

Seminars - School of Electronic, Electrical and Computer Engineering

06 November at 2pm, room 521/522.

Kenneth G. Foote - Applications of parametric sonar in fish quantification.

A light lunch will be available from 1.15pm in the same room for those attending the seminar.

This will include information regarding the IEEE OES, especially to alert students and colleagues to the benefits of membership, also referring to the OES Standards Initiative.

Bio: **Kenneth Foote** is a Senior Scientist at the Woods Hole Oceanographic Institution, which he joined in 1999 after 24 years at the University of Bergen and Institute of Marine Research in Norway. This followed a one-year postdoctoral fellowship at Loughborough University of Technology, preceded by six years at Raytheon Company. About 20 years ago he led the EU RTD project "Broadband acoustic scattering signatures of fish and zooplankton (BASS)," with partners at the University of Birmingham and RESON A/S in Denmark.

This resulted in an ultra-bandwidth scientific echo sounder spanning seven octaves: 25-3200 kHz. He is a senior member of IEEE, currently serving as Vice President for Technical Activities of the IEEE Oceanic Engineering Society, and a fellow of the Acoustical Society of America. His long-term interests in underwater sound scattering include acoustic quantification of marine organisms and performance measurement of sonars.

19th Sept 2013, room 521/522

Philip Asare, a 3rd year PhD candidate in Computer Engineering at the University of Virginia (UVA)

Medical Body Sensor Networks: Challenges, Opportunities, and Current Efforts.

A light lunch will be available from 1.15pm in the same room for those attending the seminar.

Abstract

Body sensor networks (BSNs) are an emerging technology that have the potential to impact the healthcare industry. They enable mobile monitoring scenarios to provide otherwise-unobtainable information about patients to clinicians to aid in research as well as clinical practice. These new ways of instrumenting and monitoring humans in their natural environments come with many challenges. Body sensor networks are complex cyber-physical systems of physically distributed nodes around the body that must coordinate to provide relevant information. They are mobile and typically small, hence limited to fewer resources, but must operate in a complex, highly dynamic and unpredictable environment which requires computational intelligence. This talk will highlight some of the applications of body sensor networks, breakthroughs made in technologies that are overcoming some of the challenges, and some open questions. In addition, I will briefly touch on my current efforts to aid in translation to market of these systems, where I am developing model-driven approaches to enable reasoning about and analyzing these systems with respect to their patient safety implications, an issue that is important to regulators who must certify these systems for use on the market and manufacturers who must seek regulatory approval.

06 June 2013

Dr Mike Lewis, Reader at Queens University Belfast.

Human perception aspects for automatic target recognition.

01 May 2013

EDF Energy Lecture - The Fukushima Nuclear Accident & the UK Response

Synopsis: After the nuclear accident at Fukushima Dai-ichi in March 2011, following the Japanese earthquake and tsunami, the global nuclear industry challenged nuclear safety at power stations around the world.

EDF Energy as the largest UK Nuclear operator set up a programme of work to review the safety of their stations and although it was concluded that there are no fundamental weaknesses in design and resilience for 'within design basis' events, EDF Energy is committed to delivering a comprehensive work programme to further enhance resilience and response to extreme natural events. This presentation will look at what happened at Fukushima and how EDF Energy are responding.

18 March 2013

Professor Shijie Cheng and Professor Xiaoming Yuan, Huazhong University of Science and Technology, China.

"Power Engineering Research in Huazhong University of Science and Technology: smart grid and pulsed electromagnetics"

07 March 2013

Dr Robert Cahill, Reader at Queens University Belfast.

'THz Frequency Selective Surface Filters for Earth Observation Remote Sensing Instruments'.

Abstract: In the past decade Earth observation instrument technology has largely been driven by the need to provide spectroscopic characterisation of the Earth's atmosphere for studies which will provide new insights into phenomena including atmospheric composition, ozone depletion and climate change. What these missions have in common is that they require state-of-the-art hardware to achieve the high receiver sensitivity necessary to detect weak molecular emissions at mm and sub mm wavelengths. To satisfy satellite payload constraints on cost, mass and energy consumption, passive remote sensing radiometers traditionally employ a single mechanically scanned aperture antenna to collect radiation over a wide frequency range. The signals are spatially and spectrally separated within the heterodyne receiver by Frequency Selective Surfaces (FSS). The key technology challenge is to ensure that the devices simultaneously exhibit very low signal band insertion loss and meet the conflicting requirement for high isolation between adjacent frequency bands. The purpose of this talk is to present an overview of a multidisciplinary research project at Queen's University Belfast which has exploited state of the art developments in silicon micromachining technology to create a new class of substrateless FSS which exhibit enhanced performance and functionality. This type of structure has very high mechanical strength and rigidly properties which satisfy the requirements for space deployment. Finally the results of recent work to create electronically tunable mm wave FSS and reflectarray structures based on Liquid Crystals will also be presented.

01 March 2013

Professor Christopher J. James B.Elec.Eng.(Hons), PhD, SMIEEE, FIET, FRSM

Professor of Healthcare Technology and Director of the Institute of Digital Healthcare, University of Warwick.

Title: Cortical Neurodynamics Explored: Challenges in Neural Signal Processing

Abstract: Brain signal dynamics can be explored through a variety of methods, this talk introduces analysis techniques applied to the electromagnetic signals recorded from the brain – mainly through the electroencephalogram (EEG), and will highlight the information that these signals can yield. From the diagnosis of epilepsy, to the prediction of epileptic seizures, scalp recordings of the electrical activity of the brain can be used to tell much about when and where activity of interest is happening within the brain. Of the many techniques in the literature, Independent Component Analysis (ICA) is generally used when it is required to separate measured multi-channel biomedical signals into their constituent underlying components. Fundamentally ICA in biomedicine involves the extraction and separation of statistically independent sources underlying multiple measurements of biomedical signals. In this talk I will overview the different capabilities of extensions to the basic ICA premise using techniques based on space, time, frequency and joint space/time-frequency decomposition of brain signal recordings. In summary, this presentation will talk about the

issues surrounding the analysis of these complex EEG signals and will touch on where brain signal analysis may be going – especially in brain-computer interfacing.

Biography: Christopher James was born in Malta, received the B.Elec.Eng. (Hons) degree in from the University of Malta (1992) and a Ph.D from the University of Canterbury, New Zealand (1997). He was a postdoctoral research fellow at the EEG department of the Montreal Neurological Institute, of McGill University, Montreal, Canada (1997-1998), and a postdoctoral research fellow (1998-2001), and then Lecturer (2001-2003) with the Neural Computing Research Group of Aston University, Birmingham, UK. From 2004-2010 he was a Reader in Biomedical Signal Processing at the University of Southampton, UK. He now has a chair in Healthcare Technology at the University of Warwick, UK and is co-Director of the Institute of Digital Healthcare.

Professor James is a biomedical engineer and his research activity centers on the development of biomedical signal and pattern processing techniques, as well as the use of technological innovations, for use in advancing healthcare and promoting wellbeing. Neural Engineering forms a large part of his work, as to date his work has concentrated on the development of advanced processing techniques applied to the analysis of the electromagnetic activity of the human brain, primarily in Brain-Computer Interfacing. Prof James has published over 150 papers in neural engineering in varied biomedical engineering journals and refereed conferences.

He is immediate past Chair of the Institute of Electrical and Electronic Engineers (IEEE) UK & Republic of Ireland (UKRI) Section (11,000 members), Chair of the IEEE UKRI Engineering in Medicine & Biology Society (EMBS) Chapter, and a member of IEEE the EMBS Administrative Committee as Europe Representative. He is on the council of the European Alliance of Medical and Biological Engineering Societies (EAMBES). He is immediate past Chair of the Executive Committee of the Institution of Engineering and Technology (IET) Healthcare Technology Network, is on the IET TPN Steering Committee and has advised IET on Healthcare Technology matters for the Faraday Lectures, and has presented for IET at outreach activities. He represents the IET on the Royal Academy of Engineering's UK Biomedical Engineering focus committee.

Professor James is Series Editor for the Biomedical Signals and Systems book series of Artech House Publishers; Editor in Chief of the Open Medical Informatics Journal, Associate Editor for IEEE Transactions on Biomedical Engineering and sits on the editorial advisory board of the IEEE Spectrum Magazine. He is Associate Editor of the IEEE EMBS Conference Editorial Board (Neural Engineering Theme) and he has been actively involved in many IEEE EMBS committees – mainly on student activities.

22 February 2013

Professor Fionn Murtagh, Royal Holloway University of London.

[Towards a New Science of Big Data Analytics, Based on the Geometry and the Topology of Complex, Hierarchic Systems' \(pdf 780 KB\) \(/Documents/college-eps/eece/seminars/murtagh-handout.pdf\).](#)

Abstract: My work is concerned with pattern recognition, knowledge discovery, computer learning and statistics. I address how geometry and topology can uncover and empower the semantics of data. In addition to the semantics of data that can be explored using Correspondence Analysis and related multivariate data analyses, hierarchy is a fundamental concept in this work. I address not only low dimensional projection for display purposes, but carry out search and pattern recognition, whenever useful, in very high dimensional spaces. High dimensional spaces present very different characteristics from low dimensions, I have shown that in a particular sense very high dimensional space becomes, as dimensionality increases, hierarchical. I have also shown how in hierarchy, and hence in an ultrametric topological mapping of information space, we track change or anomaly or rupture.

07 February 2013

Dr. John Batchelor, Reader in Antenna Technology, University of Kent.

'Novel wearable wireless Antennas and Motion Captured Avatars'.

Abstract: This talk will describe how human body movement has been captured in order to model and understand wireless body-centric communication channels. Avatars for use in Finite Difference Time Domain simulation software are created using a 3D scanned surfaces of real people whose body movement is obtained by motion capture. The results aim to demonstrate the significance of antenna orientation and spacing from the skin with regard to received power. Additionally some disguised wearable antennas will be presented including a small WLAN/Bluetooth antenna with the appearance of a metallic jeans button and another in the form of a metal belt buckle. Finally, recent work turning tattoos into wireless devices and some proposed wireless rehabilitation technologies will be presented where for instance, tongue control of wheelchairs can be enabled.

02 February 2013

Professor Rodrigo Quian Quiroga, University of Leicester.

The Jennifer Aniston neuron.

We can easily recognize a person or an object in a fraction of a second even when seen under strikingly different conditions. How neurons are capable of creating such an invariant representation has been a hot topic of debate in Neuroscience. In epileptic patients candidates to surgery we analyzed the responses of neurons in the human medial temporal lobe to picture presentations. Several technical improvements led to the finding of 'abstract' neurons that fired selectively to different pictures of familiar individuals (e.g. Jennifer Aniston) and even to their written names. If time permits, I will also show that from the firing of these neurons it is possible to predict what the subjects are seeing and that subjects can voluntarily modify the neurons' firing to 'project thoughts'. Finally, I will discuss the possible function of these neurons.

Bio for Professor Rodrigo Quian Quiroga

One of the major scientific challenges of our days is to understand how information is represented by neurons in the brain. Although there has been spectacular progress in the last decades, we are still far to comprehend, for example, how visual inputs are processed to create conscious percepts and how these percepts can create new memories.

To understand these principles of brain function we perform single cell recordings in epileptic patients -implanted with intracranial electrodes for clinical reasons-, electroencephalographic and eye-tracker recordings and we use a sophisticated robot arm to study potential clinical (Neuroprosthetic) applications. Since complex behaviour is encoded by the activity of large populations of neurons, we also work on the development of advanced methods to extract useful information from these data.

Rodrigo is basically puzzled by how the brain works. In particular he is interested in principles of Neural Coding, visual perception, memory, visuo-motor transformations, single-trial evoked potentials, synchronization and the development of methods for the analysis of neurophysiology data

2011-12

07 December 2012

Richard Silley, Business Development Manager - RF and Communications for National Instruments UK & Ireland.

'National Instruments RF & Microwave Discussion'

Abstract: As an organisation, National Instruments have been heavily investing RF & Microwave Technology, the result of which provides a novel approach to RF instrumentation. This modular, software-defined approach is helping scientists and engineers continue to innovate in the midst of the ever-changing demands of the wireless industry. Industry leading I/O from DC up to 26.5GHz can be configured in phase coherent MIMO configurations, up to 16x16, and FPGAs can be used for real time signal processing; perfect for a bespoke measurement system or an off the shelf radio prototyping platform. Couple this modular hardware, with flexible software that gives industry leading measurement speed for current and emerging standards such as LTE, WLAN and WiMAX, to provide highly optimised solutions that reduce the cost of test whether for characterisation, design validation or production.

01 November 2012

Professor Duc Pham, University of Birmingham.

Intelligent Optimisation

Abstract: Intelligent Optimisation Many real-world engineering problems require the manipulation of a number of system variables in order to optimise a given quality parameter such as the reliability or accuracy of a process, or the cost or performance of a product. Optimisation will become even more important as resources diminish. The Bees Algorithm models the foraging behaviour of a swarm of honeybees in order to solve complex optimisation problems. The algorithm performs a combination of exploitative neighbourhood search and random explorative search. In this presentation, we will review different formulations of the Bees Algorithm together with other swarm-based optimisation algorithms and compare the effectiveness of the Bees Algorithm to that of three other biologically inspired search methods. We will explain the search mechanisms of the Bees Algorithm and the three control methods, and highlight their differences, strengths, and weaknesses.

Biography: Duc Pham is Chance Professor of Engineering and Head of the School of Mechanical Engineering. His research interests include intelligent systems and manufacturing.

04 October 2012

Professor Lajos Hanzo.

[Wireless Myths, Realities and Futures \(pdf 760 KB\) \(/Documents/college-eps/eece/seminars/eece-seminar-Wireless-Myths-Realities-Futures.pdf\)](#)

07 June 2012

Professor Newell, University of Dundee

Abstract: Computer systems appear to be designed mainly for young to middle-aged, computer literate people with high cognitive skills. However, an increasingly ageing population and disability legislation means that the ability to design for "extra-ordinary" - older and disabled - users should be a critical part of the toolkit of HCI researchers and C & IT designers.

Focussing on the needs and wants and abilities of older and disabled people, not only produce products and services for those users, but also can produce systems which are more easily usable by young non-disabled people.

This process will be illustrated by examples drawn from over 25 years research and development in this area at Dundee University. These include communication systems for non-speaking people, software support for those with dyslexia, smart house technology, and computer systems to support people with dementia.

Biography: Alan Newell, who graduated from Birmingham University's Electrical Engineering Department in 1962 and 1965, is now an Emeritus Professor at Dundee University's School of Computing.

The School contains one of the largest academic groups in the world researching into computer and communication systems for older and disabled people. He has published widely in this field, including his recent book: "Design and the Digital Divide: insights from 40 years in Computer Support for Older and Disabled People" (Morgan & Claypool 2011). His current interest is the use of professional theatre to raise awareness and facilitate discussion on these issues.

He was appointed a Member of the Order of the British Empire in 2000 for contributions to computer-based systems for people with disabilities. In 2011 was presented with the (US) Association for Computing Machinery SIGCHI Social Impact Award, and in 2012 elected a member of the ACM SIGCHI Academy.

A former Deputy Principal of the University, Alan is a Fellow of the Royal Society of Edinburgh, the Association for Computing Machinery and the British Computer Society, and an Honorary Fellow of the Royal College of Speech and Language Therapists.

03 May 2012

Dr Christopher Peters, Coventry University.

Perception of Humanoid Agents and Pedestrian Crowds in Simulated Virtual Environments

Abstract: This presentation describes research involving the perception of believable behaviour in humanoid agents and crowds situated in simulated virtual environments. Videos of high-density pedestrian scenes are inspected and annotated in order to synthesise virtual scenes of pedestrian configurations. These configurations are subsequently altered algorithmically at the level of the individual, group and crowd, in order to probe user perceptions of naturalness. The presentation will highlight the importance of the role of context in which behaviour takes place to its perception and also raise the issue of cases where differentiations may be made between the perception of realistic versus believable behaviour.

Biography: Christopher Peters is a Senior Lecturer in Computer Games Technology at Coventry University. He obtained his PhD degree in Computer Science from Trinity College Dublin in 2004. He has served as a post-doctoral researcher at the LINC Communication laboratory, University of Paris VIII, working in the the EU FP6 NOE HUMAINE and FP6 STREP CALLAS, and the Graphics Vision and Visualisation Lab, Trinity College Dublin, studying crowd modelling and perception, as part of the Science Foundation Ireland funded METROPOLIS project. He is a founding member of the Interactive Worlds Applied Research Group (iWARG) in Coventry University. His research interests include the investigation of interrelationships between computational visual attention, affect, memory, theory of mind and gaze control models for real-time animation, perception of, and multimodal interaction with humanoid characters, groups and crowds. He is a co-founder of the AFFINE (Affective Interaction in Natural Environments) events, which include annual workshops and special sessions dedicated to the theme of multimodal affective interaction to close the loop between user and virtual agents and robots. He is co-editor of special issues of the Journal on Multimodal User Interfaces and the ACM Transactions on Interactive Intelligent Systems.

05 April 2012

Professor Yang Hao, Queen Mary College, University of London.

Discrete Transformation Electromagnetics and its Applications in Antenna Design'

Abstract: Current designs of electromagnetic cloaks are largely based on the use of metamaterials and a technique so-called "transformation optics/electromagnetics". Free space cloaks require extreme materials which are difficult to implement in practice, however, the theory of "transformation optics/electromagnetics" offers a useful design tool for antenna engineers in developing novel antennas. In this talk, the theorem of discrete transformation electromagnetics is introduced and later applied to the design of flat lens and reduction of antenna mutual coupling.

Biography of Yang Hao: Yang Hao received the Ph.D. degree from the Centre for Communications Research (CCR) at the University of Bristol, U.K. in 1998. From 1998 to 2000, he was a postdoc research fellow at the School of Electrical and Electronic Engineering, University of Birmingham, U.K. In May 2000, he joined the Antenna Engineering Group, Queen Mary College, University of London, London, U.K. first as a lecturer and was promoted to Reader in 2005 and to Professor in 2007.

Professor Hao is active in a number of areas including computational electromagnetics, electromagnetic bandgap structures and microwave metamaterials, antennas and radio propagation for body centric wireless networks, active antennas for millimetre/submillimetre applications and photonic integrated antennas. His work on metamaterials and body-centric wireless communications has been reported in the Engineer(I), the Engineer (II), Electronics Times, Microwave Engineering and the IET E&T Magazine. He is a co-editor of book "Antennas and Radio Propagation for Body-Centric Wireless Communications" (Artech House, 2006). He has published over 200 technical papers (book chapters, Journal papers and conference publications) and served as an invited (ISAP07) and keynote speaker (ANTEM05), a conference organizer and session chair at many international conferences.

Professor Hao is an associate editor for IEEE Antennas and Wireless Propagation Letters, an associate editor and a guest editor for IEEE Transactions on Antennas and Propagation. He is a Senior Member of IEEE and also a member of Technical Advisory Panel of IET Antennas and Propagation Professional Network. He is elected as a

06 October 2011

Dr David Cannell, Director of Engineering, Powerwave UK

[Challenges and Opportunities in Mobile Telecoms Infrastructure: A Materials Perspective \(pdf 568 KB\) \(/Documents/college-eps/eece/seminars/mobile-telecoms-infrastructure.pdf\)](#)

01 September 2011

Adrian Porch

Applications of Resonant Microwave Sensors

Abstract: The first part of this talk concerns the use of resonant microwave sensors for the determination of fundamental electronic properties of materials. Two examples will be discussed, namely the characterisation of carbon nanotubes, and new types of transparent conductors. The same types of devices also have many potential applications, and this forms the basis of the second part of the talk. Two devices will be discussed in detail. The first is in the area of microfluidics, where very accurate dielectric measurements of small amounts of fluid are possible. The second is in the area of medical devices, where a new type of non-invasive blood glucose monitor has been developed.