

UKSim2016

**UKSim-AMSS 18th International Conference
on Modelling and Simulation**

6 – 8 April 2016, Cambridge, United Kingdom

Conference Program

and Abstracts of scheduled papers

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UKSim2016

**UKSim-AMSS 18th International Conference on Modelling
and Simulation**

6 – 8 April 2016, Cambridge, United Kingdom

Conference Chair

Alessandra Orsoni, Kingston University, UK

Program Chair and Co-Chairs

Richard Cant, Nottingham Trent University, UK

Glenn Jenkins, University of Wales Trinity Saint David, United Kingdom

Venue/Local Arrangements/Registration

Richard Cant, Nottingham Trent University, UK

Ayodeji Remi-Omosowon, Nottingham Trent University, UK

EUROSIM Liaison Chair

Alessandra Orsoni, Kingston University, UK

General Chair and Co-Chairs

David Al-Dabass, Nottingham Trent University, UK.

Ajith Abraham, Machine Intelligence Research Labs (MIR Labs)

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UKSim2016, Program at a Glance

UKSim2016 Conference Program at a Glance					
Conditions for Submission to IEEE-Xplore					
1. Presenter must demonstrate deep and detailed knowledge of the paper content by utilizing the full 20 minutes presentation time. 2. The session chair must be satisfied the presenter has answered at least one question in full to the approval of both the session chair and the participants. 3. The value of conference attendance is to get maximum feedback from participants on the significance of the research being presented. 4. Speak clearly and slowly, do not mumble or race through the sentences, moderate your voice to make sure attendees hear every word you say without shouting.					
Session Code: Wed.pm1.A means Monday afternoon before tea break in room A. Other Time periods: am1, am2, pm1, pm2	Paper Code (PC): e.g. K1 see following pages for a full list: Track letter: A, B, C . and paper number within track e.g. K1				
Day-0: Tuesday 5 April 2016: 5 to 6pm, Early registration desk opens for one hour					
Time	Day-1: Wednesday 6 April 2016 (Keynote Speaker-1 + 22 papers)				
9 - 10.45	Wed.am1.A: (Chair: David Al-Dabass/Alessndra Orsoni): Opening session and keynote Speaker-1 : Prof Frank Wang				
10.45 - 11.15	Refreshments				
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center; border: none;">Room A</td> <td style="width: 50%; text-align: center; border: none;">Room B</td> </tr> <tr> <td style="text-align: center; border: none;">Wed.am2.A (Chair: Richard Cant/ Tugce Demirdelen-U1): A1, I1, I2</td> <td style="text-align: center; border: none;">Wed.am2.B (Chair: Alessandra Orsoni/ Serkan Turan-Z1): F3, F4, F5</td> </tr> </table>	Room A	Room B	Wed.am2.A (Chair: Richard Cant/ Tugce Demirdelen-U1): A1, I1, I2	Wed.am2.B (Chair: Alessandra Orsoni/ Serkan Turan-Z1): F3, F4, F5
Room A	Room B				
Wed.am2.A (Chair: Richard Cant/ Tugce Demirdelen-U1): A1, I1, I2	Wed.am2.B (Chair: Alessandra Orsoni/ Serkan Turan-Z1): F3, F4, F5				
11.15 - 12.15, 3					
12.15 - 1.30	Lunch				
1.30 - 3.15, 5	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center; border: none;">Wed.pm1.A (Chair: Glenn Jenkins-F3/Abdelbaset Abdellatif-I1): J1, K2, T1, T2, U1</td> <td style="width: 50%; text-align: center; border: none;">Wed.pm1.B (Chair: Alessandra Orsoni/Kyaw Myat Thu-W2): N1, P1, P2, P3, Z1</td> </tr> </table>	Wed.pm1.A (Chair: Glenn Jenkins-F3/Abdelbaset Abdellatif-I1): J1, K2, T1, T2, U1	Wed.pm1.B (Chair: Alessandra Orsoni/Kyaw Myat Thu-W2): N1, P1, P2, P3, Z1		
Wed.pm1.A (Chair: Glenn Jenkins-F3/Abdelbaset Abdellatif-I1): J1, K2, T1, T2, U1	Wed.pm1.B (Chair: Alessandra Orsoni/Kyaw Myat Thu-W2): N1, P1, P2, P3, Z1				
3.20 - 3.50	Refreshments				
3.50 - 5.30, 5	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center; border: none;">Wed.pm2.A (Chair: Richard Cant/ Serkan Turan-Z1): S1, S2, S4, S6, S7</td> <td style="width: 50%; text-align: center; border: none;">Wed.pm2.B (Chair: ??-XX/ ??-YY): Spare session</td> </tr> </table>	Wed.pm2.A (Chair: Richard Cant/ Serkan Turan-Z1): S1, S2, S4, S6, S7	Wed.pm2.B (Chair: ??-XX/ ??-YY): Spare session		
Wed.pm2.A (Chair: Richard Cant/ Serkan Turan-Z1): S1, S2, S4, S6, S7	Wed.pm2.B (Chair: ??-XX/ ??-YY): Spare session				
5 - 5.30	Close of day-1 & photo opportunity				
7 - 8.30	Dinner at own expense (Boarders dinner in college)				
Day-2: Thursday 7 April 2016 (Keynote-2 + 10 papers)					
9 - 10.30	Thu.am1.A: (Chair: David Al-Dabass/Richard Cant): day-2 opening session + Keynote Speaker-2: Prof Yong Meng Teo				
10.30 - 11	Refreshments				
11 - 12.40, 5	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center; border: none;">Thu.am2.A (Chair: Glenn Jenkins/ Tugce Demirdelen-U1): U2, U4, U5, U6, U8</td> <td style="width: 50%; text-align: center; border: none;">Thu.am2.B (Chair: Alessandra Orsoni/ Abdelbaset Abdellatif-I1): W1, W2, W3, X1, []</td> </tr> </table>	Thu.am2.A (Chair: Glenn Jenkins/ Tugce Demirdelen-U1): U2, U4, U5, U6, U8	Thu.am2.B (Chair: Alessandra Orsoni/ Abdelbaset Abdellatif-I1): W1, W2, W3, X1, []		
Thu.am2.A (Chair: Glenn Jenkins/ Tugce Demirdelen-U1): U2, U4, U5, U6, U8	Thu.am2.B (Chair: Alessandra Orsoni/ Abdelbaset Abdellatif-I1): W1, W2, W3, X1, []				
12.40	Close of day-2, photo opportunity, Lunch and Cambridge Tour 2.30pm, Conference Dinner 7pm				
Day-3: Friday 8 April 2016 (Keynote-3+ 10 papers)					
9 - 10.30	Fri.am1.A: (Chair: David Al-Dabass/Glenn Jenkins): day-3 opening session + Keynote Speaker-3: Hermann Hessling				
10.30 - 11	Refreshments				
11 - 12.40, 5	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center; border: none;">Fri.am2.A (Chair: Alessandra Orsoni/ Kyaw Myat Thu-W2): B1, H1, Y2, Y4, CA1</td> <td style="width: 50%; text-align: center; border: none;">Fri.am2.B (Chair: Chair: Glenn Jenkins/ Abdelbaset Abdellatif-I1): Z2, Z3, Z4, Z6, [?U7]</td> </tr> </table>	Fri.am2.A (Chair: Alessandra Orsoni/ Kyaw Myat Thu-W2): B1, H1, Y2, Y4, CA1	Fri.am2.B (Chair: Chair: Glenn Jenkins/ Abdelbaset Abdellatif-I1): Z2, Z3, Z4, Z6, [?U7]		
Fri.am2.A (Chair: Alessandra Orsoni/ Kyaw Myat Thu-W2): B1, H1, Y2, Y4, CA1	Fri.am2.B (Chair: Chair: Glenn Jenkins/ Abdelbaset Abdellatif-I1): Z2, Z3, Z4, Z6, [?U7]				
12.40	Close of conference, photo opportunity, Lunch and depart				
On day-1: S2, Z1. On day-2: X1. Not day-3: U6					

Papers by Track, page 1 of 4

Seq.	#	Track: 01.A.Neural Networks	Status	First author	Registered author	Presenters: names
A1	1570261289	S.A.V.I.O.R: Security Analytics on Asset Vulnerability for Information Abstraction and Risk Analysis	Published	Kieran Flanagan	Kieran Flanagan	Flanagan
		Track: 02.B.Fuzzy Systems				
B1	1570261321	Using Fuzzy Logic for Accessories Ordering in Conversion Services	Published	Mohammed Mira	Mohammed Mira	Mira
		Track: 05.E.Adaptive Dynamic Programming and Reinforcement Learning				
E1	1570258476	Computational Performance of State-Value Function Approximators Based on RLS-HDP Estimators for Online DLQR Control System Design	Published	Ernesto Ferreira	Ernesto Marcal Ferreira	
		Track: 06.F.Bioinformatics and Bioengineering				
F1	1570257859	Six Prosthetic Arm Movements Using Electromyogram Signals: A Prototype	Published	May Salama	May Salama	
F2	1570258638	Solving NP-Complete Problems Using Genetic Algorithms	Published	Bander Arabi	Bander Arabi	
F3	1570259264	A Rigid Map Neural Network for Anatomical Joint Constraint Modelling	Published	Glenn Jenkins	Glenn L Jenkins	Jenkins
F4	1570259755	Mathematically Modelling hCG in Women with Gestational Trophoblastic Disease Using Logarithmic Transformations	Published	Catherine Costigan	Catherine Costigan	Costigan
F5	1570260231	Pose Invariant Thermal Face Recognition Using AMI Moments	Published	Naser Zaeri	Naser Zaeri	Zaeri
		Track: 08.H.Data and Semantic Mining				
H1	1570264247	Cluster Rule Based Algorithm for Detecting Incorrect Data Records	Published	Nadia El Bekri	Nadia El Bekri	El Bekri
		Track: 09.I.Games, VR and Visualization				
I1	1570258346	A Proposed Framework for Simulation Based Learning of Inheritance	Published	Abdelbaset Abdellatif	Abdelbaset Jamal Naim Abdellatif	Abdellatif
I2	1570260389	Applying Gamification Principles to a Container Loading System in a Warehouse Environment	Published	Ayodeji Remi-Omosowon	Ayodeji Remi-Omosowon	Remi-Omosowon
		Track: 10.J.Emergent Technologies				
J1	1570258051	Simulation and Analysis of BDT Molecule with Au Electrodes as a Molecular Switch	Published	Rafsa Koyadeen	Rafsa Koyadeen	Koyadeen
J2	1570259890	Study of Single Layer and Bilayer GNR/FET	Published	Anas M	Anas M M	
		Track: 11.K.Intelligent Systems and Applications				
K1	1570259431	Intelligent Software Simulation of Water Consumption in Domestic Homes	Published	Rita Zaher	Kabalan T Chaccour	
K2	1570261036	Informative Process Monitoring with a Natural Language Interface	Published	Esko Juuso	Esko K. Juuso	Juuso
K.L	1570260701	A Distributed Intelligent Traffic System Using Ant Colony Optimization: A NetLogo Modeling Approach LATE PAPER	Published	Kponyo Jerry	Kenneth S Nwizege	Jerry
K3	1570261097	Utilizing Word Space with Pointed and Un-pointed Letters for Arabic Text Watermarking	Published	Reem Alotaibi	Lamiaa A. Elrefaei	
		Track: 13.M. Systems Intelligence and Intelligence Systems				
M1	1570264661	Link Prediction in Complex Networks Based on a Hidden Variables Model	Published	Ruwayda Alharbi	Ruwayda Alharbi	

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Seq.	#	Track: 14.N.Control of Intelligent Systems and Control Intelligence	Status	First author	Registered author	Presenters: names
N1	1570259143	<i>Evolutionary Based Optimisation of Multivariable Fuzzy Control System of a Binary Distillation Column</i>	Published	Yousif Al-Dunainawi	Yousif Al-Dunainawi	Al-Dunainawi
		Track: 16.P.Robotics, Cybernetics, Engineering, Manufacturing and Control				
P1	1570254789	<i>Dynamic Modeling and Simulation of Marine Satellite Tracking Antenna Using Lagrange Method</i>	Published	Yunlong Wang	Yunlong Wang	Wang
P2	1570257858	<i>A Mathematical Model for Vehicle-Occupant Frontal Crash Using Genetic Algorithm</i>	Published	Bernard Munyazikwiye	Bernard B. Munyazikwiye	Munyazikwiye
P3	1570259800	<i>Fuzzy-Backstepping Controller Based on Optimization Method for Trajectory Tracking of Wheeled Mobile Robot</i>	Published	Mouwafak Tawfik	Hasan Almgotir Kadhim	Kadhim
		Track: 19.S.Image, Speech and Signal Processing				
S1	1570256365	<i>A Novel Approach for Recovering 2-Valued Independent Sparse Components From Whitenened Data in Noisy Environments</i>	Published	Mahmoud Keshavarzi	Mahmoud Keshavarzi	Bayat
S2	1570256771	<i>Automated Baby Bottle DAY-1</i>	Published	George Freiha	George Freiha	Freiha
S3	1570256795	<i>On the Use of Compressive Sensing for Image Enhancement</i>	Published	Sahar Ujan	Sahar Ujan	
S4	1570259827	<i>A Simple Geometrical Approach for Deinterleaving Radar Pulse Trains</i>	Published	Mahmoud Keshavarzi	Mahmoud Keshavarzi	Keshavarzi
S5	1570259852	<i>A Systematic Approach for Synchronization of Identical Nose-Hoover Systems with Multiple Number of Thermostats</i>	Published	Ashraf Zaher	Ashraf A Zaher	
S6	1570259857	<i>Semi-Supervised Learning Using Incremental Support Vector Machine and Extreme Value Theory in Gesture Data</i>	Published	Husam Al-Behadili	Husam Al-Behadili	Al-Behadili
S7	1570260565	<i>Realtime-Processing of Nanocrystallography Images</i>	Published	Daniel Becker	Daniel Becker	Becker
S8	1570261029	<i>Image Tampering Detection Based on Local Texture Descriptor and Extreme Learning Machine</i>	Published	Musaed A. Alhussein	Musaed A. Alhussein	
		Track: 20.T.Industry, Business, Management, Human Factors and Social Issues				
T1	1570254687	<i>Modelling and Analysis of Operation and Patient Appointment Systems: A Case Study At a Dental Hospital in Turkey</i>	Published	Pırlı Tekin	Pırlı Tekin	Tekin
T2	1570259421	<i>Accessibility of Norwegian Municipalities Websites: An Interactive Learning Environment Experimental Investigation</i>	Published	Ahmed Abdelgawad	Mikael Snaprud	Snaprud

Papers by Track, page 3 of 4

Seq.	#	Track: 21.U.Energy, Power, Transport, Logistics, Harbour, Shipping and Marine Simulation	Status	First author	Registered author	Presenters: names
U1	1570253421	<i>A Novel Control Scheme for Dynamic Reactive Power Compensation Multilevel Inverter Based Shunt Hybrid Active Power Filter</i>	Published	Tugce Demirdelen	Tugce Demirdelen	Demirdelen
U2	1570257238	<i>Simulation of a New Proposed Voltage-Base Self-Intervention Technique with Increment and Decrement Voltage Conduction Method</i>	Published	Ranjit Singh	Ranjit Singh	Singh
U3	1570259418	<i>A Heuristic Approach for Vehicle Scheduling Problem with Time and Capacity Constraints</i>	Published	Mohamed Masoud	Saeid Belkasim	
U4	1570259604	<i>Fair Autonomous Energy Consumption Scheduling Based on Game-Theoretic Approach for the Future Smart Grid</i>	Published	Tasneem Assaf	Ahmed Osman	Osman
U5	1570259844	<i>Stochastic Optimization for Macroscopic Urban Traffic Model with Microscopic Elements</i>	Published	Ludovica Adacher	Ludovica Adacher	Adacher
U6	1570260071	<i>Modelling and Simulation of Underfloor Heating System Supplied From Heat Pump DAY1+2</i>	Published	Muhammad Akmal	Muhammad Akmal	Akmal
U7	1570260087	<i>Three-Dimensional Vehicle Routing Problem for Urban Last Mile Logistics: Problem Formulation and Computational Analysis</i>	Published	Stanley Frederick Wee Tong Lim	Stanley Frederick Wee Tong Lim	??
U8	1570260695	<i>Enhanced Approach for Modelling and Simulation of Modular Multilevel Converter Based Multiterminal DC Grids</i>	Published	Mona Moussa	Mona Moussa	Moussa
		Track: 23.W.Internet Modelling, Semantic Web and Ontologies				
W1	1570259741	<i>A New Approach to Ontology-Based Semantic Modelling for Opinion Mining</i>	Published	Rowida Alfrjani	Rowida Alfrjani	Alfrjani
W2	1570260244	<i>Development of Firewall Optimization Model Using by Packet Filtering</i>	Published	Kyaw Ye	Kyaw Myat Thu	Thu
W3	1570260246	<i>The Formal Logical Analysis of the Correctness of the Specifications of Network Protocol SIP</i>	Published	Kyaw Ye	Myo Thet Naung	Naung
		Track: 24.X.Mobile/Ad hoc wireless networks, mobicast, sensor placement, target tracking				
X1	1570255653	<i>A Dynamic Channel Allocation Algorithm Based on Back-Propagation Neural Network for Vertical Handover in HetNets</i>	Published	Sunisa Kunarak	Sunisa Kunarak	Kunarak
X2	1570256622	<i>On Industrial Wireless Sensor Network (IWSN) and Its Simulation Using Castalia</i>	Published	Abdullah Al-Yami	Abdullah Al-Yami	
X3	1570260385	<i>PW-MMAC: Predictive-Wakeup Multi-Channel MAC Protocol for Wireless Sensor Networks</i>	Published	Shagufta Henna	Shagufta Henna	
X4	1570259863	<i>An Adaptive Channel Assignment Approach for Streaming of Scalable Video Over Cognitive Radio Networks</i>	Published	Ala Eldin Omer	Mohamed Hassan	
X5	1570260637	<i>An Enhanced Dynamic Priority Packet Scheduling Algorithm in Wireless Sensor Networks</i>	Published	Wang Yantong	Wang Yantong	
X6	1570261309	<i>A Highly Efficient Distributed Algorithm for Constructing CDS with Opportunistic Announcement in Wireless Sensor Networks</i>	Published	Wei Tang	Wei Tang	

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Seq.	#	Track: 25.Y.Performance Engineering of Computer & Communication Systems	Status	First author	Registered author	Presenters: names
Y1	1570256372	<i>Design and Analysis of Miniaturized Reconfigurable Multifunction Microstrip Array Antenna for Communication and Radar Applications</i>	Published	Yasser Madany	Yasser M. Madany	
Y2	1570259276	<i>Weighting Selection in GRA-based MADM for Vertical Handover in Wireless Networks</i>	Published	Ali Almutairi	Ali F. Almutairi	Almutairi
Y3	1570260605	<i>Analytical Model of Enhancing Traffic Performance Based on Weighted Nodes</i>	Published	Anas Hadi	Omar Abdulkader	
Y4	1570261295	<i>Performance Evaluation of Wi-Fi and White-Fi: Simulation Approach</i>	Published	Rafiza Ruslan	Rafiza Ruslan	Ruslan
		Track: 26.Z.Circuits, Sensors and Devices				
Z1	1570257724	<i>Digital Radar Signal Simulator Design for Combat Management System Integration Into Warships DAY-1</i>	Published	Serkan Turan	Serkan Turan	Turan
Z2	1570259208	<i>Modelling the Positional and Orientation Sensitivity of Proximity Sensors for Industrial IoT</i>	Published	Richard McWilliam	Richard McWilliam	McWilliam
Z3	1570259367	<i>The Design and Optimization of Low-Voltage Pseudo Differential Pair Operational Transconductance Amplifier in 130 nm CMOS Technology</i>	Published	Fadi Shahroury	Fadi R. Shahroury	Shahroury
Z4	1570259700	<i>Cross Polarization Discrimination Enhancement of a Dual Linear Polarization Antenna Using Metamaterials</i>	Published	Sadiq Aqbi	Hasan Almgotir Kadhim	Aqbi
Z5	1570259856	<i>Optimal Proportional Navigation Guidance Using Pseudo Sensor Enhancement Method (PSEM) for Flexible Interceptor Applications</i>	Published	Yasser Madany	Yasser M. Madany	
Z6	1570260835	<i>Influence Analysis of a Magnetic Field Focusing Device for Long Range Position Detection Measurement</i>	Published	Marcelo Ribeiro	Marcelo Ribeiro	Ribeiro
		Track: 27.CA.Computer Art				
CA1	1570257578	<i>Computer-Generated Art: Madonna and Child - Infinity of Life</i>	Published	Igor Podlubny	Igor Podlubny	Podlubny

* * * *

UKSim2016, 6 to 8 April, 2016

Sessions

Time	Room A	Room B
Wednesday, April 6		
09:00 am-10:45 am	Wed.am1.A: <i>Keynote-1</i>	
11:15 am-12:15 pm	Wed.am2.A: <i>Neural Networks, Games, VR & Visualisation</i>	Wed.am2.B: <i>Bio-informatics & Bio-Engineering</i>
01:30 pm-03:15 pm	Wed.pm1.A: <i>Emergent Technologies, Intelligent Systems, Industry and Energy/Power, Transport etc</i>	Wed.pm1.B: <i>Control, Robotics/Cybernetics and Circuits, Sensors & Devices</i>
03:50 pm-05:30 pm	Wed.pm2.A: <i>Image, Speech and Signal Processing</i>	
Thursday, April 7		
09:00 am-10:30 am	Thu.am1.A: <i>Keynote Speaker-2</i>	
11:00 am-12:40 pm	Thu.am2.A: <i>Energy, Power, Transport, Logistics, Harbour, Shipping and Marine Simulation</i>	Thu.am2.B: <i>Internet Modelling, Semantic Web/Ontologies and Mobile/Ad-hoc wireless networks, mobicast, sensor placement, target tracking</i>
Friday, April 8		
09:00 am-10:30 am	Fri.am1.A: <i>Keynote Speaker-3</i>	
11:00 am-12:40 pm	Fri.am2.A: <i>Papers from Various Tracks</i>	Fri.am2.B: <i>Circuits, Sensors & Devices and Energy/Power, etc</i>

Wednesday, April 6, 09:00 - 10:45

Wed.am1.A: Keynote-1

Room: A

Chairs: David Al-Dabass (Nottingham Trent University, United Kingdom), Alessandra Orsoni (Kingston University, United Kingdom)

Computing for Big Science: Gravitational Wave Detection

Prof Frank Wang

Head of School of Computing, University of Kent
Canterbury, UK

Chair, IEEE Computer Society, UKRI Chapter

Email: frankwang@ieee.org

Computing has been playing an important role in the recent LIGO Gravitational Waves (GWs) detection. A graphics processing unit (GPU)-accelerated algorithm developed by Tsinghua University to search for GWs will be introduced. The aim is to facilitate fast detection of GWs with a minimum delay to allow prompt electromagnetic follow-up observations. To maximize the GPU acceleration, an efficient batched parallel computing model significantly reduces the number of synchronizations and optimizes the usage of the memory and hardware resource. The code is tested on the CUDA **Fermi** architecture in a GTX 480 graphics card and its performance is compared with a single core of Intel Core i7 920 (2.67 GHz). A 58-fold speedup is achieved while giving results in close agreement with the CPU implementation. This result indicates that it is possible to conduct a full search for GWs from compact binary coalescence in real time with only one desktop computer equipped with a Fermi GPU card for the initial LIGO detectors which in the past required more than 100 CPUs.

Biography



Frank Z. Wang is Professor in Future Computing and Head of School of Computing, University of Kent, UK. The School of Computing was formally opened by Her Majesty the Queen in 1987. Professor Wang's research interests include cloud/grid computing, green computing, brain computing and future computing. He has been invited to deliver keynote speeches and invited talks to report on his research worldwide, for example at Princeton University, Carnegie Mellon University, CERN, Hong Kong University of Sci. & Tech., Tsinghua University (Taiwan), Jawaharlal Nehru University, Aristotle University, and University of Johannesburg.

In 2004, he was appointed as Chair & Professor, Director of Centre for Grid Computing at CCHPCF (Cambridge-Cranfield High Performance Computing Facility). CCHPCF is a collaborative research facility in the Universities of Cambridge and Cranfield (with an investment size of pounds Sterling 40 million). Prof Wang and his team have won an ACM/IEEE Super Computing finalist award. Prof Wang was elected as the Chairman (UK & Republic of Ireland Chapter) of the IEEE Computer Society in 2005. He is Fellow of British Computer Society. He has served the Irish Government High End Computing Panel for Science Foundation Ireland (SFI) and the UK Government EPSRC e-Science Panel.

Wednesday, April 6, 11:15 - 12:15

Wed.am2.A: Neural Networks, Games, VR & Visualisation

Room: A

Chairs: Richard Cant (Nottingham Trent University, United Kingdom), Tuğçe Demirdelen (Çukurova University, Turkey)

11:15 S.A.V.I.O.R: Security Analytics on Asset Vulnerability for Information Abstraction and Risk Analysis

Kieran Flanagan (Athlone Institute of Technology & The NPD Group, Ireland); Abir Awad (Athlone Institute of Technology, Ireland)

Protecting intellectual property and confidential customer details from network based attacks is becoming increasingly difficult in modern times due to a dramatic increase in online based attacks. For companies such as The NPD Group, protecting this confidential information is key in keeping a positive perceived image while also doing its utmost to protect vital I.P. This paper proposes an architecture that will enable a company to perform a proactive risk assessment of their network to mitigate any possible chance of data leaks or damage to the network. It also performs an abstraction of the performance metrics gained from various data providers to allow for easily understandable metrics pertaining to the risk level of the network at large while also maintaining a level of granularity that can be used by technical experts within the company. SAVIOR is one algorithm within this architecture that uses machine learning mechanisms to perform abstraction of performance metrics gained from a data provider, Nexpose, while also performing an analysis of assets in terms of one area of risk, vulnerability.

11:35 A Proposed Framework for Simulation Based Learning of Inheritance

Abdelbaset Jamal Naim Abdellatif (Queen's University Belfast, United Kingdom); Barry McCollum (Queen's University Belfast, United Kingdom)

Different types of serious games have been used in elucidating computer science areas such as computer games, mobile games, Lego-based games, virtual worlds and web-based games. Different evaluation techniques have been conducted like questionnaires, interviews, discussions and tests. Simulation have been widely used in computer science as a motivational and interactive learning tool. This paper aims to evaluate the possibility of successful implementation of simulation in computer programming modules. A framework is proposed to measure the impact of serious games on enhancing students understanding of key computer science concepts. Experiments will be held on the EEECS of Queen's University Belfast students to test the framework and attain results.

11:55 Applying Gamification Principles to a Container Loading System in a Warehouse Environment

Ayodeji Remi-Omosowon (Nottingham Trent University & NSK Europe Ltd, United Kingdom); Richard Cant and Caroline Langensiepen (Nottingham Trent University, United Kingdom)

Gamification is a recent phenomenon that emphasizes the process of incorporating game elements, for a specific purpose, into an existing system in order to maximise a user's experience and increase engagement with the system. In this paper, we discuss the effects of the introduction of the principles of gamification to a system for solving real-world container loading problems in a warehouse environment. We show how user engagement and confidence increases over time during interaction with the 'gamified' system, and we propose subsequent work for the thorough application of gamification to the system that completely abstracts the complicated container loading algorithms running in the background.

Wednesday, April 6, 11:15 - 12:15

Wed.am2.B: Bio-informatics & Bio-Engineering

Room: B

Chairs: Alessandra Orsoni (Kingston University, United Kingdom), Serkan Turan (Havelsan A.Ş, Turkey)

11:15 *A Rigid Map Neural Network for Anatomical Joint Constraint Modelling*

Glenn L Jenkins (University of Wales Trinity Saint David, United Kingdom); George Roger (XD Studios, United Kingdom); Michael Dacey and Tim Bashford (University of Wales Trinity Saint David, United Kingdom)

Accurate individual anatomical joint models are becoming increasingly important for both realistic animation and diagnostic medical applications. A number of recent approaches have exploited unit quaternions to eliminate singularities when modelling orientations between limbs at a joint. This has resulted in the development of unit quaternion based joint constraint validation and correction methods. A number of machine learning approaches have been applied to this problem. Recent work has demonstrated the use of Kohonen's Self Organizing Maps (SOMs) to model regular conical constraints on the orientation of the limb. In this paper we investigate a derivative of the SOM, the Rigid Map, applied in the same context.

11:35 *Mathematically Modelling hCG in Women with Gestational Trophoblastic Disease Using Logarithmic Transformations*

Catherine Costigan (University College Cork, Ireland); Sabin Tabirca (National University of Ireland at Cork, Ireland); John Coulter (Cork University Maternity Hospital, Ireland)

Transformations are a common technique used to linearize data so that simple linear regression can be applied. A common transformation used is the logarithmic transformation. This transforms data that follows an exponential pattern so that a straight line can be fit to it. In this study human chorionic gonadotropin (hCG) levels in women with gestational trophoblastic disease (GTD), which are known to decrease exponentially, are transformed using a logarithmic transformation and the line of best fit is found. A new method is then described including vertical shift in the model. The two methods are tested on data provided by the National Center for GTD in Cork University Maternity Hospital. It was found that the new method described here was more accurate at predicting future hCG measurements.

11:55 *Pose Invariant Thermal Face Recognition Using AMI Moments*

Naser Zaeri (Arab Open University, Kuwait)

Imaging in the visible spectrum demonstrates difficulties in recognizing the faces in conditions of varying illumination, especially under total darkness conditions. Further, the pose variations in such images add extra burden and heavy challenge on successful performance. As such, thermal face recognition has laid itself as a successful alternative solution and eventually has become an area of growing interest. In this paper, we present a new technique for thermal face recognition based on affine moment invariants (AMI) technique. AMI technique has become one of the most important shape descriptors. The technique will be implemented at the component level by dividing the face image into non-overlapped components. We anticipate that this approach will offer robustness against variability due to changes in localized regions of the faces. The new method will be tested on a new database comprising of images of different expressions with various severe poses, and were taken within different time-lapse. The experimental results have shown that the proposed technique offers high discriminability and performs efficiently, with Rank-1 successful rate of ~95% over the different poses.

Wednesday, April 6, 13:30 - 14:15

Wed.pm1.A: Emergent Technologies, Intelligent Systems, Industry and Energy/Power, Transport etc

Room: A

Chairs: Glenn L Jenkins (University of Wales Trinity Saint David, United Kingdom), Abdelbaset Jamal Naim Abdellatif (Queen's University Belfast, United Kingdom)

1:30 *Simulation and Analysis of BDT Molecule with Au Electrodes as a Molecular Switch*

Rafsa Koyadeen (Calicut University, India); Devisree S, Anand Kumar and Rusal Raj (BITS Pilani, Dubai Campus, UAE)

Molecular electronics has the potential to miniaturize devices to atomic and molecular scales. This is significant given that CMOS devices are reaching fundamental limitations. The molecular orbital energies have been previously computed for a number of Benzene derivatives. The current flow in 1,4-Benzene Dithiol with Au electrodes has been analyzed using Hamiltonian and self-energies. The single molecule conductance has been experimentally measured using a mechanically break junction technique. The top-hollow and top-top geometry models have been proposed for alkanedithiols. Here, the 1,4-Benzene Dithiol with Au electrodes has been simulated using Density Function Theory. It is seen that the choice of basis functions, bond length and angles is critical for simulation convergence. From the simulation, the molecular orbital energies, potential energy, Band gap energy and Ionization Potential are determined. It is seen that the molecule without Au electrodes has a high band gap energy of 5.5576 eV implying an electrical insulator behavior. This molecule's top-top and top-hollow geometries (with Au electrodes) simulations indicate a slightly higher conductivity and better stability for top-hollow geometry (ON state). These simulations are broadly consistent with the earlier experimental results.

1:50 *Informative Process Monitoring with a Natural Language Interface*

Esko K. Juuso (University of Oulu, Finland)

A consistent representation is needed to understand meanings of the measurement values and use them together with knowledge-based information. The nonlinear scaling approach is used for any numeric values, including measurements, features, indices and indicators. The scaled values in the range [-2, 2] are interpreted in natural language labels, e.g. {very low, low, normal, high, very high}. Also the expert knowledge is represented in the same range. Parameters of the functions are obtained from the numeric values and modified to ensure the monotonic increase. Intelligent condition and stress indices are calculated from consecutive samples of the waveform signals by using generalized norms and the nonlinear scaling approach. Uncertainty, fluctuations and confidence in results are estimated by a difference of norms of high positive and negative order, respectively. Temporal analysis is based on the scaled values: trend indices are calculated by comparing the averages in the long and short time windows, a weighted sum of the trend index and its derivative detects the trend episodes and severity of the trend is estimated by including also the variable level in the sum. Risk indices are obtained from stress contributions. All indices are in the range [-2, 2] and represented in natural language.

2:10 Modelling and Analysis of Operation and Patient Appointment Systems: A Case Study At a Dental Hospital in Turkey

Piril Tekin and Rizvan Erol (Cukurova University, Turkey)

The main objective of this study is to generate an optimum solution for capacity planning and appointment scheduling issues, which are frequently encountered in clinical flows with various route and treatment periods at dental hospitals. With this study, given flow of different existing treatment processes belonging to patients are optimized, and also continuity of the system is ensured by minimizing the patient waiting times within the existing system. There are many factors which affect the working performance of this designed health system. Regarding hospital management quality, the most important ones of these factors are accurate calculation of appointment capacities, and the assignment of proper staff number at proper departments with optimum scheduling. These factors were addressed in this study, where case study implemented at Cukurova University Dental Hospital, the largest dental hospital in Turkey's South Region, were analyzed in detail. It was determined that system whose performance was designed has developed the most efficient solution. Furthermore, system modelling was performed by using data received from real hospital environment and its accuracy was tested by implementation of its effect in the real system. Patient waiting times encountered in the hospital were minimized, and employee productivity was enhanced with this study.

2:30 Accessibility of Norwegian Municipalities Websites: An Interactive Learning Environment Experimental Investigation

Ahmed Abdeltawab Abdelgawad (University of Agder, Norway); Jaziar Radianti (University of Agder, Center of Integrated Emergency Management, Norway); Mikael Snaprud (University of Agder, Norway); John Krogstie (Norwegian University of Science and Technology, Norway)

Accessibility is an important aspect of websites generally and public websites particularly. Many ways could be proposed to enhance accessibility, however the impact of selected actions is hard to predict due to diversification and contradiction, in addition to the existence of the time factor. A System Dynamics simulation model including factors affecting the accessibility of Norwegian municipal websites was encapsulated in an Interactive Learning Environment (ILE). As the model promised to be able to change how users think and take decisions, this ILE was tested by users in an experiment. We have conducted α , β , and γ change analysis on the results of this experiment. Results showed that the ILE was successful in changing 50% of its users' understanding and perceptions about the system's causal relationships and policy options, and helping 30% redefining the standards they use to assess or evaluate these relationships and policy options.

2:50 A Novel Control Scheme for Dynamic Reactive Power Compensation Multilevel Inverter Based Shunt Hybrid Active Power Filter

Tuğçe Demirdelen (Çukurova University, Turkey); Mehmet Tumay (Çukurova Universtiy, Turkey)

This paper presents a novel control scheme for seven levels diode clamped multilevel inverter (DCMLI) topology based shunt hybrid active power filter which can compensate both dynamic reactive power and current harmonics in three phase three wire medium voltage distribution power systems as against many literatures that compensate fixed reactive power. It is on account of this novel control method, it can obtain better compensating performances compared with conventional fixed reactive power and harmonic compensation control. Dynamic reactive power compensation is supplied both active and passive filter parts of SHAPF with fixed dc link voltage. And also control algorithm for proposed SHAPF has shown its feasibility in suppressing harmonics produced by nonlinear loads. Theoretical analyses and simulation results are obtained from an actual industrial network model in PSCAD. The simulation results are demonstrated that harmonic compensation performance meets the IEEE-519 standard.

Wednesday, April 6, 13:30 - 15:15

Wed.pm1.B: Control, Robotics/Cybernetics and Circuits, Sensors & Devices

Room: B

Chairs: Alessandra Orsoni (Kingston University, United Kingdom), Kyaw Myat Thu (Bauman Moscow State Technical University, Russia)

1:30 Evolutionary Based Optimisation of Multivariable Fuzzy Control System of a Binary Distillation Column

Yousif Al-Dunainawi (Brunel University London, United Kingdom); Maysam F Abbod (Brunel University, United Kingdom)

Genetic Algorithms (GA), Simulated Annealing (SA) and Particle Swarm Optimisation (PSO) are population-based stochastic search algorithms that categorised into the taxonomy of evolutionary optimisation. These methods have been employed independently to tune a fuzzy controller for maintaining the product compositions of a binary distillation column. An analytical investigation has been conducted to distinguish the optimal tuning approach of the controller among these techniques. Based on simulation results, particle swarm optimisation approach combined with the fuzzy logic controller is identified as a comparatively better configuration regarding to its performance index as well as computational efficiency. Keywords: Fuzzy Logic Control; MIMO; Distillation; Evolutionary Optimisation;

1:50 Dynamic Modeling and Simulation of Marine Satellite Tracking Antenna Using Lagrange Method

Yunlong Wang, Mohsen Soltani and D. M. Akbar Hussain (Aalborg University, Denmark)

Marine Satellite Tracking Antenna (MSTA) is an necessary device in ships for receiving satellite signals when ships are sailing on the sea. This paper presents a simple methodology to obtain the dynamic equations of MSTA through Lagrange method, which is fundamental in design of model-based controllers. The detailed derivation procedure of using basis vectors of coordinate system, is presented, which is much easier than previous derivation methods. Moreover, modern softwares, such as Maple and Matlab, are used for simulating the dynamics model of MSTA, whose results are compared to that from SimMechanics to validate its correctness. The proposed methods and tools can be easily applied on other mechanical systems.

2:10 A Mathematical Model for Vehicle-Occupant Frontal Crash Using Genetic Algorithm

Bernard B. Munyazikwiye, Hamid Reza Karimi and Kjell Robbersmyr (University of Agder, Norway)

In this paper, a mathematical model for vehicle - occupant frontal crash is developed. The developed model is represented as a double-spring-mass-damper system, whereby the front mass and the rear mass represent the vehicle chassis and the occupant, respectively. The springs and dampers used in the model are nonlinear piecewise functions of displacements and velocities respectively. More specifically, a genetic algorithm (GA) approach is proposed for estimating the parameters of vehicle front structure and restraint system. Finally, it is shown that the obtained model can accurately reproduce the real crash test data taken from the National Highway Traffic Safety Administration (NHTSA).

2:30 Fuzzy-Backstepping Controller Based on Optimization Method for Trajectory Tracking of Wheeled Mobile Robot

Salah Swadi (University of Al-Mostansiriyah, Iraq); Mauwafak Tawfik and Emad Abdulwahab (Technology University, Iraq); Hasan Almgotir Kadhim (Newcastle University & University of Almustansiriya, United Kingdom)

This work focus on the application of Fuzzy-Backstepping controller, based on optimization method, for trajectory tracking problem. The control algorithm based on the errors in postures of mobile robot which feed to the Fuzzy-Backstepping controller to generate correction signals that transport to torque for each driven wheel. By means of dynamic model of mobile robot, these torques used to compute the linear and angular speed to reach the desired pose. In this work a dynamics model of mobile robot was driven for the case where the centroid of mobile robot platform is not coincide with reference frame of mobile robot, while the inertia is counted for. The Evolutionary Algorithm has been used to modify the parameters of the proposed controller for wheeled mobile robot. Simulation results show the effectiveness of the proposed control algorithm form tracking S-shape trajectory. Results show a good matching between desired trajectory and simulation one, while the error in posture goes to zero rapidly.

2:50 Digital Radar Signal Simulator Design for Combat Management System Integration Into Warships

Serkan Turan (Havelsan A.Ş, Turkey); Sarp Ertürk (Kocaeli University, Turkey)

This paper presents an approach on development of digital radar signal simulator based on low cost 16-bit RISC based microcontroller. Typical, mostly used, radar output signals are given and then signal-video relationships are explained in addition to requirements of tactical display calibration with respect to stages of combat management system deployment. Later, generation of radar output signal methodology is given in detail in terms of utilization of hardware accelerators and peripherals within the microcontroller. Furthermore; the usage of signals and generated discrete radar signals are given as well as digital radar video which simulates radar video returns from target or terrain. Finally; practical results of testing and calibrating of tactical display with such a solution are discussed.

Wednesday, April 6, 15:50 - 17:30

Wed.pm2.A: Image, Speech and Signal Processing

Room: A

Chairs: Richard Cant (Nottingham Trent University, United Kingdom), Serkan Turan (Havelsan A.Ş, Turkey)

3:50 A Novel Approach for Recovering 2-Valued Independent Sparse Components From Whitened Data in Noisy Environments

Mahmoud Keshavarzi, Siavash Bayat and Sahar Keshavarzi (Sharif University of Technology, Iran)

Some sources transmit periodic and quasi periodic sparse pulse trains in the environment and a number of sensors might receive them through a single channel simultaneously. It is usually our interest to know which pulse belongs to which source. This identification process has wide applications in communications, radar system, medical applications, and neural systems. Blind source separation (BSS) is one solution for this problem. This paper proposed a geometrical approach to solve BSS problem when observations are whitened data and are obtained from the linear mixtures of 2-valued sparse signals (such as sparse pulse trains). In other words, the proposed approach aims to estimate a rotation matrix, and then to recover the independent sparse components from the whitened data. There are two assumptions in this work: First, all components of the source vector are non-negative 2-valued sparse signals. Second, all entries of the mixing matrix are positive. We have also provided some numerical simulations to illustrate the proposed method's performance. The results show that the performance is affected by the SNR value in sensors.

4:10 Automated Baby Bottle

George Freiha (American University of Science and Technology, Lebanon); Michel J Owayjan (American University of Science & Technology, Lebanon)

Breast feeding is the best way to nourish and bring up a healthy baby; however, due to Postpartum Mood Disorders affecting the mother and due to the hectic life that makes her be an affective member in the work force, such a task may pose some inconveniences. The proposed solution is the Automated Baby Bottle for feeding babies of ages 1-3 years. This project is desired to execute the task of feeding during the aforementioned states; thus, relieving the mother. It combines hardware materials manipulated by certain software algorithm. The aim of this project is to automatically feed the baby in bed by delivering a milk bottle into his/her lips taking into consideration safety measures. The baby's voice is recorded first, once a cry has been detected for a certain period of time the process begins. The application is able to detect precisely the center of baby's mouth, and deliver the bottle to the baby. This project can be developed to include monitoring vital status of new baby born and monitoring children at different child care centers.

4:30 A Simple Geometrical Approach for Deinterleaving Radar Pulse Trains

Mahmoud Keshavarzi and Amir Mansour Pezeshk (Sharif University of Technology, Iran)

Some periodic and quasi-periodic pulse trains are emitted by different sources in the environment and a number of sensors receive them through a single channel simultaneously. We are often interested in separating these pulse trains for source identification at sensors. This identification process is termed as deinterleaving pulse trains. Deinterleaving pulse trains has wide applications in communications, radar systems, neural systems, biomedical engineering, and so on. This paper studies the deinterleaving problem with the assumption that both sources and sensors are fixed. In this study, the problem of deinterleaving pulse trains is modeled as a blind source separation (BSS) problem. To solve the BSS problem, we propose a novel geometry-based producer that has not been discussed in the literature yet. The proposed method has superiority over the previous ones in a number of aspects. First, it is a computationally simple method. Second, the proposed algorithm is capable of deinterleaving similar pulse trains. Third, it is able to separate pulse trains with complex pulse repetition interval (PRI) modulations. Finally, the algorithm's performance is not influenced by missing and spurious pulses. Some numerical simulations are provided in order to illustrate the effectiveness of the proposed method.

4:50 Semi-Supervised Learning Using Incremental Support Vector Machine and Extreme Value Theory in Gesture Data

Husam Al-Behadili (TU Dortmund University & University of Mustansiriyah, Germany); Arne Grumpe (TU Dortmund University, Germany); Lubaba Migdadi and Christian Wöhler (Dortmund University of Technology, Germany)

A variety of problems are related to real-world gesture recognition, such as continuous data streams, concept drift, novel and outlier samples, noise, scarcity of manually labeled data, on-line classification and the fact that the same gesture may implement in different way. Two important features should be included in the classifier to overcome these problems, which are the ability of detecting the outlier and the ability to update itself incrementally. Since outliers affect the performance of the classifier, they should be excluded from subsequent classifier updates in semi-supervised scenarios. The updating should be done incrementally, i.e. the old data should not be required for the updating process. As the SVM classifier known to be accurate for both linearly and non-linearly separable data, we extend it here to work within a semi-supervised scenario. We present an SVM classifier that has efficient ability to detect outliers in a multi-class system using the extreme value theory. The experiments show superior of the proposed algorithm by accuracy, detecting the outliers and the computation time of incremental processing. The comparison of the experimental results on an unbalanced multi-class gesture database between the proposed algorithm and the SVDD classifier clearly shows the advantages of the proposed approach.

5:10 Real-time Processing of Nanocrystallography Images

Daniel Becker (HTW Berlin, Germany); Achim Streit (Karlsruhe Institute of Technology (KIT), Germany)

In nanocrystallography, diffraction images are captured to gain insights into the structure of macromolecules. A new generation of experiments is able to take a vast amount of images in a short time. However, most of the images are not suitable for further research. IT is not feasible to store and process all images in a reasonable amount of time. In previous work we proposed algorithms able to distinguish useful from useless data in photon science. In this article we propose and discuss a prototype implementation of the algorithms including further optimizations. We also consider its feasibility to cope with the realtime constraints.

Thursday, April 7, 09:00 - 10:30

Thu.am1.A: Keynote Speaker-2

Room: A

Chairs: David Al-Dabass (Nottingham Trent University, United Kingdom), Richard Cant (Nottingham Trent University, United Kingdom)

Modelling and Formalizing Weak Emergence

Prof Yong Meng Teo

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The **whole is greater than the sum of its parts** is attributed to the Greek philosopher **Aristotle**. It is well known that entity interactions in a system give rise to new behavior of the whole or emergent properties that may not be reducible to the behavior of the individual entities. As system complexity grows in terms of size and scale, advancing our understanding of emergent properties is becoming important and challenging. This keynote presents our work in addressing some of these challenges including formalizing weak emergence and the modelling of known emergence. Among the different perspectives of emergence from philosophy to natural sciences, we present a computer science perspective in formalizing weak emergence [3]. This approach is based on the understanding of weak emergence in scientific discussion where the truth in high-level phenomenon is unexpected given the principles governing low-level domain but is deducible via simulation. Without prior knowledge of emergence, a system is modelled as a multi-agent system and cooperative-array grammar to obtain the set of emergent property states. Secondly, we discuss different methods for quantifying the strength of these emergent property states as a mean for managing the large state-space and for emergent discovery [2]. Lastly, we present an approach to model emergence when there is prior knowledge of emergence. Using Twitter social network as an example, we present two new models: a Twitter users posting behavior model and a model for characterizing Twitter topic emergence and its intensity [1].

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Biography



TEO Yong Meng is an Associate Professor of Computer Science at the National University of Singapore (NUS) and an Affiliate Professor at the NUS Business Analytics Centre. He was a Visiting Professor at the Chinese Academy of Science in China from 2010-2014. He received his PhD and MSc in Computer Science from the University of Manchester. His research interest is on systems modeling and simulation. His recent work focuses on modeling the performance of heterogeneous parallel systems and emergent properties in complex systems among others. He has over 150 journal and conference publications and a number of best paper awards including the *Best Applied Paper Award* at the annual Wintersim Conference in 2015 and the *Best Paper Award* at the 10th International Conference on Algorithms and Architectures for Parallel Processing in 2010. Another paper, co-authored with his PhD student won the *ACM SIGSIM Best PhD Student Paper Award* in 2009. At NUS, he leads the Computer Systems Research Group and is the technical

leader for Systems Research. He has received various research grants including European Commission, Fujitsu Computers (Singapore) Pte Ltd, Fujitsu Laboratories Ltd (Japan), Sun Microsystems/Oracle (USA), NVIDIA and PSA Corporation. He is currently co-PI for two large nationally funded projects including the modeling of human interactions in cybersecurity in a new National Cybersecurity Lab that is being setup.

Thursday, April 7, 11:00 - 12:40

Thu.am2.A: Energy, Power, Transport, Logistics, Harbour, Shipping and Marine Simulation

Room: A

Chairs: Glenn L Jenkins (University of Wales Trinity Saint David, United Kingdom), Tuğçe Demirdelen (Çukurova University, Turkey)

11:00 *Simulation of a New Proposed Voltage-Base Self-Intervention Technique with Increment and Decrement Voltage Conduction Method*

Ranjit Singh, Maysam F Abbod and Wamadeva Balachandran (Brunel University, United Kingdom)

A simple Voltage-Base Self-Intervention technique is introduced in this paper to perform the switching between the connected distributed generation renewable energy sources. The Voltage-Base Self-Intervention technique fetch maximum power from either the solar photovoltaic or wind energy systems under inhomogeneous conditions and output stable voltage for DC - AC inverter and DC - DC Boost Converter. In order to fetch the maximum power, the proposed Voltage-Base Self-Intervention technique is integrated after the stable DC voltage system. This is to ensure the DC bus can efficiently and effectively measure the voltage increment and decrement during the voltage conduction. To validate the performances of the proposed Voltage-Base Self-Intervention technique for solar - wind renewable energy sources, PROTEUS simulations are presented in this paper. Simulation results shows that the proposed technique effectively perform the Self-Intervention between the distributed generation solar - wind renewable energy sources using the voltage sensing and measurement.

11:20 *Fair Autonomous Energy Consumption Scheduling Based on Game-Theoretic Approach for the Future Smart Grid*

Tasneem Assaf, Ahmed Osman and Mohamed Hassan (American University of Sharjah, UAE)

Demand-Side Management (DSM) programs are practical mechanisms to coordinate energy consumption to achieve the grid-wide objectives. While most of the prior works in the literature are successful in achieving power system optimality, i.e, minimizing the total system cost or minimizing the demand profile peak-to-average ratio, most of them ignore the significance of customers' role in achieving the system objectives. Devising a fair billing mechanism is of a major importance to incentivize customers to contribute to the system. In this paper, an optimal billing mechanism that charges customers fairly based on their power consumption while rewards them based on their commitment and contribution to achieve the optimal energy consumption scheduling is proposed. Simulation results confirm that the proposed mechanism can enhance the fairness level of the system while maintaining its optimality.

11:40 *Stochastic Optimization for Macroscopic Urban Traffic Model with Microscopic Elements*

Ludovica Adacher (Roma Tre, Italy); Marco Tiriolo (Roma Tre University, Italy)

The Cell Transmission Model for Urban Traffic (CTM-UT) is a macroscopic model that can mimic microscopic traffic elements in the representation of complex dynamics of traffic for arterial and node. This paper present: a general algorithm to maximize crossing flows to an urban intersection and the formulation for optimization model to define green splits constraints for every turns in accord with the CMT-UT framework. The surrogate method (SM) is adopted to optimize the time signals of traffic network. New extension to improve the efficiency of the surrogate method (SM) are proposed. The experiments indicate that the CTM-UT can be well-applied for the time signal optimization of real-time urban traffic with good tradeoff of efficiency respect to a macroscopic model.

12:00 Modelling and Simulation of Underfloor Heating System Supplied From Heat Pump

Muhammad Akmal (Abu Dahbi University, UAE); Brendan Fox (Queen's University Belfast, United Kingdom)

This paper describes the thermal capacity and thermal inertia of the underfloor heating system supplied from a heat pump. A MATLAB/SIMULINK based thermal model of the system have been developed and presented with detailed mathematical equations. For this purpose, experimental results and actual measurements are used to model the energy storage and temperatures. This model is used to find building temperature variations, heat energy production, electrical energy consumption, coefficients of performance (both real-time and average) based on different control strategies for demand side management. The developed model includes the effect of thermal storage in the underfloor heating arrangement as well as the thermal mass of the building itself. Heat loss calculations were carried out to develop this model. The paper also employs different control strategies for operating the developed model.

12:20 Enhanced Approach for Modelling and Simulation of Modular Multilevel Converter Based Multiterminal DC Grids

Mona Moussa (Arab Academy for Science and Technology and Maritime Transport, Egypt); Mahmoud Abdelsalam and Hatem Diab (Staffordshire University, United Kingdom)

Multi-terminal direct current (MTDC) grids are gaining the interest of many researchers because of their unique features that improve the transmission network functionality and reliability. Unlike two level and three level voltage source converters (VSC), modular multi-level converters (MMC) are suitable for the application of MTDC grids because of their generous advantages such as the elimination of DC link capacitor, the improved quality of the output power and the lower footprint. However, simulation of MMC based MTDC grids is a real challenge because of the huge computational burden due to the high number of sub-modules. This paper proposed a modeling approach for a four terminal MTDC grid which is based on average MMC models with 401 voltage levels. The control system structure which controls the power through the MTDC grid and the MMCs at each terminal is presented. The whole system is tested and simulated using PSCAD/EMTDC under different operating conditions to verify the validity and evaluate the performance of the proposed modelling approach.

Thursday, April 7, 11:00 - 12:40

Thu.am2.B: Internet Modelling, Semantic Web/Ontologies and Mobile/Ad-hoc wireless networks, mobicast, sensor placement, target tracking

Room: B

Chairs: Alessandra Orsoni (Kingston University, United Kingdom), Abdelbaset Jamal Naim Abdellatif (Queen's University Belfast, United Kingdom)

11:00 *A New Approach to Ontology-Based Semantic Modelling for Opinion Mining*

Rowida Alfrjani (Nottingham Trent University, United Kingdom); Taha Osman (Nottingham Trent University & School of Science and Technology, United Kingdom); Georgina Cosma (Nottingham Trent University, United Kingdom)

With the fast growth of World Wide Web 2.0, a great number of opinions about a variety of products have been published on blogs, forums, and social networks. Opinion mining tools are needed to enable users to efficiently process a large number of reviews found online, in order to determine the underlying opinions. This paper presents a new methodology for semantic modelling of the domain knowledge for opinion mining. In particular, the new methodology focuses on modelling the domain knowledge in such way that it can be translated to a formal ontology, which can then be automatically enriched with ground facts obtained from public linked open resources. The methodology also considers procedures to link between the formal ontology and Natural Language Processing. Our approach successfully enriches the ontology with the relevant ground facts. This ontology can then be used to perform a variety of data mining tasks including sentiment analysis and information retrieval.

11:20 *Development of Firewall Optimization Model Using by Packet Filtering*

Kyaw Zaw Ye (National Research University of Electronic Technology & National Research University of Electronic Technology, Russia); Evgeni Mikalovich Portnov (MIET, Russia); Si Thu Thant Sin (National Research University of Electronic Technology & MIET, Russia); Kyaw Myat Thu (Bauman Moscow State Technical University, Russia); Myo Thant (Defence Services Science and Technology Research Center, Myanmar)

This paper studies one particular aspect of providing communication security: firewall technology. This article provides a security framework in the form of packet filtering model within the firewall technology system and its components can be designed and evaluated. This paper introduces a reference model based on packet filtering firewall technology. All components are governed by a centralized security policy and they can be deployed in a distributed fashion to achieve scaling. This packet filtering firewall design is proven technology that provides confidentiality, integrity and availability in own information and network resources. The required design implement to set-up packet filtering firewall for network to protect and unauthorized access to our network. We describe the filtering process design depends on its underlying network technologies. The resulting security mechanism can be used as a bastion-host in the construction of firewall system

11:40 The Formal Logical Analysis of the Correctness of the Specifications of Network Protocol SIP

Kyaw Zaw Ye (National Research University of Electronic Technology & National Research University of Electronic Technology, Russia); Kyaw Myat Thu (Bauman Moscow State Technical University, Russia); Myo Thet Naung and Devyatkov Vladimivich (Bauman Moscow State Technical University, Russia)

In an article for checking the validation and correctness of the SIP specification (Session Initiation Protocol) in contrast to the well-known work is proposed to describe the specifications in much more expressive, well-structured and theoretically, as a formal system, a more advanced version of the language, based on the models of interacting sequential processes (π -calculus). Specifications must satisfy certain properties, which in contrast to well-known works are described formally in the language of temporal modal logic. Finding errors is proposed to carry out not by generating routes, as is done in the prior art, and with the evidence of formal properties described in the language of modal logic. If such property is not provided, it is proposed that there is the error. Process models provide much more clear and full describing and classifying types of errors. As a tool for finding errors is proposed to use a logic programming language Prolog, which is much more elegant, full and unfettered approach and validate the correctness of the specifications.

12:00 A Dynamic Channel Allocation Algorithm Based on Back-Propagation Neural Network for Vertical Handover in HetNets

Sunisa Kunarak (Srinakharinwirot University, Thailand)

The vertical handover decision algorithm is an important role to guarantee the seamless mobility in single mobile terminal for heterogeneous wireless networks in next generation. Hence, the efficient management of available radio resource utilization becomes a crucial owing to maintain uninterrupted communication. The major of this paper contributions consist of the channel allocation based on back-propagation neural network (BPNN) that reduces the dropped call and data packet delay. Second, the channel allocation scheme and vertical handover management are associated to provide the quality of service (QoS). The simulation results indicate that our proposed algorithm significantly enhance the overall performance with compared to previous method.

Friday, April 8, 09:00 - 10:30

Fri.am1.A: Keynote Speaker-3

Prof Hermann Hessling

Room: A

Chairs: David Al-Dabass (Nottingham Trent University, United Kingdom), Glenn L Jenkins (University of Wales Trinity Saint David, United Kingdom)

Analysing Large-Scale Data

Prof Hermann Hessling

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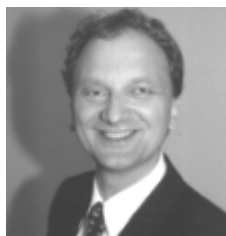
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Scientific communities have to cope with steadily increasing data rates. Even smaller communities recognize that their traditional "best-practice solutions" are no longer sufficient anymore.

The project "Large-Scale Data Management and Analysis (LSDMA)" of the German Helmholtz Association supports their research centres since 2012 in analyzing their data. The activities include developments of community-specific solutions and provide, in addition, generic technologies for data management, data access, data security, data preservation, and data analysis. The talk gives an overview on selected activities and results of LSDMA.

New Big Science projects are entering the scene putting the term "large-scale data" to a new level. The European XFEL will generate extremely intense flashes of X-rays for exploring the nano-world at an unprecedented precision. The Square Kilometre Array (SKA) will consist of thousands of telescopes to be built in deserts of South Africa and Australia. The images taken from the Universe will be the sharpest of all astronomy. The talk will present the challenges of these projects seen from the IT's perspective. For example, even in the first phase with only 10 % of the telescopes installed, SKA will produce data rates of the order of a few Zettabytes per year. Topics considered in the talk are new IT-concepts like "taking computing to the data", integrating cloud computing into a scientific work flow, secure data federation, developing long-term e-infrastructures for supporting multi-disciplinary science.

Biography



Hermann Hessling studied Physics at the Universities of Munster, Göttingen and Hamburg. He received his Ph.D. (Dr. rer. nat.) in Theoretical Physics at the Univ. of Hamburg (1992) and became a postdoctoral research fellow at Deutsches Elektronen-Synchrotron (DESY) Hamburg (1993-1996). Being the Technical Director at a networking company he accepted in 1999 a call from the University of Applied Sciences Hof as a Professor of Operating Systems. Since 2000 he has been a professor of Applied Informatics at the University of Applied Sciences HTW Berlin. His scientific interests include distributed high-performance computing and, in particular, extracting knowledge out of large-scale data in real-time.

Friday, April 8, 11:00 - 12:40

Fri.am2.A: Papers from Various Tracks

Room: A

Chairs: Alessandra Orsoni (Kingston University, United Kingdom), Kyaw Myat Thu (Bauman Moscow State Technical University, Russia)

11:00 *Using Fuzzy Logic for Accessories Ordering in Conversion Services*

Mohammed Mira (University of Jeddah, Saudi Arabia)

Inventory is carrying high risk and high benefit as a supply chain management system. A shortage or lack of supplying sufficient inventory can disrupt manufacturing plan. Inventory management plays an important role to avoid shortage or ending up with overstock. The most important task of inventory management is making trade-off between the minimization of the total cost and maximization of the customer satisfaction. The goal of this study is to introduce a model that can maximize the availability rate of accessories and reduce the total inventory costs in conversion services. To overcome this problem, the Fuzzy Logic Approach was used. Fuzzy logic was used to control uncertainties in demand and supply. Fuzzy logic control is now being the effective methodology in many applications under uncertainty. In the proposed Fuzzy Inventory System (FIS), both demand and lead time are described by linguistic terms. Then, the developed fuzzy rules were used to extract the fuzzy order quantity. The fuzzy model reduced the total inventory cost almost by 26%. In addition, no shortage was allowed in these models.

11:20 *Cluster Rule Based Algorithm for Detecting Incorrect Data Records*

Nadia El Bekri (Fraunhofer IOSB & Fraunhofer, Germany); Elisabeth Peinsipp-Byma (Fraunhofer IOSB, Germany)

Software applications has become an indispensable integral part of this world. In all areas of everyday life they are used to store information to obtain them. Software applications are premised up on databases. Users of software applications rely on the data correctness. Incorrect data within the data set can cause a reduced user acceptance and can have a negative influence. To avoid incorrect data sets the process of knowledge discovery in databases (KDD) is a powerful instrument. The application of this process comprises five different steps that are applied on top of each other. One of the core steps that is considered widely is the use of data mining techniques. This paper outlines the possibilities of combining various data mining algorithms to be able to improve the correctness of the data.

11:40 *Weighting Selection in GRA-based MADM for Vertical Handover in Wireless Networks*

Ali F. Almutairi, Mohamed Landolsi and Aliaa Al-Hawaj (Kuwait University, Kuwait)

This paper investigates the impact of weighting techniques combined with Grey Rational Analysis (GRA) when Multi-Attribute Decision Making (MADM) techniques are applied to wireless network vertical handover. The performance of the GRA algorithm is investigated with Analytical Hierarchy Process (AHP), Fuzzy AHP, Analytic Network Process (ANP), Random Weighting (RW) and Least Square weighting (LSW) techniques for background, conversational, interactive, streaming classes of services. It is found that the use of different weighting techniques for every traffic class results in widely varying performance in terms of percentage of network selection and ranking abnormalities. It is concluded that when GRA is applied to vertical network handover, careful matching among different traffic classes and proper weighting techniques should be performed in order to optimize performance in terms of judicious selection of best networks with minimal ranking abnormality.

12:00 Performance Evaluation of Wi-Fi and White-Fi: Simulation Approach

Rafiza Ruslan and Rizauddin Saian (Universiti Teknologi MARA, Malaysia); Mohd Hasbullah Omar (Universiti Utara Malaysia & InterNetWork Research Laboratory, Malaysia); Mazani Manaf (University Teknologi MARA, Malaysia)

Wi-Fi is widely used to connect electronic devices wirelessly using ISM radio bands. Previous studies have reported traffic congestion in Wi-Fi due to several reasons. As an alternative, unused spectrum in TV band known as TV white space (TVWS) can be utilized for the same purpose. The use of Wi-Fi technology in TV band is also known as White-Fi. TVWS ranges in VHF and UHF that is not utilized by licensed user in a particular time and location. This paper presents a network performance comparison between Wi-Fi and White-Fi by evaluating the average throughput, end-to-end delay and packet delivery ratio (PDR). The simulation result shows White-Fi (IEEE 802.11af) has a significant percentage of average throughput and PDR with 25.94% and 24.06% compared to Wi-Fi (IEEE 802.11g) respectively. In addition, the percentage of average end-to-end delay in White-Fi is 60.79% lower than Wi-Fi.

12:20 Computer-Generated Art: Madonna and Child - Infinity of Life

Igor Podlubny (Technical University of Kosice, Slovakia); Peter Kmetek (Freelance Atelier, Slovakia)

The presented fractal image resembles a smooth modern depiction of the Madonna holding a child in her hands. An interesting recursive self-similar pattern is captured here -- both the child in the Madonna's arms and her head are comprised of the very same recursive Madonnas. This can be interpreted as a manifestation of the idea of infinite reproduction of life and knowledge. We discovered the fractal set shown in this picture exactly 25 years ago in April 1991 while working on visualizations of fractals using Pascal language for programming an Intel 286 machine. The first color print of the 800x600 screenshot which was signed and framed in 1991 is currently in the possession of Professor Ivo Petráš. Recently we turned to MATLAB for reconstructing those old computations, and we are providing here the resulting high-resolution image of this meaningfully looking set discovered so long ago. The set is generated in a Mandelbrot-like fashion and is based on the recurrence relationship $z_{\{n\}} = z_{\{n-1\}}^2 + i \cdot \text{conj}(c)$ in a certain rectangular domain in the complex plane. It is worth noting that our recurrence relationship is different from Mandelbrot's.

Friday, April 8, 11:00 - 12:40

Fri.am2.B: Circuits, Sensors & Devices and Energy/Power, etc

Room: B

Chairs: Glenn L Jenkins (University of Wales Trinity Saint David, United Kingdom), Abdelbaset Jamal Naim Abdellatif (Queen's University Belfast, United Kingdom)

11:00 *Modelling the Positional and Orientation Sensitivity of Proximity Sensors for Industrial IoT*

Richard McWilliam (Durham University & Durham University, United Kingdom); Samir Khan (University of Coventry, United Kingdom); Alan Purvis (Durham University, United Kingdom)

This paper presents an analysis of robust proximity sensor interfaces for Industrial Internet of Things applications. A Model is presented with the aim of maximizing the range and freedom of orientation of passive sensing and communications devices in comparison to traditional source-sensor technologies. A matrix transformation approach is used to model the quality of mutual coupling between triaxial source and sensor coil arrangements for arbitrary relative position and angular rotation. Particular attention is paid to the recombination of triaxial sensor outputs and optimal rotation for maximal coverage given a specified coupling threshold. The model is useful for determining practical source-sensor configurations that achieve optimal coverage when the sensor position and rotation is restricted by the industrial application.

11:20 *The Design and Optimization of Low-Voltage Pseudo Differential Pair Operational Transconductance Amplifier in 130 nm CMOS Technology*

Fadi R. Shahroury (Princess Sumaya University for Technology, Jordan); Ishraq Riad (Applied Science University, Jordan)

This paper presents low-voltage pseudo differential pair operational transconductance amplifier (OTA) circuit designed and simulated in 130 nm CMOS technology. The imperialist competitive algorithm (ICA) is used to optimize the DC gain, common-mode rejection ratio (CMRR), and power dissipation of the presented OTA. The cost function of ICA is evaluated in the form of simulation-based rather than equation-based to increase the precision of the final results. The simulation results after optimization show that the proposed OTA has DC gain of 37.5 dB, CMRR of 37.5 dB, and maximum signal swing at the output of 210 mV, with power consumption of 200 μ W from power supply of 0.5 V.

11:40 *Cross Polarization Discrimination Enhancement of a Dual Linear Polarization Antenna Using Metamaterials*

Sadiq Aqbi (TU Chemnitz, Germany); Madhukar Chandra (TU-chemnitz, Germany); Hasan Almgotir Kadhim (Newcastle University & University of Almustansiriya, United Kingdom)

This paper presents a novel approach to enhance the cross polarization discrimination in a dual linear polarization microstrip patch antenna at the frequency of 5.5 GHz. Two different designs of a dual linear polarization antenna using metamaterials is considered. In the first design, microstrip patch antenna is loaded with two pairs of spiral ring resonators, and in the second design, two orthogonal microstrip feed lines are loaded with pairs of split ring resonators. The addition of metamaterial inclusions to the antenna structure allow compensation for an asymmetric current distribution flow on the patch antenna and thus result in symmetrical current distribution on it. This compensation leads to a significant improvement in cross polarization discrimination in comparison to the conventional dual linear polarized antenna. The simulation shows an improvement of 12 dB for the first design, and 6.6 dB for the second design in cross polarization discrimination relative to the conventional antenna.

12:00 Influence Analysis of a Magnetic Field Focusing Device for Long Range Position Detection Measurement

Marcelo Ribeiro (Carinthian Tech Research AG, Austria)

To overcome the issue of the fast decay of the magnetic fields of a magnet over distance, a device constructed of a highly permeable material was developed, aiming to focus the magnetic fields at a sensing point, hence named "field focuser". This device allows designers to increase distances between magnet and sensor, chose weaker and cheaper magnets and work with simpler 1D magnetic sensors instead of more expensive 2 or 3D ones. This work focuses on the analysis of the influences and signal distortions that such a focusing device imposes in the system, aiming to highlight its performance. The findings were accomplished making use of FEM simulations and experimental validation, where the magnetic field on the presence and absence of the field focuser was analyzed. This paper aims to extend the knowledge on magnetic systems and help developers to understand limits and advantages of such setups.

12:20 A Distributed Intelligent Traffic System Using Ant Colony Optimization: A NetLogo Modeling Approach

[Kponyo J. Jerry](#) (Kwame Nkrumah University of Science and Technology, Ghana); [Kenneth S Nwizege](#) (Ken Saro-Wiwa Polytechnic, Bori, Nigeria); [Kwasi Adu-Boahen Opare](#) (MobileLink LAB, University of Electronic Science and Technology, P.R. China); [Abdul-Rahman Ahmed](#) (Kwame Nkrumah University of Science and Technology, Ghana); [Hassan Hamdoun](#) (University of Aberdeen, United Kingdom); [Akazua Luminous](#) (Imo State Polytechnic, Nigeria); [Salman Alshehri](#) (Swansea, United Kingdom); [Hilary Frank](#) (Ken Saro-Wiwa Polytechnic, Bori, Rivers State, Nigeria)

As vehicle population continues to increase, traffic management and issues related to congestion is an inevitable consequence. The path taken to reach a destination has the tendency to reduce the traffic within the network or increase it. The choice of path depends on how much traffic information is available at the time of deciding the path to take. It is, therefore, the desire of most drivers to have information on the status of traffic on the candidate routes to a destination. A Distributed Intelligent Traffic System (DITS) which uses Ant Colony Optimization(ACO) to solve the traffic problem is presented in this paper. The DITS is implemented in NetLogo and simulated while studying traffic factors such as average travel speed, average waiting time of cars and the number of stopped cars in queue. Ten separate cases of the simulation have been considered for two scenarios of the DITS, one with ACO and the other without ACO. The average speed for the ACO case was found to be higher in all 10 cases and the average waiting time and the number of stopped cars were lower for the ACO case than the case without ACO, which is the preferred result.