Research + Enterprise @ DIT

2nd Annual DIT Postgraduate Research Symposium

Oral Presentations and Poster Displays by DIT Postgraduate Research Students

Courtyard Restaurant
DIT Aungier Street
02 November 2011

Dublin Institute of Technology
D·I·T
Institiúid Teicneolaíochta Átha Cliath

Schedule of the Event

09.00-09.15 **Registration and Refreshments**

09.15-09.30 **Welcome to the 2nd Annual Postgraduate Research Symposium**
Prof. Ellen Hazelkorn, Director of Research and Enterprise, and Dean of the Graduate Research School Board, Dublin Institute of Technology

09.30-11.15 **Research Theme: Environment & Health**

Chair: Dr. Mary McNamara, Head of Graduate Research Programme, Dublin Institute of Technology

Influence of blanching and fermentation on phytochemical content and antioxidant capacity of Irish York cabbage
Mr Amit Kumar Jaiswal, PhD Student,
School of Food Science and Environmental Health

An exploratory study of noise management in the Leinster Entertainment Industry
Ms Aoife Kelly, PhD student,
School of Food Science and Environmental Health

"This place really freaks me out": how does the presence of an adult affect children's experience of walking through their neighbourhoods?
Ms Jackie Bourke, PhD student, School of Social Sciences and Law

Passive Sampling for Quality Monitoring of Irish Marine Waters
Mr Philip White, PhD student,
School of Chemical and Pharmaceutical Sciences

Controlling T cell Activation
Ms Ralitsa Vassileva, PhD student, School of Biological Sciences

Modulation of the effect of endoperoxide-containing antitumour agents in *HeLa by varying oxygen concentrations*
Ms Sandra Gannon, PhD student,
School of Chemical and Pharmaceutical Sciences

Evaluation of a community dietetics intervention to improve oral nutritional supplement prescribing practices in the community
Ms Sharon Kennelly, PhD student, School of Biological Sciences

11.15-11.45 **Coffee Break**

11.45-13.00 **Research Theme: Materials & Energy**

Chair: Dr. Marek Rebow, Head of Research in the College of Engineering and Built Environment, Dublin Institute of Technology

An Optical Fibre Sensor for the detection of Atmospheric Gaseous Pollutants in an Urban Environment
Mr Brian Devine, PhD Student, School of Physics

Creating a uniform magnetic field for the equi-biaxial physical testing of magnetorheological elastomers
Mr Dave Gorman, PhD Student,
School of Manufacturing and Design Engineering

Characterization and Electrochromic properties of poly (2,3,5,6-tetrafluoroaniline)
Ms Lavinia Astratine, PhD Student,
School of Chemical and Pharmaceutical Sciences

Shrinkage study of photopolymer films doped with zeolite nanoparticles
Mr Mohesh Moothanchery, PhD Student, School of Physics

An Enthalpy Model for the Solidification of a Ti-Al-Nb Alloy
Mr Robin P. Mooney, PhD Student,
School of Mechanical and Transport Engineering

13.00-14.00 **Lunch & Poster Session**

14.00-15.30 **Research Themes: New Information Technologies**

Chair: Dr. John Donovan, Head of Research, Dublin Institute of Technology

Optimisation of Integrated Ultra Wide Band Antennas for Asset Tag Location Systems
Mr Antoine Dumoulin, PhD Student,
School of Electronic and Communications Engineering

Development of a channel selection mechanism in multi-radio multi-channel WLAN mesh networks
Mr Fuhu Deng, PhD Student,
School of Electronic and Communications Engineering

Optimizing the Throughput of WLAN Mesh Networks
Mr Jianhua Deng, PhD Student,
School of Electronic andCommunications Engineering

Hybrid optical fiber sensing system for composite materials
Ms Manjusha Ramakrishnan, PhD Student,
School of Electronic and Communications Engineering

Fast Ferroelectric Liquid Crystal (FLC) Matrix Optical Switch for All-optic fibre Networks
Ms Sithara Sreenilayam Pavithran, PhD Student,
School of Electronic and Communications Engineering

Detecting Distributed Denial of Service (DDoS) Attacks in Wireless Mesh Network
Mr Yi Ding, PhD Student, School of Computing

15.30-17.00 **Research Theme: Society, Culture & Enterprise**

Chair: Professor Ellen Hazelkorn, Director of Research and Enterprise, and Dean of the Graduate Research School Board, Dublin Institute of Technology

The Experience of Body-Mind Awareness in Contemporary Dance Practice
Ms. Antje Schneider, PhD Student, Conservatory of Music and Drama

Investing in National Sport Mythologies: How Young Irish Men Negotiate the Mediated Marketplace Myths of the Gaelic Athletic Association in their Identity-Work
Ms Deirdre Duffy, PhD Student, School of Marketing

Developing Strategy from the Middle: Subsidiary Strategy and the Role of the Subsidiary General Manager
Mr Dónal O'Brien, PhD Student, School of Management

Young People and the Youth Justice System: The Roles, Expectations and Resilience of Parents
Ms Maria Lahiff, PhD Student, School of Social Sciences and Law

Understanding Multidisciplinarity in Scientific Research: Insights from Nanoscience
Mr Nicolas Battard, PhD Student, School of Marketing

How is Ireland imagined as a Tourism Destination in the Minds of American Tourists
Mr Sean Ruane, PhD Student, School of Hospitality Management and Tourism

17.00-18.00 **Closure by the President, Professor Brian Norton with the Proclamation of the Winners of the Fiosraigh Programme Awards followed by Reception**

Abstracts of Oral Presentations

Environment & Health

Amit Kumar Jaiswal

Title: Influence of blanching and fermentation on phytochemical content and antioxidant capacity of Irish York cabbage

Authors: Amit K. Jaiswal and Nissreen Abu-Ghannam

Abstract

Brassica vegetables are rich in a number of bioactive compounds such as vitamins, phenolic acids, flavonoids and glucosinolates, which are associated with antioxidant, antibacterial and anticancer properties. These vegetables are primarily processed by various techniques such as blanching, steaming and microwaving. Fermentation is widely used for preservation purposes and nutritional properties improvement. This study was carried out to investigate the influence of blanching on polyphenols content and antioxidant (AO) capacity of Irish York cabbage. Furthermore, fermentation of blanched cabbage was carried out using Lactic acid bacteria and its effect on phytochemical content and AO capacity were evaluated.

York cabbage was blanched between 80 to100°C with an increment of 5°C for up to 14 min. Results showed significant reductions in the polyphenols and AO capacity due to blanching. Total phenolic and flavonoid content retained ranged from 19.6-24.5 and 22.0-25.7%, respectively; whereas 74.0-82.0% loss in the AO capacity observed as compared to raw York cabbage. Kinetic evaluation of degradation was carried out for all the studied quality parameters. The fractional conversion (FC) first-order reaction model showed a good fit for the different studied parameters with the coefficient of determination ranging from 0.892-0.992. The temperature effect followed the Arrhenius law with activation energy for polyphenolic content, AO capacity calculated as 9.22-11.5 and 9.05-35.05 kJ/mol K, respectively.

York cabbage was used as the sole substrate for the lactic acid fermentation with Lactobacillus plantarum. The cabbage was blanched at 95°C for 12 min in order to render it free from contaminating flora and to make the nutrients more accessible. To achieve an optimal fermentation conditions which would result in higher release of phytochemicals and antioxidant capacity in the broth, Box-Behnken design integrating a desirability approach was used. The optimized factors were: fermentation time 36 h, solid to liquid ratio 0.25 g/ml and agitation rate 100 rpm. There was ≈5 log cfu/ml increment in bacterial growth after fermentation, whereas lactic acid production reached up to 4.97 mg/ml. However, there was a slight reduction in TPC (5%) and AO capacity (10%) after fermentation. The results of this study present an indication of the potential of fermentation of York cabbage using LAB with a possibility towards the development of a range of functional foods.

Aoife Kelly

Title: An exploratory study of noise management in the Leinster Entertainment Industry

Authors: Kelly, A., Boyd, S., Henehan, G. & Chambers, G.

Abstract

Due to the transposition of the EU Directive 2003/10/EC into Irish Law, the entertainment sector was obligated to comply with the requirements of the Safety, Health and Welfare at Work (General Application) Regulations 2007, Chapter 1 Part 5: Control of Noise at Work since February 2008. Despite this, there is a lack of baseline data on the appreciation and adoption of these regulations within the sector. In view of the potential health issues associated with excessive noise exposure this deficit is alarming. The aim of this PhD is to measure the occupational noise levels nightclub bar-employees experience, to define the most effective control measures to reduce the risk of noise-induced hearing loss and critique the application of this legislation in this entertainment industry.

Currently 15 nightclubs have participated in the research. The typical daily noise exposure of 29 bar employees was measured using two logging dosemeters and a Type 1 fixed position sound level meter. Physical site inspections identified nightclub noise control measures. Interviews and questionnaires were used to assess the managers and employees awareness of the noise legislation.

The average bar employee daily noise exposure ($L_{EX,8h}$) was 92dBA, almost four times more than the accepted legal limit. None of the venues examined were fully compliant with the requirements of the 2007 Noise Regulations and awareness of this legislation was limited. No venue had delivered occupational noise awareness training to employees or provided hearing surveillance. Noise levels in venues rose by 7dBA from 23:30-01:00.

The future of the work is based on conducting two additional noise measurements within each venue. Short-term control measures, for example hearing protection, shall be explored through focus groups and training interventions. Venue design features shall be modelled to identify the most suitable noise reduction design features in nightclubs to assist in long term noise reduction.

Jackie Bourke

Title: "This place really freaks me out": how does the presence of an adult affect children's experience of walking through their neighbourhoods?

Authors: Jackie Bourke

Abstract

There is concern that a loss of independent spatial mobility has had implications for children with respect to how they experience their urban environments (Mackett et al 2007, Romero 2010). This presentation will outline the findings of a study into how the presence of an adult shapes the experience children have as they walk through their urban worlds.

The findings form part of a PhD inquiry into children's perspectives on their experience of independent spatial mobility in an urban context. The theoretical framework for this study draws on both Hart's ecological model and the sociological understanding of children as active agents shaping their own lives. In terms of this study, the ecological model refers to the relationship between children, the urban landscape, risk perception and the presence of an adult as they move through the city.

The analysis for this presentation looked at the influence of an adult presence on children's mobility experience through an examination of photographic data collected by the children as they walked a series of routes with and without an adult.

The visual narrative through which the children describe their journey indicates that the presence of an adult is of little significance in terms of the diversity of the experience or the sense of place the children feel, but may affect the extent to which the experience is either positive or negative.

Philip White

Title: Passive Sampling For Quality Monitoring of Irish Marine Waters

Authors: Philip White, Patrice Behan, Brendan McHugh, Barry Foley, Evin McGovern.

Abstract

The Marine Environment can be subject to anthropogenic pollution from a variety of sources. The realisation of the adverse impacts from pollution on the environment has lead to legislative attempts to reduce contamination throughout Europe (Water Framework Directive). To satisfy legislative requirements with regard to monitoring of the health status of water bodies throughout Europe Passive Sampling (PS) has been suggested as a possible alternative to the use of spot water sampling. Passive sampling offers a method with improved sensitivity, low cost which is simple to use that can also take into account point source discharges, temporal and spatial trends alike. Passive sampling has been used during this project at various locations including the M6 weather buoy (400 mile off the west coast of Ireland) and various fresh water and inshore locations. Passive sampling devices have been found to be useful tools in determination of low (Pg/L) concentrations of organic pollutants with the potential to be a useful to satisfy various environmental monitoring and legislative requirements.

Ralitsa Vassileva

Title: Controlling T cell Activation

Authors: Ralitsa Vassileva, MSc, Jacinta Kelly, PhD, James Curtin, PhD

Abstract

The immune system has developed well-orchestrated surveillance mechanisms to recognize and fight infections. The cells of the innate immune system are able to detect pathogens via invariant receptors and eliminate infection in a non-specific manner. Another important function is the activation of naive antigen-specific T cells by antigen presenting cells, which is essential for the initiation and direction of the adaptive immunity. However, some pathogens and viruses have developed mechanisms to escape immune surveillance and defeat immune responses. One promising approach to overcome immunological tolerance involves augmenting endogenous T cell mediated immunity by interrupting the T cell down-regulatory pathway.

In this project a gene therapy delivery system to overexpress small interfering RNA will be used to silence the signals induced by CTLA4 that downregulate T cell activity. RNA interference will be achieved in cells using plasmid vectors that express small hairpin RNA molecules. This should create a T cell with modified activation kinetics, in which CTLA4 expression will be switched off. The research will also contribute to our knowledge about how the immune system functions, namely the role of CTLA4 as a suppressor of T cell activation.

A small hairpin RNA (shRNA) duplex designed to silence expression of CTLA4 was successfully cloned in three different plasmids. The efficacy of each plasmid was estimated by transient co-transfection of HeLa cells (do not express endogenous CTLA4) with the construct and a plasmid encoding CTLA4, followed by detection of CTLA4 expression using Western blot. We are now developing a stable T cell line expressing constitutively the CTLA4 siRNA as a model to understand the role of CTLA4 in functional assays.

Sandra Gannon

Title: Modulation of the effect of endoperoxide-containing antitumour agents in HeLa by varying oxygen concentrations

Authors: Sandra Gannon[a], Dr. James Murphy[b], Dr. Sarah Rawe[c]
[a] Focas Institute, Dublin Institute of Technology, Camden Row, Dublin 8
[b] Mitochondrial Biology and Radiation Research, Institute of Technology Sligo, Sligo
[c] The School of Chemical and Pharmaceutical Sciences, Dublin Institute of Technology, Kevin Street, Dublin 8

Abstract

As a general rule in vitro evaluation of antitumour drugs is performed at atmospheric oxygen levels (21% O_2) however this does not mimic the oxygen environments typical of cells within the body (4-10 % O_2) and in particular within tumour cells (1 % O_2). Cells undergo a number of physiological changes in response to hypoxic conditions and it has been demonstrated that hypoxia plays a crucial role in cancer cells and therefore cancer treatment.[1,2] For example, a number of anticancer drugs have been shown to display cytotoxicities that are oxygen dependent including cyclophosphamide, carboplatin and doxorubicin.[3]

Artemisinin and its semi-synthetic derivatives are well known endoperoxide-containing compounds more commonly known for their antimalarial activity. However, more recently they are also of interest as antitumour agents possessing antiproliferative and antiangiogenic activity.[4] In this work, part of a larger ongoing study, the cytotoxicity of artesunate was evaluated using both a real-time assay and an endpoint assay in HeLa cells at three concentrations of oxygen (1, 4 and 21 %) which we propose are biologically relevant. A correlation was observed between the cytotoxicity of artesunate and the level of oxygen in which the cells were cultured.

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(2) Kunz, M.; Ibrahim, S. M. *Molecular cancer* **2003**, 2, 23.
(3) Höckel, M.; Vaupel, P. *Journal of the National Cancer Institute* **2001**, 93, 266-76.
(4) D'Alessandro, S. Basilico, N. Corbett, Y. Scaccabarozzi, D. Omodeo-Salè, F. Saresella, M.Marventano, I. Vaillant, M. Olliaro, P.; Taramelli, D. *Biochemical pharmacology* **2011**.

Sharon Kennelly

Title: Evaluation of a community dietetics intervention to improve oral nutritional supplement prescribing practices in the community.

Authors: Kennelly, S., Kennedy, N. P., Corish, C. A., Glennon-Slattery, C., Flanagan-Rughaboor, F. & Sugrue, S.

Abstract

Background: Healthcare professionals working in the community do not always prescribe oral nutritional supplements (ONS) according to best practice guidelines and expenditure on ONS has increased. The aim of this study was to investigate ONS prescribing practices and to determne the impact of a community dietetics intervention on these practices and expenditure one year later.

Methods: At baseline ONS prescribing practices were investigated by patient interview with a community dietitian. The intervention involved an education programme for general medical practitioners (GPs), practice nurses, nurses in nursing homes and community nurses together with the provision of a new community dietetics service. Changes in healthcare professionals' practices and knowledge were determined by self-administered questionnaires immediately after and six months after the intervention, and by examining community dietetics records one year after the intervention. ONS prescribing volume and expenditure were assessed using data from the Primary Care Reimbursement Service of the Irish Health Service Executive.

Results: Seventy-eight and 42 patients were included in the study pre and post-intervention respectively. Ninety-six healthcare professionals participated in the nutrition education programme (including seven of ten principal GPs). Six months post-intervention improvement in healthcare professional nutritional knowledge was observed ($P<0.001$). One year post-intervention, screening for malnutrition risk was better (62% vs 0%, $P < 0.001$), dietary advice provided more often (90% vs 26%, $P < 0.001$), and ONS prescribed for a greater proportion of patients who were at 'high risk' of malnutrition than before (88% vs 37%, $P < 0.001$). There was a trend towards fewer patients being prescribed ONS (18% reduction, $P = 0.074$) and there was no significant change in expenditure on ONS by participating GPs (3% reduction, $P = 0.499$), despite a 28% increase nationally by GPs on ONS.

Conclusion: The community dietetics intervention improved ONS prescribing practices by healthcare professionals, in accordance with best practice guidelines, without increasing expenditure on ONS during the year after intervention.

Materials & Energy

Brian Devine

Title: An Optical Fibre Sensor for the detection of Atmospheric Gaseous Pollutants in an Urban Environment

Authors: Brian Devine, Supervisor: Dr. James Walsh

Abstract

Detection of pollutants in urban environments is performed using a variety of techniques, most of these are expensive and are either fixed at permanent locations or require specific forms of transport. The novel system presented here is designed for the in-situ detection of pollutant analytes in an urban environment using absorption spectroscopy. Expanding on earlier research to develop a miniaturised in-situ system to detect Nitrogen Dioxide (NO_2) in the atmosphere of an urban area the novel system consists of a miniaturised spectrometer, optical fibre and a collimating tube coupled with an Ocean Optics lens. Work has also been carried out to recommission the OPSIS-DOAS system installed on Kevin St. DIT and other locations. The method for detecting gas pollution used here is based on Differential Optical Absorption Spectroscopy (DOAS) which has been widely used to determine concentrations of pollutants. This DOAS method is accurate but presently requires the apparatus to be fixed in position and can be expensive. Its principle of operation is based on Beer's Law: $A = \alpha cL$.

The laboratory set-up was used to measure the intensity of light passing through samples. The tests were performed using polypropylene bags filled with air and a concentration of NO_2. Using an algorithm, based on the DOAS method, the laboratory tests have verified Beer's Law for varying concentrations of analyte gas. Data has also been recorded for the Dublin atmosphere. To perform these tests rigorous optical set-ups have been designed, constructed and tested. Tests have also been performed with LEDs for use as alternative light sources. Comparison of the measurements taken with the test system and the various DOAS and other methods will be used to calibrate and improve its accuracy.

Dave Gorman

Title: Creating a uniform magnetic field for the equi-biaxial physical testing of magnetorheological elastomers; electromagnet design, development and testing.

Authors: Dave Gorman Steve Jerrams Ray Ekins and Niall Murphy

Abstract

This paper investigates a method to provide the magnetic field requirements for physical testing of magnetorheological elastomers (MREs) subjected to equi-biaxial loading using the bubble inflation method. For accurate physical testing of MREs, detailed knowledge of the properties of the applied magnetic field is required. To obtain reliable data it is essential to determine the strength, uniformity and directionality of flux density. A Halbach cylinder array can produce a magnetic field of approximately uniform flux density in one direction for a reference plane perpendicular to the direction. However, it is limited by the fixed field strength. To overcome this significant limitation, an electromagnetic array based on the geometry of a Halbach cylinder is proposed. This electromagnetic array will be capable of generating a uniform magnetic field, for the reference plane and in the perpendicular direction, that is capable of having the flux density varied to offer a range of field strengths for tests on different elastomer samples. FEA simulations of uniform electromagnetic arrays have been modelled. Ultimately, a model is offered that simulates the behaviour of an electromagnetic array and the capability to generate a uniform magnetic field with different flux densities and directionality over the required volume. The advantages and disadvantages of an electromagnetic array over a fixed strength Halbach cylinder were investigated and a detailed comparison of both was carried out. Preliminary tests have been conducted on prototype electromagnets and the measured magnetic fields have been found to be in agreement with the FEA model. In addition to the magnetic field experiments, tests have been carried out on a compressed air cooling system to allow continuous operation of the electromagnets for the duration of a fatigue test without test samples becoming overheated and chemical degradation occurring. These tests are also necessary to establish conditions where there is minimal drop in field strength due to the increased resistance associated with temperature increases during prolonged dynamic testing. In conclusion a design for an electromagnetic array for the equi-biaxial testing of MREs is presented along with proposals for further testing to fully develop the array and establish standard dynamic test procedures for the material

Lavinia Astratine

Title: Characterization and Electrochromic properties of poly(2,3,5,6-tetrafluoroaniline)

Authors: Lavinia Astratine, John Cassidy, Anthony Betts, Edmond Magner

Abstract

Electrochromic films of poly(2,3,5,6-tetrafluoroaniline) (PTFA) were formed on ITO substrate from aqueous solutions utilising perchloric acid ($HClO_4$) as dopant. Electrochemical characterization was continued in background electrolyte and in solution with addition of tetrahydrofuran. The PTFA films were also characterised using spectroelectrochemical and spectrochronoamperometric techniques. When the PTFA film was removed from its growth medium, a significant decrease in the faradaic current was observed in monomer-free solution. The faradaic response was improved on addition of tetrahydrofuran. PTFA films deposited on ITO substrate were orange and light orange in the oxidized and reduced forms, respectively. The films were further characterised using scanning electron microscopy (SEM).

Mohesh Moothanchery

Title: Shrinkage study of photopolymer films doped with zeolite nanoparticles

Authors: Mohesh Moothanchery, Izabela Naydenova, Svetlana Mintova and Vincent Toal

Abstract

The effect of zeolites nanocrystals (pure silicate, aluminosilicates and aluminophosphate) incorporated in acrylamide based photopolymer layers for holographic applications is investigated. The presence of the zeolite nanocrystals improved the refractive index modulation and also resulted in substantial suppression of polymerization shrinkage. The higher refractive index modulation achieved is beneficial for applications such as holographic data storage as it provides higher storage capacities. Besides, the high refractive index modulation is advantageous for the fabrication of spectroscopic devices and holographic optical elements. The holograms recorded in the acrylamide photopolymer films doped with the zeolite nanoparticles are identified for further sensor application

Robin P. Mooney

Title: An Enthalpy Model for the Solidification of a Ti-Al-Nb Alloy

Authors: Robin P. Mooney and Dr. Shaun McFadden

Abstract

The MAXUS-8 microgravity solidification experiment was launched on the 26th March 2010 as part of the Intermetallic Materials Processing in Relation to Earth and Space Solidification (IMPRESS) project [1]. The furnace in the experiment module was designed to investigate columnar and equiaxed microstructures in a Ti-45.5at.%Al-8at.%Nb intermetallic alloy [2]. A model of the furnace has been developed using an enthalpy method scheme to determine the isotherm shape and velocity, and thermal history of the alloy during solidification. The results obtained are compared to the experiment samples from furnace A of the module. The model performance also is compared with an established front tracking model for the same furnace [3]. It was found that the results for the enthalpy model are in good agreement with the front tracking model. Recommendations are made to improve the model further by using alternative functions of temperature for solid fraction calculation.

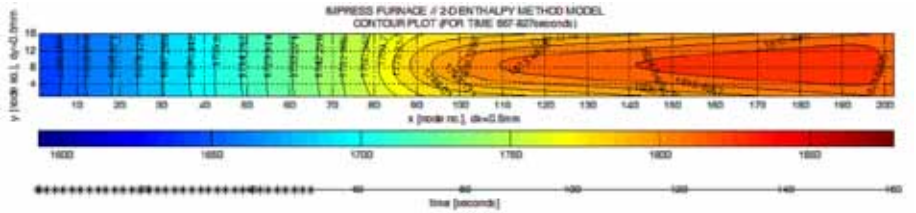

Fig.1: Screenshot of enthalpy method simulation for IMPRESS Furnace A

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[2] Mooney R, Browne D, Budenkova O, Fautrelle Y, Froyen L, Kartavykh A, McFadden S, Rex S, Schmitz B and Voss D (2011). Review of the Maxus 8 Sounding Rocket Experiment to Investigate Solidification in a Ti-Al-Nb Alloy. *Proc.of the 20th European Space Agency Symposium on European Rocket and Balloon Programmes and Related Research (Hyeres, Provence, France, 22-26 May 2011)*

[3] McFadden S and Browne D J (2009) *Applied Mathematical Modelling* **Vol. 33** 1397-1416.

New Information Technologies

Antoine Dumoulin

Title: An Empirical Investigation of Consumer Resistance towards Green Product Innovation

Authors: Marius Claudy

Abstract

Sustainable or 'green' innovations have the potential to partly decouple the economy from the environment, by re-designing products, production processes and distribution channels, allowing "[…] the economy to grow without breaching ecological limits – or running out of resources (Jackson p.67)." Innovation can help, for example, to increase the longevity of products, utilize recyclable and non-toxic materials or reduce the amount of pollutants emitted during production processes or usage.

In this context, much research has been directed into identifying and targeting the so called 'Green Consumer' (e.g., Prothero et al 2010). Yet, most research in this field has yielded only inconclusive results and shown that consumers' concern for the environment often fails to translate into purchase-behaviour (e.g., Peatti, 2001). This so-called attitude-behaviour-gap provides serious challenges for businesses and societies aiming to promote 'greener' products.

A problem that has been widely overlooked by researchers is that green innovations often require consumers to accept trade-offs between the environmental improvements and, for example, changes in design, price or performance. In other words, "[green] innovations mean change to consumers, and resistance to change is a normal consumer response that has to be overcome before adoption may begin" (Laukkanen, 2007)

Building on recent advances in the literature, the central objective of my research is to empirically investigate different forms of consumer resistance to green product innovations, to better understand the underlying barriers to change and to provide strategic recommendations for marketers and policy makers on how to overcome resistance more effectively.

My main contributions are embedded in three empirical studies, each addressing a different problem-situation and gap in the literature:

1. Study 1 proposes a new method/approach to empirical investigate consumer resistance to green product innovation.
2. Study 2 investigates passive resistance (i.e., awareness) to green product innovation. Published in: Claudy, M., A. O'Driscoll, C. Michelsen, M.R. Mullen (2010) Consumer Awareness in the Adoption of Microgeneration Technologies. An Empirical Investigation in the Republic of Ireland. *Sustainable & Renewable Energy* Reviews, 14(7), 2154–2160.
3. Study 3 examines consumers' willingness to pay for green product innovation in the context of public policy. 2nd Round of Reviews: Claudy M., C. Michelsen, A. O'Driscoll. The Diffusion of Microgeneration Technologies. Assessing the Influence of Perceived Product Characteristics on Home Owners' Willingness to Pay. *Energy Policy*.

Fuhu Deng

Title: Development of a channel selection mechanism in multi-radio multi-channel WLAN mesh networks

Authors: Fuhu Deng and Mark Davis

Abstract

The IEEE 802.11b/g and IEEE 802.11a WLAN standards provide for 3 and 12 non-overlapping channels, respectively, which can be used simultaneously within a region by assigning non-overlapping channels to the radios. This increases efficient spectrum utilization and maximizes the bandwidth availability of the network. However, as the wireless interface card cannot transmit on two channels at the same time. With the availability of cheap off-the-shelf commodity hardware, multi-radio solutions have become more attractive, which means that it becomes necessary to select a suitable channel for each network interface card.

The throughput will decrease if a channel with low capacity or high contention was assigned. It is important to select a low contention high capacity channel to each node, especially when the number of radios increases in the multi-radio wireless mesh network.

We investigate the use of a time based method to determine which channel has the highest capacity for transmission when the nodes begin to become saturated.

This method first monitors the traffic flow on each available channel and calculates the capacity of each channel. It then selects the channel with the highest capacity. From experiment, it has been shown that it takes a few milliseconds to inform the neighbour nodes of the channel selection decision through the use of beacon frames containing a channel switch information element. With carefully design, this method will not cause other nodes already present on the selected channel become saturated.

Jianhua Deng

Title: Optimizing the Throughput of WLAN Mesh Networks

Authors: Jianhua Deng, Dr. Mark. Davis

Abstract

In WLAN mesh networks (WMNs), for any given set of wireless channel conditions, there is an optimal packet size that minimises the probability of re-transmission and maximizes the throughput.

In this research project, maximizing the WMNs throughput through packet aggregation is investigated. A new scheme called Optimal Aggregation Sized Packet Scheme (OASPS) is adopted here. The OASPS is based around two algorithms. The first algorithm is concerned with determining the Optimal Packet Size (DOPS) of WMNs under varying wireless channel conditions. The second algorithm is concerned with how to assemble the Optimal Aggregate Packet (AOAP). The goal of the AOAP algorithm is to aggregate the smaller sized packets from the packet buffer into larger and optimally sized aggregate packets at every network node.

In the DOPS, it is proposed to employ an Additive-Increase Multiplicative-Decrease (AIMD) technique. In the AOAP, 4 possible algorithms for realising efficient aggregation are proposed and some hash tables are also employed.

The effectiveness of OASPS is being investigated through computer simulation using the NS3 simulator application. The simulation scenario involves upto 5 mesh nodes, different traffic models, such as Poisson traffic model and CBR traffic model. The simulation results indicate that this scheme can achieve a trade-off between maximizing throughput and minimizing delay in WLAN mesh networks. In particular, this scheme can significantly improve the capacity when the packets size is small in WLAN mesh networks.

Manjusha Ramakrishnan

Title: Hybrid optical fiber sensing system for composite materials

Authors: Manjusha Ramakrishnan, Ginu Rajan, Yuliya Semenova, and Gerald Farrell1

Abstract

This work focuses on the development of composite structures embedded with hybrid optical fiber sensors for structural health monitoring (SHM) applications. Unlike the conventional electronic SHM systems, the embedded optical fiber act as nervous system without perturbing the structural integrity and mechanical strength of glass/fiber reinforced composite materials, due to the comparable size of the optical fibres with that of the reinforcement fiber. The present sensing scheme utilise two types of optical fibre sensors, working together to implement a so-called hybrid fibre sensing scheme. The hybrid fiber sensor approach demonstrated offers the specific advantage of simultaneous real time measurement of stain and temperature. The hybrid sensing scheme under investigation comprises of a highly birefringent polarization maintaining (HB-PM) fiber based polarimetric sensors for average strain/ temperature measurements and fiber Bragg grating (FBG) sensors for point strain/ temperature measurements. One of the highlights of this research is the novel discrimination of temperature and strain parameters, by cross evaluating the temperature insensitive polarimetric fiber sensors with the fiber Bragg grating (FBG) sensors. The design and demonstration of a demodulation system for the hybrid sensing technology is another research aspect of my doctoral research work. An integrated Arrayed Waveguide grating (AWG) based FBG demodulation can be used to convert FBG wavelength shift information into intensity variation. The AWG based demodulation allows simultaneous detection of several FBG's embedded in different locations in the composite material. The polarimetric sensor provides information in terms of phase change when subjected to strain or temperature. Integrated Electro-optic phase modulators can be used to demodulate the polarimetric sensors, and in such demodulation system, measuring the level of voltage applied to achieve the phase matching condition can yield information about the external perturbation. A flexible integrated device fabrication technology can be utilized for fabricating the electro-optic phase modulator and the AWG, through which stability and miniaturisation of demodulation system can be achieved.

Sithara Sreenilayam Pavithran

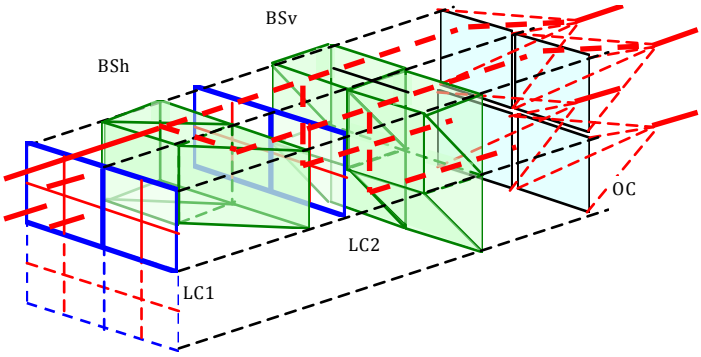
Title: Fast Ferroelectric Liquid Crystal (FLC) Matrix Optical Switch for All-optic fibre Networks

Authors: Sithara Sreenilayam Pavithran, Yuri Panarin

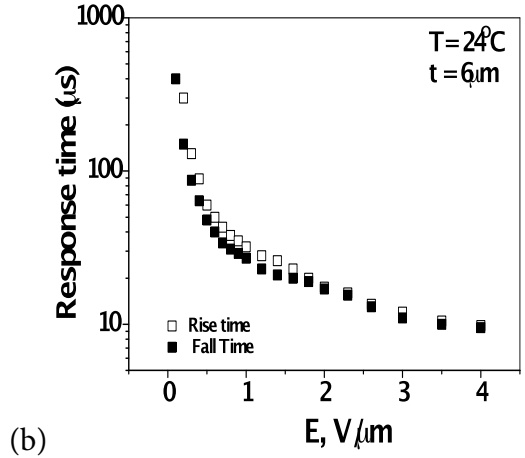
Abstract

With the rapid pace in technological advances and the widespread deployment of optical networks demands more and more band width. The researchers are eagerly focusing on the generation of novel technologies to make networks much faster, reliable and more scalable. Optical switches place a vital role for routing signals from input to appropriate output ports in all-optical fibre networks without resorting to optical-electrical-optical (OEO) conversions. We have developed an interesting fast ferroelectric liquid crystal (FLC) matrix optical switch for all-optical fibre networks with practically unlimited bandwidth, which is regarded as a promising solution for much faster and flexible transport networks for the future broadband telecommunications. The experiments are carried out with commercially available FLC mixture (θ=22.5°). The material exhibits high contrast ratio for a particular cell thickness and very fast optical response within the range of 1-10 μs. The best achieved cross talk is –19 dB.

An ideal switching (*i.e.* rotation of the polarization on 90°) in FLC modulator can be achieved when molecular tilt angle θ=22.5° and for particular wavelength when optical retardation is $\pi \cdot \Delta n \cdot d / \lambda = 1/2, 3/2$.. The core element of switching array (SA) of this new switch matrix scheme is simple and inexpensive FLC matrix in conjunction with lateral displacement beam splitter (LBS).



(a)



(b)

Figure 1 (a) Schematic of 4X4 FLC matrix switch and (b) response time as a function of voltage at 24°C

When compared to conventional MEMS optical switches, it has some attracting advantages such as fast switching, cost efficient and very small power dissipation. Due to the faster response time and reliability, FLC modulators will be the solution for future wider band width flexible telecommunication networks. The novel matrix switch scheme and the FLC switch properties are discussed.

Yi Ding

Title: Detecting Distributed Denial of Service (DDoS) Attacks in Wireless Mesh Network

Authors: Yi Ding, Dr. Mark Davis

Abstract

Security is an important consideration in the operation of any wireless network. However, wireless network and in particular wireless mesh networks are particularly vulnerable to a Distributed Denial of Service (DDoS) attack makes use of a large population of compromised clients through a protocol flaw or from vulnerabilities in a software application to attack the network by UDP flooding attack or TCP-SYN flooding attack and the result can be hugely destructive. This requires a fast and effective alarm detection method to mitigate such as attack. This project develops a new method that combines WLAN Resource Measurement (WRM) techniques with a Bayesian Decision Theory to detect DDoS attacks in wireless mesh networks.

Under the WRM framework the channel capacity may be categorised in terms of 3 key parameters: *Cmax, Cavail* and *Cmin*. The objective in this research is to use the changes in these parameters to detect the onset of a DDoS attack. Specifically, these *Cmin, Cavail* and *Cmax* parameters are used to define a new metric called $DDoS_{metric}$ which is used in conjunction with a Bayesian Decision Theory scheme to distinguish between normal and abnormal (i.e. DDoS attack) operation.

The effectiveness of this scheme is being investigated through computer simulation using the NS2 simulator application. The simulation scenario involves 1,000 random topologies comprising 50 mesh routers, different node densities and different attack levels. The simulation results indicate that this scheme can detect DDoS attack effectively and accurately in a short time interval. The goal now is to improve the performance of the DDoS attack detection method through minimizing the False Positive Ratio (*FPR*), False Negative Ratio (*FNR*) and Response Time *(Tr)* without compromising the performance.

Society, Culture and Enterprise

Antje Schneider

Title: The Experience of Body-Mind Awareness in Contemporary Dance Practice

Authors: Antje Schneider

Abstract

This presentation gives an introduction to the research project, which focuses on the individual professional dancer's experience and perception of body-mind self during improvisational dance practice.

The background on which the research question evolves is the contemporary dance scene, in which body-mind awareness is an essential part of the dominant movement practices. Evolving from the 1960s and the beginnings of postmodern dance, 'somatic' techniques have taken on a significant role in the field. This development goes hand in hand with changes in the understanding of choreography and technique, the roles of choreographer and performer, and dance practice. The contemporary dancer today can be seen as in a historically unique situation, composed of the triangular relationship between contemporary dance as a cultural art practice, the movement practices practised in contemporary dance and the dancer as an individual. The dancer is involved in a complex, on-going process that merges the diverse areas of the dancer's life. The dance practice is a mirror of the dancer's ideas and concerns emerging and manifesting, dissolving and disappearing, during the regular practice that accompanies the dancer over time. The experience of self-awareness in improvised movement practice is a reflection of the dancer's self-understanding, and can be put into a wider context of the person's reality and on-going process of construction of meaning.

This research aims to add a new perspective to the research in contemporary dance practice undertaken so far by investigating the multiple individual experiences and understandings of body-mind awareness of contemporary dancers in Ireland. Employing movement observations, videos and interviews, 5 professional dancers from diverse backgrounds provide close insights to their experience. As the research is still 'in progress', the presentation focuses on the research process rather than final outcomes. It gives a brief overview of the research focus and theoretical framework underpinning the research, outlines the methodology and provides some examples of the 'cases' investigated so far.

Deirdre Duffy

Title: Investing in National Sport Mythologies: How Young Irish Men Negotiate the Mediated Marketplace Myths of the Gaelic Athletic Association in their Identity-Work

Authors: Deirdre Duffy

Abstract

This paper purports to understand how young Irish male sports players use marketplace mythologies to negotiate their involvement with the Gaelic Athletic Association (GAA) and how these negotiations in turn shape their selves. In particular, the research considers the continuing circulation of specific values and meanings in GAA sponsorship advertisements that are traditionally associated with Gaelic sport and in so doing, explores Irish sports men's construction of identity in tandem with their lived existence in this mediated social world. The interrelations and influences of their family, friends, the media, sport club membership - ultimately human interdependency itself, all serve as potential cues upon which young men borrow to craft their own masculine identity.

In considering men's identity projects, the later works of French philosopher Michel Foucault are drawn upon to consider 'how subjects (individuals) come to create their own selves and "realise their own desires" aginst a scenario partly constructed by their own artistry' (Whitehead, 2002: 102). However the influencing power of social environment (the circulating imagery and rhetoric of the GAA) on the development of an individual's life project cannot be ignored. Thus while Foucault's 'technologies of the self' will provide a useful lens, the individual man is located within his interpretive community (Gaelic sports player and GAA club member) which incorporates the social practices and interactions of men as their identity projects are constructed.

Research Methodology

The interpretive community, what I have labelled 'The GAA Fellas' serves as an entity within which to explore how power relations operate and shift through institutional discourses and practices. In this paper the focus is particularly on the discourses and practices of the GAA and the mediated narrative and imagery surrounding this sporting organisation.

The 'GAA Fella's' are a group of respondents between 22 to 27 years of age, all hailing from North County Dublin. Each of the five men played Gaelic football at local clubs since the age of 6 or 7 years.

Life-story interviews were conducted to learn the respondent's life themes and life projects. In Foucauldian terms, such life stories will illuminate the men's practices of the self, how they go about constructing their self as a 'work of art'. Through their conversations, experiences, memories and accounts of life events expressed during the interview interaction, I seek insights to

address how GAA marketplace mythologies are engaged with by these GAA players/consumers and how the advertising narrative connects to their individual life projects (Mick and Buhl, 1992).

Aim of the Paper

This paper takes the Irish national sports organisation – the Gaelic Athletic Association, to act as a prism shedding light on the discursive practices in operation within the interpretive community of Gaelic sportsmen. In particular commercially mediated mythologies surrounding the GAA were considered to understand how young Irish men use these circulating meanings, metaphors and ideals diffused through GAA advertising material when negotiating their own identity projects. Themes in this paper, such as 'The Parish Dream', 'The GAA Father & Son "Truth"' and 'Investment in the Commercial Myth?' will illuminate young Irish men's constructions of identity in modern Ireland.

Dónal O'Brien

Title: Developing Strategy from the Middle ;
Subsidiary Strategy and the Role of the Subsidiary General Manager

Authors: Dónal O'Brien (DIT), Dr. Pamela Sharkey Scott (DIT),
Dr. Pat Gibbons (UCD)

Abstract

The Irish Economy is increasingly more reliant on the Multinational subsidiary sector and the CEOs who run these subsidiary units are one of the most important management groups operating in Ireland today. These CEOs work in a highly pressurised environment constantly vulnerable to extinction or relocation. Subsidiary CEOs must also operate under the burden of expectation from their Irish based employees and Irish policy makers. On top of those constraints they are also placed under paradoxical pressures in today's Multinationals (MNCs). On the one hand current trends suggest that MNCs are developing into more global business structures which are reducing the power and influence of subsidiary managers. This is an important development on its own, but what makes it truly remarkable is that simultaneously there is a broad empowerment trend in management practice, through which subsidiary managers are being encouraged to act more entrepreneurially and to contribute knowledge and innovation to the entire MNC.

Research needs to address how subsidiary management develop strategy while coping with these conflicting demands.

A major survey and interview program of subsidiary CEOs of leading multinational corporations is being undertaken. The objective of this research is to contribute by applying a new theoretical framework which for the first time addresses the theoretical difficulties in studying strategy development at the subsidiary level.

From a practitioner perspective this research will highlight the restrictions on the ability of subsidiaries to develop a unique position to ensure their survival and growth due to continuing globalisation of systems and processes. By highlighting subsidiary management's approach to differentiating their subsidiary in this highly constrained environment this research will provide crucial insights for subsidiary managers and policy makers alike, at a time when Ireland is relying on the Multinational subsidiary sector to be a major driver of economic recovery.

Maria Lahiff

Title: Young People and the Youth Justice System: The Roles, Expectations and Resilience of Parents

Authors: Maria Lahiff (PhD Candidate) and Dr. Mairèad Seymour Supervisor

Abstract

Ineffective and inconsistent parenting styles are commonly associated with young people who come into contact with the criminal justice system. While these factors have been established in the literature on parenting and youth criminality, less is known about parental perspectives on the parenting role in this context. This research addresses the gap in the literature by focusing on parents' own accounts of their role as parents; the level to which they perceive that they are involved in the criminal justice process; the expectations on parents, first by the wider community, and second, the expectations of parents themselves with regard to the level of responsibility surrounding their child's behaviour. This research investigates the challenges experienced by parents who have children in the youth justice system and the coping mechanisms they employ. The manner in which parents access resources to cope with these challenges will also be explored. The research will document the parents lived experiences and perspectives on their roles, expectations and resilience when parenting in the youth justice context as they journey along the youth justice continuum (i.e. from when their child first comes into contact with the youth justice system to when that child completes any sanction received from the youth justice professionals). The analysis is based on qualitative information gathered from court observations and one to one interviews with parents of children who are, or previously have been, involved in the criminal justice system since the introduction of the Children Act (2001). Ultimately this study plans to reflect the parents own parenting experiences and identify the level and depth of parental involvement in the youth justice process.

Nicolas Battard

Title: Understanding Multidisciplinarity in Scientific Research: Insights from Nanoscience

Authors: Nicolas Battard

Abstract

Nanotechnology is considered as an emerging and converging technology (Roco, 2008; Roco and Brainbridge, 2002) that is said to be one of the key technologies of the 21st century. Nanotechnology is a young domain and encompasses disciplines such as applied physics, materials science, physical chemistry, physics of condensed matter, biochemistry and molecular biology, and polymer science and engineering (Heinze *et al*., 2007). In this time of crisis, understanding multidisciplinaryn research is key in order to build a new smart economy andn restore a stable and sustainable growth. The main argument of the presentation is that research groups focusing their activity on nanotechnology are considered as 'technological' hubs where scientists with multiple backgrounds converge in order to conduct research at the nanoscale. Through an exploratory and inductive research, I show that 'technological hubs' develop a speciality based on internal capacities and stock of knowledge. Second, I show that scientific boundaries are difficult to cross and lead scientists to create local knowledge in order to produce a multidisciplinary scientific outcome. Finally, by practising multidisciplinary on a daily basis, scientists and young scientists particularly are torn between being pioneers of a new scientific area and have difficulties to locate themselves in their environment.

Sean Ruane

Title: How is Ireland Imagined as a Tourism Destination in the Minds of American Tourists

Authors: Sean T. Ruane, Dr. Bernadette Quinn & Dr. Sheila Flanagan

Abstract

Tourism as a consumable product in Ireland has always been heavily dependent on the American market. This involves in essence a considerable degree of cross-cultural experiences on behalf of both the tourist and the service provider, (Weiermair, 2000). O' Leary & Deegan (2005) credit much of Ireland's success as a tourist destination to attracting visitors from four main markets, Britain, The United States, Germany and France. The focus of this study will look at one of those markets, the United States. O' Leary & Deegan's (2005) work looked at Ireland's Image as a Tourism Destination in France, and a similar approach will be adapted in this study in an American context. Tourism destination image literature suggests that there is a correlation between decision to travel and destination image as interpreted by the traveller (Yüksel and Akgül, 2006). In an Irish context O'Connor (1993) suggests how the Irish imagine themselves is largely influenced by way they are perceived by others, others being non Irish people. This research will examine the images used to promote Ireland as a tourism destination with the intention of answering the following research question; *How is Ireland Imagined in the Minds of American Tourists?* To answer this question the following research objectives have been formulated.

(1) What is Ireland's destination image in the minds of American tourists?

(2) How are these images interpreted by Americans in the context of their own cognitive construction of Ireland?

(3) How do their photographs/choices function as devices/tools by which that construction can be explored?

Emergent findings based on the personal photographs taken in Ireland by American tourists during the summer of 2011 indicate that whereas; there are similarities in how American's imagine Ireland when compared with images used to sell Ireland in America; there are also subtle differences as recorded in the personal photographs of their experience of Ireland.

Poster Displays

RESEARCH THEME: ENVIRONMENT & HEALTH

1. **Evaluation of the usefulness of the Sonora NickelTM Test Device as a tool for routine Ultrasound Imaging and Spectral Doppler quality control testing** by Brian Buckley, PhD Student, School of Physics

2. **Genes expressed in a radiation-induced Bystander Effect** by Hayley Furlong, PhD Student, School of Biological Sciences

3. **Molecular characterisation of Irish Brassica oleracea species using Microsatellites (SSRs) Markers** by Mohamed El-Esawi, PhD Student, School of Food Science and Environmental Health

4. **The prevalence of malnutrition in patients who develop Clostridium difficile associated disease in Ireland** by Yvonne Hickey, MPhil Student, School of Biological Sciences

5. **Pilot Primary School Vision Screening involving Teachers in Nampula, Mozambique** by Aoife Phelan, PhD Student, School of Physics

6. **Prognostic indicators and outcome measures for patients with neovascular age-related macular degeneration undergoing treatment with intravitreal ranibizumab** by Sarah Sabour-Pickett, MPhil Student, School of Physics

7. **Plant available Nitrogen and Phosphorus from composted waste materials** by Alan Lee, MPhil Student, School of Chemical and Pharmaceutical Sciences

8. **Survey of Ink Components in Food Packaging Materials** by Eimear McCall, PhD Student, School of Chemical and Pharmaceutical Sciences

9. **Applying Science & Risk Based Approaches to the Manufacturing of Human Pharmaceutical Products**, by Nuala Calnan, PhD Student, School of Chemical and Pharmaceutical Sciences

RESEARCH THEME: MATERIALS & ENERGY

10. **Characterization of Luminescent Down-Shifting Materials and Applications for PV Devices** by Hind Ahmed, PhD Student, School of Physics

11. **Systematic study into substituent's effect on the photoluminescence performance of a series of therapeutic Ru(II) complexes** by Laura Perdisatt, PhD Student, School of Chemical and Pharmaceutical Sciences

12. **Development and Modification of Non-Toxic Holographic Photopolymers** by Dervil Cody, PhD Student, School of Physics

13. **The influence of the structure of a sub-wavelength metal grating (SWMG) on its transmission efficiency** by Youqiao Ma, PhD Student, School of Electronic & Communications Engineering

14. **Smart Grid Simulator and parallel usage with a real control system** by Stefan Geidel, MPhil Student, School of Electrical Engineering Systems

15. **Synthesis and Characterisation of Isomers of Cathinones Found in 'Legal Highs'** by Rachel Christie, PhD Student, School of Chemical and Pharmaceutical Sciences

16. **Fatigue analysis for off-road vehicle suspension systems using an existing custom-built test rig for validation** by John Grimes, MPhil Student, School of Mechanical and Transport Engineering

RESEARCH THEME: NEW INFORMATION TECHNOLOGIES

17. **The Scenario-oriented Method for Recording And Playing-back Complex Information** by Yi Ding, PhD Student, School of Computing

18. **Clustering of NMF Basis Functions for Monaural Sound Source Separation** by Rajesh Jaiswal, PhD Student, School of Electrical Engineering Systems

19. **Vision based management of complex information** by Jianfeng Wu, PhD Student, School of Computing

RESEARCH THEME: SOCIETY, CULTURE & ENTERPRISE

20. **What do engineering students know about Sustainable Development?** by Iacovos Nicolaou, MPhil Student, School of Civil and Building Services Engineering

21. **How Small and Medium Sized Professional Service Firms Internationalise: an exploratory investigation into the internationalisation of architecture firms** by Deirdre Canavan, PhD Student, School of Management

22. **Identifying knowledge, skills and competences for nanoscience and nanotechnology research** by Deepa Chari, PhD Student, School of Physics

23. **Customer Participation in Self-Service Technologies in the Tourism Sector** by Petranka Kelly, PhD Student, School of Hospitality Management and Tourism

24. **Pause - Rethinking & remaking architectural education** by Sima Rouholamin, PhD Student, School of Architecture

25. **Boundary spanning activity as in influencing mechanism on the formation of marketing strategy** by Sarah Browne, PhD Student, School of Marketing

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