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SC-O1: Communications 1

Room: Al Ameera 1

Exploiting Opportunistic Networking in the GCC

Youssef Francis (Carnegie Mellon University, Qatar); Khaled A. Harras (Carnegie Mellon University, USA); Saquib Razak (Carnegie Mellon University, USA)

Mobile users nowadays expect network connectivity in all places and at all times. While 3G and 4G networks promise to satisfy this growing demand, these networks can be overloaded, and users prefer free network access whenever possible. Research in Delay/Disruption Tolerant Networks (DTNs), has demonstrated the viability of opportunistically utilizing public 802.11 networks for providing networking connectivity. In this paper, we take a first step towards understanding the potential 802.11 resources that can be exploited from taking advantage of opportunistic networking as one of the alternatives for data access on the Internet. We report on the results of a system we built that recorded 802.11 AP's in Doha, and conclude that the GCC is a fertile ground for conducting DTN type research as an alternative that would fulfill the growing demand of its mobile users.

pp. 1-4

A Cross-layer Based Multipath Routing Protocol for IEEE 802.11e WLAN

Shaik Madhar Saheb (Caledonian College of Engineering, Oman); A. K. Bhattacharjee (National Institute of Technology, India); Athinarayanan Vallavaraj (Caledonian College of Engineering, Oman); Rajib Kar (National Institute of Technology, Durgapur, India)

Despite many enhancement mechanisms that have been introduced to achieve QoS support in IEEE 802.11e WLAN based on HCCA, performance evaluation results in multi-hop networks show that HCCA still suffers from significant throughput degradation and high delay at high load conditions. In this context, the route quality plays a very important role in the success of application delivery and QoS support. This paper proposes a design of a cross-layer based multipath routing protocol for IEEE 802.11e WLAN. In this proposed approach, initially multiple disjoint paths are determined. Then a total cost metric is estimated based on the Traffic Contention Time, Average Transmission Delay and Signal Fading Value. From the multiple disjoint paths, the path with minimum total cost is selected as best path and the data is transmitted through this path. The simulation results show that the proposed protocol achieves better delivery ratio and throughput with reduced delay.

pp. 5-8

Efficient Connection Admission Control based-Code Searching Algorithm in 3G/Mesh Networks

Saied M. Abd El-atty (Alkharj University, Saudi Arabia); Konstantinos Lizos (Head of IT Department / Embassy of Greece, Norway)

Code allocation procedure in 3G systems is provided by utilizing the OVSF channelization codes. In OVSF system, blocking of a new incoming call (new or handover) can be characterized either as capacity blocking or as code blocking. Therefore, we propose an efficient CAC policy based on guard code scheme to reduce the failure rate of the handover (HO) calls due to code capacity shortage and simultaneously the CAC policy utilizes two code searching strategies (single code search (SCS) and multiple code search (MCS)) to mitigate the blocking due to code blocking. The adopted analysis of the proposed CAC is based on Markov chain model. The performance evaluation at code-level is measured in terms of code utilization, handover call failure rate and new call blocking probability.

pp. 9-12

Capacity Enhancements in IEEE 802.16j Systems Using MIMO-Relay Multiplexing

Ahmed Iyanda Sulyman (King Saud University, Saudi Arabia); Assad Akhlaq (King Saud University, Saudi Arabia); Hossam S. Hassanein (Queen's University, Canada); Abdulhameed Alsanie (King Saud University, Saudi Arabia); Saleh A Alshebeili (King Saud University, Saudi Arabia)

This paper presents the analysis of relay multiplexing configuration for IEEE 802.16j systems employing MIMO antennas. The availability of multiple relay paths in IEEE 802.16j motivates two relay configurations: relay diversity and relay multiplexing. Existing works have focused on the relay diversity method. In this paper, we explore the relay multiplexing alternative. Using the concept of code-division multiple relay access (CDMRA), where relay stations (RS) are assigned unique access codes for parallel relaying of independent data streams from source to destination, we derive the capacity of the relay multiplexing system in comparison with the relay diversity methods. We show that while the capacity of the diversity methods grow with the log of SNR enhancement provided by the system, the capacity of relay multiplexing approach grows linearly with the number of parallel relay paths created in the system. Relay multiplexing thus creates affordable means of realizing high-speed multihop communications.

pp. 13-16

Optimal Power Allocation Over Parallel Relay Channels with Orthogonal Regenerative Decode-and-Forward Strategy

Mohammad Shaqfeh (Texas A&M University at Qatar, Qatar); Hussein Alnuweiri (Texas A&M University, Qatar)

We consider the problem of optimal power allocation over a family of parallel Gaussian relay channels, each with a different set of channels' power gains. The applied cooperative strategy is half-duplex regenerative decode-and-forward which is multiplexed orthogonally with a direct transmission link from the source node to the destination node. We assume the availability of channel-state-information of the three links in every channel realization. We obtain a characterization of the optimal solution which includes the power allocated for each channel realization as well as the power allocated to the source node and the relay node so that the long-term average total transmitted power constraint is maintained. The solution has a simple structure and can be applied practically in relay-assisted wireless systems.

pp. 17-20

Capacity Analysis of Cooperative Relay-based Communication System

Ibrahim Y Abualhaol (Khalifa University of Science, Technology, and Research, UAE); Muhammad Bawa'aneh (Khalifa University, UAE)

In this paper, we consider the analysis of a cooperative relay-based amplify-and-forward system in terms of average and outage capacity over fading channels. We first optimize the relay gain with the objective of maximizing the received signal-to- noise-ratio (SNR) at the destination, given that the fading statistics of the links in the cooperative system are known at the relay node. The Gaussian finite mixture with an expectation maximization algorithm is utilized to approximate the fading pdf expression in a simple and unified closed-form for the pdfs of Rayleigh, Nakagami-m, and Weibell fading channels. Using this technique, the average capacity and the outage capacity are derived. Monte Carlo simulation results are presented to validate the derived expressions.

pp. 21-24

SC-O5: Electronics 1

Room: Al Dana

Quantitative Analysis to the Electric Field Generated At a Nano-Tip and the Effect of the Tip Base

Mohd Rezeq (Khalifa University of Science, Technology and Research, UAE)

Nanotips are the main components in most of the powerful nanotechnology tools like scanning tunneling microscope (STM) and scanning transmission electron microscope (TEM). Therefore the improvement of the performance of these microscopes relies on fabricating extremely sharp tips with well defined shapes. Tips with an apex radius of a few nanometers are often characterized in the field ion microscope (FIM) or the field emission microscope (FEM), to estimate their sizes. However, these methods are only sufficient for characterizing the very end of the tip. Here we present a quantitative model that links the electric field, which is adequate to generate either FIM or FEM images at certain applied voltages, to the radius of the nanotip and to the radius of the tip base as well. This model introduces a more accurate method to estimate the overall tip shape over a relatively long range.

pp. 25-28

Design of an Oil Pipe Inner Surface Inspection System

Abdellatif Bouchalkha (The Petroleum Institute, UAE); Mohamed Sabri (The Petroleum Institute, UAE); Khaled Al Blooshi (The Petroleum Institute, UAE); Mana AlQayedi (The Petroleum Institute, UAE); Khalid Al-Hammadi (The Petroleum Institute, UAE)

Magnetic Flux Leakage (MFL) techniques are the commonly used methods in the inspection of oil pipelines. This technique presents several limitations in detecting cracks. In this paper we present a novel method using ultrasound waves to obtain 3-d images of pipeline inner surfaces. Using this technique, cracks on the inner surface of a steel pipeline were identified and measured.

pp. 29-32

A Reconfigurable SAT-based Automatic Test Pattern Generator

Mona Safar (Ain Shams University, Egypt); Mohamed Shalan (Ain Shams Uinversity, Egypt); Watheq El-Kharashi (Ain Shams University, Egypt); Ashraf M Salem (Mentor Graphics Egypt, Egypt)

With the increasing complexity of integrated circuits and transition to Systems-on-Chip (SoC) paradigm, Automatic Test pattern Generation (ATPG) becomes a crucial tool in the Electronic Design Automation (EDA) domain. ATPG based on Boolean Satisfiability (SAT) has been proposed as an alternative to classical structural algorithms for generating test patterns for single stuck-at faults in combinational circuits. SAT-based ATPG provides excellent balance of simplicity and robustness versus structural algorithms. However, a highly efficient and fast SAT solver in needed to overcome the time overhead incurred in extracting the SAT formula. In this paper, we propose a reconfigurable hardware SAT-based test pattern generator. For different circuits, compilation, synthesis and place-and-route overhead is eliminated. We demonstrate the feasibility of our approach by experimenting with ISCAS'85. Our proposed reconfigurable SAT-based test pattern generator achieves 20 times average speedup compared to software SAT-based ATPG.

pp. 33-36

Timing Based DWT Approach for At-Speed Capture Power Reduction

Manu Baby (VLSI Chip Design Engineering, Dubai Circuit Design, Dubai Silicon Oasis, UAE)

Modern technology applications are constantly demanding ultra low power integrated circuit (IC) design. The testing of these low-power devices are considered as one of the most important challenge in semiconductor industry. This paper provides a path timing based design with test (DWT) approach for limiting the power during test capture phase. The motive is to introduce some sort of hardware logic into the net list during synthesis itself to disassociate the at-speed testing of critical paths from that of the non-critical ones. The already existing clock gating cells and Q gating techniques may be leveraged to keep this required implementation simple. This proposed solution is experimented on an encryption sub block design and this approach reduces the capture peak power up to 45% compared to the original design. This approach allows the test engineer to have a better control over the overall peak power consumption during at speed test.

pp. 37-40

Characterization of Al/SiO2/Arbitrarily-Doped pp+-Si Solar Cell

Shaban A. A. Mahmoud (South Valley University, Faculty of Engineering, Egypt); Mohamed Abdel-Gawad A. El-Sayed (Assiut University, Egypt); Mohamad El-sayed (Assiut University, Faculty of Engineering, Egypt)

Al/SiO2/pp+-Si metal-insulator-semiconductor (MIS)solar cell device was simulated using a comprehensive numerical model. The semiconductor layer consists of p-type Si epitaxial layer (base) which is deposited on p+- Si(001) substrate. The doping profile in the base layer was chosen to be arbitrary with different doping gradients. The effect of doping profile in the base layer and substrate was studied. The built-in electric filed,generated due to inhomogeneous doping in the base layer, extends deeply inside the base layer as the doping gradient is increased. The performance of the device as a solar cell was optimized at a doping gradient of 5×10^4 cm-1 and a substrate doping density of 1×1017 cm-3. The simulation results suggest that MIS solar cells performance can be improved by the inhomogeneous impurity distribution inside the base layer.

pp. 41-44

SC-O4: Engineering Education 1

Room: Al Maasa

Engineering Leadership Education: Rationale and Challenges for the Future

Hamid N Khattak (Higher Colleges of Technology, UAE)

In real-world situations, engineering leaders are needed who are skilled to understand and address significant engineering problems. Industries now seek engineers who are technically capable as well as possessing leadership skills. The pace with which technologies are emerging amid economic chaos underscores the need for effective leaders. Global recession has drawn attention toward equipping future engineers with leadership traits. Employers while recognizing technical knowledge as of prime importance also consider leadership as instrumental in realizing organization's goals. Educational institutes across Europe, US and Australia have been offering engineering leadership education in various formats. Although most of the programs have been offered for the last five years or more, still there are some challenges associated with the development and implementation of engineering leadership education which need to be overcome. The purpose of this paper is to highlight the rationale and challenges of the engineering leadership education in the current economic scenario.

pp. 45-48

Engineering Secondary Curriculum: IAT Approach

Ra'a Said (Institute of Applied Technology, UAE); Abdullatif Al Shamsi (Institute of Applied Technology, UAE)

Today's knowledge-based economy demands continuous learning and innovation. The demand for specialized engineering expertise to run national strategic projects nowadays is more than ever, and the need to introduce engineering education at younger ages seems to be an ever-increasing urge in response to the challenges of the 21st century. Educational systems have to be reshaped in order to reduce the gap between scholastic education and real life experience. Career Technical Education (CTE) may be the right answer. The CTE model teaches the academic rigorous core curriculum, along with hands-on technical and professional skills. The Institute of Applied Technology (IAT) has adopted the CTE model in which core academic knowledge is integrated with technical and professional skills in relation to career clusters that are designed and customized to meet local community needs. The Institute's philosophy is quality education founded on a standards-based curriculum, with specific and measurable outcomes.

pp. 49-52

A Comparison of Output Quality for Two Programs Based on Different Accreditation Criteria

Mustahsan Mir (Ajman University of Science & Technology, UAE); Anas Ali (Ajman University of Science & Technology, UAE)

This paper presents a comparison of the quality of EE graduates following a study of two parallel programs based on different accreditation criteria. The first program followed the input-based accreditation criteria while the second followed the outcome-based criteria similar to EC2000. Analysis of students' exit surveys and faculty feedback has clearly shown that for the desired skills of engineering graduates in present job market, the quality of graduates of an engineering program following the outcome-based criteria is better than that obtained by a program following the input-based criteria.

pp. 53-56

Sustainability of Engineering Education in the Gulf Cooperation Council Region

Issam W. Damaj (American University of Kuwait, Kuwait); Farid Chaaban (American University of

Beirut, Lebanon)

At the turn of the 21st century, many universities have been established in the Gulf Cooperation Council (GCC) region, few of which are branches of universities from other regions. In 2004, Dhofar University (DU), in collaboration and partnership with the American University of Beirut (AUB), opened its doors to offer the first liberal arts education in Oman with an engineering program. DU and AUB have recognized the demand for a sustainable institution that can serve students as well as society as a whole. Give a man a fish and you feed him for a day; Teach a man to fish and you feed him for a lifetime. This paper presents DU's experience in developing sustainable education. The paper presents the model of collaboration between DU and AUB, and DU efforts in preparing for accreditation. The paper also presents DU practices in balancing core academics and non-technical skills of engineering students.

pp. 57-60

SC-O3: Industrial Technology Applications 1

Room: Al Remal

Learning to Become "Green": Personalised Carbon Accounting At University

Fabrice Saffre (ETISALAT BT Innovation Centre, UAE)

A university campus offers the perfect example of a user community that, although it has many ties with the outside world, has fairly well-defined boundaries. In this paper, we briefly present the opportunities for and challenges of promoting an energy-aware (i.e. "green") attitude through personalized carbon-accounting. We argue that state-of-the-art pervasive technology can help students learn how to become more friendly to their environment without altering their lifestyle.

pp. 61-62

Context-aware Collaborative Mlearning in an Intelligent Campus Environment

Jason Ng (British Telecom, United Kingdom); Mohamed Jamal Zemerly (Khalifa University of Science, Technology and Research, UAE); Omran Al Hammadi (Khalifa University of Science, Technology & Research (KUSTAR), UAE)

In this paper, a new paradigm of thinking pertaining to a novel holistic intelligent campus (iCampus) environment is proposed to transform the end-to-end learning lifecycle of the knowledge ecosystem. To illustrate part of the concept, this study will look into the various issues of a smart mobile learning (mlearning) system, in order to highlight the application of context-aware collaborative learning in an intelligent campus environment. The mlearning system should be able to learn and adapt to the profile of the individual and provide context-aware applications and services that are relevant to that particular student at the right place and at the right time.

pp. 63-64

DubaiSat-1: Mission Overview and Applications

Adnan Al Rais (Emirates Institution For Advanced Science and Technology, UAE); Ali Al-Suwaidi (Emirates Institution for Advanced Science & Technology (EIAST), UAE); Abdulla Bushahab (Emirates Institution for Advanced Science & Technology (EIAST), UAE)

DubaiSat-1 is an initiative from Emirates Institution for Advanced Science and Technology (EIAST) to start the first Earth observation satellite program in the United Arab Emirates (UAE). The satellite was designed and developed by Satrec Initiative - a pioneer satellite manufacturing company in South Korea, with a strong participation from EIAST engineers. DubaiSat-1 is a catalyst project and part of an in-depth technology transfer program to convey advanced satellites technology to the UAE. The satellite was launched on 29th of July 2009 from Baikonur launch site onboard of Dnepr rocket. DubaiSat-1 observes the Earth at a Low Earth Orbit (LEO) and generates high resolution optical images at 2.5m panchromatic (Pan) and 5m multispectral (MS) bands. These images provide a variety of users and decision makers in the UAE with valuable tool for a wide range of applications including infrastructure development, urban planning as well as environment monitoring and protection.

pp. 65-66

Using Remote Sensing Satellites for Water Quality Monitoring in the UAE

Ammar Almuhairi (Emirates Institution for Advanced Science & Technology (EIAST), UAE); Hosni Ghedira (Masdar Institute of Science and Technology, UAE); Hussain Al-Ahmad (Khalifa University, UAE); Ali Dawood (Khalifa University Of Science Technology and Research, UAE)

The GCC (Gulf Cooperation Council) countries lack adequate freshwater availability. Hence, most of the fresh water is obtained from seawater desalination. Because seawater is the main source of fresh water and can be polluted by human and non human activities, it needs to be continuously protected and monitored. The objective of this paper is to highlight the development of an automated approach for monitoring the water quality in the UAE. Visible and thermal measurements provided by MODIS (MODerate-resolution Imaging Spectro-radiometer) sensors on board of Terra and Aqua satellites are used in this project. Medium resolution data of MODIS will be complemented with very high resolution data from the newly launched satellite DubaiSat-1 (DS-1). The project deals with monitoring of pollution caused by desalination plants, red-tide and oil spills.

pp. 67-68

Considerations for Service-Oriented Architecture (SOA) in Military Environments

Gregory Zoughbi (Center of Excellence (COE), UAE); Gerald Kattnig (Center of Excellence (COE), UAE); Simon Parkinson (Center of Excellence (COE), UAE); Niko Lindqvist (Center of Excellence (COE), UAE); Mohamed Al Nuaimi (Center of Excellence (COE), UAE); Hussain Al Balooshi (Center of Excellence (COE), UAE)

World militaries are transforming to Network-Enabled Capabilities (NEC), which is characterised by the ability to seamlessly share information through secure, interconnected, and interoperable networks. NEC is also concerned with agility and flexibility, and therefore requires a move from a pre-planned and pre-configured systems approach to a Service-Oriented Architecture (SOA) approach as adopted by NATO and other militaries. Militaries of GCC countries should follow a similar approach to further prepare them for the unique requirements of the twenty-first century. This paper reports on some considerations for GCC militaries to achieve NEC transformations based on SOA.
pp. 69-70

Characteristics and Properties of United Arab Emirates Fog Events Using Meteosat Second Generation Thermal and Visible Channels

Abdulla Bushahab (Emirates Institution for Advanced Science & Technology (EIAST), UAE); Hosni Ghedira (Masdar Institute of Science and Technology, UAE); Khalid Mubarak (, UAE); Hussain Al-Ahmad (Khalifa University, UAE); Ali Dawood (Khalifa University Of Science Technology and Research, UAE)

Satellite remote sensing is an important tool in the detection and short range forecasting (now-casting) of fog events. Fog over land develops primarily during the late-night and pre-dawn hours, infrared remote sensing is indispensable in observing fog formation, while visible imagery helps to monitor the extent and density of fog after sunrise. On average there are more than forty five fog occurrences in UAE per year. This paper describes the methods used by EIAST for using satellite remote sensing for detecting and now-casting fog events. The temperature difference between two infrared bands (11 μm and 4 μm) forms the basis for fog detection and classification.
pp. 71-72

SC-O2: Power and Energy 1

Room: Al Ameera 2

Design and Simulation of a Chopper Circuits Energized by Photovoltaic Modules

Sameer Hanna Khader (University of Hartford, Palestine)

This paper describes dc chopper with various configuration of the main and auxiliary switches aiming at studying the circuit behavior of the chopper design with different snubber and auxiliary circuits. Because of the input voltage is supplied by a Photovoltaic (PV) module, several types of feedback configurations are studied in order to select the most suitable circuit configuration that corresponds to minimum output voltage fluctuations. The feedback signal is taken from either line or the load side. Four circuit configurations have been studied; auxiliary, modified auxiliary, cascade, and modified cascade circuits. PSIM and MATLAB platforms were used to simulate the behavior of these circuits. The simulation results and the conducted analysis states that modified auxiliary circuit present the optimized configuration for PV modules. The feedback control for this circuit compensates the output voltage fluctuation.Design recommendations and suggestions are proposed for future work.
pp. 73-76

Rotor Position Estimation of 6/4 Switched Reluctance Motor Using a Novel Neural Network Algorithm

Maria Lawrence Marsaline Beno (Ibra college of Technology, Lecturer, Oman); Rajaji L (Lecturer of Ibra College of Technology, Oman); Varatharaj V M (Lecture of Ibra College of Technology , Sultanate of Oman, Oman); Arnold Nolasco Santos (Ibra College of Technology, Sultanate of Oman, Oman)

This paper presents a novel approach for estimating the rotor position of a SRM drive system using the cascade correlation ANN algorithm .This technique estimates rotor position by measuring the three-phase voltages and currents and using magnetic characteristics of the SRM, with the aid of an ANN. The rotor position estimating techniques are used in a high-performance sensor less variable speed SRM drive. The results are compared with the measured values, and the error analyses are given to determine the performance of the developed method. The error analyses have shown great accuracy and successful rotor position estimation technique for a 6/4 pole switched reluctance motor using the cascade correlation algorithm based ANN.
pp. 77-80

Performance Analysis of PWM Strategies for Cascaded H-Bridge Three-Level Inverter

Sreenivasappa Veeranna (National Institute of Technology Karnataka, India); Abdul Rahiman Beig (The Petroleum Institute, UAE); Udaykumar Yaragatti (National Institute of Technology Karnataka, India)

Multilevel inverters with various pulse width modulation strategies have established their importance in high power high performance ac drive industrial applications, as they can synthesize output waveform with improved harmonic spectrum. This paper presents the performance analysis and comparison of different PWM strategies for cascaded H-bridge three-level inverter in terms of line voltage and motor current THD with their fundamental components. It is shown that harmonic loss minimized optimal-SHEPWM strategy gives better results in terms of voltage THD compared to SPWM, SVPWM and SHEPWM strategies.
pp. 81-84

Effect of Gate Pulse Variation on the Performance of Fifteen-Level Cascaded H-Bridge Voltage Source Inverter

Tuka AlHanai (The Petroleum Institute, UAE); Thuraya AlHanaei (The Petroleum Institute, UAE);

Sreenivasappa Veeranna (National Institute of Technology Karnataka, India); Abdul Rahiman Beig (The Petroleum Institute, UAE)

This paper proposes a fifteen level H- bridge cascaded multilevel inverter with fundamental frequency switching for low power applications such as solar powered power supplies, battery powered standby power supplies. The effect of the variation of gate pulse on the performance of the inverter for different conditions of gate pulse variation is studied and simulation results are presented. Experimental implementation of gate pulse generation on a low cost FPGA is presented. The results presented in this paper are useful in designing the inverter, determining the control range of the inverter for the reliable and stable closed loop and fault tolerant operation of the inverter.

pp. 85-88

Analysis and Robust Control Design of Multimodule Parallel Dc-Dc Converter Systems

Ali Altowati (University of Garyounis, Libya)

Recently, there has been increasing interest in the parallel operation of DC-DC converters for reasons of increasing system reliability, facilitating system maintenance, allowing for future expansion, and reducing system design cost. However, paralleled DC-DC converters require a systematic modeling methodology and a categorical current-sharing mechanism to improve a performance of the overall system. In order to achieve desirable characteristics when operating converter modules in parallel, this paper proposes a unified systematic approach for modeling of parallel DC-DC converters with current-sharing control. The derived analytical results are verified by simulations of a peak current-mode (PCM) controlled buck converter.

pp. 89-92

SGFCF: Graduate Forum Posters (during Coffee Break)

SD-O1: Communications 2

Room: Al Ameera 1

BER Performance of Non-Sequential Turbo Product Codes Over Wireless Channels

Sara Ahmed Al Muaini (Khalifa University of Science, Technology, and Research, UAE); Arafat J. Al-Dweik (Khalifa University, UAE); Mahmoud Al-Qutayri (Khalifa University of Science Technology and Research, UAE)

This work evaluates the bit error rate (BER) performance of various two-dimensional turbo product codes (TPCs). The turbo decoder is implemented using hard-input hard-output data, which is impaired by additive white Gaussian noise (AWGN) and multipath fading. The effectiveness of the iterative TPC BER is evaluated using sequential and non-sequential decoding. Numerical simulation for different TPCs have confirmed that the non-sequential decoding in Rayleigh fading channels can offer double the coding gain offered in AWGN channels. Moreover, the extra coding gain achieved by the non-sequential decoder is inversely proportional to the code rate and the code length.

pp. 93-96

Modulation Adaptation According to Radio Channel Pulse Response

Norbert Majer (Research Institute of Posts and Telecommunications, Slovakia); Vladimir Wieser (University of Zilina, Slovakia); Peter Brida (University of Zilina, Slovakia); Matej Uram (University of Zilina, Slovakia)

In this paper the method for radio channel pulse response processing and modulation adaptation principle is described. The received signal is converted by baseband conversion, digitized and the pulse response of radio channel is processing by proposed algorithms. These algorithms are working in real time and are able to estimate the amplitude, phase and delay of the received signal in each of propagation paths. The most promising algorithm (Exponential Power Descend Algorithm) achieved recovery successfulness of all signal paths equal approximately 90 % for SNR = 2.5 dB. The advisable modulation is calculated from pulse response of radio channel and is immediately used in actual radio channel.

pp. 97-99

Low-Complexity Delay-Controlled Blind MMSE/ZF Multichannel Equalization

Houcem Gazzah (University of Sharjah, UAE)

We propose a blind equalization algorithm that computes the MMSE/ZF equalizer with a specified length and delay. Little computation is needed in addition to the eigen vector decomposition of the channel covariance matrix, resulting in a complexity significantly lower than that of the only existing comparable algorithm.

pp. 100-103

Impulsive Noise Reduction Using Auto-Gating Technique

Saleh Al-Araji (Khalifa University of Science, Technology and Research, UAE); Mahmoud Al-Qutayri (Khalifa University of Science Technology and Research, UAE); Mohammed Al-Tenaiji (Khalifa University of Science Technology and Research, UAE)

This paper presents the design and simulation of an Auto-Gating technique for impulsive noise reduction in communication systems. The Auto-Gating process applies an adaptive approach in order to reduce the impact of impulsive noise. An AWGN system model that uses both 16-QAM and QPSK were implemented. The BER performance for the proposed technique under AWGN and impulsive noise was compared with different impulsive noise reduction techniques such as Fixed-Gating. The results showed that the proposed technique offered clear improvement over conventional techniques.

pp. 104-107

On the Effect of Amplifier Non-linearity on the Capacity of MIMO Systems

Ishtiaq Ahmad (King Saud University, Riyadh, Saudi Arabia); Ahmed Iyanda Sulyman (King Saud University, Saudi Arabia); Abdulhameed Alsanie (King Saud University, Saudi Arabia); Awad Kh. Al-Asmari (King Saud University, Saudi Arabia)

This paper investigates the effect of nonlinearity on the capacity of MIMO systems and develops a capacity-enhancing MIMO transmission technique suitable for deployments over nonlinear channels. Nonlinearity arises in communication systems in several ways. In this work, we focus on the nonlinearity introduced at the transmitter side by the High Power Amplifier (HPA), the last stage in the communication chain at the transmitter. Eigen beamforming which is a well-known capacity-achieving technique in linear MIMO channel is re-examined for the case of nonlinear channels. We show that the optimum beamforming solution results in a degraded capacity when used over MIMO channels exhibiting nonlinearities, except when the amplifier nonlinear distortions effects are factored into the beamforming weights. Factoring the HPA effects in the beamforming weights, the capacity of the nonlinear MIMO channel reaches its linear channel equivalent.

pp. 108-111

An Integrated Adaptive Approach for Video Streaming Over Wireless Channels

Husameldin Mukhtar (Khalifa University of Science, Technology and Research, UAE); Mohamed Hassan (American University of Sharjah, UAE); Taha Landolsi (American University of Sharjah, UAE)

In this paper, we propose a multi-level adaptive video streaming approach to mitigate the challenges of video streaming over wireless channels. Scalable video coding, adaptive modulation and channel coding are integrated to maintain continuous playback and acceptable video quality. A probabilistic approach is used to adequately scale video frames to ensure successful delivery within a buffer-state-dependent budget time. Adaptive modulation and channel coding reduce the likelihood of buffer starvation. Moreover, they help reduce the amount of required video scaling, hence, improving the temporal and spatial quality of the received video.

pp. 112-115

SD-O3: Computing and IT 1

Room: Al Remal

Efficient Path Planning for Searching a 2-D Grid-Based Environment Map

Mohamed S Marzouqi (Khalifa University of Science, Technology and Research, UAE)

In this paper, the aim is to find the shortest path from which a mobile robot can view the whole environment. Available solutions are based on polygonal representations of the environment. This has limited a detailed modeling of the obstacles due to the representation complexity and modeling limitations forced by the proposed solutions. Such inaccuracy can be critical in search related tasks. This work presents a solution based on a grid-based representation of the environment which provides a detailed modeling for complex obstacle strewn environments. The presented approach provides a close to optimal short search path which the robot can traverse to incrementally view all free spaces. The approach has been implemented and tested on a simulated environment. A number of test cases are presented.

pp. 116-119

Transforming IbnSina Into an Advanced Multilingual Interactive Android Robot

Nikolaos Mavridis (UAEU, UAE)

IbnSina is the world's first Arabic-language conversational android robot, and is also part of an interactive theatre with multiple possibilities for human teleparticipation. In this paper, we describe extensions carried out to IbnSina's software architecture in order to enrich its capabilities in multiple ways, so that it can become an exciting educational / persuasive robot in the future. The main axis for extension were: access to online (Wikipedia) and stored (Koran database) content for dialogue generation, basic multilingual capability exploration (English and Arabic, also utilizing Google Translate), basic read-aloud-text capability (through OCR), and systematization of motor control (with higher-level API for real-time lip syncing, eye blinking, natural looking random face movements, and interpolation between facial expressions including an affective state subsystem). With such capabilities, IbnSina becomes closer to an attractive robot that can find real-world round-the-clock application in shopping malls, schools, as a receptionist etc.

pp. 120-123

Using Graph-based Techniques for Temporal Requirements Engineering

Mohamed Ghazel (IFSTTAR, France)

The purpose of this work is to develop an approach for assisting the temporal requirements' specification phase, within critical systems. We use a new typology taking into account all the common temporal properties one may meet when dealing with requirements specification. On the other hand, we develop a literal-words-based formal grammar able to express all the types of the identified requirements. The goal being to provide specification means which are at the same time simple, intuitive and rigorous. Then, in order to check requirements consistency, a graph-based algorithm has been elaborated. To our best knowledge, this is the first study which formalizes the consistency checking problem as a graph exploration. The whole of the developed mechanisms have been implemented in a prototype tool with an intuitive graphical interface that offers interesting facilities in terms of requirements' specification and consistency-checking.

pp. 124-127

Efficient Techniques for BGA Solder Joint Identification in Low Resolution X-Ray Images

Mohammad S Laghari (UAE University, UAE); Raed Hijer (AMD, UAE); Gulzar Khuwaja (UAE University, UAE)

The benefits of X-ray inspection are broad in scope due to the ability of X-rays to see through packages including:

encapsulation, heat sinks, and metallic shielding to reveal obscured connections and identify potential quality non-destructive issues. X-ray inspection is particularly beneficial to applications that involve advanced packaging technologies such as Ball Grid Array (BGA). This paper proposes a method that relies on an image processing and computer vision technique that detects each ball of the X-ray image of BGA chip and flags the suspect balls for further evaluation and rework. It makes use of the basic geometric distinction between a circle (perfect solder ball) and an ellipse (balls with solder joint). Thus makes it easier for the casual user to identify the suspect areas (solder joints) for further evaluation.
pp. 128-131

Case Based Reasoning Methodology for Diagnosis of Swine Flu

Baisakhi Chakraborty (National Institute of Technology, Durgapur, West Bengal, India); Srinivas Iyenger (NIT, Durgapur, India); Puneet Sood (NIT Durgapur, India); Vivek Nabhi (NIT Durgapur, India); Debidas Ghosh (National Institute of Technology, Durgapur, West Bengal, India)

Case Based Reasoning (CBR) has become a successful methodology for problem solving, reasoning and learning. It is applied for diagnosis and decision support in the medical field in several areas. This is because CBR methodology is analogous to the process of human reasoning and natural problem solving. In this paper, a CBR aided Swine Flu Diagnostic Assistant (SFDA) prototype has been developed that assists diagnosis of Swine Flu.
pp. 132-135

Multilevel Models for Data Processing

Valery Sklyarov (University of Aveiro, Portugal); Iouliia Skliarova (University of Aveiro, Portugal); Dmitri Mihhailov (Tallinn University of Technology, Estonia); Alexander Sudnitson (Tallinn University of Technology, Estonia)

The paper suggests multilevel models for data processing and demonstrates advantages of such models on examples of data sorting. Three different techniques are discussed, namely graph walk, using tree-like structures and sorting networks. The relevant implementations were done on the basis of hierarchical finite state machines and verified in commercially available FPGAs. Experiments and comparisons demonstrate that the results enable the performance of processing for different types of data to be increased compared to known implementations.
pp. 136-139

SD-O5: Special Session on Quantum Hardware and Software

Room: Al Dana

Extending the Reach of QKD Using Relays

Simon Phoenix (Khalifa University, UAE)

One of the obstacles to deployment of QKD solutions has been the distance limitation. Solutions using relays have been proposed but these rely on link-by-link key establishment. We present a new technique to extend the distance of a quantum key distribution channel using an active relay. Each relay acts as an intercept/resend device and allows the establishment of an end-to-end key. It has been argued that such relays cannot be used to extend the distance, but we show that with a suitable adaptation of the protocol the effective key distribution distance can be increased.
pp. 140-142

Securing a Quantum Key Distribution Relay Network Using Secret Sharing

Simon Phoenix (Khalifa University, UAE)

We present a simple new technique to secure quantum key distribution relay networks using secret sharing. Previous techniques have relied on creating distinct physical paths in order to create the shares. We show, however, how this can be achieved on a single physical path by creating distinct logical channels. The technique utilizes a random 'drop-out' scheme to ensure that an attacker must compromise all of the relays on the channel in order to access the key.
pp. 143-145

A Game Theoretic Approach to Quantizing Markov Processes

Steven A. Bleiler (Portland State University, USA); Faisal S Khan (Khalifa University of Science, Technology & Research, UAE)

In the context of quantum information theory, "quantization" of various mathematical and computational constructions is said to occur upon the replacement, at various points in the construction, of the classical randomization notion of probability distribution with higher order randomization notions from quantum mechanics such as quantum superposition with measurement. For this to be done "properly", a faithful copy of the original construction is required to exist within the new "quantum" one, just as is required when a function is extended to a larger domain. Here procedures for extending history dependent Parrondo games, Markov processes and multiplexing circuits to their "quantum" versions are analyzed from a game theoretic viewpoint, and from this viewpoint, proper quantizations developed.
pp. 146-149

Voltage Dependent Spin Tunneling and Spin Relaxation in Spin-LEDs

Abdel Isakovic (KUSTAR, UAE); George Wesley Hitt (Khalifa University of Science, Technology, and Research, UAE)

Spin diodes are basic building blocks of spin transistors, themselves major units for future spintronics chips for quantum information processing. Ferromagnet-semiconductor Schottky diodes are useful model devices that allow for understanding of basic physical and electronic processes in transport of spin-polarized electrons across the interface between a conventional ferromagnet (itself a natural reservoir of spins) and a spin hospitable semiconductor like gallium-arsenide (GaAs), where spin-carrying electrons can be used for quantum information processing. This paper will introduce a model

that explains experimentally observed voltage dependence of finite spin transfer efficiency, using Schottky tunneling contact, and drift-diffusion equations. In the same framework we present a rate-equation based explanation for voltage dependent spin relaxation of hot electrons, which has also been experimentally observed in spin light emitting diodes (spin-LEDs). Based on this model, we present device suggestions that are realizable within the modern semiconductor growth and nanoprocessing R&D sector.
pp. 150-153

The Potential of Electron-Nuclear Spin Interactions for Use in Quantum Information Processing

George Wesley Hitt (Khalifa University of Science, Technology, and Research, UAE); Abdel Isakovic (KUSTAR, UAE)

Recent experiments have demonstrated that an ensemble of spin polarized electrons can transfer its spin polarization to the spin of the host atomic nuclei in a "spin-friendly" semiconductor like gallium arsenide (GaAs). In this paper, we analyze this process in terms of its efficiency for using natural nuclear spin in a solid state quantum computer. Among the appealing features of the proposed design is the potential to mate it to existing memory technology. We propose a realizable and scalable model of such a device based on growth-implanted quantum dots in a III-V semiconductor matrix and analyze the feasibility of transferring spin polarized information to such a system, keeping it stored in the system and processing it.
pp. 154-157

SD-O2: Power and Energy 2

Room: Al Ameera 2

Evaluation of a Combined CPV and TPV System Under High DNI

Alaeddine Mokri (Masdar Institute of Science and Technology, UAE); Mahieddine Emziane (Masdar Institute, UAE)

Concentrating photovoltaic systems (CPV) are usually composed of a Fresnel lens, and a three-junction two-terminal monolithically stacked solar cell. Sticking the sub-cells and the substrate monolithically raises the issue of the lattice and current matching. This issue limits the choice the materials and imposes optimization constraints. These constraints of current and lattice matching also exist in two-junction monolithically stacked solar cells. As a solution, an optical system is designed to keep the two quantum receivers apart while keeping the feature of converting different bands of the solar spectrum. In this paper, the design of a CPV system is presented. The system has two quantum receivers: a TPV cell and another cell that has a high efficiency in the visible range, in addition to other optical components. The design shows an optical efficiency of 86.68 % and an overall electrical efficiency of 27 %.
pp. 158-161

Measurements and Analysis of Fixed WiMAX with LAN in Microgrid

Lip Kian Siow (Nanyang Technological University, Singapore); Lim Hui Ling Angie (Nanyang Technological University, Singapore); Ping Lam So (Nanyang Technological University, Singapore); Hoay Beng Gooi (Nanyang Technological University, Singapore)

Sensing and communication in a microgrid plays an important role in data exchange as it ensures reliable functionality in the microgrid system. Deployment of wireless technologies with Local Area Network (LAN) is feasible in a microgrid with its sole advantages offered by respective wireless technology and LAN. In this paper, a combination of fixed Worldwide Interoperability for Microwave Access (WiMAX) and LAN is proposed for monitoring and control the power meter data in a microgrid. Fixed WiMAX serves as the major communication network for information exchange between buildings in a microgrid that is situated in an academic campus. The LAN serves as the secondary communication network within a building with power meters attached to the Distributed Energy Resources (DERs) and loads. Field measurements are taken in the WiMAX cloud which operates at 5.8 GHz to analyze its network performance in microgrid.
pp. 162-165

Influence of Modeling Pitch Angle Controller on Transient Behaviour of Fixed-Speed Wind Farm

Fawzi A.Rahman AL Jowder (University of Bahrain, Bahrain)

This paper studies the influence of modeling the pitch angle controller on the transient behavior of a grid-connected wind farm subjected to mechanical and electrical disturbances. Two fixed-speed grid-connected wind farms under study are introduced based on radial network for this study. The first wind farm is connected to the grid through transmission line and second one directly connected to the grid without transmission line (strong grid). Time domain simulations of two wind farms, using PSCAD have been performed to show the importance of including the pitch angle controller model in the simulations of the fixed-speed wind farms.
pp. 166-169

Prospects of Electric Vehicles in Middle-East North Africa Markets

Noha Sadek (The American University in Cairo, Egypt)

Air pollution, climate change and traffic congestion are three major challenges facing the Middle East and North African (MENA) countries today. The current transport system, especially in large urban centers, requires significant improvements to reduce the current levels of carbon emissions and traffic congestion. There is, therefore, a pressing need to have an adequate, efficient and clean transport system. This paper presents the Electric Vehicle (EV) as a strong candidate that can satisfy the current needs in the MENA countries. It explains in detail why the oil-rich MENA region is a potential market for EVs.
pp. 170-173

THE GCC: Wind Technology Deployment Potential

Mirza Shawon (Petroleum Institute, UAE); Lana R El Chaar (Petroleum Institute, UAE); Lisa A Lamont (Petroleum Institute, UAE)

The Gulf Cooperation Council (GCC) countries, known fossil fuel producers, are well aware of this energy source's problems such as depletability and pollution. To address these issues, this region has shown willingness and determination in its mission of deploying renewable energy sources particularly wind energy to support and enhance their growth. The following is accomplished by investigating the suitability of these sources. This paper presents the wind potential and characteristics of this region by discussing the annual and monthly average wind speed. Based on the data obtained the locations were classified according to wind speed highlighting the applicability of wind energy in the GCC countries.

pp. 174-177

SD-O4: Signal Processing 1

Room: Al Maasa

Normalized 3D to 2D Model-based Facial Image Synthesis for 2D Model-based Face Recognition

A-Nasser Ansari (Qatar Society of Engineers, Qatar); Mohammad Mahoor (University of Denver, USA); Mohamed Abdel-Mottaleb (University of Miami, USA)

In our previous research [1-3], we created a database of 3D textured face models of people using stereo images and a generic face mesh model for 3D face recognition application. Consequently, in this paper we make use of this available database and propose an algorithm for synthesizing multiple view 2D facial images of each subject, which extends the number of images used in the training stage of a 2D face recognition system. The main contributions of our work are: a) proposing a novel 3D model-based face pose and scale normalizations before creating the synthesized 2D database from its 3D counterpart and b) proposing a model-based facial area segmentation and normalization to a given 2D probe facial image. Recognition experiments, using near frontal probe facial images and the extended synthesized database, demonstrate improved 2D recognition rate.

pp. 178-181

Image Fusion Tool for DUBAI SAT-1 Images

Ahmad Al Harmoudi (Kustar, UAE); Ali Dawood (Khalifa University Of Science Technology and Research, UAE); Ali Al-Suwaidi (Emirates Institution for Advanced Science & Technology (EIAST), UAE)

In this paper, an Image Fusion Tool for satellite images is proposed. It is mainly developed to enhance quality of images taken from DubaiSat-1 remote sensing satellite. Two different methods were proposed, one is called Pixel-intensity Fusion (PIF) and the other is Transferred color space Fusion (TCSF). Each technique is presented with two options. Each method is also consisting two approaches. Results show that TCSF is superior to the two PIF method.

pp. 182-185

Peak Position Recognizing Characters in Saudi License Plates

Khaled Almustafa (Prince Sultan University, Saudi Arabia); Rached N Zantout (Prince Sultan University, Saudi Arabia); Hasan R. Obeid (Zawya, Lebanon)

In this paper character recognition in Saudi Automobile License Plates is described. Due to special properties of Saudi license plates, simpler procedures as compared to the ones used for Lebanese plates have been developed. A limited character set for recognition enables the development of smaller recognition trees. The developed procedure was applied to different characters taken from real license plates and the recognition rate was 100% for characters supported by the algorithm. Uniformly distributed pseudo-random noise was added to simulate error in the image. The algorithm was proven to work even in cases in which the characters were extremely degraded by noise.

pp. 186-189

Parameter-orientated Segmentation Algorithm Evaluation

Hassan Al-Muhairi (Khalifa University (KUSTAR), UAE); Martin Fleury (University of Essex, United Kingdom); Adrian F. Clark (University of Essex, United Kingdom)

Quantitative testing of segmentation algorithms implies rigorous testing against ground-truth segmentations. Though under-reported in the literature, the performance of a segmentation algorithm depends on the choice of input parameters across core, pre- and post-processing stages. The paper highlights the importance of post-processing parameters when the figure of merit is the Berkeley F-measure. It also shows that the search of a parameter space with a genetic algorithm is not only accelerated through the inclusion of a time factor in the cost function but the relative importance of different parameters is highlighted.

pp. 190-193

A Genetic Programming Approach to Face Recognition

Behzad Bozorgtabar (Iran University Of Science And Technology, Iran); Farzad Noorian (K.N. Toosi University of Technology, Iran); Gholam Ali Rezai Rad (Iran University Of Science And Technology, Iran)

Increasing demand for a fast and reliable face recognition technology has obliged researchers to try and examine different pattern recognition schemes. But until now, Genetic Programming (GP), an acclaimed pattern recognition, data mining and relation discovery methodology, has been neglected in face recognition literature. This paper tries to apply GP to face recognition. First Principal Component Analysis (PCA) is used to extract features, and then GP is used to classify image

groups. To further improve the results, a leveraging method is also utilized. It is shown that although GP might not be efficient in its isolated form, a leveraged GP can offer results comparable to other Face recognition solutions.
pp. 194-197

Monday, February 21

MA-K3: Keynote Speech 3: Sustainable ICT and Cloud Computing

Dr. Mazin Yousif (Chief Enterprise Architect and Head of Architecture, T-Systems International)
Room: Al Ameera 1+2

MCF1: Coffee Break

MB-O1: Communications 3

Room: Al Ameera 1

The Design and Implementation of Electrically Small Reconfigurable Patch Antennas
Adel Damaj (Beirut Arab University, Lebanon); Soubhi Abou Chahine (Beirut Arab University, Lebanon); Issam W. Damaj (American University of Kuwait, Kuwait)
In modern times, a large part of communication equipment is getting smaller with a great need for power efficient and electrically small wireless devices. Wireless devices are not limited to one standard and can operate at multiple frequencies. The key characteristic of future generation wireless communication systems is the ability of antenna reconfiguration. Reconfigurable antennas are considered as a promising paradigm that can generate many modes using a single antenna structure. In this paper, the design and implementation of electrically small reconfigurable patch antennas is presented. Different designs are developed and simulated. The designed antennas are fabricated and tested. The performance of the fabricated antennas is evaluated and analyzed.
pp. 198-201

A Novel Circularly Polarized Dual-band Slot Antenna for RFID Applications
Ali Azarbar (Islamic Azad University, Parand Branch, Iran); Mostafa Mashhadi (University of Science and Technology, Iran); Javad Ghalibafan (University of Science and Technology, Iran)
In this paper, a new slot antenna is proposed for dual-band RFID applications. This antenna is designed to cover the frequency of ISM Bands (2.45GHz and 5.80GHz). In this antenna, two squared-slots are used for dual-band characteristic. Furthermore, some perturbations are set on an appropriate location to achieve circular polarization radiation. Also, an L-shaped feed line is used for antenna excitation. The simulations results show that the proposed antenna has good circularly polarized radiations and the 3 dB axial-ratio bandwidth is more than 7.2% and 5.8% for first and second bands respectively. So, it is suitable to use for RFID as the reader antenna.
pp. 202-204

A New DOA Estimation Based on Direct Data Domain Algorithm
Ali Azarbar (Islamic Azad University, Parand Branch, Iran); Gholamreza Dadashzadeh (Shahed University, Iran)
Direct data domain least square (D3LS) approach has been developed so quickly for array signal processing .Because only a single data snapshot instead of multiple needed to form a covariance matrix in conventional algorithms. Unfortunately it is generally assumed that one knows the direction of arrival (DOA) of the signal of interest (SOI) and the goal is to estimate its complex amplitude in the presence of jammer, clutter and noise This paper proposes a novel direction of arrival (DOA) estimation algorithm based on D3LS approach using the property of minimum of the sum of the norm of the adaptive weights that can be used as an indicator to estimate the DOA of the SOI in adaptive algorithms. Simulation results show that the proposed algorithm can estimate the DOAs of signals and its complex amplitude accurately in the presence of interference, clutter and noise.
pp. 205-208

Low Profile Small Size Monopole Antenna for Mobile Communication
Hanin Hamad (University of Sharjah, UAE); Abdul-Kadir Hamid (University of Sharjah, UAE)
A small size low profile monopole antenna for mobile communication is presented using magnetic coating material. The obtained FDTD simulation results show that a magnetic material coating surrounding the monopole antenna may reduce its size approximately by 50% . The antenna size reduction may be controlled by using appropriate magnetic materials without affecting the radiation characteristics of the antenna
pp. 209-212

Design of an Electrically Small Meander Antenna for LTE Mobile Terminals in the 800 MHz Band
Mohammad S. Sharawi (King Fahd University of Petroleum and Minerals, Saudi Arabia); Yanal S Faouri (KFUPM, Saudi Arabia); Sharif Sheikh (KFUPM, Saudi Arabia)
Fourth generation mobile networks (also called Long Term Evolution -LTE) will make use of multiple-input-multiple-output (MIMO) technology to achieve very high data rates in both the uplink and downlink. MIMO is based on the use of multiple antenna systems within the mobile terminal as well as the base station. The small size of the mobile terminal poses series

integration and antenna miniaturization challenges. In this work, we propose an electrically small antenna (ESA) that is based on the meander antenna structure that operates in the 800 MHz band of LTE and 3G cellular standards. The antenna has a measured center frequency of 897 MHz, bandwidth of 185 MHz and total size of 23.5 x 43 mm2. Both simulation and experiment results are presented. A study on the effect of the various antenna parameters that will aid the designer fine tune his structure is also discussed.
pp. 213-216

The Design of 80 GHz Antenna Array on LTCC Substrate

Mohamed Fouad El-Nawawy (German University in Cairo, Egypt); Darek Korzec (German University in Cairo, Germany); Wolfgang K.J. Mahler (Universität Stuttgart, Germany)

A 2x2 array of an aperture coupled microstrip patch antenna (ACMPA) was designed. The antenna was designed on Low Temperature Co-fired Ceramic (LTCC) substrate with an embedded air cavity to increase gain and bandwidth. Simulated S11 was -21.45 dB at 81 GHz with 3.5% bandwidth and the simulated radiation pattern shows a maximum gain of 10.42 dBi. Moreover, a prototype has been fabricated and measured for an ACMPA scaled down to 15 GHz.
pp. 217-220

MB-O3: Computing and IT 2

Room: Al Remal

A Novel Phishing Classification Based on URL Features

Mahmoud Khonji (KUSTAR, UAE); Andrew Jones (KUSTAR, UAE); Youssef Iraqi (Khalifa University, UAE)

Phishing is the process of illicitly obtaining data through social engineering via electronic communication channels. As reported by the Anti-Phishing Working Group (APWG), Phishing attacks are growing in volume and sophistication. As a result, the need to improve Phishing detection methods increases. We introduce a novel Phishing classification that aims toward supplementing existing classifiers by detecting a subset of Phishing attack features which none of the existing proposals addressed. We have implemented and tested our classification mechanism against Phishing and legitimate content to assess its effectiveness.
pp. 221-224

Undecryptable Symmetric Encryption

Thomas Martin (Khalifa University, UAE)

Cryptography is necessary where the confidentiality of information needs to be protected, but it often not sufficient. There are many cases where a persistent attacker can obtain the secret keys in use on a system, no matter how much the system tries to prevent this (e.g. cold-boot attacks, DRM circumvention). On the other hand, there are many systems where information needs to be stored and protected, but not understood by (i.e. available to) the recording device. This includes sensors, video recorders, CCTV, networking equipment, etc. By the nature of symmetric encryption, they have more access than they need. Asymmetric encryption could be used to prevent this, but is impractical for large volumes of data. We present a solution that allows a device to symmetrically encrypt data without itself being able to decrypt it, and nor can any attacker that compromises the device.
pp. 225-228

Business Continuity Planning (BCP) Methodology - Essential for Every Business

Manik Dey (Kuwait Institute for Scientific Research (KISR), Kuwait)

Business Continuity Planning (BCP) indicates how well an organization prepares itself to survive in unexpected disasters, disruptions or changes, assuring that the critical business processes will continue to function in most adverse circumstances with acceptable limitations. BCP is also one of the domains of Information Security management. It has been emphasized by BS 25999 standard that an organization must have a Business Continuity (BC) program in place in order to fulfill its obligations in this world of uncertainty. The main objectives are that in all unusual situations the business should sustain, maintain regulatory compliances and deliver its products and services with minimum losses to its employees, customers, vendors and to the society at large. This paper illustrates the concept of BCP along with its implication to business in adverse circumstances and enunciates a methodology about how a Business Continuity Planning framework can be established in an organization.
pp. 229-232

Distributed Lightweight KERBEROS Protocol for Mobile Agent Systems

Hussam Al-Hamadi (Khalifa University for Science, Technology and Research, UAE); Chan Yeob Yeun (Khalifa University, UAE); Mohamed Jamal Zemerly (Khalifa University of Science, Technology and Research, UAE); Mahmoud Al-Qutayri (Khalifa University of Science Technology and Research, UAE)

This paper focuses on an efficient technology for implementing a Mobile Agent System (MAS). The mobile agent is able to hold consumers' requests, migrates between platforms and executes its code autonomously. The agent is required to return results to its owner, so he or she can make the right decisions. Kerberos protocol is one of the best known authentication protocols based on symmetric key. Kerberos is a trusted third-party authentication protocol designed to establish network security. In this paper, we propose a new protocol that is based on enhancements modification of Kerberos and is suited to provide confidentiality, integrity, authentication and authorization. A security analysis of the new protocol is also provided.
pp. 233-236

Fermat Number Transform Diffusion's Analysis

Mohammed Al-Gailani (Newcastle University, United Kingdom); Said Boussakta (Newcastle University, United Kingdom); Jeffrey A Neasham (University of Newcastle upon Tyne, United Kingdom)
The Fermat Number Transform (FNT) has distinctive features, making it attractive for use in the design of secure cryptosystems. Advantages of FNT include parameterization; by achieving variable block size and key size, sensitivity; element values change for any changes to the input, output or key elements. Additionally, it is suitable for real time implementations as a fast algorithm could be adapted to it to speed up processing. The work presented here is an analysis of the transform's avalanche and diffusion power to evaluate its effectiveness for security applications.
pp. 237-240

A Sign Reading System for the Visually Impaired

Mahmoud Younes (American University of Sharjah, UAE); Basma AlMoshaigih (American University of Sharjah, UAE); Michel Pasquier (American University of Sharjah, UAE); Ghassan Qadah (American University of Sharjah, UAE)
Navigating within new or unfamiliar environments is a major problem for the visually impaired, not only in moving about safely but also in finding their location and the way to their destination. One key issue is that the visually impaired cannot take advantage of available directional signs, maps, building directories, etc. Accordingly, we propose in this paper a helper system that aims at locating indoor signs and reading their content out loud. While existing approaches are limited by relying on specific shapes or color marks, or requiring user assistance, our system is able to automatically locate and read the signs present in the indoor environment. Using a portable camera, computer, and headphones, the system continuously captures images, locates and extracts the text within, and converts it into speech. The system integrates proven text processing and speech synthesis algorithms, as well as novel techniques for text identification and logical content filtering.
pp. 241-244

MB-O5: Engineering Education 2

Room: Al Dana

Engineering Education: Importance and Relevance of Ubiquitous Technologies

Sergio Martin (Spanish University for Distance Education - UNED, Spain); Elio Sancristobal (Spanish University for Distance Education - UNED, Spain); Rosario Gil (Spanish University for Distance Education - UNED, Spain); Gabriel Díaz (Spanish University for Distance Education - UNED, Spain); Manuel Castro (Spanish University for Distance Education - UNED, Spain); Juan Peire (Spanish University for Distance Education - UNED, Spain)
This paper analyzes the current technology trends in engineering education, focusing on the importance of ubiquitous technologies, such as RFID, mobile devices, context-awareness, and geo-location. This paper reviews how these technologies have impacted education and the future impact that experts forecasts will have in a near future.
pp. 245-246

Dynamic Generated Material for E-Learners (DGML)

Ahmed Bentiba (Khalifa University of Science, Technology and Research, UAE); Mohamed Jamal Zemerly (Khalifa University of Science, Technology and Research, UAE); Omran Al Hammadi (Khalifa University of Science, Technology & Research (KUSTAR), UAE); Sultan Al-Sharif (Khalifa University, UAE); Mohamed Naqbi (KUSTAR, UAE)
E-learning websites with online assessments for learners are very abundant. However, few of these websites provide learners with materials that assist them to strengthen their weak areas. Our Dynamic Generated Material for E-Learners (DGML) system, is a dynamic e-learning system that measures the learner's knowledge in a subject and generates from a database some learning materials from the sections where the learner scores low in quizzes. As a real application, we implemented DGML for DC course in electricity. DGML is a web based system. It was tested successfully whether hosted on Linux or on Microsoft Windows. Also the system was tested successfully using major web browsers and on two mobile platforms, the Nokia N97 browser and the iPhone browser.
pp. 247-250

Are You Balanced?

Ulrica J Denson (Saudi Aramco, Saudi Arabia)
Are you feeling like you are just making it through the day, falling behind and never catching up, or merely making it to the end of the week and feeling exhausted when you arrive home? These are typical signs that clear boundaries and some degree of separation between work and home life must be established in order to be more effective in life. How individuals balance the demands of life has become increasingly important in a time when many households consist of two working parents with added responsibilities of taking care of children and/or elderly dependents. This paper will focus on ways to create balance between work and life with the ultimate goal of improving lifestyle. Improving lifestyle requires recognizing habits that sabotage balance, reevaluating one's life as it pertains to short and long term goals, and developing strategies enabling focus on what matters most at work and at home.
pp. 251-254

UAE Future Electrical Engineers Lead in Serving the Community

Kamal Al Khuffash (The Petroleum Institute, UAE); Lisa A Lamont (Petroleum Institute, UAE); Lana R El Chaar (Petroleum Institute, UAE)

This paper discusses the application of a sample service learning project in the educational process of the United Arab Emirates (UAE). Reviewed articles discussing the implementation of service learning in developed countries such as the United States of America (USA), and the United Kingdom (UK) where standards for such applications have been drafted and highlighted. The paper presents an example of the service learning projects conducted in the UAE, how the project was conducted and the response of the client and students after project completion. In addition, the paper highlights various skills developed by the students during this project. Finally the paper illustrates the benefits of service learning projects in the development of the student's personality, confidence and educational skills.
pp. 255-258

MB-O2: Power and Energy 3

Room: Al Ameera 2

A Novel Hybrid Evolutionary Algorithm Based on ACO and SA for Distribution Feeder Reconfiguration with Regard to DGs

Javad Olamaei (Islamic Azad University- South Tehran Branch, Iran); Taher Niknam (Iranian, Iran); Ali Arefi (Tarbiat Modares University, Iran); Amir Hooshang Mazinan (Islamic Azad Unversity, Science and Research Branch, Iran)

This paper presents an efficient hybrid evolutionary optimization algorithm based on combining Ant Colony Optimization (ACO) and Simulated Annealing (SA), called ACO-SA, for distribution feeder reconfiguration (DFR) considering Distributed Generators (DGs). Due to private ownership of DGs, a cost based compensation method is used to encourage DGs in active and reactive power generation. The objective function is summation of electrical energy generated by DGs and substation bus (main bus) in the next day. The approach is tested on a real distribution feeder. The simulation results show that the proposed evolutionary optimization algorithm is robust and suitable for solving DFR problem.
pp. 259-262

Reinforcement Learning Solution to Economic Dispatch Using Pursuit Algorithm

Imthias Ahamed (King Saud University, Riyadh, Saudi Arabia); Jasmin E. A. (Govt.Engg.College, Thrissur, India); Faisal Pazheri (Saudi Aramco Chair in Electrical Power, Saudi Arabia); Essam A. Al-Ammar (King Saud University, Saudi Arabia)

Reinforcement learning (RL) algorithms are powerful tools that can be used to solve multi stage decision making problem. In this paper, we view Economic Dispatch (ED) problem as an n stage decision making problem and propose a novel RL algorithm which uses pursuit algorithm for making decisions at each stage during the learning process. Even though many soft computing techniques like simulated annealing, genetic algorithm and evolutionary programming have been applied to ED, they require searching for the optimal solution corresponding to each demand. In RL approach, once learning phase is over, we can find optimal dispatch for any load from a lookup table. One important issue in RL algorithm is striking a balance between exploration and exploitation during the learning phase. Here we propose to use an efficient algorithm called pursuit algorithm from theory of learning automata for balancing the exploration and exploitation during the learning phase.
pp. 263-266

On the Energy Management in Data Center's Microgrid

Teemu Koski (Aalto University, Finland); Heikki Koivo (Aalto University, Finland); Vesa Hasu (Aalto University, Finland)

This paper focuses on the energy management of microgrid connected to a data center. In our simulation studies, we use microgrid including a diesel generator, a micro turbine and the supply from the main grid. The energy supply management in microgrid is studied with a few allocation procedures. The first procedure is based on Mesh Adaptive Direct Search (MADS) optimization. The second procedure is an expert system. Based on the simulations, the paper suggests features for energy management algorithms of data centers' microgrids.
pp. 267-270

Impact of Damping Scheme on Damping Characteristics of Static Synchronous Series Compensator

Fawzi A.Rahman AL Jowder (University of Bahrain, Bahrain)

This paper shows the impact of two damping controllers on the damping characteristics of the Static Synchronous Series Compensator with respect to their ability to damp the local mode of oscillation of single-machine infinite bus system. The first damping controller is introduced the through the magnitude control of the SSSC while the second is introduced through the angle control of the SSSC. Eigenvalue analysis and time domain simulations are performed to show that the first method provides higher damping than the second method.
pp. 271-274

An Optimum Power Flow Tool for Optimising the Expansion Plan of Reactive Power Compensation

Karim Karoui (Tractebel Engineering, Belgium); Horia Crisciu (Tractebel Engineering, Belgium); Ludovic Platbrood (GDF Suez, Belgium)

This paper describes the methodology to determine the optimum size and location of reactive compensation equipments. The proposed method is implemented with a new interior point optimum power flow program called IPSO (Integrated Power System Optimizer), developed by Tractebel Engineering. The proposed objective functions achieve the trade off between economic objectives (investment cost) and functional objectives (real power losses reduction or security level requirements). The discrete variables are first modelled as continuous quantities then rounded-off sequentially to obtain a applicable

operating point. The efficiency of the proposed methodology has been proven on several studies in different Gulf countries (e.g. Oman, Dubai,…).
pp. 275-278

Adequacy Assessment of Bulk Electric Power Systems Incorporating Wind Energy

Eman Bassyouni Yossef Rohayem (Azhar University, Egypt); Adel Abou EL Ela (Menoufiya University, Egypt); Seuid Osman (Azhar University, Egypt)

Distributed generation units such as wind generation farms at the IEEE reliability test system (RTS) to assess the bulk electric system reliability. IEEE test system is simulated and analyzed at this paper; several scenarios are implemented to the test system to assess the impact of penetrating Wind generation farms at the power system reliability indices at composite level including both the generation and transmission (HLII). This study is important for planners to determine the best locations of wind generation farms and the optimal percentage of the penetration level. The results of this work show the impact of adding wind generation farms at different locations and with different Penetration level.
pp. 279-282

MB-O4: Signal Processing 2

Room: Al Maasa

Face Recognition System Using Multilinear Principal Component Analysis and Locality Preserving Projection

Shermina Jebaraj (University of Stirling, Oman); Vasudevan V (Kalasalingam University, India)

Face recognition technology has evolved as an enchanting solution to perform identification and the verification of identity claims. By advancing the feature extraction methods and dimensionality reduction techniques in the pattern recognition applications, number of facial recognition systems has been produced with distinctive degrees of success. In this paper, we have presented a novel biometric face recognition approach based on Multilinear principal component analysis (MPCA) and Locality Preserving Projection (LPP) to enhance the face recognition performance. This approach consists of four major steps: 1) Face image preprocessing, 2) Dimensionality reduction using MPCA 3) Feature Extraction using LPP in which, the significant features for class separability are selected and 4) Face recognition using L2 similarity distance measure. The proposed approach is validated with FERET and AT&T database of faces. Experimental results on these databases demonstrated the effectiveness of the proposed approach for face recognition with good recognition accuracy.
pp. 283-286

Enhanced Hidden Markov Models for Accelerating Medical Volumes Segmentation

Shadi AlZubi (brunel University, United Kingdom); Naveed Islam (brunel University, United Kingdom); Maysam F Abbod (Brunel University, United Kingdom)

A fully automated unsupervised image segmentation method using Hidden Markov Models (HMMs) is proposed to segment medical volumes. The application of this system to medical volumes has been evaluated using NEMA IE body phantom and a comparison study has been carried out to evaluate HMM and other segmentation techniques which reveal thatHMMdelivers promising results in terms of accurate region of interest detection. Computational time is the main issue to tackle in HMMs, a solution has been proposed and evaluated with respect to the effects of the accelerators on the system accuracy.
pp. 287-290

Powerful Video Noise Removal Using Fuzzy Logic

Mike Nachtegael (Ghent University, Belgium); Tom Mélange (Ghent University, Belgium); Etienne Kerre (Ghent University, Belgium)

Fuzzy logic and fuzzy set theory can be interesting tools for engineers when solving image processing problems. They provide a mathematical model for approximate reasoning, which mimics human reasoning and therefore can be very powerful. In this paper we review the basic concepts of fuzzy logic and fuzzy set theory, and use these tools for the construction of a filter for random impulse noise removal in image sequences. Experimental results and a comparative study demonstrate the excellent performance of the filter and hence the power of the used tools.
pp. 291-294

Lung Cancer Detection by Using Artificial Neural Network and Fuzzy Clustering Methods

Fatma Mohammed Taher (Khalifa University, UAE); Rachid Sammouda (University of Sharjah, UAE)

The early detection of the lung cancer is a challenging problem, due to the structure of the cancer cells. This paper presents two segmentation methods, Hopfield Neural Network (HNN) and a Fuzzy C-Mean (FCM) clustering algorithm, for segmenting sputum color images to detect the lung cancer in its early stages. The manual analysis of the sputum samples is time consuming, inaccurate and requires intensive trained person to avoid diagnostic errors. The segmentation results will be used as a base for a Computer Aided Diagnosis (CAD) system for early detection of lung cancer which will improves the chances of survival for the patient. The two methods are designed to classify the image of N pixels among M classes. In this study, we used 1000 sputum color images to test both methods, and HNN has shown a better classification result than FCM, the HNN succeeded in extracting the nuclei and cytoplasm regions
pp. 295-298

1-D Walsh Coded Watermarking Technique for Colour Images Using the Y Channel

Kamal Ahmed (Khalifa University for Research And Technology, UAE); Hussain Al-Ahmad (Khalifa University, UAE); Patrick Gaydecki (University of Manchester, United Kingdom)

In this paper a new blind technique using one dimensional Walsh coding to improve the robustness of image watermarking is presented. The proposed technique inserts the 16x64 binary bits of handwritten signatures in the DCT blocks of a 512x512 digital color image. The 1-D Walsh coding can be applied either horizontally or vertically. The work was carried out using the horizontal 1-D Walsh coding. Results prove that the use of Walsh coding has improved robustness against JPEG compression and some image manipulation techniques.
pp. 299-302

An Algorithm for Watermarking Mobile Phone Colour Images Using BCH Code

Jeedella Jeedella (Khalifa University, UAE); Hussain Al-Ahmad (Khalifa University, UAE)

This paper proposes a scheme for embedding phone numbers into color images captured by a mobile phone camera. Firstly, the phone number digits are transformed using BCD encoder and the generated binary vector is appended by the phone number checksum represented in binary format. Then, this binary vector is coded by BCH code before inserting it in the DCT blocks of the image. The coded watermark information are embedded into a predefined low frequency coefficient in the DCT domain. The robustness of the scheme is assessed by using "Stirmark" software package. The new algorithm survived JPEG compression and 3x3 2D filtering.
pp. 303-306

MLU: Lunch

MC-O1: Communications 4

Room: Al Ameera 1

Performance Investigation Using Different Software of Dynamic Source Routing in Ad-Hoc Networks

Ali F. Almutairi (Kuwait University, Kuwait); Taher El-Hendawy (Kuwait University, Kuwait)

Ad-hoc network is a self organizing network that consists of mobile nodes. Each node acts as a router that forwards the data to other nodes in the network. Ad hoc routing protocols are affected by mobility of the nodes and network scalability. In this paper, the performance of Dynamic Source Routing (DSR) is studied through simulation, using NS2, and QualNet. The effects of mobility and network scalability for different networks will be investigated. The performance results show that there exist significant divergences, among the results obtained by the two software packages, when the network scaled to a large number of nodes or the traffic sources increased. An analytical model to compute the number of route errors is presented. We expect that these results will be very helpful to engineers in designing ad-hoc routing protocols, and their decision about the type of network and the appropriate software tool they will use.
pp. 307-310

Topology Effect on the Capacity of Wireless Mesh Networks

Youssef Iraqi (Khalifa University, UAE)

The wireless backbone of the WMN poses several constraints on the amount of traffic that can be transferred through the network. In this paper we present an investigation of the WMNs topology effect on the capacity of these networks. Three different topology types were considered: square, triangle, and hexagon. These topology configurations can be used as a starting point in the initial design of a new WMN. The study shows that a triangle-based topology leads to higher capacity of the network. We also provide guidelines on when a new gateway should be introduced to increase the capacity of the network.
pp. 311-314

Enhanced QoS Support in Mobile Ad Hoc Networks Using Multipath Routing Backbones

Mansoor Ali (Caledonian College of Engineering, Oman); Brian G Stewart (Glasgow Caledonian University, United Kingdom); Alireza Shahrabi (Glasgow Caledonian University, United Kingdom); Athinarayanan Vallavaraj (Caledonian College of Engineering, Oman)

Quality of Service (QoS) provisioning has been a challenging task in Mobile Ad hoc Networks (MANET) due to their dynamic and un-predictable behaviour and topology change. This paper presents a new approach based on multipath routing backbones for enhanced QoS in MANETs. Nodes in MANETs greatly differ with each other in terms of communication and processing capabilities. In this approach, multiple routing backbones are identified from source to destination using intermediate nodes that have better communication and processing capabilities to take part in the mobile routing backbones and efficiently participate in the routing process. In addition to enhanced QoS support, the new approach also provides better congestion control according to current network traffic levels and nodes' processing loads. Simulation results show that this approach reduces end-to-end delay considerably and improves network throughput and packet delivery ratio by directing traffic through lowly congested multiple routing backbones that are rich in resources.
pp. 315-318

About the Optimal Delay for Linear Equalization of MIMO Channels

Houcem Gazzah (University of Sharjah, UAE)

Delay selection has notoriously a dramatic impact on the performance of a linear equalizer of a communication channel. We give here the proof that near-optimal performance can be obtained by choosing the delay to be equal or slightly larger than the channel memory. This results is proved in the general context of a multiple-input multiple-output finite impulse response channels. It constitutes a helpful design criterion that ensures practically optimal performance and whose simplicity contrasts with the huge computation required by optimal delay selection algorithms.
pp. 319-322

Temporal and Spatial Realistic Clustered Channel Model for Circular Array Based

Wideband WLAN MIMO Systems

Mohab A. Mangoud (University of Bahrain, Bahrain); Zahra Mahdi (University of Bahrain, Bahrain)

In this paper a spatially and temporally clustered channel model is proposed to be applicable to WLAN MIMO systems based on circular antenna arrays (UCA). Properties of multipath taps along with angular and power values of clusters are included in this model to consider wideband selective fading channels. Link performance of systems that utilize UCA at both link ends, the access point (AP) and mobile associated stations (STAs) are investigated. Standard IEEE802.11 TGn channel scenarios are used to simulate different realistic environment. Characteristics of ergodic channel capacity versus azimuth orientation of UCA arrays are analyzed and compared with that of uniform linear array (ULA). Also, the water filling power scheme performance is investigated allocation under different conditions. Performance of VBLAST UCA bases receivers in combination with successive interference cancelation are also presented for different TGn channel models by utilizing the proposed channel model.

pp. 323-326

MC-O5: Electronics 2

Room: Al Dana

A New Enhanced Howland Voltage Controlled Current Source Circuit for EIT Applications

Abdullah Al-Obaidi (Petroleum Institute, UAE); Mahmoud MMeribout (Petroleum Institute, UAE)

A current source is one of the most important circuits in Electrical Impedance Tomography (EIT) hardware systems for measuring conductive multiphase flows. One of its important and challenging features is to deliver a relatively large and constant current for a wide range of resistive loads, high signal to noise ratio, and a large bandwidth. This paper presents a new voltage controlled current source for EIT applications. It is based on Howland circuit and uses two similar current sources circuits operating in parallel. Furthermore, the paper suggests a General Inverter Circuit (GIC) to remove the effect of eventual stray capacitance which usually appear across the load. Experimental results using Multisim software indicates that the new suggested circuit presents a more stable impedance output over a range of 100 to 3000 ■. Furthermore, it was found that the current remains stable for range of 100 to 6000 Ω.

pp. 327-330

A Novel Impedance Multiplier Using Low Voltage Digitally Controlled CCII

Iqbal Ahmad Khan (Umm Al-Qura University, Saudi Arabia); Mohammed Simsim (Umm Al-Qura University, Saudi Arabia)

The digitally controlled current conveyor has been used to realize a novel digitally controlled impedance multiplier. The realized impedance multiplier can provide positive or negative multiplying factor with directly or inversely proportional to an n-bit digital control word. The digitally controlled multiplier is utilized for the realization of a first order continuous time filter with low pass and high pass responses. The pole frequency of the filters is programmable through digital control word. The realized digitally controlled continuous time filter is designed and verified using PSPICE and the results thus obtained justify the theory.

pp. 331-334

CMOS Magnetic Actuators for Bio-material Manipulation

Faisal Abu-Nimeh (Michigan State University, USA); Fathi Salem (Michigan State University, USA)

Magnetic manipulation for molecular-level interro- gation and diagnosis are emerging as lab-on-chip platforms. These platforms necessitate low-cost, low-power, portable, and high efficiency integrated implementations. We Implement an all-integrated programmable 16x16 magnetic coil array chip with a die-size of 1.5x1.5mm2 designed in CMOS 0.5■m technology. The design does not require any external magnetic source. It relies on the Hall effect generated by the smallest permissible vertical coil inductors (in this reported technology, the inductor's planar area is 6■mx6■m). The coil array is selectively and dynamically controlled. Each cell, composed of the coil and its logical control, can emit eight programmable magnetic field levels. All array components are tuned to work at 900MHz and incorporate high-speed serial row/column switching. The array can be used to manipulate a small, in the order of 6■mx6■m, single molecule or in collaborative manipulation of larger biomaterial objects.

pp. 335-338

Four Pole Elliptic Bandpass Filter on GaAs Substrate

MohammadReza Salehi (Shiraz University of Technology, Iran); Ebrahim Abiri (Shiraz iran, Iran); Shahamat Kohan (Shiraz University of Technology, Iran); Hadi Bashiri (Shiraz University of Technology, Iran)

In this paper a novel result of the phase noise is shown. A four pole elliptic band pass filter on GaAs substrate is presented. Two substrates RT/duroid 5880 and GaAs in terms of the phase noise oscillator for a band pass filter with dimensions 11×11mm and width 1mm are investigated. These substrates can be used in oscillators. The phase noise of the oscillator on RT/duroid 5880 substrate with εr=2.2 and h=31mil at oscillation frequency of 8GHz is -122 and -140dBc/Hz at an offset frequencies of 100KHz and 1MHz respectively and on GaAs substrate with εr=12.9 and h=100μm in the same frequencies is -128 and -146 dBc/Hz.

pp. 339-342

Blood Flow Model for Noninvasive Diagnostics

Dirk Fricke (University Rostock, Germany); Hagen Koroll (Universität Rostock, Germany); Jens Kraitl (University of Rostock, Germany); Hartmut Ewald (University of Rostock, Germany)

An artificial blood flow model (BFM) based on the human circulatory system was developed to allow a controlled variation of

the blood parameter as total haemoglobin concentration (ctHb), oxyhaemoglobin (O2Hb) and carboxyhaemoglobin (COHb). The purpose was to observe the absorption, transmission and scattering properties of human whole blood in a wavelength range from 400 to 1700 nm. All the noninvasive measurements of the whole blood transmission-spectra were compared with sample results obtained by a Blood Gas Analyzer (BGA) to validate the results. Blood circulation and predetermined oxygen state were adjusted with an extra-corporal circulation unit. The blood was gently stirred and kept flowing through the blood tubes and the specially designed cuvettes. Oxygen saturation and COHb were adjusted by a continuous flow of N2, N2-CO- and N2-O2-mixture through a hollow fiber membrane oxygenator. The blood temperature was kept constant at 37 °C.
pp. 343-346

MC-O3: Industrial Technology Applications 2

Room: Al Remal

Aviation and Service Oriented Architecture

Ali Zalzala (Hikma Group Ltd., UAE)

Since the airline industry is one of the most volatile industries being continuously affected by macro-micro forces in the environment, it is imperative that the information infrastructure be flexible and agile to business changes. This paper explores the Service Oriented Architecture based IT reorganisation strategy within the information technology department of AirlineCo, a leading airline company, to handle the volatile business environment of the airline. Current challenges in the AirlineCo's IT information delivery life cycle are analysed in line with this new architectural strategy.
pp. 347-348

An Advanced Toolset for Network Optimization Problems

Kin Fai Poon (Khalifa University, UAE); Anthony Conway (British Telecom, United Kingdom); Tim Glover (British Telecom, United Kingdom)

Due to the severe competition and budget constraints in the telecoms market, many network operators are exploring different ways to reduce their operating cost while still providing excellent services to their customers. One of the possible savings that can be made is to apply software planning tools to automate and optimize network designs at the lowest possible cost. This paper describes how a novel network optimization toolset named BT NetDesignTM (BTND), based on advanced network planning and optimization technology, can be used to automate network design. An overview of BTND is provided. Different applications created by BTND are described.
pp. 349-350

Collecting Malware From Distributed Honeypots - HoneyPHARM

Ahmad Hassan (aeCERT/TRA, UAE); Majid Al Ali (AECERT/TRA, UAE)

The purpose of having a honeypot that collects malicious software (malware), such as Nepenthes, is to build the capability of capturing malware propagating in a certain infrastructure, or intentionally targeting that infrastructure. When multiple honeypots of this type are deployed, they require a mechanism in which the malware and other related intelligence are reported to a centralized repository to analyze collected malware and study both overall and infrastructure-specific trends. Such setup also caters for identifying new malware, i.e., malware that are not known by any antivirus provider. This provides a mechanism of malware detection and analysis at early stages, which allows dealing with it before it spreads massively and causes severe damage.
pp. 351-352

Analysis and Design of a Disinfection Device for Agricultural Products

Shady Keyrouz (Eindhoven University of Technology, The Netherlands); Elias Nassar (Notre Dame University, Lebanon); Elie Akiki (Notre Dame University, Lebanon)

Pesticides are posing great risks on human health, alternative treatments for pest control and postharvest diseases are of crucial importance. One very promising technique is the microwave frequency heat treatment. In order to study the effect of electric field radiation, in the microwave range, specifically at 1.8 GHz frequency, the Finite Difference Time Domain method (FDTD) method was used to calculate the electric field intensity. Our simulation framework consisted of placing a horn antenna near an apple fruit infected with codling moth pest. The rise in temperature along and inside the apple surface was calculated. After 3 minutes of radiation, the temperature rise on the surface of the apple reached 52°C which is a sufficient value to ensure 100% mortality of bacteria, while the temperature rise inside the apple will not exceed 10°C which does not affect the quality and taste of the fruit.
pp. 353-354

Importance of Integrated Circuit (IC) Packaging in Semiconductor Companies Design Flow

Mahmoud Abou-Gabal (Design Consultant at DCD, UAE)

This paper will discuss the IC packaging industry trends and how IC packaging is important and should to be considered in semiconductor companies for successful product design. IC packaging design flow and steps will be discussed on how it is done in the industry.
pp. 355-356

MC-O2: Power and Energy 4

Room: Al Ameera 2

A Novel Concentrating Photovoltaic System with Two Separate Receivers

Alaeddine Mokri (Masdar Institute of Science and Technology, UAE); Mahieddine Emziane (Masdar Institute, UAE)

A common approach to achieving high solar energy conversion efficiency is to concentrate sunlight on a multi-junction monolithically stacked solar cell. The process of manufacturing monolithically stacked solar cells is complex and makes restrictions on the choice of materials. In this paper, a concentrating photovoltaic system is designed. The system has the feature of splitting the sunbeam into two beams and directing each one towards a receiver. The system is optimized to have a Si solar cell with an energy band-gap equal to 1.124 eV and an AlGaAs cell with an energy band-gap equal to 1.817 eV.

pp. 357-360

Multi-Junction Solar Cell Designs

Mahieddine Emziane (Masdar Institute, UAE)

We review in this paper the designs of multi-junction solar cells for very high energy conversion efficiencies. We highlight the importance of the concept of multi-junction solar devices and its superiority compared to other photovoltaic technologies. We present different types of multi-junction structures, and address the different electrical configurations used in various multi-junction designs.

pp. 361-364

Participation of FACTS in Stabilizing DFIG with Crowbar During Grid Fault Based on Grid Codes

Kenneth Okedu (Kitami Institute of Technology, Japan); S. M. Muyeen (The Petroleum Institute Abu Dhabi, UAE); Rion Takahashi (Kitami Institute of Technology, Japan); Junji Tamura (Kitami Institute of Technology, Japan)

This paper investigates the effect of connecting FACTS (Flexible AC Transmission System) device such as a STATCOM (static synchronous compensator) to the point of common coupling (PCC) of a wind farm composed of DFIG. Simulation results show that a FACTS device can effectively enhance the performance of the DFIG, when it is disconnected by the crowbar switch during grid fault by providing additional reactive power to the system, thus improving the voltage instability performance of the DFIG and the wind farm as well.

pp. 365-368

Reduced Order Models for Flat-Plate Solar Collectors

Maamar Bettayeb (University of Sharjah, UAE); Mahmoud Nabag (University of Sharjah, UAE); Muhammad Ali Al-Radhawi (University of Sharjah, UAE)

Reduced-order models are developed for partial differential system representing the dynamic behavior of the flat-plate solar collector system using SVD-based model reduction schemes. These schemes are applied to the high-order model representing the original system which is obtained from the exact infinite-dimensional system via Taylor series approximation of the irrational transfer function. A substantial order reduction is shown to be possible and the obtained reduced-order models are tractable for the purposes of simulation and control.

pp. 369-372

Cost of PV Electricity in Oman

Mohammed Albadi (Sultan Qaboos University, Oman); Abdullah Al-Badi (Sultan Qaboos University, Oman); Ali Al-Lawati (SQU, Oman); Arif S Malik (Sultan Qaboos University, Oman)

Utilizing solar radiation data of 25 locations in Oman, RETScreen software is used to study the economic prospects of solar energy. A solar PV power plant of 5-MW is considered at each of the 25 locations. The results show that the renewable energy produced each year from the PV power plant varies between 9000 MWh at Marmul to 6200 MWh at Sur while the mean value is 7700 MWh of all the 25 locations. The capacity factor of PV plant varies between 20% and 14% and the cost of electricity varies between 210 $/MWh and 304 $/MWh for the best location to the least attractive location, respectively. The study shows that the PV energy at the best location is competitive with diesel generation without including the externality costs of diesel. Renewable energy support policies that can be implemented in Oman are also discussed.

pp. 373-376

A Comparison of Fixed-Frequency Soft-Switching Phase-Shifted PWM Converters

Ashoka Bhat (University of Victoria, Canada); Sriram Jala (University of Victoria, Canada)

This paper compares three soft-switched fixed-frequency high-frequency transformer isolated DC-DC converters designed for the given specifications. Three configurations compared are (a) phase-shifted PWM full bridge converter, (b) hybrid phase-modulated converter (HPMC) with inductive output filter, and (c) HPMC with capacitive output filter. It is shown that HPMC with capacitive output filter is useful for high output voltage applications and has superior characteristics compared to other two configurations.

pp. 377-380

MC-O4: Signal Processing 3

Room: Al Maasa

ECG Signal Feature Extraction and Classification Based on R Peaks Detection in the Phase Space

Olga Malgina (Institute Jozef Stefan, Slovenia); Jana Milenkovic (Institute Jozef Stefan, Slovenia); Emil Plesnik (University of Ljubljana, Slovenia); Matej Zajc (University of Ljubljana, Slovenia); Jurij F. Tasic (University of Ljubljana, Slovenia)
The goal of this paper is to present a novel approach in the automatic diagnosis of ECG abnormalities based on detection of R peaks in the phase space. The features are extracted from detected R peaks using their geometric position on the phase curve. This paper is dealing with classification problem of normal and abnormal ECG signals. The proposed system has been validated with the data from the MIT-BIH database, in order to detect the cardiac arrhythmia. Support Vector Machine and K-Nearest Neighbour are used as classifiers. Results for both classifiers are similar. They are showing high accuracy in the experiment of classifying one test signal.
pp. 381-384

Surface Roughness Determination Using Wavelets

Sibi Chacko (Heriot Watt University, UAE)
Surface is a finger print of all manufacturing processes and is a quantifying parameter. The determination of the roughness of technical surfaces plays an important role in scientific and industrial applications. Traditional surface texture involves surface profile classified into wavelengths of Roughness, Waviness and Form. Different aspects of manufacturing processes generate different wavelength regimes and these affect the function of part differently. Conventional analysis should not incorporate these wavelength bands while evaluation of the surface roughness values. In the present paper, the surface profile is considered as a signal and using wavelet transforms a coherent approach for evaluating the surface roughness is proposed. The main contribution of the paper is to present wavelength based surface features extracted from the surface profiles by wavelet analysis. By this technique surface roughness can be separated from the actual profile and the Ra value can be measured
pp. 385-388

Business Process Forecasting in Telecom Industry

Dymitr Ruta (Boronia Capital, Australia); Basim Majeed (Etisalat BT Innovation Centre (EBTIC), Khalifa University, Abu Dhabi, UAE)
Telecommunication companies deal with thousands of business processes daily. As different tasks progress along the process sequence the process owners are interested in three key questions: what other events might still occur, when and how will the process end? All these questions are addressed here in an attempt to create a generic framework for predicting various properties of the remaining process flow based on the data extracted from a combination of live and historical processes. The proposed methodology exploits both categorical and numerical features extracted at the process and individual tasks levels to deliver some predictive characteristics of the remaining process path. In the example studied in this paper the focus is on predicting the remaining fault repair process carried out on telecommunication lines. A set of methods ranging from Markov chains up to decision trees are applied and tested, showing some interesting results and hinting for further research.
pp. 389-392

Multiple Classification Algorithms for the BCI P300 Speller Diagram Using Ensemble of SVMs

Hend El Dabbagh (Arab Academy for Science & Technology and Maritime Transport, Egypt); Mohamed Waleed Fakhr (Arab Academy for Science and Technology, Egypt)
Brain computer interface is one of the most recent and controversy field in Computer Science which emerged in order to help some handicapped people. This paper investigates different classification algorithms dealing with the BCI P300 speller diagram. The system used is composed of an ensemble of Support vector machines. Three different methods are used which are namely Weighted ensemble of SVM, Row & column based SVM ensemble and Channel selection with optimized SVM's. Experimental results show that proposed methods obtain better results than published results of competition III dataset II.
pp. 393-396

Tracking and Occlusion Handling in Multi- Sensor Networks by Particle Filter

Hamideh Rezaee (University of Tabriz, Iran); Ali Aghagolzadeh (University of Tabriz, Iran); Hadi Seyedarabi (University of Tabriz, Iran); Shadi AlZubi (brunel University, United Kingdom)
In this paper we propose a multi sensor tracking method. Tracking is done independently for each view. Fusing several cues including color, edge, texture and motion constrained by structure of environment is used in a novel way and in particle filter framework. The results of individual image planes are projected to ground plane using homography relation. The similarity of projected locations with the reference model and minimum variance estimate are two key points to evaluate the total location of the target. Also, we introduce a method based on two views tracking to handle occlusion. Robust statistic is used to declare an occlusion in one view. Homography relation and inter-frame transformation are the tools to cancel the occlusion. Experimental results show the robustness and accuracy of the proposed method.
pp. 397-400

Exploiting Foveation in User-Centred Image Fusion

Essa Basaeed (Khalifa University of Science, Technology and Research, UAE); Mohammed Al-Mualla (Khalifa University of Science, Technology and Research, UAE); David Vernon (Italian Institute of Technology, Italy)
The selection of image fusion techniques has always been a compromise between effectiveness and efficiency. In this paper, foveation (using log-polar transformation) is introduced to satisfy the real-time requirement of applications where the fused image is eventually presented to a human to interpret. Log-polar transformation achieves a data reduction without a subsequent loss in perceptual information. Thus, it can be used to reduce the execution time of any existing image fusion technique without modifying the technique itself. In this paper, the log-polar transformation is integrated with three widely-used image fusion techniques: image averaging, the Laplacian pyramid, and the Discrete Wavelet Transform. Then, the

proposed fusion process is objectively evaluated using a set of established metrics; they are Mutual Information (MI), Xydas & Petrovic, and Piella & Heijmans.
pp. 401-404

MCF2: Coffee Break

MD-O1: Communications 5

Room: Al Ameera 1

Deployment Challenges of Femtocells in Future Indoor Wireless Networks

Lina Mohjazi (Khalifa University of Science Technology and Research, UAE); Mahmoud Al-Qutayri (Khalifa University of Science Technology and Research, UAE); Hassan Barada (Khalifa University of Science, Technology and Research, UAE); Kin Fai Poon (Khalifa University, UAE); Raed Shubair (Khalifa University of Science, Technology and Research, UAE)

Femtocell technology is expected to improve both coverage and capacity, especially indoors. Providers of cellular services are increasingly implementing this technology in their networks. However, the decentralized manner of femtocells operation introduces several challenges. This paper presents an overview of the femtocells. It highlights the network requirements for deploying femtocells and discusses the major issues that affect their operation and performance. The paper also describes the key challenges of deploying femtocells and some of the proposed solutions. It then presents the future direction on applying optimization to enhance femtocell performance.

pp. 405-408

Multicarrier-assisted PU-PIC Detector for Overloaded CDMA System

Muhammad Aamer Saleem (Air University, Pakistan); Muhammad Zubair (International Islamic University, Pakistan); Ijaz Qureshi (Air University, Pakistan)

Multiple access interference is the major limiting factor for the channel capacity especially when it is desired to have an overloaded CDMA system, in which the number of users is larger than the dimension of signal space. To resolve the problem of overloading we exploit the multicarrier communication and a proposed scheme, which uses pseudo-user along with parallel interference cancellation (PU-PIC) detector. The proposed scheme assumes that spreading code for all the users is the same throughout. MAI is removed with very little computations and performance in BER is almost user independent.

pp. 409-412

OFDM with Permutation Block Spreading

Sherif Moussa (University of Quebic, Canada); Adel Omar Dahmane (Universite du Quebec a Trois-Rivieres, Canada); Claude D'Amours (School of Information Technology and Engineering(SITE), University of Ottawa, Canada); Habib Hamam (University of Moncton, Canada)

In this paper, a new Orthogonal Frequency Division Multiplexing (OFDM) with Permutation block spreading scheme is introduced; where the data symbols in each block will be used to select the spreading code. Therefore, frequency diversity in the system is increased as well as improving the symbol detection due to the inherited coding in the spreading technique. Simulation results show significant improvement in BER performance for the proposed system compared with conventional OFDM one

pp. 413-416

A Novel Space Time Diversity Generalized Decorrelating Rake Receive for Multipath Downlink DS-CDMA Systems

Abdollah Doosti Aref (Malek Ashtar University of Technology (MUT), Iran); Nasrolah Hosaini (STU, Iran); Farshid Samsami Khodadad (Sharif University of Technology, Iran); Mohammad Reza Baghbanmanesh (Mapna Group, Iran)

in this paper a novel Space Time Diversity Generalized Decorrelating Discrete Time Rake (STD-GD-DTR) for Upstream DS-CDMA System is proposed. The chosen algorithm for estimating the correct data is Maximum likelihood. In this method, a robust receiver based on maximum likelihood estimation is represented in which, space time diversity technique has been combined with generalized decorrelating discrete-time RAKE (GD-DTR) receiver to obtain higher performance than other widely used techniques for data estimation. Our proposed STD-GD-DTR ML based receiver provides gains up in the presence of channel estimation errors from similar methods. Simulation results illustrate the appropriate performance of the new proposed receiver.

pp. 417-420

Modeling of Downlink Wireless Fading Channel for 3GPP LTE Cellular System

Farag Sallabi (UAE University, UAE); Khaled Shuaib (United Arab Emirates University, UAE)

In this paper, we model the behavior of a finite-state downlink wireless fading channel based on the configurations and system parameters provided by the 3GPP LTE. By partitioning the range of the received signal-to-noise ratio into a finite number of intervals, finite-state Markov channel models can be constructed for Rayleigh fading channels. Each state corresponds to a different channel quality indicated by certain modulation scheme. In LTE, Node B is capable of transmitting frames in the downlink with different modulation schemes (QPSK, 16QAM, 64QAM). The model can be used to provide realistic physical layer input to evaluate the performance of algorithms at the upper layers. For example, the MAC layer will use this data to test the performance of scheduling, admission control, power control, etc. Computer simulations

are performed to verify the accuracy of the proposed model.
pp. 421-424

Security Challenges in Opportunistic Communication

Abdullatif Shikfa (Bell Labs, Alcatel-Lucent, France)

Opportunistic networks requires to revisit all security aspects of communication due to their specific requirements. In this article, we present the new security challenges of opportunistic communication in terms of cooperation enforcement, trust establishment, integrity, authenticity, confidentiality and privacy.
pp. 425-428

MD-O3: Computing and IT 3

Room: Al Remal

Extraction and Alignment of Facial Regions for 3D Facial Image-Based Recognition

Naoufel Werghi (Khalifa University, UAE); Harish Bhaskar (Khalifa University of Science Technology and Research, UAE); Ali Malek (Khalifa University, UAE)

Face recognition is the process of identifying a person using his image as biometric data. 3D image-based face recognition is expected to overcome many problems that are faced in traditional 2D face recognition, such as the lack of explicit shape information, pose and lighting variations. However, as a relatively new technology, it does face a number of challenges among them are: 1) How to automatically extract the facial region from the data captured by a 3D facial scanner, which may contain hair, neck and shoulder and possibly other background data and 2) How to precisely and efficiently align two instances of 3D faces. This paper proposes new innovative techniques that address some aspects of these challenges
pp. 429-432

Proactive Integrated Mobile Services Using Multi-Agents System

Hend Al Tair (Khalifa University for Science, Technology and Research, UAE); Mohamed Jamal Zemerly (Khalifa University of Science, Technology and Research, UAE); Mahmoud Al-Qutayri (Khalifa University of Science Technology and Research, UAE); Marcello Leida (Khalifa University, UAE)

Integration between multi-agents systems and mobile services can lead to advanced creative applications on smart handsets. Communication and learning are some of the main features of agents. These features can be utilized to implement a smart system that can be proactive and adaptive to a user's context/-situation. This paper highlights a number of related projects and points out their drawbacks. It proposes - an alternative architecture for a tourist guide system. It also describes the workflow of a number of tasks in the system and provides some possible scenarios regarding the use of such system.
pp. 433-436

A New Intelligent Strategy for Optimal Design of High Dimensional Systems

Ahmed El-bastawesy (Marine Engineering Department, Faculty of Engineering, Alexandria University, Egypt); Ahmed El-sayed (Marine Engineering Department, Faculty of Engineering, Alexandria University, Egypt); Mohamed Abdel-Salam (Marine Engineering Department, Faculty of Engineering, Alexandria University, Egypt); Bassam Salah (Marine Engineering Department, Faculty of Engineering, Alexandria University, Egypt); Islam Adel (Marine Engineering Department, Faculty of Engineering, Alexandria University, Egypt); Mohamed Alaa El-laffy (Marine Engineering Department, Faculty of Engineering, Alexandria University, Egypt); Mohamed Tariq (Marine Engineering Department, Faculty of Engineering, Alexandria University, Egypt); Beshoy Magdy (Marine Engineering Department, Faculty of Engineering, Alexandria University, Egypt); Omar Fathy (Marine Engineering Department, Faculty of Engineering, Alexandria University, Egypt)

The present paper proposes a new intelligent strategy that is suitable for optimal design of large scale complex systems such as ships and aircrafts. The strategy relies on three key aspects. The first is choosing a suitable compact compressed invertible representation for the high dimensional design variables vector. The second is defining a goal-focused problem-specific objective function. The third is seeking the global optimal of this objective function using a gradual non-greedy optimization procedure. The effectiveness of the proposed case study is demonstrated through a ship design case study. Starting from an initial far from optimal design, the strategy successfully converged to a greatly improved design in only three iterations.
pp. 437-440

Evolutionary Multiobjective Optimization for Medical Classification

Aboubekeur Hamdi-Cherif (Computer College, Qassim University, Buraydah, Saudi Arabia); Chafia Kara-Mohamed (alias Hamdi-Cherif) (, Saudi Arabia)

We propose an evolutionary algorithm-based computational environment for medical classification. We use evolutionary multiobjective optimization (EMO) to solve a general medical minimization problem. As an example, we simultaneously minimize three objectives, namely the number of genes responsible for cancer classification while reducing the number of misclassifications in both testing and learning data sets obtained from real patients. Results quality is reported against three genetic operators namely selection, crossover and mutation, each of which offering three different methods. Consequently, our implementation gives comparable results to more sophisticated methods, such as NGSAII-like ones, with

far less computational efforts.
pp. 441-444

A Delay-based Probing Technique for the Discovery of a Firewall's Accept Rules

Khalid Alhamwi (King Fahd University of Petroleum and Minerals, Saudi Arabia); Omar Al-Hmouz (KFUPM, Saudi Arabia); Mohammed H. Sqalli (KFUPM, Saudi Arabia); Khaled Salah (Khalifa University (KUSTAR), UAE)

Firewalls are widely used nowadays to protect networks, and they may also become the target of DoS attacks. To achieve this, the attacker needs to recognize the firewall access control list, i.e., rule-set, and the order of rules inside this list. The attacker can then launch an attack by targeting rules at the bottom of this list. This makes the firewall busy with processing dummy requests, its performance degrades sharply, and it may go down. In this paper, a method to identify the order of the rules within the rule-set is presented. Then, a mechanism to make the sampling algorithm more efficient is described. We focus on discovering information related to the accept-rules only of a firewall's policy. Results show that a high level of precision and recall can be obtained for deducing the order of rules within a rule-set while requiring a very low cost.
pp. 445-448

Fast Mobile IPV6 Handoff Using Cross Layer Interaction

Khaled S. Alassaf (University of Bradford, Kuwait)

FMIPv6 always fails to perform predictive handoff procedure and results in reactive handoff when integrated with the IEEE 802.11-based standard. It is because of the protocol nature of IEEE 802.11 and the weak relationship between IEEE 802.11 and FMIPv6. Furthermore, a Mobile Node (MN) can not receive packets destined to it as it sends the Fast Binding Update (FBU) to the old Access Router (oAR). This would cause unnecessary packet loss and make the predictive handoff have more packet loss then reactive. In this paper, FMIPv6 scheme will be proposed, which is based on an interaction between L3 and L2. It can reduce the unnecessary packet loss when the handoff occurs and avoid the longest phase that IEEE 802.11 will enter, and can lower the handoff latency.
pp. 449-452

MD-O5: Control 1

Room: Al Dana

FUZZY Sliding Mode Control for Missile Autopilot Design

Negar Elmi Sadr (Tarbiat Modares University, Iran); Hamidreza Momeni (Tarbiat Modares University, Iran)

In this paper we have discussed about the Sliding Mode Control (SMC) method for autopilot of a Ballistic missile. Using fuzzy algorithm, We select controller coefficients so that the system is robust under various uncertainties and external disturbances. Also, the system's stability has been demonstrated using Lyapunove's stability theory. Then the chattering phenomenon has been studied as the main problem of the sliding mode control, We used boundary layer method to overcome this problem.
pp. 453-456

A Complete Solution to Intelligence Based Multivariable Predictive Control Scheme

Amir Hooshang Mazinan (Islamic Azad Unversity, Science and Research Branch, Iran); Mehdi Fallah Kazemi (Islamic Azad University (IAU), Lahijan Branch, Iran); Javad Olamaei (Islamic Azad University- South Tehran Branch, Iran)

A 160 MW drum-type boiler-turbine system has been selected in this paper for the purpose of dealing with through a new intelligence based multivariable predictive control (IBMPC) scheme. In the control strategy presented here, a multi-IBMPC scheme, which is developed in line with intelligence based identifier, is realized to drive a multi-multivariable model approach. Actually, a number of multivariable linear models of the system are accurately identified, at some chosen operating points, to organize the approach presented as well as its multivariable control schemes.
pp. 457-460

Design and Manufacture of a Pneumatic Glass Climbing Robot for Cleaning of High-Rise Buildings

Hashem Anwari (Heriot Watt - Dubai, UAE); Nidhal Abdulaziz (Heriot Watt University Dubai Campus, UAE)

In this paper a pneumatic autonomous glass climbing robot has been used. The idea was to design and manufacture a small size and light weight glass climbing robot for cleaning purposes. The design consists of four active (scanning) type suction modules, two servo motors, two free wheels, a cleaning mechanism, and a programmable onboard microcontroller. Each of the suction modules includes a vacuum generator and a chamber mounted on the supporting frame for adhering to the surface. The innovation of the proposed project is in using a scanning type suction module which is based on aerodynamics principles to provide adhering force for the attachment to the glass surface.
pp. 461-464

A Wireless Sensor Network-based Heliostat System Using Real-Time Image Processing Techniques

Maha Faisal Younis (Petroleum Institute, UAE); Hessa Al-Shehhi (Petroleum Institute, UAE); Nada Al Hamar (The Petroleum Institute, UAE); Mahmoud MMeribout (Petroleum Institute, UAE)

In this paper a new concept of heliostat system to maximize the amount of solar energy projected onto the focus is

introduced. Its principle consists to use a single CCD camera to track in real-time the three dimensional (3D) motion of the sun and to broadcast this information to all the mirrors of the system in a wireless manner. Each of these mirrors is controlled by an independent control unit, the task of which is to rotate the associated mirror around its center and in 3D space in such a way to provide the maximal reflection of the solar energy onto the focus. Experimental results on a hardware prototype system indicate the feasibility of the concept to track a source of light in an indoor environment at the image frame rate.
pp. 465-468

Emulating Reflex Actions Through Memristors

Apurv Mittal (Indian Institute of Technology Delhi, India); Sundaram Swaminathan (BITS Pilani Dubai, UAE)

The paper describes a method to simulate the reflex action of human beings in a robot. The paper uses the recently discovered memristors to implement a method for the reflex action, using a configuration of memristors developed to form multi-directional circuits. The benefit of memristive systems is that they are capable of integrating both data storage and data processing in a single device, which offers the potential to more closely emulate the capabilities of biological intelligence.
pp. 469-472

MD-O2: Power and Energy 5

Room: Al Ameera 2

Critical Spots for Microgrids in the City of Al-Ain Power Network

Rawan Younis (University of United Arab Emirates, UAE)

Microgrids are an important asset to power systems since they address the technical issues of long-distance power transmission and the environmental and economical concerns related to the traditional power generation. In the research study, first the collected information from the AADC and TRANSCO was used to develop a model for Al-Ain power network. Based on these information, the network loads are separated in two groups of VIP and non-VIP loads. The VIP loads are the most critical (sensitive) loads for which no power interruption should happen. The frequency and duration of interruptions and the amount of power shortage for each interruption for all VIP and non-VIP loads were obtained. The results were used to specify critical spots of Al-Ain power network. The critical spots are places where Microgrids should be created to enhance the security of network, the reliability and power quality at local critical loads.
pp. 473-476

New Method for the Location of Ground Faults on Transmission System

Haifa Al Motairy (The Petroleum Institute, UAE); Redy Mardiana (The Petroleum Institute, UAE); Charles Su (Petroleum Institute, UAE)

This paper presents a new fault location method using high-frequency transient voltages generated by ground faults on transmission system. The method is based on the measurement from one end of the transmission line. The fault location is determined solely from the arrival time of initial waves of modal voltages at the measuring bus. The method does not need to exploit the reflected waves. The method is tested quantitatively using the Alternative Transients Program/Electromagnetic Transient Program (ATP/EMTP) for typical ground faults on a model of transmission line. The statistical results are given to demonstrate the performance of the proposed method.
pp. 477-480

A Single-Phase Current Vector Control for a DSTATCOM Installed in Distribution Systems

Amr Elnahdy (RMC, Kingston, Ontario, Canada)

This paper demonstrates an effective control technique for a Distribution STATic COMpensator, (DSTATCOM), as a custom power conditioner to mitigate the current fluctuation and voltage flicker in industrial distribution systems. The proposed control is newly utilized for a single-phase DSTATCOM, and it depends on a current vector control technique for generating the required reactive power. It is known that the current vector control is commonly implemented on a three-phase system to operate a three-phase DSTATCOM. The novelty in this paper is articulated in the implementation of the current vector control on a single-phase circuit to operate a single-phase DSTATCOM. The presented ideas are conveyed and approved through simulation results using MATLAB/SIMULINK along with a real time-domain model of the arc furnace.
pp. 481-484

Accurate Fault Location of Two-Terminal Transmission Line Based on One End Voltage Measurement and Smooth Support Vector Machines

Eyada A Alanzi (University Tenaga Nasional, Malaysia); Mahmoud Younis (University Tenaga Nasional, Malaysia)

This paper presents a new technique for accurate fault location based on voltage measurement from one end of the two-terminal transmission line and Smooth Support Vector Machine (SSVM). Due to common problems of current transformer during fault location and as a result increasing the cost and reduction of the accuracy, proposed technique is independent of current measurement and based on one terminal voltage measurement of the transmission line. Post-fault voltage at one end of the line is measured and used in calculation of the fault location. GPS is not required for this technique resulting in a reduction of economic cost. Using the proposed technique, fault location can be estimated with a lower than 0.025% error without using current transformers and GPS. EMTP/ATP simulation and SSVM results show that the proposed fault location technique is independent of fault type, fault resistance and fault inception angle of the transmission line.
pp. 485-488

Study on the Capacity of Sheath-Protecting Surge Arrester At a 230 kV Cable End

Hairui Xu (The Petroleum Institute, UAE); Redy Mardiana (The Petroleum Institute, UAE); Charles Su (Petroleum Institute, UAE); Cheng-Rong Li (North China Electric Power University, Beijing, P.R. China)

For relatively long cable system, the cable is subdivided into minor and major sections. The sheaths of each minor section are cross-bonded, while the sheaths at the sending end are grounded and at the other end are left open. When short-circuit faults occur close to the ungrounded end, the overvoltage appears between the sheaths and local ground. The arresters which are connected to the ungrounded sheaths suffer more from the overvoltage stress. Hence, the absorbed energy capacity of these arresters is of interest to be studied. This paper investigates the influence of some parameters (such as grounding resistance, lead inductance, ratio of source impedance, and rated voltage) on the arrester capacity. The choice of the absorbed energy capacity (KJ/kV) of arrester is also discussed. The case of a single line to ground fault on a 230 kV cable system is considered. The simulation is carried out using PSCAD/EMTDC.

pp. 489-492

MD-O4: Signal Processing 4

Room: Al Maasa

Blind Separation of Noisy Convolutive Sources

Abdelkader Miraoui (University of Technologie of Troyes, France); Hichem Snoussi (University of Technology of Troyes, France); Abderrazek Abdaoui (Universite de Technology de troyes, France); Jacques Duchêne (Université de Technologie de Troyes, France)

In this paper, we present a new blind source separation method for noisy linear convolutive signal mixtures of independent non stationary components. The effectiveness of the proposed method is tested on synthetic data processing. Our technique has many advantages; first, it is based on the expectation-maximization (EM) algorithm for the separation of the components. Second, the proposed technique works in the spectral domain where, thanks to two simple approximations, the likelihood assumes a simple form which is easy to handle (low dimensional sufficient statistics) and to maximize (via the EM algorithm). With this technique, we have obtained a good preliminary results. , being able to blindly separate noisy mixtures with two components and four different versions of mixing matrix.

pp. 493-496

A Robust Keyword Spotting System for Persian Conversational Telephone Speech Using Feature and Score Normalization and ARMA Filter

Akram Shokri (Iran University of Science and Technology, Iran); Shima Tabibian (Iran University of Science and Technology, Iran); Ahmad Akbari (Iran University of Science and Technology, Iran); Babak Nasersharif (Iran University of Science and Technology, Iran)

In this paper, we evaluate a robust keyword spotting system based on hidden markov models for speaker independent Persian conversational telephone speech. Performance of base line keyword spotter is improved by means of normalizing features using cepstral mean and variance normalization (CMVN) and cepstral gain normalization (CGN). And better performance is gained by applying auto-regressive moving average (ARMA) filter on normalized features. Experimental results show that although all these methods improve keyword spotting performance, CMVN and ARMA (MVA) processing of PLP features works much better on our Persian conversational telephone speech database and 41% improvement to baseline system at false alarm (FA) rate equal to 8.6 FA/KW/Hour is achieved.

pp. 497-500

Two Methods for Autoregressive Estimation in Noise

Luis Weruaga (Khalifa University of Science, Technology & Research, UAE)

The maximum-likelihood (ML) and the expectation-maximization criteria have been previously used in the problem of autoregressive estimation in noise. This paper pre-sents a thorough comparative study of these techniques. Despite these criteria lead in both cases to apparently similar iterative algorithms, the methodological differences and connections between both approaches are explored. Their performance, speed of convergence, and robustness of the solution are assessed with the help of simulated experiments as well. Further research work at increasing robustness in the ML approach is finally proposed.

pp. 501-504

Transform-Based Multi-Feature Optimization for Robust Distributed Speech Recognition

Djamel Addou (USTHB University of Science & Technology, Algeria); Sid-Ahmed Selouani (Université de Moncton, campus of Shippagan, Canada); M Boudraa (USTHB, Algeria); Bachir Boudraa (USTHB University of Science & Technology, Algeria)

This paper describes a noise-robust Distributed Speech Recognition (DSR) front-end using a combination of conventional Mel-cepstral Coefficient (MFCC) and Line Spectral Frequencies (LSF). These features are adequately transformed and reduced in a multi-stream scheme using Karhunen-Loève Transform (KLT). We investigate the performance of a new front-end DSR in terms of recognition accuracy in adverse conditions as well as in terms of dimensionality reduction. Our results showed that for highly noisy speech, the proposed transformation scheme leads to a significant improvement in recognition accuracy on Aurora 2 task.

pp. 505-508

Convergence Performances of Various Adaptive Filter Algorithms with Application to System Identification

Shihab Jimaa (Khalifa University, UAE); Saeed Al-Ali (Khalifa University, UAE)

This paper examines the performance of mean square error (MSE) using various adaptive filtering algorithms in the adaptation process of system identification over two defined communication channels. The MSE performances of the proposed algorithms are compared with that of the standard Normalized Least Mean Square (NLMS) algorithm. To enhance the adaptation performance, non-mean-square algorithms have been utilized, for instant, Least Mean Fourth (LMF) algorithm. Also, switching algorithm led to better performance. In this paper, random step size NLMS, switching between NLMS and LMF, and LMS+F mixed norm algorithms have been implemented and their performances over two defined Finite Impulse Response (FIR) channels were tested in comparison with the standard NLMS.

pp. 509-512

MBD: Banquet Dinner

Tuesday, February 22

TA-K4: Keynote Speech 4: Role of Real-Time Information in Trade & Supply Chain Control

Prof. Chelsea C. White III (Fellow IEEE, Schneider National Chair of Transportation and Logistics, Georgia Institute of Technology Founding Chair of Industrial & Systems Engineering and Founding Director, the Logistics Institute, Khalifa University)

Room: Al Ameera 1+2

TCF1: Coffee Break

TB-O1: Communications 6

Room: Al Ameera 1

An End-To-End QoS Scheme for GPON Access Networks

Hamada Alshaer (Etisalat British Telecom Innovation Center EBTIC, Khalifa University, UAE); Mohamed Alyafei (Etisalat, UAE)

This paper introduces a QoS scheme which consists of an intra-ONU dynamic weighted faire queuing (DWFQ) scheduling and a multiservice dynamic bandwidth allocation algorithm (MDBA), which we call together DWFQ-MDBA. This aims to support proportional differentiated services (PDiffServ) while alleviating the problem of light-loaded penalty resulting from intra-ONU strict priority scheduling, as well as increasing the utilization of GPON upstream bandwidth. We conduct detailed simulation experiments using our developed Java-based simulator to study the performance and validate the effectiveness of the proposed DWFQ-MDBA in terms of the average packet delay, packet loss probability and average packet throughput.

pp. 513-516

On the Fairness of Frequency Domain Resource Allocation in Wireless Mesh Networks- A Survey

Irfan Ahmed (Qatar University, Doha, Qatar); Amr Mohamed (Qatar University, Qatar)

This article presents a comprehensive survey of fairness-aware frequency domain resource allocation techniques in Wireless Mesh Networks (WMNs). Wireless mesh networks have emerged as a key technology for next generation application specific multi-hop wireless networks. We analyze the state-of-the-art resource allocation schemes for WMNs, providing comprehensive taxonomy of the latest work and the future research trends in this field. In general, the resources that are available for WMNs include, time, frequency, space, relays, and power. An efficient utilization of these resources can make the network more robust, reliable, and fair. In this article we focus the frequency domain resource fairness techniques already presented, and then, provide a suboptimal fair resource allocation scheme that maximizes the sum throughput after guaranteeing the Service-Level-Agreement (SLA) requirement.

pp. 517-520

Near-Optimal Power Aware Routing for Amplify-and-Forward Multi-Hop Networks

Ahmad Raeisi (K N Toosi, Iran); Behrad Mahboobi (Tehran Univ, Iran); Saadan Zokaei (university of Technology of Tehran, Iran); Mehrdad Ardebilipour (Khajeh Nasir university, Iran)

In this paper we developed a sub-optimal algorithm for joint routing and power allocation for an amplify-and-forward multi-hop relay network. The objective function is the received signal-to-noise ratio (SNR) at the destination. The joint problem of power allocation and relay selection is formulated with respect to maximizing received SNR at the destination while the channel state information (CSI) of all links is available and constant during the transmissions. Formulating the problem, we separate it into two sub-problems, the routing and power allocation problems. The power allocation problem is solved sub-optimally for high SNR regime. The solution of power allocation problem induces a new routing metric causing to our desired goal. The relay selection algorithm could be solved by some dynamic programming methods like Dijkstra. Our new metric asymptotically become optimal in high SNR regime. Simulation results show a significant performance gain against the traditional routing and power allocation schemes.

pp. 521-524

Optimal Power Aware Routing for Decode-and-Forward Multi-Hop Relay Networks

Ahmad Raeisi (K N Toosi, Iran); Behrad Mahboobi (Tehran Univ, Iran); Saadan Zokaei (university of Technology of Tehran, Iran); Mehrdad Ardebilipoor (K.N. Toosi University of Technology, Iran)
A novel cross-layer routing protocol is presented for Decode-and-Forward multi-hop relaying systems which lead to optimal power allocation for a given power budget by maximizing the capacity of source to destination. Showing the convexity of the problem we separated the problem into two independent sub-problems. The one is power allocation and the second problem is the routing problem. Our routing problem has introduced new routing metric which by using it we can hold optimality when applying power allocation to the selected route. Simulation results show that our power aware routing works well in middle SNR too. A comprehensive simulation setup is performed to analyze our algorithm in a realistic scenario which shows large performance gain over the previous power allocation (such as uniform power allocation) and other routing algorithms. Even significant gain is achieved when optimal power allocation or optimal routing algorithm are bundled with non-optimal version of each other.
pp. 525-528

Average Bit Error Rate of Best Relay Selection Protocol for Cooperative Wireless Networks Over Independent Nonidentical Nakagami-m Channels

Rose Hasan (United Arab Emirates University, UAE); Mohammed Adel Abdel-Hafez (United Arab Emirates University, UAE)
This paper investigates the average bit error rate performance for cooperative wireless communication schemes over independent nonidentical Nakagami-m fading channels with arbitrary fading parameters. The network consists of multiple dual-hop nonregenerative relays in addition to a direct path to achieve the cooperative diversity with maximal ratio combining at the destination. The average bit error rate was studied for different coherent binary signal constellations. The joint cumulative distribution function was derived for fixed gain relay and channel state information with upper and lower bounds for exact and approximate solutions. The proposed mathematical analysis are complimented by numerical results for the average bit error rate; including the effect of fading severity of the channel, number of acting relays, and transmitted signal-to-noise ratio.
pp. 529-532

FPGA - Based Fast SSCH Detector for 3G WCDMA System Using Cyclic Hierarchical Codes

Abdulazeez Ali Hussein (University of Technology, Iraq); Abdulkareem Abdulrahman Kadhim (Nahrain University, Baghdad, Iraq)
In 3G asynchronous WCDMA, the downlink receivers spent much time on acquisition and synchronization due to large computation time of the correlation and the detection of large codes (512) used. The work here deals with a reconfigurable FPGA design using VHDL Hardware Description Language to provide realization of frame synchronization and code group identification to be complied with the 3GPP standard. The implementation is based on cyclic Hierarchical codes which show better cross correlation properties than that of CFRS (Comma Free Reed Solomon) codes. The proposed structure complexity is relatively low compared with that for CFRS: we need just one correlator instead of 16 and (32*15) ROM instead of (64*60) is required. A low complexity approximation is used to calculate the true magnitude of signals. Also different clock frequencies for correlation calculation are used. AS a result, one slot is sufficient to obtain frame synchronization.
pp. 533-536

TB-O3: Computing and IT 4

Room: Al Remal

Delimiting Boundaries of a National Web in a Globalized World, UAE Case Study

Chiraz Benabdelkader (New York Institute of Technology, Abu Dhabi, UAE); Mustafa Sanver (NYIT Abu Dhabi, UAE)
In this paper, we address the problem of delimiting the boundaries of a specific national Web community. We contend that previous simple techniques, mostly based on IP range and language information, are no longer effective. In reality, the Web has undergone a globalization trend, and we can no longer assume a simple one-to-one mapping between where Web content is hosted, the language it is written in, the community it is intended for, and its geographic location. We propose a two-stage web page filtering (classification) method for this problem instead: (1) a pre-crawl filter designed to quickly prune out most of the irrelevant pages without downloading them, and (2) a post-crawl filter that prunes out most of the remaining ones via more detailed but time-consuming analysis. We discuss the proposed techniques in the context of the UAE national Web, and present results on web crawl data collected locally during June–July 2010.
pp. 537-540

Arabic Information Retrieval: Techniques, Tools and Challenges

Maqbool Al-Maimani (Universiti Teknologi Malaysia, Oman); Ahmed Al Naamany (Sultan Qaboos University, Oman); Ahmad Zaki Bin Abu Bakar (Universiti Teknologi Malaysia, Malaysia)
The amount of Arabic electronic information is growing drastically on the web. Statistics shows that the number of Internet users in the Middle East has increased enormously since the year 2000 due to increase in ICT awareness and its importance within Arab countries. As a result this has raised the need to find effective methods and techniques for allocating and retrieving the Arabic-based content from the web. This paper presents major Information Retrieval (IR) tools and techniques and it highlights few challenges in this regard.
pp. 541-544

Revitalizing the Introductory Programming Course

Qusay H. Mahmoud (University of Guelph, Canada); Manar Abutalib (Zayed University, UAE); Zakaria Maamar (Zayed University, UAE); Emad A. Bataineh (Zayed University, UAE); Leon Jololian (Zayed University, UAE)

In this paper we present our approach to revitalizing the introductory level programming course at Zayed University in the United Arab Emirates (UAE). This course has been re-designed to make computer programming fun and accessible to female students who sign up for the IT program with no background in computing and in particular analytical and problem solving skills. The approach has been used at other universities and represents a marked departure from the use of a single programming language to employ multiple programming tools. The results we have obtained confirm the viability of the approach and is inspiring students to spend more time learning how to design and develop interesting applications that appeal to female students. In addition, ZU students have expressed a great deal of satisfaction and responded positively towards the new approach of learning how to program.

pp. 545-548

Characterizing the UAE National Web with a Two-step Filter

Mustafa Sanver (NYIT Abu Dhabi, UAE); Chiraz Benabdelkader (New York Institute of Technology, Abu Dhabi, UAE)

The Web as a large collection of pages is organized around a hierarchical domain system. For searching, analyzing or other purposes, selecting the pages related to a country is a challenging problem. A Web page `belongs` to a national Web if it bears identities from a particular country. Using the national domain such as .ae, .uk, as primary identifier and IP address, geographic location, and language as secondary identifiers is no longer adequate. We propose a two-step Web page classifier (1) pre-crawl filter and (2) post-crawl filter. The former stage prunes out web pages not belonging to the nation under investigation before downloading a Web page while the later stage filters irrelevant ones through a multiple-step analysis after downloading a page. We used the United Arab Emirates (UAE) national Web as a case study. We introduce the crawler designed and present some of our results and findings.

pp. 549-552

A Scalable Internet of Things Lean Data Provision Architecture Based on Ontology

Chunxiao Fan (Beijing University of Posts and Telecommunications, P.R. China); Jie Song (Beijing University of Posts and Telecommunications, P.R. China); Zhigang Wen (University of Michigan-Dearborn, USA); Xiaoying Zhang (Beijing University of Posts and Telecommunications, P.R. China); Yuexin Wu (Beijing University of Posts and Telecommunications, P.R. China); Junwei Zou (Beijing University of Posts and Telecommunications, P.R. China)

The paper proposes a data management platform with an open architecture for converting huge amount of various and cluttered data into Lean Data, which provides customer-expected service and can be then encapsulated as service packages to be used by different application developers. Ontology is used to provide a unified way for data flow description and semantic data storage to achieve a unified understanding among different layers and modules. A case study for routing optimization in the industry of intelligent transportation is illustrated to show how the platform works, and he potential business value of such platform is also indicated in this paper.

pp. 553-556

Bi-lingual Agent-guided Touch-screen Interface for Public Information Kiosks

Ameer Abdulsalam (Carnegie Mellon University, Qatar); Majd F Sakr (Carnegie Mellon University, USA)

An effective human-computer interface should allow for intuitive and seamless communication between the human and the computer. With the increased popularity of touchscreens on devices, computers and kiosks, the need arises to further study user interface design for touchscreen enabled information systems catering to users of various linguistic and cultural backgrounds. This paper presents our work on creating a bi-lingual intuitive touchscreen user interface and information system for a kiosk in a mixed-cultural public setting. We use this test-bed to run initial experiments to evaluate the effectiveness of the interface across the English and Arabic languages including the effects of an animated agent on the respective interface languages and user satisfaction.

pp. 557-560

TB-O4: Control 2

Room: Al Maasa

H∞ Analysis for a Class of Markov Jump Nonlinear Systems

Amirhossein Abolmasoumi (Tarbiat Modares University, Iran); Saleh Delshad (Tarbiat Modares University, Iran); Hamidreza Momeni (Tarbiat Modares University, Iran)

The problem of H-inf analysis for Markov jump nonlinear systems with Lipchitz type nonlinearity is considered. A sufficient condition for disturbance attenuation in terms of linear matrix inequalities is developed which ensures robust stochastic mean square stability. The design process assumes a prescribed level of disturbance attenuation and uses a mode based Lyapunov function. A numerical example is also provided to show the effectiveness of our approach.

pp. 561-564

Synchronization of Chaotic Systems with Uncertain Parameters Using Backstepping and Adaptive Active Control Algorithms: A Comparative Study

Ameur Ikhlef (University of Mentouri Constantine, Algeria); Mansouri Noura (University Mentouri of Constantine, Algeria)

This paper addresses synchronization of chaotic systems with uncertain parameters. Two approaches are considered; an adaptive active control algorithm and a backstepping control algorithm. The described algorithms are detailed on example and on the basis of the simulation results, the effectiveness of the two approaches is compared.
pp. 565-568

Comparative Study of Wind Farm Stabilization Using Variable Speed Generator and FACTS Device

Kenneth Okedu (Kitami Institute of Technology, Japan); S. M. Muyeen (The Petroleum Institute Abu Dhabi, UAE); Rion Takahashi (Kitami Institute of Technology, Japan); Junji Tamura (Kitami Institute of Technology, Japan)

Recently, the grid codes require taking into account the reactive power of the wind farm in order to contribute to the network stability during grid fault, thus operating the wind farm as active compensator devices. This paper presents a comparative study of stabilizing a wind farm with variable speed wind turbine generator system that use doubly fed induction generator (DFIG) as the wind generator and a flexible ac transmission system (FACTS) like the static synchronous compensator (STATCOM). Simulation results show that the wind farm could be effectively stabilized with both systems, but at a reduced cost with the DFIG system.
pp. 569-572

An Optimized Chattering Free Sliding Mode Controller to Suppress Torsional Vibrations in Drilling Strings

Tarek Ahmed Fouad (The Petroleum Institute, UAE)

A sliding mode controller can tackle nonlinear system's uncertainties and can exhibit robustness to parameter variations. Suppressing torsional vibrations in drilling strings is a good example where variable structure control could be used. However, the discontinuous control signal causes significant problems of chattering and does not provide a smooth control signal to the top-drive or rotary table system used on drilling rigs. This control signal might practically place the top-drive under loads of oscillatory torque and it might jeopardize its safety. A chattering free sliding-mode controller optimized using a Particle Swarm Optimization (PSO) routine is proposed to avoid bit sticking phenomena and in addition, provide a smooth control signal to the top drive system. In this work, a discontinuous lumped-parameter torsional model of four degrees of freedom is considered, and the bit-rock contact is taken to be a variation of the Stribeck friction together with the dry friction model.
pp. 573-576

H∞ Robust Fault Detection Filter in Drum Boiler Systems

Ladan Khoshnevisan (Tarbiat Modares University, Iran); Hamidreza Momeni (Tarbiat Modares University, Iran); Ali Ashraf-Modarres (Research Manager of Mapna Company, Iran)

In this paper, the robust fault detection filter (RFDF) design problem for linear time-invariant (LTI) with unknown disturbances is studied. The fundamental idea of our study is to introduce a reference residual model generator to formulate the robust fault detection filter as a robust H∞ model matching problem through which the generated residual can be evaluated. By applying the robust H∞ optimization control technique, the reference residual model can take into account the robustness against disturbances and sensitivity to faults simultaneously. The robust H∞ optimization control technique is presented via a linear matrix inequality (LMI) formulation. A drum boiler model is used to demonstrate the design procedures and the applicability of the proposed approach.
pp. 577-580

TB-O2: Power and Energy 6

Room: Al Ameera 2

Application of Super Capacitor Energy Storage in Microgrid System

Prashant Kumar Soori (Heriot-Watt University, UAE); Subhas Shetty (Heriot-Watt University, UAE); Sibi Chacko (Heriot Watt University, UAE)

With the advancement in distributed generation systems, Power Electronics and power semiconductor technologies, the microgrid system is considered as a promising solution to meet the growing energy demand. Super capacitor based energy storage system becomes one of the best choices for microgrid because of its high storage capacity, wide working temperature range, cost effectiveness and environmental advantages. The application of super capacitor energy storage system connected to microgrid is proposed in this paper. The proposal explored here is to address energy and carbon emission concerned global issues. The design and development of a dynamic support system for specific microgrid applications are discussed. The hardware and software design and development of a 7.8kW, single-phase converter connected to a 125V, 100Wh super capacitor bank is presented in the paper.
pp. 581-584

Study on Improving the Energy Efficiency of Office Building's Lighting System Design

Prashant Kumar Soori (Heriot-Watt University, UAE); Safaa Alzubaidi (Heriot Watt University, UAE)

Lighting for both functional and decorative purposes is a major consumer of electrical energy. Setting up new power plants to meet growing consumption requirements is not financially viable. In a country with a growing demand for energy, increased efficiency in utilizing the energy is the only way to meet the shortfall. The scope of increasing efficiency exists in the performance improvements of lighting systems, pumps and different processes in industries where engineering techniques can be used to enhance their efficiencies. This paper discusses the performance of different types of lighting installations used in the commercial buildings in UAE and saving in energy consumption in the office lighting applications.

The study on different types of lamps used in practice, its suitability and cost effectiveness is highlighted. DIALux simulation software is used to study and evaluate the efficient lighting scheme for the office buildings through the use of different types of lamps.
pp. 585-588

The "BIM's 4D+" Dimension: Real Time Energy Monitoring

Mahmoud Alahmad (University of Nebraska - Lincoln, USA); Wisam Nader (University of Nebraska - Lincoln, USA); Adam Brumbaugh (University of Nebraska-Lincoln, USA); Yong Cho (University of Nebraska-Lincoln, USA); Song Ci (University of Nebraska-Lincoln, USA); Hamid Sharif (University of Nebraska-Lincoln, USA); Jonathan Shi (University of Nebraska - Lincoln, USA); Jill Neal (EPA, USA)

With the current trend towards Building Information Model (BIM), facility managers have a new tool for raising efficiency. This paper discusses the integration of the BIM software with a real-time monitoring (RTM) system, as a 4D+ dimension in BIM, to track the electrical usage at every location in a building. This ability could be invaluable in identifying what unnecessary loads are connected to a device and could be disconnected. This would result in elimination of needless loads and phantom loads during non-business hours, causing significant reduction in energy consumption. A prototype of the RTM was built and the results are in support of reduction in energy consumption. Real-time awareness is a major factor in facility management and essential to meet the strict guidelines presently being adopted.
pp. 589-592

ESDD- and DDDG- Based Assessment of Insulator Pollution Levels in Oman

Eyad A. Feilat (Sultan Qaboos University, Oman)

Several methods are being used to evaluate the site pollution severity. The degree of pollution is determined by measuring equivalent salt deposit density on the insulators surfaces. Nonsoluble material deposit density is also measured. Moreover, pollution level or pollution index is assessed using directional dust deposit gauge. In this paper, the pollution severity and pollution performance of porcelain insulators are assessed using ESDD and NSDD values. The measurements are conducted on three longrod porcelain insulators that were removed from three existing towers. Moreover, seven DDDG stations are mounted in several locations with different topographies to evaluate the pollution severity. Based on the values of the ESDD and PI, the field measurements show that some zones are classified as light, others as medium and others as heavy zones of pollution. Accordingly, the corresponding specific creepage distances of the insulators for each zone are determined.
pp. 593-596

Phase Difference Method for Two-End Partial Discharge Location in Power Cables

Redy Mardiana (The Petroleum Institute, UAE); Charles Su (Petroleum Institute, UAE)

This paper presents a method to locate partial discharges (PD) in power cables based on the phase difference between the first arriving waves of a PD pulse at the cable terminals. The phase difference as a function of frequency is obtained using the cross Fourier spectral density function. The final PD location can be determined from the slope of the phase difference. The performance of the proposed method is tested using the Electromagnetic Transient Program (EMTP) on the model of a 20 kV, 2-km underground cable. The simulation takes into account the frequency-dependent parameters of the cable. The statistical results are given and discussed.
pp. 597-600

Performance of Oman Transmission System with the 400kV Gulf Cooperation Council Electricity Interconnection

Omar H. Abdalla (Oman Electricity Transmission Company, Oman); Rashid Al-Badwawi (Oman Electricity Transmission Company, Oman); Hilal Al-Hadi (Oman Electricity Transmission Company, Oman); Hisham Al-Riyami (Oman Electricity Transmission Company, Oman)

The paper describes the static and dynamic performance of the main transmission system of Oman with the 400kV Gulf Cooperation Council (GCC) electricity interconnection between Oman and Abu Dhabi. A detailed model of the transmission system of Oman is obtained to simulate the steady-state and dynamic system performances using the DIgSILENT software. The model includes simulation of the generating units at power plants with their turbines, speed governors, exciters and voltage regulators. The UAE system is represented by an external source. Simulation results are presented to show the feasibility of successful operation with exchange of up to 400MW between Oman and UAE in either direction in 2014. The results include line and transformer loadings, voltage profiles, fault currents, and dynamic system responses to tripping the 400kV interconnector.
pp. 601-604

TLU: Lunch

TC-O1: Communications 7

Room: Al Ameera 1

Characterization of the Indoor-Outdoor Radio Propagation Channel At 2.4 GHz

Irfan Ahmed (Qatar University, Doha, Qatar); Sara Orfali (Qatar University, Qatar); Tamer Khattab (Qatar University, Qatar); Amr Mohamed (Qatar University, Qatar)

This article presents the signal strength measurement results (using spectrum analyzer Rohde \& Schwarz FSH8 and InSSIDer (free software for WLANs)) of path loss, shadowing, and fading in 2.4GHz band. An empirical channel model has

been derived from these measurements that characterized the indoor-outdoor wireless channel which is suited for broadband multihop communications. This paper provides information that would be useful for the design and deployment of wireless mesh network in Qatar University.
pp. 605-608

Hybrid EPSO-DE Optimization Technique for Null Steering of Circular Antenna Array by Selected Position Perturbations

Mohab A. Mangoud (University of Bahrain, Bahrain); Hassan Elragal (University of Bahrain, Egypt); Mohamed Alsharaa (University of Bahrain, Bahrain)

A novel null steering method depending on position perturbation of selected elements in circular arrays using new proposed optimization algorithm Hybrid EPSO/DE is presented in this paper. This method intends to reduce the number of perturbed elements in the array to form the null toward the interference direction by getting the optimum solution of the problem using the Hybrid EPSO/DE as optimization tool. The hybridized algorithm has shown to give better result compared with using each algorithm separately on different configurations of position perturbation: angular, radial and arbitrary configurations in circular arrays.
pp. 609-612

Performance of Different Code Families in SAC-OCDMA Systems Impaired by GVD

MohammadReza Salehi (Shiraz University of Technology, Iran); Ebrahim Abiri (Shiraz iran, Iran); Mehran Dezfouli (Shiraz University of Technology, Iran); Keyvan Kazemi (Shiraz University of Technology, Iran)

In this paper, three main code families for spectral amplitude coding optical code division multiple access (SAC-OCDMA) systems in terms of performance are compared when the system is affected by group velocity dispersion (GVD). The results show that m-sequence codes have the best performance compared to Walsh-Hadamard and modified quadratic congruence (MQC) codes. In addition, a SAC-OCDMA system with 7 users and m-sequence codes is simulated and the impact of GVD is compensated using a chirped fiber bragg grating. The results exhibit a wide opening in the eye diagram as well as a great improvement in the system bit error rate.
pp. 613-616

Power Consumption Estimation Models for FIR Decimation Filters in Multi-Standard Receivers

Nadia Khouja (CIRTA'COM Laboratory Sup'Com Tunis, Tunisia); Khaled Grati (Ecole Superieur de Comm. Sup'Com Tunis, Tunisia); Bertrand Le Gal (University of Bordeaux, France); Adel Ghazel (SUPCOM, Tunisia)

Many communications embedded systems implement decimation filters. In particular, base-band stage in multistandard receivers is composed of cascade of decimation filters performing channel selection. The number of used filter and the kind of these filters can have a significant impact on the computation complexity and power consumption of multistandard receivers. In This work, we present FIR filters' power consumption estimation models. Models were obtained from a large number of FIR filter syntheses using direct and polyphase forms. Several curves that estimate power consumption were extracted from these experimental results. The idea behind this work is to use the obtained models and curves to help filter designer to make the right choice regarding decimation factor versus power consumption.
pp. 617-620

Modelling Differentiated Services Availability in IP-Over-WDM Mesh Networks

Hamada Alshaer (Etisalat British Telecom Innovation Center EBTIC, Khalifa University, UAE); Ibrahim Haddad (School of Electronic and Electrical Engineering, United Kingdom); Jaafar Elmirghani (University of Leeds, United Kingdom)

This paper evaluates a mathematical model for supporting differentiated services availability in IP-over-WDM networks. IP traffic connections are allocated network resources based on their priority, data rate or network utility, which guarantee in turn the degree of service availability- quality-of-recovery (QoR) - of these connections when a failure occurs in a network. Using a Markov chain process, a mathematical model is conceived to quantify service availability which can be supported by $M: N$ protection scheme, namely : N$ protection scheme in IP-over-WDM networks. This model is numerically evaluated in terms of service availability and service disruption rate performance metrics.
pp. 621-624

TC-O3: Computing and IT 5

Room: Al Remal

A Framework for Comparing Process Mining Algorithms

Philip Weber (University of Birmingham, United Kingdom); Behzad Bordbar (University of Birmingham, United Kingdom); Peter Tino (The University of Birmingham, United Kingdom); Basim Majeed (Etisalat BT Innovation Centre (EBTIC), Khalifa University, Abu Dhabi, UAE)

There are many process mining algorithms with different theoretical foundations and aims, raising the question of how to choose the best for a particular situation. A framework is proposed for objectively comparing algorithms for process discovery against a known ground truth, with an implementation using existing tools. Results from an experimental evaluation of five algorithms against basic process structures confirm the validity of the approach. In general, numbers of traces for mining are predictable from the structure and probabilities in the model, but there are some algorithm-specific differences.

pp. 625-628

Healthcare Technologies in Developing Countries

Ali Zalzala (Hikma Group Ltd., UAE); Stanley Chia (Vodafone Group R&D, USA); Laura Zalzala (Academy of Economic Studies, Bucharest, UAE); Ali Karimi (Trans Technology Group, USA)

This paper describes international humanitarian efforts for the deployment of technology in healthcare centres in developing countries. The IEEE Humanitarian Technology Challenge (http://www.ieeehtc.org) develops and implements technological solutions for the provision of reliable electricity, data connectivity of rural district health offices, and identifying individuals and linking them to their medical records. The focus is set on the Individual ID tied to Health Records because the authors are involved in this specific challenge. The paper describes the economics of healthcare in developing countries and how this affects the implementation of technologies. Furthermore, this study will report the proceedings for providing a comprehensive system that will define public health in villages, allowing for trauma and emergency as well as disease response, control and studies, clinical healthcare, disease surveillance and prevention, and health vaccination.

pp. 629-632

Applying Protocol Service for the Monitoring of Business Process

Xiaofeng Du (University of Birmingham, United Kingdom); Behzad Bordbar (University of Birmingham, United Kingdom); Mohammed Alodib (University of Birmingham, United Kingdom); Basim Majeed (Etisalat BT Innovation Centre (EBTIC), Khalifa University, Abu Dhabi, UAE)

Identifying occurrences of failure is a major challenge in business process management. Current business monitoring techniques are invaluable tool for debugging and evaluating business process executions. In this paper a method of extending existing monitoring capabilities of the systems to allow real-time or near-real-time monitoring is discussed. The presented method draws on the existing Model Driven Development techniques to automatically create a new module called Protocol Service. The created Protocol Service is deployed with the existing system to monitor occurrences of undesirable events and failure. In this paper the outline of the approach which has been implemented as an Oracle JDeveloper plugin will be presented.

pp. 633-636

Heterogeneous Device Discovery Framework for the Smart Homes

Ehsan Warriach (University of Groningen, The Netherlands); Eirini Kaldeli (University of Groningen, The Netherlands); Jaap Bresser (University of Groningen, The Netherlands); Alexander Lazovik (University of Groningen, The Netherlands); Marco Aiello (University of Groningen, The Netherlands)

The future home will be pervaded by mobile and stationary devices which need to dynamically connect and coordinate in order to seamlessly help people in accomplishing their tasks. However, for this vision to become a reality, it is important for researcher and developer to build applications that constantly adapt and integrate heterogeneous devices supported by different communication technologies. Bluetooth efficiently fits in the home environment: the range of communication it provides sufficient for Smart Homes applications consisting of a large number of resource-constraint devices. In this paper, we present a Pervasive Discovery Framework for Smart Homes, and an implementation currently supporting the Bluetooth and UPnP device discovery. The framework is based on robust technologies such as the UPnP protocol and the Java based OSGi bundles.

pp. 637-640

Comparing Hough and Radon Transform Based Parallelogram Detection

Harish Bhaskar (Khalifa University of Science Technology and Research, UAE); Naoufel Werghi (Khalifa University, UAE)

In this paper, we describe and compare methods for detecting parallelograms in images using Hough and Radon transforms. Locating parallelograms in an image involves combined transform and spatial domain analysis. During transform domain analysis, we apply Hough/Radon transform on the edge detected image of the target, extract peaks and filter them based on geometric constraints. Furthermore, we apply spatial constraints on these filtered peaks (lines in spatial domain) to accurately detect parallelograms. We explore the effect of model parameters on system performance and show that the methods achieve good accuracy on several synthetic datasets and real world applications.

pp. 641-644

TC-O2: Power and Energy 7

Room: Al Ameera 2

K- Rated Transformers and Active Power Filter for Harmonic Conditioning in Industrial and Commercial Applications

Shameer Ahammed Koya (Yanbu Industrial College, Saudi Arabia); Mustajab Ahmed Khan (Yanbu Industrial College, Saudi Arabia)

Harmonic problems are common not only industrial applications but in commercial buildings as well. This is primarily due to the switched mode power supply (SMPS) and variable frequency drives. A K-rated transformer is one which is used to deal with harmonic generating loads. K-rated transformers are sized appropriately to handle the additional heat produced by harmonic component. The Active Power Filter uses power electronic switching to generate harmonic currents that cancel the harmonic currents from a non-linear load. The harmonic current is considered as the reference current and switching signals for the VSI are generated. VSI will generate the required compensation current. In this paper SMPS were analyzed for harmonic analysis. Two techniques, K-rated transformer and active power filters, are considered and compared. K-Rated transformers do not mitigate the harmonics, but protect the transformers from overheating. The active filters mitigate

the harmonics.
pp. 645-648

Automated Control for Power Transmission System in Urban Area

Srdjan Skok (University of Rijeka, Croatia); Vedran Kirincic (University of Rijeka, Croatia); Igor Ivankovic (HEP – OPS d.o.o. (Croatian Power Company – Transmission System Operator), Croatia)

Modernization of a power system involves development and deployment of an Intelligent System or a System Integrity Protection Scheme for a Power Transmission System. As the observed urban Power Transmission System has a ring topology, including overhead lines and underground cables, various scenarios of a closed loop and island operation are considered. Deficiencies of a traditional control solution are stated and a modern automated control of the urban transmission system, based on synchronized phasor measurements, is presented. A developed architecture is designed to provide real time monitoring and control functions. Control actions are based on different switching and operational states.
pp. 649-652

Design of PSS for Damping Low Frequency Oscillations Using Bacteria Foraging Tuned Non-Linear Neuro-Fuzzy Controller

Maria Lawrence Marsaline Beno (Ibra college of Technology, Lecturer, Oman); Albert Singh (Executive, India); Ciba Therase (Lecturer of Arunachal College of Engineering, India); Mohammed Ibrahim (Lecture of Ibra College of Technology , Sultanate of Oman, Oman)

In this paper a bacteria foraging intelligent optimization based optimal fuzzy scheme has been developed to design intelligent adaptive controllers for improving the dynamic and transient stability performance of multimachine power system. This concept is applied to Power System Stabilizer (PSS) connected to a nine bus three machine power system. The rules of the neuro-fuzzy scheme are derived from the speed error and their derivatives. The parameters of the Fuzzy Logic are to be optimized for better control performance. The optimization of the fuzzy logic parameters are performed through bacteria foraging algorithm. The performance of the proposed controller is analysed in multimachine power systems subjected to various dynamic and transient disturbances. The proposed bacteria foraging intelligent -neuro-fuzzy control scheme exhibits a superior damping performance in comparison to the existing controllers. The advantage of Neuro-Fuzzy Logic and bacteria foraging optimization shows that the proposed technique is attractive for real-time implementation
pp. 653-656

Strategic Bidding of Gencos Under Two Pricing Mechanisms: Pay-as-Bid and Uniform Pricing

Soodabeh Soleymani (Science and Research Branch, Islamic Azad University, Iran)

This paper compares the behavior of Generating Companies (Gencos) in the two competing pricing mechanisms of uniform and pay-as-bid pricing in an electricity market. Game Theory is used to simulate bidding behavior of Gencos and develop Nash equilibrium bidding strategies for Gencos in electricity markets. In the proposed methodology, competition is modeled as a bi-level problem with the upper level sub-problem representing individual Gencos for maximizing their profits, and the lower level sub-problem representing the Independent System Operator (ISO), which minimizes consumer's payments. The simulation results show that Gencos yield less total revenue in expectation under pay-as-bid pricing than under uniform pricing.
pp. 657-660

Load Model Development Based on Monitoring and Laboratory Staged Testing

Karim Karoui (Tractebel Engineering, Belgium); Yousef Jebril (Dubai Electricity and Water Authority, UAE); Awad I. Ibrahim (Dubai Electricity and Water Authority (DEWA), UAE); Shaban Shaban (Dubai Electricity and Water Authority, UAE); Salha Al Dessi (Dubai Electricity and Water Authority, UAE)

The paper presents a load model to assess the voltage stability margin of power system with a large share of air conditioning (AC) load. The first part of the paper describes the laboratory tests performed on a set of electrical appliances and the dedicated load monitoring campaign performed in the power system of Dubai (UAE). It illustrates the non linear nature of the load following large disturbances. The second part of the paper presents a general methodological approach to model at system level the distributed undervoltage relays embedded in the electrical AC appliances single and three phase LV connected and MV connected appliances.
pp. 661-664

Mitigation of Magnetic Fields Near Transmission Lines Using a Passive Loop Conductor

Redy Mardiana (The Petroleum Institute, UAE); Majid Poshtan (Petroleum Institute, UAE)

This paper presents a concept to reduce the magnetic field generated from ac overhead transmission lines. The mitigation of magnetic field is performed by using a passive loop conductor. The method is applied to a flat transmission line configuration which is used frequently in extra high-voltage system. The effect of width and height of passive loop conductor on the reduction of magnetic field intensity is further investigated. Numerical results of magnetic field mitigation and further discussion are provided.
pp. 665-668

TCS: Closing Ceremony

Room: Al Ameera 1+2