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Proceedings of the CSE 2017 Annual PGR Symposium (CSE-PGSym 17)

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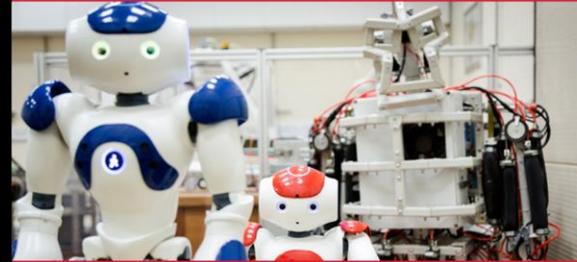
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Materials & Physics Research Group



Sprays and Petroleum Research Group

Proceedings of the CSE 2017 Annual PGR Symposium

CSE-PGSym 17



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Foreword

Welcome to the Proceedings of the second Annual Postgraduate Research Symposium of the School of Computing, Science and Engineering (CSE-PGSym 2017). After the success of the first symposium, the school is delighted to run its second symposium which is being held in The Old Fire Station on 17th March 2017. The symposium is organised by the Salford Innovation Research Centre (SIRC) to provide a forum for the PGR community in the school to share their research work, engage with their peers and staff and stimulate new ideas.

In line with SIRC's strategy, the symposium aims to bring together researchers from the six groups that make up the centre to engage in multidisciplinary discussions and collaborations. It also aims to contribute to the creation of a collaborative environment within the Research Centre and the Groups and share information and explore new ideas. This is also aligned with the University's ICZ (Industrial Collaboration Zone) programme for creating cultural, physical and virtual environments for collaboration, innovation and learning.

As outlined in the programme, this year there are a total of 26 short papers accepted for participation in the symposium. The printed proceedings contain the paper abstracts, while the complete publication of the short papers is made available online on the University's Research Website. The abstracts represent PGR work from the 6-Research Groups in the Centre: (i) Acoustics Research Groups, (ii) Autonomous Systems & Robotics Research Groups (iii) Engineering Research Groups (iv) Informatics Research Groups (v) Materials & Physics Research Groups (vi) Sprays & Petroleum Research Groups. Research at the School continues to be innovative, vibrant and multi-disciplinary and this Symposium is designed to give a flavour of the achievements and challenges of the PGR researchers in the School.

The programme contains 26 presentations in various pure and applied research topics and areas divided into six sessions, with each session includes 4 – 5 presentations within a specific theme. The school is delighted that the program technical committee is made up of a number of PGR students, who helped with reviewing the papers and finalizing the program. The organizing committee extends its thanks to all students members for their effort in making this symposium a success.

Finally, we would like to thank all those who contributed to the planning and organisation of this event. Special thank goes to Ms Karen Walmsley for helping with logistics and organising the venue and the staff in the Research Office at the University of Salford for their help. In particular, we extend our thanks to Ms Tracy Ireland for arranging the online registration and printing the proceedings and Mrs Catriona Nardone for helping with managing the paper submission and notification process. Lastly, we would like to thank all the presenters for contributing to the success of this event.

Dr Adil Al-Yasiri (Chair)

Dr Francis Li (Co-Chair)

Salford Innovation Research Centre (SIRC)
School of Computing, Science and Engineering (CSE)

Conference Chair: Dr Adil Al-Yasiri (PGR Director, School of CSE)

Conference Co-Chair: Dr Francis Li (PGR Admission Tutor, School of CSE)

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Miss Peace Ihenacho (PhD: Sprays and Petroleum Research Group)

Mr Alex Wilson (PhD: Acoustics Research Group)

Miss Atousa Zaeim (PhD: Engineering Research Group)

CSE PGSym17 - General Programme

9:00 – 9:30	Registration	(Room Albert Adams)
	G.05	G.02/03
09:30	Welcome	
09:45	Keynote Presentation <i>Title: Science Communication as a Way of Life</i> Speaker: Prof Andy Miah Chair: Nigel Linge	
10:35	3MT Davina Whitnall	
10:45	<u>Tea/coffee break Room: Albert Adams</u>	
11:00	Session A Chair: Alex Wilson Co-chair: Yuhua Li	Session B Chair: Mohammed Al-Jawad Co-chair: Olga Umnova
12:30	<u>Lunch Room: Albert Adams</u>	
13:25	Session C Chair: Ahmed Al-Juboori Co-chair: Rob Aspin	Session D Chair: Atousa Zaeim Co-chair: Jonathan Hargreaves
15:05	<u>Tea/coffee break Room: Albert Adams</u>	
15:20	Session E Chair: Ahmad Alsahlani Co-chair: Meisam Babaie	Session F Chair: Peace Ihenacho Co-chair: Wayne Wang
16:50	<u>Close</u>	
18:00 – 20:00	<u>Conference Dinner and Award Presentations</u>	

CSE PGSym17 - Sessions

	<u>Session A</u>		<u>Session B</u>	
11:00	Ahmed Aljuboori	Enhancing case-based reasoning retrieval using classification based on associations	Adnan M. Khalid Qaisi	Mechanical properties of beta titanium alloys for biomedical applications
11:20	Asaad F. Qasim	Digital watermarking for medical image authentication	Abdullah Al-Ani	Calibration methods for magneto-inertial measurement units for use in tracking the arm during fes supported rehabilitation
11:40	Lauren Ward	Snap, crackle and pop: how sound effects help, and hinder, hearing in broadcast audio	Ali Dulla	Geometric correction of historical arabic documents
12:00	R. M. Benashor	Experimental investigations to study the effects of halite (nacl) precipitation on sandstone permeability and injectivity during co2 storage into saline aquifers	Ali Mahmood	Imperfect channel state information in c-ran: causes and consequences

	<u>Session C</u>		<u>Session D</u>	
13:25	<i>Ali Mahmood</i>	Towards one-millisecond latency in future 5g cellular networks	<i>Ahmad Alsahlani</i>	Conceptual and preliminary design approach of a high altitude, long endurance solar-powered uavs
13:45	<i>Naser Al-Falahy</i>	Achieving higher data rate in millimetre wave 5g networks through dynamic antennas distribution	<i>Odum Rowani</i>	Effect of weather on point to point 60ghz (v band) millimetre wave radio in salford
14:05	<i>Mohammed Mohsin Hassoun Al-Jawad</i>	A context-aware method for verifying users identity in pervasive computing environments	<i>Ahmed M. Fakhrudeen</i>	New cognitive radio networks architecture for enabling self-coexistence
14:25	<i>Olegs Marcenko</i>	Kinematic analysis of the metamorphic anthropomorphic robotic hand with gear and four-bar linkage based transmission	<i>Hasanein Alharbi</i>	Towards integrating ontolgy and hierarchical bayesian network: a flexible framework
14:45	<i>Hisham Alshaheen</i>	Energy saving for biosensor nodes in the wireless body sensor network		

	<u>Session E</u>		<u>Session F</u>	
15:20	<i>Zaid Al-Bayati</i>	Ontology-based approach to represent the artefacts of reference architecture	<i>Dina A. Yaseen</i>	Assessing the impact of dyes accumulation on the growth of lemna minor l. Using image processing technique
15:40	<i>Armin Berenjian</i>	Parametric study of current eurocode for desiging glass pane	<i>Ruqayah Mohammed</i>	Evapotranspiration techniques impacts at different elevations on the reconnaissance drought index
16:00	<i>Hawraa. H. Alateya</i>	Effect of location of cavities on stability analysis of slopes	<i>Mustafa Hameed Al-Allaf</i>	Simplified bond-slip model for interfaces between frp reinforcement and lightweight concrete
16:20	<i>Amjad Hussein</i>	Effect hydraulic contact time on dye wastewater treating by vertical flow constructed wetlands	<i>Kamal Alogla</i>	Numerical analysis of reinforced concrete structures in the event of progressive collapse

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Keynote Speaker: Professor Andy Miah

Chair: Prof Nigel Linge

School of Environment & Life Sciences, University of Salford

Science Communication as a Way of Life

Professor Miah, PhD (@andymiah) is Chair in Science Communication & Future Media, in the School of Environment & Life Sciences. He is a Fellow of the Institute for Ethics and Emerging Technologies, USA and Fellow at FACT, the Foundation for Art and Creative Technology, UK. He is author of 'Sport 2.0' (2017, MIT Press), co-editor of 'A Flash of Light' (2016, Royal Society of Chemistry), author of 'Genetically Modified Athletes' (2004 Routledge), co-author with Dr Emma Rich of 'The Medicalization of Cyberspace' (2008, Routledge), Editor of 'Human Futures: Art in an Age of Uncertainty' (2008, Liverpool University Press and FACT), co-author with Dr Beatriz Garcia of 'The Olympics' (2012, Routledge), and co-author of 'The Olympic Movement and New Media' (2014).

Professor Miah's research discusses the intersections of art, ethics, technology and culture and he has published broadly in areas of emerging technologies, particularly related to human enhancement. Professor Miah has published over 150 academic articles in refereed journals, books, magazines, and national media press on the subjects of cyber culture, medicine, technology, and sport. He has also given over 300 major conference presentations and he is often invited to speak about philosophical and ethical issues concerning technology in society.

Professor Miah regularly interviews for a range of major media companies, which have included BBC's Newsnight and Start the Week with Andrew Marr, ABC's The 7:30 Review and CBC's The Hour. He often publishes essays for media outlets, which have included the Huffington Post, Wired, Washington Post, The Guardian, and the Times. He is currently part of a European Commission project called Digital Futures 2050 and has previously been involved with a number of international projects on technological convergence and ethics. He is also part of the Ministerial Advisory Group on Digital Participation in the Scottish Government.

Session A Chair: Alex Wilson, Co Chair: Dr Yuhua Li

Enhancing Case-Based Reasoning Retrieval Using Classification Based on Associations

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Abstract

The research reported in this paper contributes to both CBR and CARs mining fields in that it develops a new retrieval strategy using a frequent classed tree algorithm. A novel strategy, Case-Based Reasoning Using Association Rules (CBRAR) is proposed to improve the performance of the Similarity based Retrieval (SBR), classed frequent pattern trees FP-CAR algorithm, in order to disambiguate wrongly retrieved cases in CBR. CBRAR uses CARs to generate an optimum frequent pattern tree (FP-tree) which holds a value for each node. The possible advantage offered is that more efficient results can be gained when SBR returns uncertain answers. We compared the CBR Query as a pattern with FP-CAR patterns to identify the longest length of the voted class. If the patterns are matched, the proposed strategy can select not just the most similar case but the correct one. CBRAR has been evaluated using two open source CBR frameworks - Jcolibri and Free CBR. Our experimental evaluation on real data sets from the UCI repository indicates that the proposed CBRAR is a better approach when compared to the CBR systems used in our experiments. All tested datasets show a higher accuracy and lower error rate.

Keywords

Class association rules; Similarity-based reasoning; frequent pattern trees; case-based reasoning, retrieval; P-trees.

Digital Watermarking for Medical Image Authentication

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Abstract

Digital watermarking has been recognised as a robust approach for ensuring data integrity and authenticity in medical environments. Integrity refers to the ability to demonstrate that the information has not been changed without authorization. Authenticity indicates to the capacity to identify that the data delivered from the correct source and belongs to the right patient. During use, medical images can be intentionally or unintentionally tampered with which may cause serious effects related to the diagnosis of patients with real impact on the life of the human. Intentional modifications may also change the medical data for deceitful goals such as obtaining false health insurance demands; hide a medical case for personal benefit, etc. Many organizations have invested significantly in picture archiving and communication systems, which are aimed to simplify data security. However, it is popular for images, and records, to be abstracted from these for a wide range of sensible practices, such as external second opinion, sending to another healthcare provider, patient data request, etc. Therefore, integrity and authenticity confirmations of these images have become crucial. This paper aims to clarify medical image, and workflow, requirements to determine the appropriate tools and methods for hiding the watermark.

Keywords

Reversible watermarking; medical imaging; integrity; authentication; DICOM; PACS.

Snap, Crackle and Pop: How Sound Effects Help, and Hinder, Hearing in Broadcast Audio

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Abstract

Sound effects in broadcast content are included with the aim of changing how dialogue is interpreted. However what effect non-speech elements have on the intelligibility of speech in complex listening scenarios has not been established. This work investigates what influence sound effects (acoustic context) have on both normal hearing and hard of hearing listeners' ability to understand speech in noise.

Results for normal hearing listeners show acoustic context improves keyword recognition in noise, with a 69.86% improvement for acoustic context only and a 106.30% improvement when used in concert with semantic context (relative to the control condition). Results from the smaller hard of hearing cohort were varied, with some listeners exhibiting good improvement in word recognition using acoustic context, but on average, this cohort showed much more limited improvement (9.92%). Implications for accessible broadcast audio and future work are also discussed.

Keywords

None supplied

Experimental Investigations to Study the Effects of Halite (NaCl) Precipitation on Sandstone Permeability and Injectivity during CO₂ Storage into Saline Aquifers

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Abstract

Salt precipitation associated with the injection of dry CO₂ into saline aquifers has caused reduced injectivity in CO₂ storage sites such as Ketzin and Snøhvit, which are located in Germany and Norway respectively. The produced salt provides additional surface area for evaporation, and therefore enhances the overall rate of precipitation. For carbon dioxide (CO₂) underground storage, saline aquifers are considered as good candidates due to their abundance as well their favourably large storage capacities. This paper focuses on salt precipitation, which can occur due to the variation of the salinity of the aquifer and its effects on the aquifer porosity, permeability and CO₂ injectivity.

The objectives of this study are to: (1) investigate the effect of the salt precipitation phenomenon on aquifer gas permeability during CO₂ injection into sandstone rocks, (2) visualise the locations of salt precipitation within the pores of the sandstones rocks by using CT scan (X-ray) technology (3) estimate the changes in gas permeability (4) evaluate the injectivity behaviour. The experimental work investigated the changes in the core permeabilities as a result of high brine (NaCl) concentrations. Six different sandstone core samples were saturated with different NaCl concentrations.

Keywords

None supplied

Session B Chair: Mohammed Al-Jawad, Co Chair: Olga Umnova

Mechanical properties of beta titanium alloys for biomedical applications

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Abstract

Titanium and its Ti-6Al-4V alloy have been widely used as implant materials for a number of decades, in spite of the reported cytotoxicity of aluminium (Al) and vanadium (V). For this reason, Al and V free titanium alloys have been investigated in the literature, with novel titanium alloys composed of non-cytotoxic elements like molybdenum, (Mo), tantalum (Ta), niobium (Nb), zirconium (Zr), or tin, (Sn) having been developed. When formed as a cubic β -phase alloy, in addition to having exceptional corrosion resistance, they also have lower moduli of elasticity, close to that of the bone-material they are replacing. In this work, the bulk modulus Ti-alloys have been calculated by fitting the Birch-Murnaghan equation-of-state to the cell volume as a function of applied pressure, measured using a diamond-anvil cell at the European Synchrotron Radiation Facility, Grenoble, France. Four materials as considered: β -phase Gum metal (Ti-36Nb-2Ta-3Zr alloy), Ti-7Mo-10, Ti-7Mo and Ti2448, from which the Ti-7Mo system exhibited the lowest bulk modulus.

Keywords

None supplied

Calibration Methods for Magneto-Inertial Measurement Units for Use in Tracking the Arm during FES Supported Rehabilitation

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Abstract

Body segment worn magneto-inertial measurement units (MIMUs) can potentially be used in upper-limb FES systems to provide an element of voluntary triggering. However, in order to estimate clinically useful joint angles from the sensor data, an anatomical calibration method is required. A detailed literature review of existing anatomical calibration methods used in upper-limb applications was carried out and a comparison made of the alternative methods. The anatomical calibration methods were classified as involving one or more of the following: anatomical alignment of sensors; static measurements; or dynamic measurements.

Keywords

None supplied

Geometric Correction of Historical Arabic Documents

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Abstract

This paper presents work in progress towards the design and development of a method for the geometric correction of printed (and certain handwritten) historical Arabic documents. In addition to the significant issues posed by historical documents in general, the geometric correction of Arabic document images is especially challenging due to the fact that the segmentation of characters and words in Arabic texts is not straightforward. Unlike Latin texts, in Arabic documents the height and slopes of the letters of the words do not follow a specific order, which presents difficulties in determining an accurate baseline, which is necessary to assess and correct geometric distortions.

This paper examines the issues involved in terms of the characteristics of Arabic writing, the corresponding challenges in document image analysis and proposes a plan of work to create a solution.

Keywords

Arbitrary warping; Geometric Correction; De-warping; Page Curl Removal; Text line modelling; Voronoi Diagrams

Imperfect Channel State Information in C-RAN: Causes and Consequences

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Abstract

Cloud Radio Access Network (C-RAN) was introduced as a revolutionary architecture to meet the exponential growth in mobile data traffic for current and future (e.g. 5G) networks. However, the centralized configuration of C-RAN brings many challenges. One of the key questions is to find out how the channel state information (CSI) is accurately acquired in the C-RAN for numerous access points and users. For the purpose of emphasizing the key role of CSI in C-RAN, this paper highlights and examines the potential reasons for the imperfection of CSI with its impact on network performance and outlines some current solutions to this problem. This paper uses simulation to determine the causes and effects of inaccurate CSI on throughput in mobile networks.

Keywords

C-RAN; Channel State Information; Virtual Base Stations, Channel Estimation Algorithms

Session C Chair: Ahmed Al-Juboori, Co Chair: Rob Aspin

Towards One-Millisecond Latency in Future 5G Cellular Networks

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Abstract

This paper investigates the low latency requirements in next generation 5G networks. The end-to-end latency can be considered as a key driver of 5G technologies (e.g. IoT). In fact, the crucial challenge lays in the trade-off between the required value of coherence time with the increase of mobility speed of the mobile user, and carrier frequency which are considered as the main trends in 5G networks. This research highlights the reasons behind the reduction of latency in the next generation of mobile networks. It also discusses the challenges that will be faced in providing 1ms latency and suggests some solutions that could follow in the network design to meet the desired latency. The simulation results quantify the amount of reduction in the latency in the next generation of mobile networks.

Keywords

Latency; Coherence Time; 5G; IOT; Tactile Internet

Achieving Higher Data Rate in Millimetre Wave 5G Networks through Dynamic Antennas Distribution

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Abstract

The IEEE 802.22 standard for Wireless Regional Area Network (WRAN) is the first standard for Cognitive Radio that aims to harness the idle or under-utilized spectrum allocated for TV bands. Two major challenges that are faced by IEEE 802.22 are Self-coexistence and Incumbent-coexistence. In this paper, we address the following self-coexistence issues: Spectrum Misdetection; Inter-Cell Interference; Primary User Emulation Attack; and modelling of Secondary Users (SUs) Activities. While the existing solutions in the first three issues attempt are able to some extent to mitigate them, they are unable to prevent these challenges. Additionally, inability to model SUs activities is still an open issue. To address these challenges, we propose a new design for infrastructure-based CRNs core, namely Reliable Cognitive Network Core (RCNC). RCNC consists of two engines: Monitor and Coordinator Engine and Modified Cognitive Engine. To achieve these, RCNC integrates the information of spectrum sensing, geolocation databases, and CogMnet databases. Comprehensive simulation scenarios well validate RCNC and its components.

Keywords

CRNs; IEEE 802.22; Self-coexistence; Inter-cell Interference; Spectrum sensing; PUEA; Modelling of SUs activities

A Context-Aware Method for Verifying Users Identity in Pervasive Computing Environments

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Abstract

The necessity of verifying user identity is a crucial element of any system to avoid any potential identity attack. Selecting an appropriate verification method impacts the system's overall behavior, since it is a trade-off between security and usability. It is even more significant when that system is situated in a pervasive environment, since such environment is more vulnerable to such attacks. Any proposed method for this environment needs to be seamless (non-intrusive) and secure. As users in such environments tend to access a variety of resources across multiple networking domains, verifying their identity securely requires a real time verification method. Therefore, a seamless verification process with a reliable level of security is required.

Keywords

Identity verification; pervasive computing; context-awareness; fuzzy logic

Kinematic Analysis of the Metamorphic Anthropomorphic Robotic Hand with Gear and Four-Bar Linkage Based Transmission

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Abstract

This paper presents robotic hand which combines metamorphic and anthropomorphic principles. Solid model of the hand is introduced and then the actuation mechanism is discussed. Kinematic and static analysis of the hand and fingers are developed. Afterwards, grasping potential is briefly reviewed so that the possible force accumulated at the fingertips could be approximated and compared with other robotic hands. In the end, evaluation of the proposed robotic hand is addressed.

Keywords

Metamorphic, anthropomorphic, robotic hand, gear, four-bar linkage, kinematics

Energy Saving for Biosensor Nodes in the Wireless Body Sensor Network

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Supervisor

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Abstract

The most important challenges in the design of a Wireless Body Sensor Network (WBSN) are the reduction of energy usage and the successful delivery of data. In general, for healthcare applications, the batteries of biosensor nodes cannot be easily recharged or replaced. Therefore, energy consumption is a critical issue in WBSNs, specifically; the nodes that are placed next to the sink node consume more energy, which limits the network lifetime because all biomedical packets are aggregated through these nodes forming a bottleneck zone. Therefore, this paper proposes a novel mathematical model for body area network (BAN) topology to explain the deployment and connection between biosensor nodes, simple relay nodes, network coding relay nodes and the sink node. The model uses Random Linear Network Coding (RLNC) to improve the energy efficiency for biosensor nodes in the WBSN bottleneck zone, to save energy while achieving the delivery of data if there is a failure in one of the links of the transmissions. A mathematical model for a WBSN was designed, and it was apparent that energy consumption was reduced and data delivery achieved with the proposed mechanism.

Keywords

Wireless Body Area Network (WBSN); Network Coding (NC); Energy Consumption; Bottleneck

Session D Chair: Atousa Zaeim, Co Chair: Dr Jonathan Hargreaves

**Conceptual and Preliminary Design Approach of a High Altitude, Long
Endurance Solar Powered UAV**

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Abstract

In this paper, a description of newly developed conceptual and preliminary design approaches is introduced, to design a high altitude long endurance solar powered unmanned aerial vehicle. The conceptual design approach is based on representing the mass and the power requirement of each aircraft element as a fraction in order to produce the total mass equation. The fractions have been gathered statistically from available data of existing aircraft of the same type. Then the mass equation will be solved for the expected range of the aspect ratio and span of the wing to generate a possible design space. The optimal design is then concluded from the design space as the minimum weight. This approach has been validated using existing data of related aircraft. In the preliminary design tool, the aircraft shape and the wing geometry are designed using the main characteristics of the aircraft which were obtained from a previous design stage. An appropriate twist and sweep of the wing are then found using an optimisation tool which contains the aerodynamic and the structure models. The outcome at this stage must be a flyable aircraft geometry capable of meeting the mission requirements. Moreover, a case study of designing a solar powered aircraft is introduced using the developed design approaches.

Keywords

Solar aircraft; conceptual design; preliminary design; high altitude aircraft; optimization

Effect of weather on point to point 60GHz (V band) Millimetre Wave Radio in Salford

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Abstract

This paper investigates the effect of weather that can cause significant changes in the Amplitude Modulation level of a 60GHz radio link, and gives the system planner additional tools for the design of millimetre wave links in areas of high precipitation. The experiment uses NEC IPASOLINK 60GHz packet radio system alongside a weather monitoring station to monitor the performance of 60GHz link in an outdoor environment under different weather conditions and to monitor the effects weather propagation on the modulation scheme. Raspberry pi computers and Ostinato are used to generate traffic up to 400MHz to push the link to maximum capacity. The IPASOLINK Network Management System Java version (PNMSj) is used for monitoring, control, configuration and collection of link performance data. The results from PNMSj and Weather station can be used to evaluate the effects of weather on the link.

Keywords

60GHz; Millimetre Wave; Modulation; V-Band; Propagation

New Cognitive Radio Networks Architecture for Enabling Self-Coexistence

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Abstract

The IEEE 802.22 standard for Wireless Regional Area Network (WRAN) is the first standard for Cognitive Radio that aims to harness the idle or under-utilized spectrum allocated for TV bands. Two major challenges that are faced by IEEE 802.22 are Self-coexistence and Incumbent-coexistence. In this paper, we address the following self-coexistence issues: Spectrum Misdetection; Inter-Cell Interference; Primary User Emulation Attack; and modelling of Secondary Users (SUs) Activities. While the existing solutions in the first three issues attempt are able to some extent to mitigate them, they are unable to prevent these challenges. Additionally, inability to model SUs activities is still an open issue. To address these challenges, we propose a new design for infrastructure-based CRNs core, namely Reliable Cognitive Network Core (RCNC). RCNC consists of two engines: Monitor and Coordinator Engine and Modified Cognitive Engine. To achieve these, RCNC integrates the information of spectrum sensing, geolocation databases, and CogMnet databases. Comprehensive simulation scenarios well validate RCNC and its components.

Keywords

CRNs; IEEE 802.22; Self-coexistence; Inter-cell Interference; Spectrum sensing; PUEA; Modelling of SUs activities

Towards Integrating Ontology and Hierarchical Bayesian Network: A Flexible Framework

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Abstract

Bayesian Networks (BN) can either be learned from data or constructed manually by human experts. However, both approaches have their limitations. While, experts based approach is time consuming, error-prone, costly and experts are not available all time, data driven approach suffered from biasness and lack of training data.

Alternatively, recent research works are using external source of knowledge in form of ontology to enhance the BN construction process. However, ontology is known with its deterministic nature and BN is powerful tool to represent uncertainty. Hence, an approach to integrate these two features is required in order to construct an ontology-based BN model. To this end, this paper proposes an ontology-based approach to construct Hierarchical Bayesian Network (HBN) in such way which preserves the advantages of both: Ontology and Bayesian theory. The proposed model not only combines the advantages of ontology and Bayesian theory, but also utilizes the implicit knowledge of ontology to guide the HBN structure creation process, propose a general framework that could be applied to different domains and eliminate human interventions.

Keywords

Hierarchical Bayesian Network (HBN); Ontology

Random Multiple Access Scheme Protocol

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Abstract

This paper considers random access protocols, part of multiple access scheme protocols. It focuses on carrying out a background research of the Aloha and CSMA family in terms of performance, throughput and offered load. In addition, it presents, compares and discusses the measurement results obtained from Aloha's and CSMA's families in terms of their throughput and offered load using Matrix Laboratory, C plus plus and Qual-net simulators.

Keywords

MAC; ALOHA; CSMA; Qual-Net; simulation

Session E Chair: Ahmad Alsahlani, Co Chair: Dr Meisam Babaie

Ontology-Based Approach to Represent the Artefacts of Reference

Architecture

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Abstract

A growing interest in the establishment of ontology has been recognized for the various knowledge domains. Ontology plays a significant role in the software development process. However, it is not widely used in the architectural design. The reference architecture encompasses a huge amount of knowledge. Likewise, this knowledge is almost always non-organized and non-structured. There is not yet an agreement about which tools work better to describe these architectures. This work presents a methodology to develop ontological vocabularies which will be used to support organizing and structuring the artefacts of the reference architecture. The ontology will be built with basis on literature, experience and understanding the domain, and multiple case studies. Specifically, we are interested in defining a common well-established vocabulary for reference architecture, which can be useful for developers to organize and structure the artefacts of the reference architecture.

Keywords

Reference Architecture; Ontology

Parametric Study of Current Eurocode for Designing Glass Pane

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Abstract

This research critiques the recently proposed, draft Eurocode for structural glass design. A parametric study has been undertaken which focusses on the current design approach adopted by the draft Eurocode to design glass panes which are subjected to out-of-plane loading. Span, thickness, and embedded design factors from within the code have been varied within the parametric study. Based upon the conclusions drawn, a design chart has been derived which will help designers to design glass panes subjected to out-of-plane loading which would comply with the draft Eurocode but without the need for any direct calculations.

Keywords

Structural glass; Parametric study; PrEN 16612

Effect of Location of Cavities on Stability Analysis of Slopes

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Abstract

Numerical simulation accomplished to examine the influence of cavities on the slopes stability of earth dam using the finite-element-based PLAXIS 2D software. The main objective of present study is to estimate the effect of location of cavities horizontally and vertically on slope stability analysis. Numerical investigation was preformed to estimate the effect of cavities on slope stability of earth dam beneath rapid drawdown condition. The results of numerical analysis indicated that the existence of cavities into foundation of earth dam decrease the stability of upstream slope considerably, where safety factor was less than the required value for rapid drawdown condition. The analyses results also showed that there is small difference between the values of safety factor for models with and without the existence of cavities for all analyses of stability in downstream face.

Keywords

Cavities; stability analysis; numerical modelling

Effect of Hydraulic Contact Time on Dye Wastewater Treating By Vertical Flow Constructed Wetlands

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Abstract

Wetlands have long played an important role as natural purification systems. Textile industry processes are among the most environmentally unsustainable industrial processes, because they produce coloured effluents in large quantities polluting water resources. In this study, two different azo dyes (Acid Blue 113 (AB113) and Basic Red 46 (BR46)) have been fed as part of synthetic wastewater recipes to a laboratory-scale vertical-flow construction wetland set-up comprising wetlands with gravel media as controls and wetlands planted with *Phragmites australis* (Cav.) Trin. ex Steud. (Common Reed) for each dye. Two different concentrations (7 mg/l and 215 mg/l) were used for each dye at two different hydraulic retention times (48 h and 96 h). According to results for the low concentration of BR46, there is no difference between wetlands (unplanted and planted) in terms of dye removal. For chemical oxygen demand (COD), the removal percentages were 59% and 67% for the wetlands with short and long retention times, respectively. All reductions were statistically significant ($p < 0.05$). For the high concentration of BR46, the removal percentages for this dye and COD were 94% and 82%, and 89% and 74% for the long and short retention times, respectively. For the low concentration of AB113, the percentage corresponding removals for the dye were 68% and 80%. The COD removals were 7% and 15% for the short and long retention times, respectively. Finally, for the high concentration of AB113, the percentage removals for the dye and COD were 71% and 73%, and 50% and 52% for the 48-h and 96-h retention times in this order.

Keywords: Acid Blue 113; Basic Red 46; Chemical oxygen demand; *Phragmites australis*; Reed bed filter; Textile wastewater

Session F Chair: Peace Ihenacho, Co Chair: Wayne Wang

**Assessing the impact of dyes accumulation on the growth of Lemna minor L.
using image processing technique**

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Abstract

This study aimed to treat four textile dyes using ponds system planted with Lemna minor L. and assess the impact these dyes on the plant growth rate using image processing technique. The experiment operated under controlled conditions by preparing simulated wastewater. The growth rate of L. minor monitored depending on the relative growth rate, coverage area and colour of the plants using Aletheia Lemna Edition software and Munsell colour chart. Results clearly indicate that the dyes negatively impacted on the plants and the dye BR46 treated significantly comparing with other dyes. Furthermore, the software was able to quantify the growth parameters providing more understanding about the plant in the treatment system.

Keywords

Colour; coverage area; frond removal; textile dye; wastewater

Evapotranspiration Techniques Impacts at Different Elevations on the Reconnaissance Drought Index

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Abstract

Several meteorological drought indicators with different complexity have been exploited in numerous climatic areas. Currently, a strong index, the reconnaissance drought index (RDI), is acquisitioning approval primarily in semi-arid and arid areas. As RDI is founded on precipitation (P) and evapotranspiration (ET), it is vital to evaluate the impact of ET methods on the drought severity classification estimated by RDI. The prime target of this study is to assess the impact of ET methods on the results of RDI, particularly, the initial form of the index for annual reference periods using three of the most common experimental ET techniques with low data needs.

Keywords

Aridity Assessment; Evapotranspiration Techniques; Drought Indicator; Water Resources Management; Penman-Monteith

Simplified bond-slip model for interfaces between frp reinforcement and lightweight concrete

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Abstract

To attain a suitable strengthening system for concrete structures, adequate stress distribution between externally bonded fibre reinforced polymer (FRP) materials and the substrate is required. Several studies have been done and models have been proposed to estimate the interfacial behavior in adhesively bonded joints. However, the bond characteristics of epoxy bonded system in lightweight weight concrete are still not fully understood. With the growing application of FRP in strengthening of structures and in order to be able to sufficiently model the strengthened structural behavior, the need for a generic bond-slip relationship is increasing. Therefore, in this study, a simplified model was developed for determination of the interface characteristics in the adhesively bonded joints. Based on this approach, a polynomial equation is proposed to estimate the maximum debonding load and local stress and strain profile of FRP-lightweight /normal weight joints.

Keywords

None supplied

Numerical analysis of reinforced concrete structures in the event of progressive collapse

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Abstract

Abstract: In the event of progressive collapse, large deflections, plastic hinge formation, concrete crushing, steel bar slippage, steel bar pull-out and bar fracture may occur. Therefore, both geometrical and material nonlinearities must be included and considered in the analysis of reinforced concrete (RC) structures subjected to abnormal loads which may lead to progressive collapse.

A finite element (FE) modelling is developed using the finite element software package ANSYS in order to numerically simulate the structural behaviour of RC beam-column sub-assemblages under column removal scenario (CRS). A macro-model based approach was used in the FE analysis by using beam elements and a series of non-linear elements to capture the non-linear behaviour of structural members associated with the redistribution of loads under CRS. Numerical results were compared with those obtained from the experimental program conducted at The University of Salford structural lab.

It was concluded that the macro-models consisting of beam and spring elements can accurately predict the response characteristics of RC beam-column sub-assemblages.

Keywords

Finite element analysis; progressive collapse; reinforced concrete structures; macro-model approach