D-focusing at the desired lateral location along the width of the microchannel. The developed model is used for understanding the influence of different geometric and operating parameters on 3D-focusing and consists of equations of motion, Navier-Stokes and continuity equation, and electric potential equation (Laplace equation). The model accounts for forces associated with inertia, gravity, buoyancy, virtual mass, drag, and dielectrophoresis. The model is solved using finite difference method. The findings of the study indicate that the 3D-focusing possible with the proposed microfluidic device is independent of micro-scale entity's size and initial position, microchannel height, and volumetric flow rate. On the other hand, 3D-focusing achievable with the microfluidic device is dependent on the applied electric potential, protrusion width of electrodes, and width of electrode/gap. Additionally, by varying the applied electric potential the position of the lateral position of 3D-focused stream of micro-scale entities can be controlled. The advantage of the proposed microfluidic device is that it is simple to construct while achieving 3D focusing.

# Spectrophotometric detection of breast cancer and synthesizing its equivalent circuit

Nida Nasir, Mahmoud Al Ahmad

College of Engineering

This work deals with the electrical characterization of breast cancerous and non-cancerous cells by transmittance measurements, over wavelength of 640-1050 nm, of normal breast cells (MCF 10A) and cancer breast cells (MDA-MB-231) along with their growth medium DMEM/F12 (Dulbecco's Modified Eagle's Medium and Ham's Nutrient Mixture F12) through spectrophotometer. The effective transmittance signals have been used to generate equivalent electric circuit networks for cells and their medium, using MATLAB Prony toolbox. Prony toolbox has extracted the coefficients of transfer function that represents the signals, using which we generated the equivalent circuit of the transmittance by foster realization. The transmittance level and synthesized circuits has been compared and discussed.

# Online monitoring for early detection of water toxicity

Aaesha Alali, Shaikha AlDhaheri, Fatma AlKhamali and Dr Mohammad Abdul-Hafez

College of Engineering

Water is essential for human survival. Hence, fresh water is a valuable resource that must be carefully monitored and maintained. The existing traditional monitoring systems are none real-time, slow and mostly need laboratory tests. Therefore, the development of a real-time and online Monitoring for Early Detection of Water Toxicity System is proposed. The main contribution of this research is to design and develop a low-cost system to continuously monitor potable water quality and to early detect of any water toxicity by using a smart water sensor network. This is achieved by using a network of multiple sensing nodes to detect water quality parameters. These nodes will be mounted at different locations on the transmission lines of Water Distribution Company and water tanks at every residence in the neighborhood. The resulting monitoring network will be able to detect potential contamination events. Different types of sensors are studied to find the most efficient ones that can be used to measure the various required water quality parameters. The sensors involved in this research are pH, Oxidation reduction potential, dissolved oxygen, conductivity, temperature and turbidity sensors. The data available from the various sensors are processed by the Arduino microcontroller and transmitted to a data center using Zigbee communication protocol through Wi-Fi gateway. The data will be presented on graphical dashboard or in row data form using application. The system will consist of a three water tanks filled with water along with sensors that are mounted inside the tanks and connected to the central monitoring software for data visualization. Different types of toxics will be added to the water to determine the ability of the system to provide rapid and accurate detection.

# Morphology characterization and oil extraction yield of UAE date seed and its potential for energy production

Emad Elnajjar, Shereen Hassan, Sulaiman Al-Zuhair, Salah Al Omari, Ali Hilal-Alnaqbi

College of Engineering

Recently, a great deal of attention has been focused on the production of biodiesel out non-eatable organic material so we will not be competed with the food chain. The present work is a preliminary study focused on the effect of the date seeds size and type on the percentage of oil extraction. The present study investigate the morphological characterization, the chemical composition and the percentage of the extracted oil of date seed powder with average size of 0.1 < DS.

# Modelling and optimization of mechanical behavior of HDPE nanocomposites with artificial neural network and response surface methodology

Anusha Mairpady, Mohammad Sayem Mozumder, Abdel-Hamid I. Mourad

College of Engineering

Over the past few decades, nanocomposites have become excellent approach to boosting the performance and properties of the polymers for biomedical application. However, most convenient strategy to improve structure or property polymer by using filler without harming the properties of polymer still yet to found. In this research, influence of 1. nanofillers (nano-$TiO_2$), 2. nanofiber (cellulose nanocrystal), 3. coupling agents on the uplifting mechanical performance of high density polyethylene was evaluated. Effect of independent major factors and its interaction on tensile strength, yield strength, young modulus and percentage elongation was calculated using analysis of variance. The statistical analysis confirmed combination of nano-$TiO_2$ and cellulose nanocrystal enhances the mechanical property of HDPE. Further using synergic combination of nanofiber and nanofillers central composite design was developed. Response were to optimized using response surface model and artificial neural network model.

# Development of innovative concept of a heat sink for thermal management applications using solid gallium and un-encapsulated phase change materials

S.-A.B. Al Omari, A.M. Ghazal, E. Elnajjar

College of Engineering

We developed a novel heat sink concept that can be used effectively for thermal management applications. This concept has been filed in the US patents office (file number 15/614524) and results of experimental testing of it were published in two of the prestigious journals in the field. Hereby we augment the applicability of solid gallium as effective phase change material (PCM) for heat sinks. Gallium is blessed with a high thermal conductivity and low melting point temperature that can make it be used advantageously as cooling medium. However, it suffers from a major inherent drawback namely its limited specific heat capacity. This drawback can result in non-negligible superheating of the formed melted mushy gallium layer touching the hot source during direct contact heat rejection form to-be-cooled hot sources. Consequently, this can lead to non-negligible deterioration of the temperature difference that drives heat transfer from the source to the gallium body. To overcome this issue, we came up with a new concept namely to integrate within the solid gallium block discretely distributed cavities filled with macro-scale chunks of un-encapsulated PCM material. The PCM is intended to capture some of the heat dumped into gallium resulting in: (1) less superheating of melted gallium mushy layer, and (2) lower melting rate of solid gallium; hence prolonged operation. There is no need for encapsulation shell for the PCM since gallium engulfing the PCM cavities is assured to stay in the solid state during heat dumping operation in the sink. This leads to less resistance to heat transfer hence better sink performance. The proposed sink concept was implemented and tested and results show clear improvement when PCM is used the way proposed.

# Electrically conductive graphene/polymer nanocomposites

Muhammad Z. Iqbal

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A unique combination of excellent electrical, thermal, and mechanical properties enables graphene as a multi-functional reinforcement for polymer nanocomposites. However, poor dispersion of graphene in non-polar polyolefins limits its applications as a universal filler. In this presentation, we discuss our research on improving the dispersion of graphene in polyolefins to produce electrically conductive nanocomposites. Highly non-polar nature of polyethylene (PE) was altered by blending it with a polar polymer, called oxidized polyethylene (OPE). Blends of PE with OPE were synthesized via solution blending method. Inclusion of OPE in PE produced miscible blends, but the miscibility decreased with increasing OPE loading. Meanwhile, the Young's modulus of blends increased with increasing OPE con-centration, attributed to decreased long period order in PE and increased crystallinity. In addition, the miscibility of OPE in PE substantially reduced the viscosity of blends. Electrically conductive nanocomposites were manufactured by incorporating graphene in PE/OPE blends via solution blending. The rheological and electrical percolations de-creased substantially to 0.3 and 0.13 Vol% in blend/graphene nanocomposites compared to 1.0 and 0.3 Vol% in PE/graphene nanocomposites. Improved dispersion of graphene in blends was attributed to increased graphene/polymer interactions, leading to high aspect ratio of the dispersed graphene. A universal Brownian dispersion mechanism for graphene was concluded similar to that of carbon nanotubes, following the Doi-Edwards theory. Furthermore, the improved dispersion of graphene correlated with the formation of surface fractals in blend/graphene nanocomposites.

# Estimation of Wax Thickness in Oil Pipelines

Fadi Alnaimat, Mohammed Ziauddin, Bobby Mathew

College of Engineering

Wax deposition is a crucial problem in sub-sea oil distribution pipelines and in low temperature surroundings. This problem is also concerning to the UAE and the region due to presence of several oil distribution pipelines. In order to provide assurance of wax removal, a common method used for wax removal is called pigging. The associated cost of using this cleaning method is prohibitively expensive. Hence, it becomes vital to know the frequency of needed pigging operations, and/ or determine if the cleaning is required or not. Sometimes due to thicker layer deposition of wax, the risk of pigging device getting stuck in the pipeline and blocking is also observed. Estimation of wax thickness externally will ideally serve the purpose of determining the frequency of required pigging. In literature, there are few studies available on this topic; however, experimental studies on this topic are lacking. In this study, we are developing an experimental setup to estimate the thickness of wax based on the external thermal sensing. External thermal sensing is obtained with monitoring the heat pulse such that the change in temperature difference can help in identifying the thickness of wax deposition layer. Currently, the experimental apparatus is ready and preliminary results are being collected by introducing the known wax thicknesses and using heat pulse method. The results show that constant increment in layer thickness reflects persistent variations in the temperature difference under same operating conditions.

# Ti-Ni-Cu shape memory alloys for joint assembly/disassembly applications

Aiman Ziout, Sawsan Dagher, Jaber Abu Qudeiri

College of Engineering

The objective of this research is to design and manufacture an assembly/disassembly joint utilizing shape memory effect. Nitinol (Ti50%Ni50%) shape memory alloy exhibits high yield strength of 800-1000 MPa., its deformability at room temperature is difficult. Thus, addition of alloying element is proposed. Copper (Cu) is alloyed with the original nitinol alloy, using vacuum induction melting (VIM). Currently the investigations are going on to determine the optimum Cu ratio, aging temperature and time. Furthermore, to verify that Ti-Ni-Cu alloy has good mechanical properties, and keeps the excellent shape memory effects after adding copper alloying element. Which would further confirm the potential application of Ti-Ni-Cu alloys for assembly/disassembly joints in several devices.

# Carbon nanotube/polyethylene composites: Influence of polyethylene structure

Aiman Ziout, Sawsan Dagher, Jaber Abu Qudeiri

College of Engineering

Polymer nanocomposites are advanced materials with multifunctional characteristics and wide range of applications in the energy, automotive, construction and packing sectors. In this work, the emphasis was on understanding the effect of polyethylene(PE) molecular structure on the carbon nanotubes (CNT)/PE interfacial interactions and consequently the thermal, electrical and mechanical characteristics of the nanocomposites. 3 different types of PE were investigated namely: high density polyethylene (HDPE) which is linear PE with small number of short branches, low density polyethylene (LDPE) characterized by high degree of long and short branches, and linear low density polyethylene (LLDPE), which has a linear structure with substantial number of short branches. Nanocomposites over a wide range of CNT concentrations were formulated using the conventional melt mixing approach, and tested according to the relevant ASTM standard. This study is of industrial importance since PE has wide range of applications and is one of the major products of UAE petrochemical industry. CNT is a very promising nanofiller due to its high aspect ratio and small diameter. The CNT/PE composites were prepared by melt mixing followed by compression molding. Based on the PI experience in this field, the compounding conditions were set at: 13min mixing time, 100 RPM mixing speed and 190$^{o}$C mixing temperature. Prior to mixing the PE pellets and the CNT powder were dried in a vacuum oven. Collected samples from the mixing machine were sent for a compression machine to prepare plates for the electrical, thermal and mechanical properties characterization.

# Using supercritical $CO_2$ for simultaneous microalgae oil extraction-reaction for biodiesel production

Hiyam Hisham, Reem Shomal, Amal Mlhem, Rawan Hassan and Sulaiman Al-Zuhair

College of Engineering

Biodiesel is a promising sustainable alternative to non-renewable petrol diesel. It has become more attractive in recent years due to the increasing awareness of the depletion and environmental problems of fossil fuels. In addition to being renewable and more environmental friendly, biodiesel can be used in conventional engines without the need for any modification. In this work, microalgae have been selected as a source for oils that can be used for biodiesel production due to their relatively high oil content and rapid biomass production. By transesterification, oils can be converted to biodiesel in the presence of a catalyst. A biocatalyst, namely lipase, was used in this work, instead of conventional alkaline chemical catalyst, due to its low sensitivity towards the free fatty acids content in the oil, and the less energy requirements. Lipase is capable of converting oils, from different sources, without any pre-treatment to biodiesel and with easy product separation and no soap formation. Microalgae oil extraction and reaction were carried out simultaneously using supercritical $CO_2$ (SC-$CO_2$). The use of SC-$CO_2$, which is a green solvent, was selected to minimize the use of toxic volatile organic solvents, and to allow utilizing the leftover, after extractions, in food and pharmaceutical applications. The results of this work provides a deeper understanding of enzymatic reactions in supercritical condition, and promises to simplify the extraction and reaction processes.

# *Abstract: Poster Presentations*

# Automated Threat Alerting System

Aamna Ali, Khawla Rashed, Mouza Mohammed, Nouf Ali, Fekri Kherbash

College of Information Technology

The security of nations can simply be defined as a safe environment to protect the vital of lives in ways that enhance human integrity and preserve public facilities. There are indeed activities and incidents that destabilize the stability of dynamistic places; for instance, hazardous gas leaks, illegal gun shooting, explosives, nuclear radiations leaks, deliberately igniting fire, and abnormal weather conditions. The proposed idea is aligned with the country orientations in artificial intelligence in 2017 and 2021 vision to enhance its safety and security measures. It will introduce several risks detection, surveillance functionalities and improved communication for incident response. The system will utilize a combination of sensors that monitors the state of the environment in several aspects; for example, temperature change, concentration of certain gases in the air, air quality, exposure to radiation, and noise. The sensed data will be read and analyzed to decide the threats or incidents type, risk levels, and who to notify. In case of the occurrence of a threat, an automated signal will be sent by the system to the authorized agents or entities in an approach that is more efficient to improve incident response time.

# Portable monitoring and reporting system for drinking water quality

Asma Mubarak Al Khaili, Aisha Al Mamari, Walid Ibra

College of Information Technology

The quality of tap water has been a concern of many people in UAE as it has a direct effect on their health. Contaminated water not only tastes bad, it could be deadly. A joint report from the World Health Organization and the UNICEF indicated that every 90 seconds a child dies from a water-related disease, while water-related diseases affect more than 1.5 billion people every year. Most of the tap water in UAE is obtained from desalination. The distilled water is filtered, treated to prevent bacteria growth and is subject to the authority check. Although the water coming out from the desalination plants is perfectly safe for human consumption, there are many factors that could affect the water quality until it reach the consumer tap including the storage tanks at home. Unfortunately, there is limited awareness of the possibility of contamination in the water tanks, and more should be done to educate consumers on the importance of maintaining a hygienic water tank. Several studies showed that storage tanks cleaned three or more times per year had statistically less Escherichia coli and turbidity than tanks cleaned less frequently. In this research the students designed and implemented a portable hardware system to measure the quality parameters of the water stored in the residential water tanks. The system consists of an Arduino Mega board, pH sensor, temperature sensor, and water temperature sensor. The system also has a SD memory card to record the collected data, and LCD screen to display the current parameters. The system is currently installed and data is collected every 30 minutes. The aim is to collect enough data to study the effect of having the water tank directly exposed to the sun on the quality of the water around the year, especially in hot summers.

# Activated carbon nanofibers from renewable and waste resources for wastewater treatment

E. Svinterikos, M. Al-Marzouqi, A.M. Soliman, I. Zuburtikudis

College of Engineering

The utilization of inexpensive renewable and waste resources for producing high added-value products can have positive implications in the sustainable economy of the future. This concept has been the main motivation behind our research, which focuses on the development of versatile adsorbents from inexpensive bioresources and waste feedstock. In this project, lignin, an abundant natural polymer, was blended with recycled poly(ethylene terephthalate), a widely used commodity plastic, and spun into nanofibers of controlled diameter via the electrospinning technique. The nanofibers were carbonized and activated under $N_2$ and $CO_2$ respectively at 600$^oC$, and transformed into activated carbon nanofibers (ACNFs). These ACNFs have a mesoporous structure with BET surface area around 314 $m^2/g$ and average pore width 6.7 nm. In addition, the ACNFs were treated with HNO3 in order to increase their active sites for adsorption. Their adsorption capacity was assessed through batch adsorption experiments, for the removal of Pb ions from aqueous solutions. The ACNFs exhibited an adsorption capacity of 23.75 mg/g.

# Automated Shading Systems

Mariam Juma Alkaabi

College of Engineering

Glass is an important element in the architectural expression of the building and it can provide users with a visual connection with the outdoors and daylight to enhance the quality of the indoor environment. However, the building skin should be able to maintain suitable interior working environments to changing outdoor conditions since thermal and visual comfort has a beneficial effect on the occupant's well-being and performance. In most cases a static, fixed control solution will not be sufficient enough, especially in larger buildings with many users. Some degree of active response to changing outdoor conditions and to varying interior task requirements is required. This is why automated interior and exterior shading systems are increasingly being used in facade design. The goal is to show how these different systems would provide comfortable and consistent indoor temperatures, continuous glare control, and decrease the reliance on artificial lighting. This will be assessed by examining the system used in the Al Bahar Towers, Abu Dhabi as a case study.

# Performance evaluation of concentrated photovoltaic-thermal (CPV-T) system employing phase change material (PCM) for UAE climate

Ahmed Hassan, Ali Hasan Shah, Hamza Alnoman

College of Engineering

This study was carried out to take advantage of the concentrated solar radiation. While the Phase Change Material (PCM) was used to store the excessive heat generated at PV panel that can cause the overall power drop. A PCM with the melting of 58°C – 60°C was integrated behind the CPV system into the container to absorb the excess heat. The PCM investigated by using Temperature History Method (THM) to find its thermo-physical properties and melting and solidification temperatures of interest. It was encapsulated in a metal container internally finned to overcome the problem of low thermal conductivity of the PCM. The module temperature in the CPV-PCM reduced up to 30°C and operation could be sustained throughout the day. A substantial amount of thermal energy was recovered by circulating the water into the PCM container and heated water can be used for different applications. The PCM will get solidify at the night time due to decrease in ambient temperature and can be used again. The system improves the overall efficiency with the substantial amount of power enhancement. Economic analysis shows that, it will take 10 years payback period.

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# Ultimate deformation and resistance capacity of bolted T-stub connections for robust construction

Ghazanfar Ali Anwar, Florea Dinu

College of Engineering

The disproportionate collapse of world trade center in September 11, 2001 is a turning point to study and improve the robustness to prevent progressive collapse of structures. Column loss scenario is used to study robustness of structures, imparting large displacements on connections causing catenary action in the beams and tying forces in adjoining connections. This research aims to study T-stub components of beam-to-column extended bolted end plate connections under quasi-static large displacements. For this purpose, extensive experimental testing and advanced numerical finite element investigations are carried out. Calibration of material model and T-Stub macro components are based on tensile data and experimental testing. Parametric study is carried out for T-stub macro-components with End plate thickness ranging from 10mm to 18mm and distance between the bolts ranging from 90mm to 140mm. Numerical simulations are performed in finite element analysis software Abaqus using explicit dynamic solver considering geometric and material nonlinearity to accurately predict post yield behavior of a structure. It is concluded that numerical models replicate exact behavior of experiment. Parametric study reveals decrease in yield strength and ultimate capacity with increasing distance between the bolts and/or reducing the end plate thickness. It is also concluded that Eurocodes overestimate the ultimate capacity of T-stubs in a ductile failure mode, ignoring the prying action and bending of the bolts. Hence for a ductile T-stub failure i.e. Mode 1 and Mode 2, a new set of formulas are required to predict the ultimate capacity of the T-stub in order to account for the reserve capacity and ductility for a robust design of structures.

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# Enhancing the mechanical properties of fiber reinforced geopolymer concrete

Said Abdelfattah Said Elkhouly, Esmaou M

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The climate change due to the emission of greenhouse gases, such as carbon dioxide ($CO_2$), to the atmosphere by human activities has become a major concern. Since the production of one ton of Portland cement (POC) emits approximately 1.1 ton of $CO_2$ into the atmosphere, the POC industry is responsible for above 7% of the $CO_2$ emissions due to human activates. Recently, geopolymer concrete, made from materials of geological origin or by-product materials, was introduced to be used as an eco-friendly and sustainable concrete material in infrastructure and building construction. In this research, an experimental approach to study the effect of the volume fraction of steel fiber reinforced geopolymer concrete composites is adopted. Different geopolymer concrete mixes, using NaOH solutions with different molarity (from 8 M to 14 M) and volume fraction of steel fiber (from 0 to 3%), were examined. The mechanical properties of the geopolymer matrices are measured and compared to characterize completely the material. How may the increasing of the steel fiber volume fraction ratio enhance geopolymer mechanical properties (such as compressive strength, modulus of rupture, split tensile strength, modulus of elasticity)? Can the experimental approach be used to reach the optimum volume fraction ratio? What are the effects of the NaOH molarity on the mechanical properties of fiber reinforced geopolymer concrete?

UAEU Annual Research and Innovation Conference 2018

# Robot Arm as an Assistive Device

Fatima Alneyadi, Fady Alnajjar, Massimiliano L Cappuccio, Mariam Alkabi, Fatima Almazroui

College of Information Technology

We are presenting here a novel wearable assistive arm robot that can assist post stroke patients along their recovery. Indeed, we believe it can speed up the recovery period. The robotic arm is a smart assistive tool that is easy wearable and easy to use. Post stroke patients with lower ability to control their arm and hand functions could easily use our device to enhance their ability and increase their confidents to perform their daily living activities. Our novel device is portable and economical (most part is a 3D printed), thus can be used in hospitals, clinics, or even at personal use in home. The design was inspired by a discussion with post-stroke patients as well as medical expertise in physiotherapy. Our design guarantee lightweight and easy to operate.

# Enhancing "Estidama" rating of ADEC schools in Abu Dhabi emirate through renewable energy integration

Joud Al Dakheel, Kheira Anissa Tabet Aoul, Ahmed Hassan Noor Muhammad

College of Engineering

The UAE has one of the world's largest energy consumption per capita, with the building sector accounting for 70% of the consumed energy. "Estidama" was introduced by the government as the local sustainability framework, and the Pearl Building Rating System (PBRS) to promote the development of sustainable buildings. Governmental buildings must achieve a minimum of 2 out of a maximum of 5 Pearls. Among these, schools are dominant in number. In this regard, Abu Dhabi Educational Council (ADEC) has targeted new schools to go beyond the requirement and reach 3 Pearls by planning to build 100 new schools from 2010 to 2020 of which 53 schools had been built. However, only 10 of these have achieved the desired target. The objective of this research is to investigate the opportunities of enhancing the performance of ADEC schools that did not achieve the targeted Estidama level through a representative school prototype. Hence, an analysis of the school performance was carried out to identify the opportunities of enhancement which showed a gap within the renewable energy systems. A transient simulation tool TRNSYS, was used to predict the performance of three renewable energy systems namely Photovoltaic System, Solar Powered Absorption Chiller and Geothermal System. Parameters were optimized in each system to reach optimal performances. Photovoltaic system was sized to achieve 10% of the annual energy consumption and the solar absorption chiller targeted a cooling demand reduction of 10%. The geothermal system was sized to reach optimum values of delivered energy of the ground heat exchanger. Results reveal that the three systems collectively saved 19% of the school annual energy consumption that helped the school earn 14 additional credit points and reach the targeted 3 Pearls.

# Innovative vitamin D blood test and its implications in Emirati population

Bashar Haitham Alzohily , Salem Hussein Alakbari

College of Information Technology

Research shows that immunoassay techniques are not the best choice for vitamin D estimation in human blood samples. The main reasons are that some immunoassays cannot distinguish between 25OHD2 metabolite from 25OHD3 and furthermore immunoassays cannot differentiate between 25OHD and the inactive epimers of vitamin D. The epimers and isobars has been known to overlap the 25OHD signals and show false positives. Liquid chromatography mass spectrometry (LC- MS/MS) can differentiate between 25OHD3 and 25OHD2. But to separate the epimers and isobars of vitamin D (which has the same molecular weight) is achieved through chromatographic separation from actual 25OHD peaks. This could also cause inaccuracies in vitamin D measurement. The main aim of this study was to develop and validate an improved LC-MS/MS method (using a Shimadzu 8060 system) that could accurately detect and quantitate up to 10 different metabolites of vitamin D along with separating the epimers and isobars. The secondary aim was to apply the developed LC-MS/MS method for accurate measurement of blood vitamin D levels in Emirati population. Shimadzu 8060 LC- system was run with positive ion electrospray ionisation (ESI) in Dynamic Multiple Reaction Monitoring (DMRM) mode for quantification. The method involved blood sample collection from 80 Emirati volunteers, followed by serum extraction and liquid-liquid extraction. The chromatography column used for analysis was Ascentis Express F5 and precursor and product ions detected using Shimadzu 8060 LC-MS/MS system and metabolites of vitamin D detected and quantified including epimers and isobars. The method validation showed good sensitivity, recovery, linearity, precision, specificity and accuracy. Furthermore, the da

# Date seed protein hydrolysates with potential antioxidative, anti-inflammatory and anti-haemolytic properties

Noura Alahbabi, Priti Mudgil, Hina Kamal, Sajid Maqsood

College of Food and Agriculture

Scientific research has highlights the role of bioactive peptides derived from various food proteins in promoting health. Such peptides are released from parent proteins upon enzymatic hydrolysis during gastrointestinal digestion and interact with body receptors to regulate the functions of the organism. The beneficial role of bioactive peptides includes antihypertensive, antioxidative, antiobesity, antidiabetic, and cholesterol lowering effects. Scientific data suggests that date seeds contains 5.1% proteins which could be an interesting source of health promoting bioactive peptides. Therefore, in present study health related bioactive properties of date seed protein hydrolysates were explored. Overall, 12 different DSPHs were produced using food grade enzymes (alcalase, bromelain, papain and protease) for 2, 4 and 6 h of hydrolysis time. The results revealed that hydrolysate A6 (alcalase 6h), Pa2 (papain 2h) and Pr4 (protease 4h) displayed strong Ferric Reducing Antioxidant Power (FRAP) and ABTS radical scavenging activity. FRAP Activity for these hydrolysates improved from 430 µM trolox equivalent antioxidant capacity (TEAC) for intact date seed protein to 599.2, 696.7 and 739.9 µM TEAC for A6, Pa2 and Pr4, respectively. ABTS activity also showed strong improvements from an initial 1264.0 µM TEAC to 2691.1 µM, 2720 µM and 2796.9 for A6, Pa2 and Pr4, respectively. However, for DPPH activity hydrolysates showed slight improvement in comparison to intact proteins. Moreover, hydrolysates A4, Pa2 and Pr6 were very effective in inhibiting thermal hemolysis of red blood cells and hydrolysates A4, B4 and Pa2 displayed strong anti-inflammatory activity depicting there potential to be used as antipyretic and antiallergic substances.

# Trainees' perspectives on the educational environment

Tahra AlMahmoud, Mohammed Al Ali, Rabah Almahmoud, Margaret Elzubeir, M. Jawad Hashim

College of Medicine and Health Sciences

Ethics and professionalism are recognized as core competencies in medical practice and an integral part of many medical schools' curricula worldwide. Several studies have investigated the teaching and learning methods for this subject. However, there are few reports on the students' views and experiences with professionalism in their working environment especially in the Arab world. The current study was predicated on the belief that understanding the perspectives of student about their medical environment may assist in efforts to create effective, valuable ethics education that, in turn, may foster the development of good physicians. An anonymous paper questionnaire was distributed to a total of 134 final year clinical clerks. Standard descriptive statistics, unpaired t-test to evaluate differences between male and female groups and Pearson Correlation to determine relationships between variables were used. 114 (86%) completed the survey. Students identified during their clinical training, medical colleagues and allied healthcare workers whom that they consider role models. (mean = 6.68 ± 2.126 on a scale of 0 to 9; and 6.62 ± 2.17 respectively). They observed that medical colleagues and allied healthcare workers place the needs of their patients ahead of their own self-interests 7.25 ± 1.69 and 6.87 ± 2.095 respectively. Minor number of students reported to be urged by medical colleagues and allied healthcare workers to copy their history and physical exam rather than gathering their own information from the patient (mean 3.26 ± 5.14 versus 2.83 ± 3.19) or observing medical colleagues and allied healthcare workers scheduling tests or performing procedures at times that are more convenient for themselves than for the patient (mean 3.37 ± 2.96 and 3.32 ± 3.

# Team-based-learning in teaching disaster medicine for undergraduate medical students

Fikri M. Abu-Zidan, Arif Alper Cevik

College of Medicine and Health Sciences

Team-Based Learning (TBL) is accepted as an active learning method with positive effects on learning outcomes (1-2). We aim to report our recent experience in using TBL in teaching disaster medicine for undergraduate medical students. 5th year medical students were asked to triage victims of a standardized clinical scenario of a car bomb that resulted in 6 victims using TBL. The injuries ranged between psychological trauma to expectant death. TBL activity was part of the undergraduate surgical curriculum and lasted for 2 hours. 98 medical students (60 females, 38 males) were taught in 24 teams having 3-6 students in 6 sessions (4 teams in each session) during the period of August 2016-September 2017. Triage was done according to a simple ABC approach. Initially each student made the triage alone, then with the team, and finally with the whole class. A team leader was chosen for each team in which she/he was asked to facilitate the discussion, present the findings, and defend the group decision in the class discussion. TBL sessions were dynamic, rich in debate, and interactive. The students were completely involved in the discussion and the decision making process. They showed maturity in understanding the scenario, following the rules, and making and defending their decisions. There were two clear observations on the triage of the students. Students over-triaged the victims and did not use the expectant category. Principles of disaster medicine, like triage, can be included in the undergraduate curriculum. TBL was useful in promoting working within teams, critical decision making, and leadership; all are essential components of management of disasters.

# Innovations in biostatistics – enabling evidence-based medicine

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Regrettably, 40 to 62% of randomized clinical trials change, introduce or omit the primary outcome measure. Mandatory registration of study protocols prior to data collection has not been effective as readers of published trials are still faced with the problem of incomplete reporting. Readers need a way to differentiate the p-value of the primary outcome from p-values of post-hoc secondary analyses. Theory and methodology Multiple comparisons can falsely lead to statistically significant p-values even there is no effect (Hashim, 2010). Less well known and perhaps more harmful is selective reporting of only those p-values that are significant. Formally termed as outcome reporting bias, this partial inclusion of results for the sake of increasing publication odds is a threat to the validity of subsequent meta-analyses. Findings We propose a new format in reporting of research results that will reduce outcome reporting bias. This format differentiates p-values of the primary outcome using an uppercase P (for example, P = 0.03) from secondary outcomes annotated with a lowercase p (example, p = 0.001). Thus, readers of research results will be able to recognize the primary outcome for which the study was designed to detect a meaningful effect with a sample size with prespecified power. While other secondary analyses including subgroup comparisons and exploratory unplanned or post hoc statistical tests (whether adjusted or not) will be distinguishable by the lowercase p. This proposed reporting requirement may have additional beneficial effects such as reduced number p-values reported and decreased exploratory statistical testing. Furthermore, researchers will make fewer unfounded conclusions since the primary outcome result will be highlighted.

# Clinical procedure experience of medical students improves their OSCE station marks

Arif Alper Cevik, Fikri M. Abu-Zidan

College of Medicine and Health Sciences

We aimed to study the correlation between procedure experiences in the clinical setting and Objective Structural Clinical Examination (OSCE) marks achieved at the end of an Emergency Medicine clerkship for final year medical students. This is a retrospective analysis of prospectively collected clinical data of 141 final year medical students and their OSCE marks for two consecutive academic years (2015 - 2017). The experience of practical skills including suturing, Extended Focused Assessment Sonography for Trauma (EFAST), airway management, and cardiopulmonary resuscitation were correlated with the final OSCE marks in the same areas. Weighted experiences of the four procedures were significantly correlated with the total OSCE station marks ($p = 0.027$, Spearman's rho = 0.19). Suturing OSCE marks were significantly higher than the other stations ($p < 0.0001$, Wilcoxon signed ranks test). There was a significant correlation between suturing experience and its OSCE mark ($p = 0.036$, Spearman's rho = 0.18). There was also a strong trend in the correlation between EFAST experience and its OSCE mark ($p = 0.063$, Spearman's rho = 0.16). There was a significant difference in weighted experience between each of the four procedures ($p < 0.0001$, Wilcoxon signed ranks test). In all cut-off levels (75 – 95) of OSCE marks, students showed higher weighted procedure experience for those who had higher marks. Statistical significance was found only for students who scored more than 90% of the OSCE mark. Clinical experience of procedures improved OSCE marks of the same procedures. The top students showed significantly higher weighted procedure experience.

# Perceived educational needs concerning relationship and boundaries in a multicultural medical environment "clinical clerks' perspectives"

Tahra AlMahmoud, M. Jawad Hashim, Rabah Al Mahmoud, Naghma Naeem, Frank Branicki

College of Medicine and Health Sciences

The fundamentally relational nature of medical practice requires a skillful balance of professionalism issues including boundary recognition, empathy, mindful objectivity and recognition of cultural norms and values influencing acceptable professional conduct. There are few reports on the students' perceived educational needs concerning relationship and boundaries especially in the Arab world. This work is predicated on the belief that an understanding of the perspectives of medical students with regard to professionalism and ethics education will help with development and refinement of effective ethics curricula that may foster good medical practice in better doctors. An anonymous paper questionnaire was distributed to a total of 130 final year clinical clerks. Standard descriptive statistics were used. 84% completed the survey. Students identified the need for more curricular attention for all of topics during training and practice pertaining to boundaries and relationships (mean=6.61 ± 1.32 on a scale of 0 to 9; and 6.66 ± 1.27 respectively). Topics with a high ranking interest considered for additional attention comprised: mistreatment of medical students (mean7.22 ± 1.96), coping with mistakes in clinical care (mean7.25 ± 1.63), reporting of medical mistakes (7.58 ± 1.36), and gender bias in clinical care (7.10 ± 1.82). Women perceived a greater need for academic attention for all topics compared with men. Most differences between the females and males concerned the following items: responding to an impaired colleague (p = 0.000), and a physician's social and political responsibilities (p = 0.001). Students indicated the need for education regarding relationship boundaries in the undergraduate medical ethics curriculum.

# Does ureteric obstruction affect glomerular permeability function?

Omran Bakoush, Loay Lubbad, Carl M Öberg, Fayez Hammad

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Renal function depends on the integrity of glomerular filtration barrier (GFB). The effect of ureteric obstruction (UO) on the detailed perm-selectivity functions of GFB and its recovery pattern after reversal of UO have not been reported yet. Wistar rats underwent reversible 24-hour left unilateral ureteric obstruction (UUO). Renal functions of right (NOK) and left (OK) kidneys were measured 3 hours (G-1, n = 10), 7 days (G-3, n = 10) and 30 days (G-3, n=9) post-UUO reversal. Glomerular permeabilty was also assessed by measuring glomerular sieving coefficients (θ) for FITC-Ficolls (molecular radius 20–90Å). Results: In G-1, renal blood flow and glomerular filtration rate (GFR) in OK were lower than NOK (2.16 ± 0.25 vs. 4.26 ± 0.35 and 0.58 ± 0.09 vs. 1.94 ± 0.17, P

# Time-resolved fluorescence lifetimes of warfarin inside Cyclodextrins

Naji Al-Dubaili, Na'il Saleh

College of Science

The photophysical properties of the fluorescent anticoagulant drug warfarin (W) were examined in water and inside methyl-β-cyclodextrins (Me-β-CD) through absorption and time-resolved fluorescence measurements at pH 3 and 9 and upon the selective excitation of different isomers of warfarin at 280 and 320 nm. Advanced global analysis of parallel, mono- exponential emission decays collected across the entire emission spectra of free and CD-complexed drugs also enabled separating the microenvironments effects of CD model systems on either open or cyclic protonated form of W. At pH 3 (below pK a), the results confirmed that the host, due to steric factors, preferentially binds the open protonated form over the cyclic one, causing a shift in the absorption maximum at ~ 305 nm to blue, while keeping the absorbance at ~ 280 nm unchanged. No change in excited-state lifetime of W cyclic form (τ 1) upon addition of CDs was noted. The increase in excited-state lifetime of W open form (τ 2) with small effects on emission quantum yield was explained by radiative-rate law. At pH 9 (above pK a), CD increases the excited-state lifetime and emission quantum yield of anionic form ($W^-$) (τ 3) due to rigidity effects. The changes in pK a values in water and inside CDs also indicated the open isomer to be more acidic than cyclic form in both ground and excited state due to extending electron delocalization in the final charged product ($W^-$).

# Synthesis and biological applications of some novel urea and thiourea-benzimidazole derivatives

Lamia Ali Siddig, Haythem Ali Mohammad Saadeh, Mohammad Ahmad Khasawneh

College of Science

The objectives of this research are to synthesize and characterize novel urea and thiourea-benzimidazole derivatives. The proposed compounds containing these moieties are expected to exhibit several biological activities including antiplasmodial, anti-inflammatory, antimalarial, antituberculosis, anticancer, anti-HIV, antioxidant, and antimicrobial. The final products have linker compound which is piprazine that connect these moieties. By changing the functional group, we aim to synthesize 12-16 new structures that will be synthesized and then purified by different techniques such as extraction and column chromatography. Following purification, these compounds were characterized by using suitable techniques including melting point determination, NMR measurement (both proton and 13C), IR spectroscopy measurement, and elemental analysis. These compounds will be sent to the collaborators for biological evaluations. We expect some dual activities.

# Synthesis and biological applications of some novel urea and thiourea quinoline derivatives

Aysha Alkaabi, Mohammed Kasawenh, Haytham Saadeh

College of Science

The aim of this research is to synthesize bioactive compounds derived from bioactive moieties. In this regard, we will design, synthesize and characterize several novel derivatives containing three moieties which are 8-hydroxyquinoline, urea and thiourea. Extensive literature survey shows that compounds containing these important moieties exhibit many biological activities such as anticancer agent, metal-chelators, HIV integrase inhibitors, metalloenzymes inhibitors, antibacterial, antimalarial, antifungal. We will connect the two moieties using piperazine. The novel compounds are synthesized and then purified using appropriate techniques (extraction and column chromatography). Followed by purification of these compounds, characterization techniques including melting point determination, IR spectroscopy measurement, NMR measurement (both proton and 13C), and elemental analysis. The biological activities will be tested by our collaborators.

# Novel camel gelatin hydrolysates with potential inhibitory activities towards dipeptidyl peptidase-IV (DPP-IV) and angiotensin converting enzyme (ACE)

Noura Ahbabi, Maitha Alameri, Raghad Abdel Rahman, Maryam AlKaabi, Priti Mudgil

College of Food and Agriculture

The potential of camel gelatin hydrolysates (CGH) for antidiabetic and antihypertension have been evaluated. Several CGHs were produced by using alcalase (A), protease (P) and combination of alcalase and protease (A-P) with different enzyme to substrate ratio and time of hydrolysis. Results obtained exhibited visible inhibitory activity against dipeptidyl peptidase-IV (DPP-IV) and angiotensin converting enzyme (ACE). The hydrolysates produced by the different proteolytic enzymes showed significantly lower IC50 values when compared with the non-hydrolyzed gelatin for both DPP-IV and ACE inhibition. For the assessment of CGH against DPP-IV, protease (P) generated CGH seems to be more effective than alcalase generated CGH (P

# Short-run and long-run impact of uncertainty shocks on stock markets

Chiraz Labidi, Amira Mubdi, Radina Rashed Qannas Alketbi, Mohammad K. Bayzid, Ali Dadoua

College of Business and Economics

The objective of this paper is to build bridges between financial markets and political economy and shed more light on frequency dynamics of the impact of policy uncertainty shocks on stock market returns. More specifically, we propose to use a novel framework, introduced by Barunik and Krehlik (2015), for measuring frequency dynamics of connectedness between policy uncertainty and stock market return. Using a sample that covers developed, emerging and frontier stock markets, this approach allows to decompose the aggregate effect of uncertainty shocks on international markets into long-, medium- and short-term impacts and to understand to what extent shocks to policy uncertainty impact stock markets at different frequencies with different strength.

# Bank competition, concentration and risk-taking in the UAE banking industry

Aktham Almaghaireh

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This paper investigates the impact of competition and concentration on bank stability or risk-taking behavior in the UAE banking industry over the period extends from 2006 to 2015. The Herfindahl–Hirschmann (HHI) index is used as an inverse measure of competition, while the nonperforming loans (NPL) ratio and Z-scores are used as proxies for bank risk-taking. The impact of competition is derived from a dynamic panel specification that accounts for bank-level factors (size, efficiency, liquidity, and capitalization). Using the two-step system Generalized Method of Moments (GMM) estimates, our empirical results suggest that the increase in competition erodes banks' charter value and increases their tendency to assume additional risks with associated negative repercussions on financial stability. These results strongly support the competition-fragility hypothesis for UAE banks.

# Radio resource management for device to device (D2D) commuincations underlaying cellular networks

Shamsa Abdulla Saeed Al Hassani, Fatima Rashid Salem Alsaedi, Mohammad Hayajneh

College of Information Technology

D2D Communications performance gains over conventional cellular mode: the hop gain, proximity gain, and reuse gain which allows higher bit rates, lower delays and lower power consumption. Our work will be mainly focused on cross-layer (Physical and Network layers) resource management techniques to optimize one or more of the followings: end-to-end delays, power consuming, aggregate system throughput, and communication mode selection to enhance the overall cellular system performance. At the end of this project, we expect to submit a conference paper to an indexed conference and submit a paper to a journal that is networks and communications related.

# Constructability of an "Estidama" and building codes compliant SIP system in adaptive public housing in UAE

Khaled Galal Ahmed, Ghaleb Al Seena, Omar Abu-Zidan, Sultan Al Mansouri, Hamed Ahmad

College of Engineering

The current external wall construction systems of Emirati public housing in UAE are quite rigid leaving residents with little or no options for undertaking the needed extensions and adaptations of their houses. On the other hand, Structured Insulated Panel (SIP) Systems have recently emerged in the global housing construction market, that can be used as a relocatable external wall construction system. This research aims to examine the SIP external wall construction systems to define which is more suitable for replacing the current rigid masonry one in UAE public housing from sustainability, constructability, cost efficiency and other construction-related perspectives. This would help achieve the desperately needed resilience of public housing and allow residents to have the lead in extending/adapting their houses without compromising sustainability and safety considerations. A comprehensive market survey for the available SIP Systems helped define the available SIP Systems. To select the best SIP relocatable system, the specs of the available systems have been compared as per Estidama and relevant Building Codes requirements. Afterwards, the research proposed a construction mechanism for fixing, relocating or removing the SIP panels without vast disturbance in the existing construction and finishing materials. In this proposed construction paradigm, the public housing providers would be responsible for constructing the 'fixed' modular skeleton beside the panels of a 'core' house delivered to beneficiaries. The extension of this core house would be the responsibility of the residents according to their needs with the technical support and guidance of the local authorities, if and when needed.

# Activating carbon fibers and date pits for use in liver toxin adsorption

Asel Mwafy, Ameereh Seyedzadeh, Waleed Ahmed, Kamala Pandurangan , Ali Hilal-Alnaqbi

College of Engineering

Acute liver failure (ALF) is a rare, potentially fatal complication of severe hepatic illness. It is a syndrome that triggers a cascade of events, leading to multiple organ failures and often death. The work aimed at demonstrating the usefulness of activated raw date pits and carbon fiber reinforced polymers (CFRP) in the management of ALF. The activated carbons produced are used for adsorption of albumin bound toxins from the liver of patients with ALF. The liver is not cured, however, patients are given the time they need to find a suitable donor. Initially, date pits are milled and epoxy is removed from the CFRP. Both materials then undergo pyrolysis and activation treatments. The activated carbon fiber (ACF) and powdered activated carbon (PAC) resulting are tested using FTIR and TGA analysis. FTIR spectrums provide information about functional groups present in the samples and TGA graphs illustrate weight loss as treatment temperature increases. From the data analysis carried out, it appears that the process of recycling both; date pits and CFRP was successful. This confirms the ability of PAC and ACFs to adsorb toxins and as potential candidates for consideration in the search for effective treatment options for liver failure.

# Indoor positioning based on RSS and K Nearest Neighbors (KNN)

Mayar Kamel, Marwan Alakhras, Mousa Hussein

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WLAN indoor positioning is receiving great attention and becoming more and more a matter of research studies in terms of cost, safety, power and efficiency. Research studies have been facing problems due to vigorous indoor area state and blocking effect of the human body and obstacles on various frequencies, which will significantly condense the performance of the location. In this paper the indoor localization method based on Wi-Fi received signal strength (RSS) fingerprinting technique is considered. It is simple in realization and estimation and can localize the position of a device within one room. RSS fingerprint is the most viable solution for positioning. The benefit of this method is that it does not require a new infrastructure (it reuses already and widely deployed equipment), and the RSS measurement is part of the normal operating mode of wireless equipment. Simultaneously, a fingerprint based RSS method is presented and discussed below to examine the error of a target object based on K-nearest neighbor receiving signal strength fingerprinting algorithm. Comprehensive performance of the developed estimation algorithm, including accuracy and error has been evaluated and experimental work scenario has been adapted. First, the position estimation procedure is based on the Received Signal Strength (RSS) measurements collected in an indoor environment. In particular, different sources of measurement are analyzed by theoretical simulations based on fingerprinting technique and experimental results. The principal technology of positioning is actually signal strength measurement. If we know the specific coordinates of any points related to the unknown point, the coordinates of unknown points can be calculated by the KNN algorithm based fingerprinting.

# Macrophage-induced gastric stem cell activation

Subi Sugathan, Sherif Karam

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Tissue injury activates macrophage to secrete different cytokines and growth factors, which stimulate tissue resident stem cells to initiate regeneration. The gastric mucosa comprises significant number of connective tissue cells including macrophages. Their possible role in gastric stem cells activation and regeneration of gastric mucosa following injury are not fairly investigated yet. In this study, we aim to analyze the effects of macrophage on gastric stem cell s regeneration and homeostasis. Bone marrow hemopoietic stem cells were isolated from both femur and tibia and cultured in the presence of macrophage colony stimulating factor to attain naïve macrophages. Macrophages were treated with LPS and IL-4 to induce both inflammatory and anti-inflammatory macrophage phenotypes, respectively. Condition media from both macrophage phenotypes were collected and added to cultured gastric stem cells for 24 hours. RNA was extracted and processed for RT-qPCR. Treatment of gastric stem cells with anti-inflammatory macrophage condition media induced mRNA expressions of Muc6, TFF2, HK-ATPase and CgA, indicating the differentiation of gastric stem cells. In conclusion, defining the factors secreted by macrophages responsible for the gastric stem cell differentiation will improve our understanding the biology of gastric stem cells in health and disease.

# Identification of saturated fatty acid regulated LncRNAs during in vitro human embryonic neurogenesis

Sahar Juma Al Mansoori, Amani Albedwawi, Sareh Karimi, Fatima Shuaib, Suraiya Ansari

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Both epidemiological as well as experiments on animal models have provided evidence that maternal obesity and metabolic complications increase the risk of neurodevelopmental disorders (NDDs). However molecular mechanism/s behind this association is not known. Several studies have recently indicated the role of long noncoding RNAs (LncRNAs) in NDDs. In this study, we have identified LncRNAs which were differently expressed due to high levels of saturated fatty acid treatment during in vitro human embryonic neurogenesis using hESCs as model. We found that several of these LncRNAs altered due to increased fatty acids levels target genes which are known regulators of developmental neurogenesis. Our studies suggest that mis-regulation of specific LncRNAs could be responsible for adverse neurodevelopmental outcomes of metabolically compromised pregnancies.

# Nootkatone confers hepatoprotective and anti-fibrotic actions in a murine model of liver fibrosis by suppressing oxidative stress, inflammation, and apoptosis

Mohanraj Rajesh, Amani Kurdi, Kamal Hassan, Balaji Venkataraman

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In this study, the hepatoprotective and anti-fibrotic actions of nootkatone (NTK) were investigated using carbon tetrachloride (CCl4)-induced liver fibrosis in mice. CCl4 administration elevated serum aspartate and alanine transaminases (AST and ALT) levels respectively. In addition, CCl4 produced hepatic oxidative and nitrative stress, characterized by diminished hemeoxygenase-1 (HO-1) expression, antioxidant defenses, and accumulation of 4-hydroxynonenal and 3-nitrotyrosine. Furthermore, CCl4 administration evoked profound expression of pro-inflammatory cytokine expressions such as TNF-α, MCP-1, and IL-1β in hepatic tissues, which corroborated with nuclear factor kappa B (NFκB) activation. Additionally, CCl4-treated animals exhibited higher apoptosis, characterized by increased caspase 3 activity, DNA fragmentation, and poly (ADP-ribose) polymerase (PARP) activation. Moreover, histological and biochemical investigations revealed marked fibrosis in the livers of CCl4 administered animals. However, NTK treatment mitigated CCl4-induced phenotypic changes. In conclusion, our findings suggest that NTK exerts hepatoprotective and anti-fibrotic actions by suppressing oxidative stress, inflammation, and apoptosis.

# Control of gastric stem cells by Aryl hydrocarbon receptors

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Adult stems cells are widely distributed throughout the human body and are thought to be involved in the pathogenesis of many diseases including gastric cancer. Therefore, there is a need to reveal the biological features of these stem cells to help in the development of preventive and/or therapeutic modalities. In this study, we have used a technique to cultivate mouse gastric stem (mGS) cells in a 3D structural model (spheroids) using hanging drop method. mGS cells were seeded into drops with RPMI-1640 culture media containing 10% serum. Within three days, cells aggregated to form small spherical structures. After six days, the spheroids were transferred into agarose coated 96-well plates to maintain their integrity and facilitate their analysis. Cell viability assay and electron microscopy revealed that the spheroids consist of viable cells at the periphery with dead cells in the center. Aryl hydrocarbon receptors (AhR) were recently found to be involved in the progressiveness and invasiveness of gastric cancer, it was thought to test whether they are expressed in mGS cells and control their dynamic features. Immunocytochemistry and western blot analysis were carried out and results demonstrated the localization of AhR in both mGS cells and stomach tissues. AhR were activated in mGS cells using different concentrations of dioxin (AhR agonist). Results revealed alterations in stem cell-specific genes (Oct4 and Notch3) suggesting a change in their dynamic features. Use of gastric spheroids will hopefully provide new insights into the mechanisms of stem cell self-renewal and differentiation and the role of AhR in the stem cell homeostasis. These ongoing experiments will be a step forward to improve our understanding of gastric stem cell biology in health and disease.

# Cloning of a novel developmentally regulated long non-coding RNA using a rodent model system

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Metabolic syndrome which includes diseases such as type 2 diabetes, obesity, is the new epidemic affecting the world today. The percentage of people with obesity is very high in UAE. Unfortunately, children are becoming increasingly overweight and obese. Long noncoding RNAs (lncRNAs), are a class of regulatory RNAs which are more than 200 nucleotides in length and are involved in a variety of biological processes. They are dysregulated in different diseases such as cardiovascular diseases, neurological disorders, immune-mediated diseases, genetic disorders and in various types of cancers. We hypothesize that regulatory interactions mediated by long non coding RNAs play critical roles in normal development and differentiation of metabolically relevant tissues and these regulations may be altered in metabolic diseases including obesity. In this project we have cloned one such long non coding RNA UAEU-709. We have also characterized its role in obesity using a rodent model system.

# Cucumaria Frondosa extract Frondanol mitigates colon inflammation: A study using experimental model of DSS-induced colitis mice

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Crohn's disease and ulcerative colitis are the principal types of inflammatory bowel disease (IBD) which affect both small and large intestine. Existing therapeutics for IBD have limited beneficial actions and shown side effects when prescribed for longer period. Therefore, many IBD patients turns to unconventional management with the hope of relief from morbidity. Sea cucumbers - a marine animal, has rich source of biologically active molecules. Sea cucumber extracts have been reported to exhibit anti-inflammatory, anti-proliferative, and anti-cancer properties in various cancer cell lines and in rat model colon carcinogenesis. Frondanol is extracted from sea cucumber (Cucumaria frondosa) seems to be having anti-inflammatory properties. To investigate the role of anti-inflammatory properties of frondanol using mouse model of colonic inflammation. C57BL/6J black mice were given 3% dextran sodium sulfate (DSS) in drinking water for 7 days to induce colitis. The colitis group received frondanol (100mg/kg body weight/per day) and compared with control and DSS group. The disease activity index (DAI) was established throughout the treatment period. After 7 days, the colon was excised and length was measured, stored for histology and other studies. Changes in myeloperoxidase (MPO) activity, pro-inflammatory cytokines protein was measured using ELISA and mRNA by real time PCR. Leukotriene B4 (LTB4) and prostaglandin E2 (PGE2) were estimated using ELISA. Frondanol significantly (p

# Stratigraphic study of some Oligo-Miocene outcrops, Abu Dhabi emirate, United Arab Emirates

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This paper deals with the study of the discovered ostracoda embedded in marls and limestones of the Asmari and Lower Fars foramtions respectively from an Early Oligocene to Early Miocene rocks at Jabals Hafit, Malaqet and Mundassah in Al Ain area. The Lower Fars Foramtion unconformably overlies limestone rocks of the Asmari Formation. Variable sizes of pores of the Asmari limestones reach up to a few mm in diameter were observed and provide strong possibility for high permeability conditions. Such conditions make the Asmari Formation as a potential aquifer or hydrocarbon reservoir at depth. On the other side, the occurrence of evaporites interbedded with clays of Lower Fars Formation considered it as a seal rock. An additional economic outcome of the study was the rediscovery of pockets of celestine (SrSO4) which are associated with the evaporites near the base of the Miocene succession. The celestine may be related to the upwelling of saline ground during the Miocene. The discovered ostracoda with the other accumulations of benthonic fauna such as larger forams, molluscs, echinoderms, bryozoa, calcareous algae and corals indicate shallowing upward sequence, the proposed depositional environment of the study area is from intertidal to supratidal conditions.

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