Surrey Postgraduate Research Conference 2012

Abstract Book

Keynote Speakers:

• Hilary Wilson
• Prof. Jeremy Watson

www.surrey.ac.uk/pgrconference

31st January 2012 to 1st February 2012

Austin Pearce Building

Registration from 08:00

Bringing Surrey Researchers Together
Foreword

Foreword by Prof. Steve Williamson
Deputy Vice-Chancellor (Research and Innovation)

The University of Surrey places great value on its postgraduate research students. For many of you it will be the first rung on a career ladder in research, and for others it will be the key that unlocks the door to a high-powered career away in a different field. During your time here you must not only be digging deeply into your chosen topic for research, but also honing your skills of presentation and communication, which will be essential to success in your future career. I am therefore delighted to be able to give my full support to this Postgraduate Research Conference, which is organised by research students for research students. For many of you it will be your first opportunity to present; for others it will be the first opportunity to find out about what is going on in the university. And that is an important point. It is tempting to keep your head down and keep burrowing away in your own topic, but please remember that interesting things take place across subject boundaries, and being aware of what is hot in other areas will pay surprising dividends. For that reason I am particularly pleased that your conference is designed to be interdisciplinary. Enjoy!

Contents

Foreword by Prof. Steve Williamson (Deputy Vice Chancellor) .......................................................... 1
Speaker Biographies.................................................................................................................................... 2
Oral Programme (31st January) .............................................................................................................. 3
Oral Programme (1st February) .............................................................................................................. 4
Poster Programme (Sessions 1-3) .......................................................................................................... 5
Oral Presentation Abstracts...................................................................................................................... 10
Poster Presentation Abstracts.................................................................................................................. 55
Afterword by Prof. Sir Christopher Snowden (Vice Chancellor) ...................................................... 130
Acknowledgements.................................................................................................................................... 130

www.surrey.ac.uk/pgrconference
Speaker Biographies

Prof. Jeremy Watson
Global Research Director of Arup

Jeremy Watson is Chief Scientific Adviser for the Department of Communities & Local Government. He is responsible for advising CLG ministers and senior officials on science, technology and engineering evidence and strategy. Jeremy is also Global Research Director at Arup, responsible for the firm’s research strategy, and is European Champion on Arup’s Intellectual Property Executive.

Jeremy has held research and technical management roles in industry and academia including service with the DTI, DIUS and EPSRC. His specialities include Strategic Technology Development and Transfer, Innovation Processes and Research Management. He has technical expertise in Industrial Instrumentation and Control, Signal Processing and Power Electronics. Current research interests include Renewable Energy, Automatic Control for Energy Efficiency, and Business Models and Technologies for Building Retrofit.

Jeremy is a Chartered Engineer, a Fellow of the Royal Academy of Engineering and the Royal Society for the Arts, and a Fellow of the Institutions of Civil Engineering and Engineering Technology. He is a Visiting Professor at the Universities of Southampton and Sussex, and a member of the HEFCE Research & Innovation Committee. Jeremy was a Board member of the Technology Strategy Board until July 2010, and was also a founding Trustee of the Institute for Sustainability.

Jeremy’s talk will explore how interventions from research councils, TSB, HEFCE and Chief Scientific Advisers are effective in supporting capability-building and innovation in the UK.

Wednesday 1st February
15:00 AP1

Hilary Wilson
Speaker, Trainer, Mentor, Author

You are good at your job, that is a given, however being good at your job isn’t enough to differentiate you in the 21st century world of work. This session will contain all you need to know about the unwritten rules of success at work, what is really powerful, what works and how to create career sustainability. This session covers:

- Understand and implement the top 5 critical success factors
- Own a toolkit that outlines the exact formula for career success
- Create security and success in the ever-changing world of work
- Your authentic self – discover work that makes you shine

Hilary Wilson is an international conference speaker, trainer and executive coach who specialises in what makes people and their businesses successful. Success leaves clues and she’s a super-sleuth at spotting and developing the clues. These clues form a blueprint.

Exactly what are the key skills, strengths, behaviours and strategies that make you successful in the areas of influencing, presenting, creating positive impact, building relationships and career success whilst being yourself? Over the last 22 years Hilary has worked with over 50,000 people across a host of top global organisation so she brings vast experience and knowledge on the clues of how to get noticed for the right reasons whilst being yourself.

She has written a number of articles on her areas of expertise and as well as the highly acclaimed book entitled “The Little Black Book of Career Success”.

Hilary has been successfully running her own consultancy business since 1989. Her client list includes Sony BMG, Whitbread Plc, BUPA, Teach First, T-Mobile, Cancer Research and Aviva.

Tuesday 31st January
15:30 AP1
## Oral Programme
### Tuesday 31st January

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00</td>
<td>Registration &amp; Coffee</td>
</tr>
<tr>
<td>10:00</td>
<td>Welcome by Prof. Steve Williamson (AP1)</td>
</tr>
</tbody>
</table>

### Oral Session 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30</td>
<td>The Isolation and Total Synthesis of Compounds from the Hyacinthaceae Family and Their Anti-Inflammatory Activity Catherine Waller</td>
</tr>
<tr>
<td>10:50</td>
<td>I Need Therapy, You Need Therapy, We All Need Therapy Miltos Hadjiosif</td>
</tr>
<tr>
<td>11:10</td>
<td>Supercapacitors for Vehicle Applications: Benefits and Future Perspectives Alberto Santucci</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:20</td>
<td>Emotional Responses to Multiple Sclerosis: A Pluralistic Qualitative Exploration of Idiographic Experiences Bridget Jones</td>
</tr>
<tr>
<td>13:40</td>
<td>The Three Myths of the United States Constitution. How the Individual Mandate Has Exposed the Mythological Nature of Federalism Through a Misconstruction of American Federalism Jamie Fletcher</td>
</tr>
<tr>
<td>14:00</td>
<td>Arsenic Contamination in Cyprus Andrea Petrona</td>
</tr>
<tr>
<td>14:20</td>
<td>Forensic Fingerprint Analysis – Unmasking Overlapping Fingerprints and Inks Nicholas Bright</td>
</tr>
</tbody>
</table>

### Poster Session 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:50</td>
<td>Lunch</td>
</tr>
</tbody>
</table>

### Oral Session 2

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:20</td>
<td>Emotional Responses to Multiple Sclerosis: A Pluralistic Qualitative Exploration of Idiographic Experiences Bridget Jones</td>
</tr>
<tr>
<td>13:40</td>
<td>The Three Myths of the United States Constitution. How the Individual Mandate Has Exposed the Mythological Nature of Federalism Through a Misconstruction of American Federalism Jamie Fletcher</td>
</tr>
<tr>
<td>14:00</td>
<td>Arsenic Contamination in Cyprus Andrea Petrona</td>
</tr>
<tr>
<td>14:20</td>
<td>Forensic Fingerprint Analysis – Unmasking Overlapping Fingerprints and Inks Nicholas Bright</td>
</tr>
</tbody>
</table>

### Poster Session 2

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:40</td>
<td>Coffee Break</td>
</tr>
</tbody>
</table>

### Keynote Speaker 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:30</td>
<td>Hilary Wilson – “The Career Success Toolkit” (AP1)</td>
</tr>
</tbody>
</table>

### Oral Session 3

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:30</td>
<td>Kinematic Analysis of Submarining in Older Children Barbara Girard</td>
</tr>
<tr>
<td>16:50</td>
<td>Environmental Monitoring of Geothermal Waters in New Zealand Gillian Lord</td>
</tr>
<tr>
<td>17:10</td>
<td>Dynamic Analysis of Railway Bridges for Robustness Evaluation Nurul Fadzli A Yahya</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>17:30</td>
<td>The PhD Movie (AP1)</td>
</tr>
<tr>
<td>19:30</td>
<td>Quiz and buffet at Wates House</td>
</tr>
</tbody>
</table>
## Oral Programme
**Wednesday 1st February**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00</td>
<td>Registration &amp; Coffee</td>
</tr>
<tr>
<td>09:00</td>
<td><strong>Oral Session 4</strong></td>
</tr>
<tr>
<td></td>
<td><strong>AP1</strong></td>
</tr>
<tr>
<td></td>
<td>The Development of Polymer Electrolytes for Fuel Cells</td>
</tr>
<tr>
<td></td>
<td><em>Sam Murphy</em></td>
</tr>
<tr>
<td></td>
<td><strong>AP2</strong></td>
</tr>
<tr>
<td></td>
<td>Annotated Sketches for Intuitive Video Retrieval</td>
</tr>
<tr>
<td></td>
<td><em>Stuart James</em></td>
</tr>
<tr>
<td>09:20</td>
<td>Learner Autonomy in Interpreter Training: The Role of Spoken Corpora</td>
</tr>
<tr>
<td></td>
<td><em>Richard Bale</em></td>
</tr>
<tr>
<td>09:40</td>
<td>Predicting Badly Behaved Brain Tumours with a MiNiMUS of Fuss</td>
</tr>
<tr>
<td></td>
<td><em>Adam Cole</em></td>
</tr>
<tr>
<td>10:00</td>
<td>South Asian Women Have Denser But Smaller Tibia (Lower Leg) Bones</td>
</tr>
<tr>
<td></td>
<td>Than Caucasian Women, Contributing to a Reduced Bone Strength</td>
</tr>
<tr>
<td></td>
<td><em>Andrea Darling</em></td>
</tr>
<tr>
<td>10:20</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>10:40</td>
<td><strong>Oral Session 5</strong></td>
</tr>
<tr>
<td></td>
<td><strong>AP1</strong></td>
</tr>
<tr>
<td></td>
<td>Fabrication and Characterisation of Gelatin-Hydroxyapatite Scaffolds</td>
</tr>
<tr>
<td></td>
<td><em>Ali Salifu</em></td>
</tr>
<tr>
<td></td>
<td><strong>AP2</strong></td>
</tr>
<tr>
<td></td>
<td>Automated Detection of Cancerous Cell Nuclei in Microscopic Images</td>
</tr>
<tr>
<td></td>
<td><em>Violet Snell</em></td>
</tr>
<tr>
<td>11:00</td>
<td>Monetary Policy and Banking Regulation: Is There a Conflict of</td>
</tr>
<tr>
<td></td>
<td>Interests?</td>
</tr>
<tr>
<td></td>
<td><em>Diana Lima</em></td>
</tr>
<tr>
<td></td>
<td><em>Sarah Mallinson</em></td>
</tr>
<tr>
<td>11:40</td>
<td>Pilot Perspectives on the Performance of the Surrey Virtual Reality</td>
</tr>
<tr>
<td></td>
<td>System</td>
</tr>
<tr>
<td></td>
<td><em>Mohammad Al-Amri</em></td>
</tr>
<tr>
<td>12:00</td>
<td>Lunch</td>
</tr>
<tr>
<td>13:20</td>
<td><strong>Oral Session 6</strong></td>
</tr>
<tr>
<td></td>
<td><strong>AP1</strong></td>
</tr>
<tr>
<td></td>
<td>Dielectrophoresis Technology: A Novel Approach to Investigate Cells’</td>
</tr>
<tr>
<td></td>
<td>Electrical Properties Through Their Division Cycle to Help Improve</td>
</tr>
<tr>
<td></td>
<td>Cancer Therapy</td>
</tr>
<tr>
<td></td>
<td><em>Nafiseh Naeemi Khondabi</em></td>
</tr>
<tr>
<td>13:40</td>
<td>Examination of the Reaction Mechanism and Structure - Property</td>
</tr>
<tr>
<td></td>
<td>Relationships of New Initiators for Curing Epoxy Resins</td>
</tr>
<tr>
<td></td>
<td><em>Fiona Binks</em></td>
</tr>
<tr>
<td>14:00</td>
<td>Dying Stars in a Grain of Sand</td>
</tr>
<tr>
<td></td>
<td><em>Matthew Pang</em></td>
</tr>
<tr>
<td>14:20</td>
<td>Form and Being: An Analysis of the Experience of Dancing</td>
</tr>
<tr>
<td></td>
<td><em>Karen Cann</em></td>
</tr>
<tr>
<td>14:40</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>15:00</td>
<td><strong>Keynote Speaker 2</strong></td>
</tr>
<tr>
<td></td>
<td><em>Prof. Jeremy Watson</em> - “Science and Engineering in Government: A</td>
</tr>
<tr>
<td></td>
<td>Catalyst for Innovation” (AP1)</td>
</tr>
<tr>
<td>16:00</td>
<td>Awards &amp; Close by Prof. Sir Christopher Snowden (AP1)</td>
</tr>
<tr>
<td>ID</td>
<td>Name</td>
</tr>
<tr>
<td>----</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Najla Albaridi</td>
</tr>
<tr>
<td>2</td>
<td>Liam McCafferty</td>
</tr>
<tr>
<td>3</td>
<td>Sherie Smith</td>
</tr>
<tr>
<td>4</td>
<td>Oluremi Olamigoke</td>
</tr>
<tr>
<td>5</td>
<td>Elisabetta Pellini</td>
</tr>
<tr>
<td>6</td>
<td>Somporn Buapathoom</td>
</tr>
<tr>
<td>7</td>
<td>Donna Hillman</td>
</tr>
<tr>
<td>8</td>
<td>Ming Tsuey Chew</td>
</tr>
<tr>
<td>9</td>
<td>Ioannis Dandoulakis</td>
</tr>
<tr>
<td>10</td>
<td>Ruth Torcal Serrano</td>
</tr>
<tr>
<td>11</td>
<td>Simon Licourinos</td>
</tr>
<tr>
<td>12</td>
<td>Richard Hanna</td>
</tr>
<tr>
<td>13</td>
<td>Ahmed Alsaleh</td>
</tr>
<tr>
<td>14</td>
<td>Unwana Ekpe</td>
</tr>
<tr>
<td>15</td>
<td>Thomas Waller</td>
</tr>
<tr>
<td>16</td>
<td>Sarene Chu Saifuddin</td>
</tr>
<tr>
<td>17</td>
<td>Pamela Farshim</td>
</tr>
<tr>
<td>18</td>
<td>Keyur Gandhi</td>
</tr>
<tr>
<td>19</td>
<td>Irene Freire Martin</td>
</tr>
<tr>
<td>20</td>
<td>Margaret Gompers</td>
</tr>
</tbody>
</table>
### Poster Programme

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Poster Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Kwaku Owusu-Darko</td>
<td>Determination of Phenotypic Resistance of M. Tuberculosis in the Chemostat</td>
</tr>
<tr>
<td>22</td>
<td>Noramaliza Mohd Noor</td>
<td>The Use of Ge-Doped Optical Fibres as a Radiation Dosimeter</td>
</tr>
<tr>
<td>23</td>
<td>Deborah Guest</td>
<td>Cancer: A Variety of Cells to Kill?</td>
</tr>
<tr>
<td>24</td>
<td>Dorota Nawrot</td>
<td>Chemical Constituents of East European Forest Species</td>
</tr>
<tr>
<td>25</td>
<td>Graeme Burt</td>
<td>A Bayesian Method for Identifying Intakes of Uranium</td>
</tr>
<tr>
<td>26</td>
<td>Nattana Leelaharattanarak</td>
<td>Strategies of Politeness Expressions in Thai Hospitality Settings</td>
</tr>
<tr>
<td>27</td>
<td>Mohammad Alenezi</td>
<td>ZnO Hexagonal Nanodiscs</td>
</tr>
<tr>
<td>28</td>
<td>Charo Hodgkins</td>
<td>The Ability of Front-of-Pack Nutrition Labelling Systems to Guide Healthy Choices</td>
</tr>
<tr>
<td>29</td>
<td>Sofia Siddique</td>
<td>Energy Transfer from Nanostructures to Organic Materials</td>
</tr>
<tr>
<td>30</td>
<td>Joanna Sier</td>
<td>Investigation of the Impact of Cellular Defence Proteins in the Human Liver on the Endogenous Hormone Estradiol</td>
</tr>
<tr>
<td>31</td>
<td>Guosheng Hu</td>
<td>Pose Invariant Face Recognition with Multi-Resolution 3D Morphable Model</td>
</tr>
<tr>
<td>32</td>
<td>Grace Edmund</td>
<td>Gin and Tonic Anyone? Not for Me I'm a Rat!</td>
</tr>
<tr>
<td>33</td>
<td>Marc Jones</td>
<td>The Tree Hugger: A Portable NMR Imaging System</td>
</tr>
<tr>
<td>34</td>
<td>Panos Zanos</td>
<td>Persistent Up-Regulation of the Vasopressin Receptors in the Brain Following Chronic Cocaine and Morphine Administration and Withdrawal</td>
</tr>
<tr>
<td>35</td>
<td>Robert Gurney</td>
<td>Designing Thermally-Switchable Pressure-Sensitive Adhesives for Recycling Applications</td>
</tr>
</tbody>
</table>

**Poster Session 2** (Tuesday 31st January at 14:40-15:30 in AP 3 & 4)

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Poster Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>Abdullah Alshammari</td>
<td>Inkjet Printed Silver Electrodes for Organic Thin Film Transistors</td>
</tr>
<tr>
<td>37</td>
<td>Najlaa Almana</td>
<td>The Acute Effects of Resistant Starch on Appetite and Satiety</td>
</tr>
<tr>
<td>38</td>
<td>Emma Wilson</td>
<td>Gamma Spectroscopy of Nuclei in the Vicinity of 208Pb on the Chart of Isotopes</td>
</tr>
<tr>
<td>39</td>
<td>Davis Mpavaenda</td>
<td>A Double Blind Exploratory RCT: Enhancing Cognitive Behaviour Therapy (CBT) with Exposure Response Prevention (ERP) Based Obsessive Compulsive Disorder (OCD) Treatment Outcome - Imagery Rescripting and Reprocessing Therapy Effects on Shame and Cognitive Inflexibility</td>
</tr>
<tr>
<td>40</td>
<td>Salma Al Ahbabi</td>
<td>A Comparison of Protocols for External Beam Radiotherapy Beam Calibrations</td>
</tr>
<tr>
<td>ID</td>
<td>Name</td>
<td>Poster Title</td>
</tr>
<tr>
<td>----</td>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>41</td>
<td>Hussain Hamed</td>
<td>The Role of Intangible Resources (IR) in Improving Quality in Hospitals</td>
</tr>
<tr>
<td>42</td>
<td>Yang Liu</td>
<td>Barrier Properties of Polymers Anticorrosion Coatings, Barrier Properties of Polymers Anticorrosion Coatings</td>
</tr>
<tr>
<td>43</td>
<td>Onyinye Diribe</td>
<td>Development of Rapid Diagnostic Tests for Detection of Antibiotic Resistant Bacteria</td>
</tr>
<tr>
<td>44</td>
<td>Simon Ng</td>
<td>The Determination of the Work Function of Conductive Polymers</td>
</tr>
<tr>
<td>45</td>
<td>Ghalia Shamlan</td>
<td>Examining the Effects of Exercise Intensity on Subsequent Appetite, Food Intake, 24 Hour Blood Pressure and Resting Energy Expenditure</td>
</tr>
<tr>
<td>46</td>
<td>Milos Nedeljkovic</td>
<td>Modulation of Mid-Infrared Light in Group IV Materials</td>
</tr>
<tr>
<td>47</td>
<td>Kaylee Moakes</td>
<td>Modelling the Menstrual Cycle</td>
</tr>
<tr>
<td>48</td>
<td>Siavash Adhami</td>
<td>Failure of a Waterborne Primer Applied to Zinc Coated Steel</td>
</tr>
<tr>
<td>49</td>
<td>Philip Cox</td>
<td>An Interpretative Phenomenological Analysis of the Lifeworld Experiences of a Treatment Day-Centre Attendee</td>
</tr>
<tr>
<td>50</td>
<td>Mingyen Yu</td>
<td>Supply Chain Optimization: Profit Maximization and GHG Minimization on Stover to Ethanol Production</td>
</tr>
<tr>
<td>51</td>
<td>Samantha Salvage</td>
<td>Abnormal Heart Rhythms – Identification of a Fundamental Cause and a Potential Strategy for Their Reversal</td>
</tr>
<tr>
<td>52</td>
<td>Fouad Abolaban</td>
<td>Radiotherapy Treatment Planning Using Cone Beam CT Images</td>
</tr>
<tr>
<td>53</td>
<td>Aryati Ahmad</td>
<td>Does Liver Fat Influence the Plasma Triacylglycerol Response to a High Sugar Diet?</td>
</tr>
<tr>
<td>54</td>
<td>Nicholas Martin</td>
<td>En-Flo Laboratory Showcase of Various Flow Visualisation Techniques in Fluid Dynamics</td>
</tr>
<tr>
<td>55</td>
<td>Ross Milton</td>
<td>Development of an Enzyme-Based Electrochemical Fuel Cell: Optimisation of a High Performance Glucose Oxidase Bioelectrode</td>
</tr>
<tr>
<td>56</td>
<td>Mark Langridge</td>
<td>Manufacture of Optical Components Near Diffraction Limit</td>
</tr>
<tr>
<td>57</td>
<td>Weam Abou Hamdan</td>
<td>Supramolecular Chemistry Can’t Kill the Polluting Ion, but Can Capture It</td>
</tr>
<tr>
<td>58</td>
<td>Alia Ibrahim</td>
<td>Semantic Clustering for Heterogeneous Wireless Sensor Networks</td>
</tr>
<tr>
<td>59</td>
<td>Noraida Omar</td>
<td>Nutritional Status in Older Adults Across Care Settings in Surrey</td>
</tr>
<tr>
<td>60</td>
<td>Atur Siregar</td>
<td>The Effect of Aggregate Grading on Fracture Characteristic of Concrete</td>
</tr>
<tr>
<td>61</td>
<td>Joanna Gough</td>
<td>Semantic Technologies and Translation</td>
</tr>
<tr>
<td>ID</td>
<td>Name</td>
<td>Poster Title</td>
</tr>
<tr>
<td>----</td>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>63</td>
<td>Mina Kalantarzadeh</td>
<td>Assessment of Inhibitory Effect of Heated Wood of Scotch Pine, Japanese Larch and Rhododendron on the Spread of ‘Sudden Oak Death’</td>
</tr>
<tr>
<td>64</td>
<td>Kittiyaporn Singsumphan</td>
<td>Development of TES-Anthracene/Polymer Blends for Laser Applications</td>
</tr>
<tr>
<td>65</td>
<td>Nouf Alkhamees</td>
<td>Lower Limb Surgery After Injury: Does Whether Surgery is Elective or Emergency Make a Difference to the Patient Experience in Saudi Arabia?</td>
</tr>
<tr>
<td>66</td>
<td>Nazli Farajidavar</td>
<td>Transfer Learning for Action Classification in Racket Sports</td>
</tr>
<tr>
<td>67</td>
<td>Mohammad Alenezi</td>
<td>Solution Phase ZnO Nanowires</td>
</tr>
<tr>
<td>68</td>
<td>Ahmad Faizal Abdull Razis</td>
<td>Studies on Glucoraphasatin Extracted from Japanese Radish Kaiware Daikon for Anti-Cancer Agent</td>
</tr>
<tr>
<td>69</td>
<td>Hanan Aldousari</td>
<td>Study the Linear Attenuation Coefficient of the Hydrophilic Materials for Tissue Equivalent Phantoms</td>
</tr>
<tr>
<td>70</td>
<td>Peter Johnson</td>
<td>A Systematic Review of the Social and Economic Risk Factors Associated with Land Degradation in Tropical Developing Countries</td>
</tr>
<tr>
<td>71</td>
<td>Ana Matran</td>
<td>Feature Extraction and Selection for the Classification of Electrocardiogram and Respiration Signals</td>
</tr>
</tbody>
</table>

**Poster Session 3 (Wednesday 1st February at 12:00-13:20 in AP 3 & 4)**

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Poster Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>72</td>
<td>Kendi Muchungi</td>
<td>A Biological Cone Model and Simulator, with Rod-Cone Coupling and Light Adaptation</td>
</tr>
<tr>
<td>73</td>
<td>Jocelyn Spence</td>
<td>Live Digital Storytelling: Performative Experience Design for Autobiographical Storytelling</td>
</tr>
<tr>
<td>74</td>
<td>Syed Ashar Akhtar</td>
<td>Investigation of Two Layer Image Compression Scheme Used by Interactive CAD Teaching System</td>
</tr>
<tr>
<td>75</td>
<td>Thuraya Farhana Haji Said</td>
<td>The Study of the Nature and Practice of New Public Management in Brunei Public Sector</td>
</tr>
<tr>
<td>76</td>
<td>Lara Barazzuol</td>
<td>Combining Radiation with Targeted Therapies in Glioblastoma</td>
</tr>
<tr>
<td>77</td>
<td>Andrew Pringle</td>
<td>Shifting Between Modes of Thought: A Mechanism Underlying Creative Performance?</td>
</tr>
<tr>
<td>78</td>
<td>Miriam Barry</td>
<td>Investigating the Use of Fluorescence Microscopy as a Method of Analysing Phase Delay for Low Dose Particle Irradiations</td>
</tr>
<tr>
<td>79</td>
<td>Aseel Alkhamees</td>
<td>An Investigation of a Rehabilitation Training Programme to Facilitate the Benefits of Hearing Aid Use for Hearing Impaired Adults in Saudi Arabia</td>
</tr>
<tr>
<td>80</td>
<td>Aliyu Dadan-Garba</td>
<td>Assessment of Contamination of Water Sources Due to Human Activities in Kaduna Metropolis, Nigeria</td>
</tr>
<tr>
<td>81</td>
<td>Hannah Farnfield</td>
<td>Arsenic in Hair and Nails from Exposed and Unexposed Regions of Argentina</td>
</tr>
<tr>
<td>ID</td>
<td>Name</td>
<td>Poster Title</td>
</tr>
<tr>
<td>----</td>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>82</td>
<td>Achilleas Sesis</td>
<td>On the Importance of Quantification of Amount of Cavitation During Ultrasonic Dispersion of Carbon Nanotubes</td>
</tr>
<tr>
<td>83</td>
<td>Emma Arbon</td>
<td>Individual Differences in the Response to Sleep Extension and Restriction</td>
</tr>
<tr>
<td>84</td>
<td>Oijai Ongrai</td>
<td>High Temperature Eutectic Cells for Self-Validation of W/Re Thermocouples</td>
</tr>
<tr>
<td>85</td>
<td>Margaret Gompers</td>
<td>The Action of Beta-Adrenoceptors in Brain Addiction Pathways</td>
</tr>
<tr>
<td>86</td>
<td>Paul Farrell</td>
<td>The Effect of Anti-Epileptics/Mood Stabilisers Valproic Acid and SAHA on Glioblastoma Cells</td>
</tr>
<tr>
<td>87</td>
<td>Noura Alasmael</td>
<td>Regulation of Matrix Metalloproteinase by Farnesoid X Receptor in Breast Cancer</td>
</tr>
<tr>
<td>88</td>
<td>Sofia Siddique</td>
<td>Selection of Donor and Acceptor Nanotubes for Energy Transfer</td>
</tr>
<tr>
<td>89</td>
<td>Connie Golsteijn</td>
<td>Materialising and Crafting Treasured Digital Media</td>
</tr>
<tr>
<td>90</td>
<td>Karen Graham</td>
<td>Employment of Dielectrophoresis in Early Diagnosis of Oral Cancer</td>
</tr>
<tr>
<td>91</td>
<td>Stavroula Chrona</td>
<td>Mapping Citizens’ Political Considerations Under the Lens of the Ideological and Political Evolution in Turkey</td>
</tr>
<tr>
<td>92</td>
<td>Piyalap Manakit</td>
<td>Optimal Utilisation of Biomass Feedstocks: A Case Study Based on Rice and Sugar Mills in Thailand</td>
</tr>
<tr>
<td>93</td>
<td>Nathifa Moyo</td>
<td>Characterization of Equine Monocyte-Derived Dendritic Cells</td>
</tr>
<tr>
<td>94</td>
<td>Maryam Aryafar</td>
<td>Multiscale Modelling and Optimisation of Hybrid Desalination</td>
</tr>
<tr>
<td>95</td>
<td>Florence Lee Chi Hiong</td>
<td>Attachment of MS2 and ØX174 on Clay Minerals</td>
</tr>
<tr>
<td>96</td>
<td>Foivos Markoulidis</td>
<td>Supercapacitors: Materials, Fabrication &amp; Testing</td>
</tr>
<tr>
<td>97</td>
<td>Jaspreet Kaur Sihra</td>
<td>Chemical Constituents from the Southern African Hyacinthaceae Family</td>
</tr>
<tr>
<td>98</td>
<td>Erin Henslee</td>
<td>Dielectrophoretic Spheroid Formation of Breast Tumour Cells for Clinical and Biomedical Research</td>
</tr>
<tr>
<td>99</td>
<td>Céline Rojon</td>
<td>What Constitutes Individual Workplace Performance? Towards a New Generic Model</td>
</tr>
<tr>
<td>100</td>
<td>Shumaila Babar</td>
<td>A Surface Chemistry Study of Etching and Passivation Treatments for Cadmium Zinc Telluride (CdZnTe) Radiation Detectors</td>
</tr>
</tbody>
</table>
ORAL PRESENTATION ABSTRACTS
The Isolation and Total Synthesis of Compounds from the Hyacinthaceae Family and Their Anti-Inflammatory Activity

*Catherine Waller, Prof. D.A. Mulholland*

Natural products are an important starting point for pharmaceuticals. It is thought that over 25% of prescribed medicines have been derived from a natural product. This is not including the natural products that are used in developing countries in ethnomedicine. Using a plant family well-known for its use in ethnomedicine within Africa, the Hyacinthaceae, this study focuses on isolating biologically active compounds and testing them for their anti-inflammatory capabilities using the cyclo-oxygenase enzyme.

From two plants, Ledebouria socialis and Ledebouria ovatifolia, 32 compounds (9 novel) were isolated and tested against two isoforms of cyclooxygenase, COX-1 and COX-2. Another compound (E)-hinokiresinol was synthesised and also tested. Of these, five were found to be active against COX-2, and two were found to be selective for COX-2. Selective COX-2 inhibitors are important drug targets as they also have anti-tumour properties.

IC50’s are in the 1µM range, comparable to trans-resvertrol - a marketed non-selective COX inhibitor with an IC50 of 1.2µM.
I Need Therapy, You Need Therapy, We All Need Therapy

*Miltos Hadjiosif, Dr Adrian Coyle, Dr Riccardo Draghi-Lorenz*

Psychotherapy has received a plethora of descriptions within academia and healthcare settings. Despite prominent interdisciplinary debates struggling to consolidate psychotherapy’s status as an art or a science, there has been very little research into the ways it is talked about in popular culture and therefore, to some extent, understood by lay people. The present study investigates how psychotherapy gets constructed in the lyrics of popular songs in an attempt to tease out the vocabularies that are set in motion by the appearance of the category ‘therapy’ as well as related terms in popular music discourse. A critical discourse analysis method was applied to 23 songs suggested by a pool of music industry executives. Three broad themes were discerned from analytic engagement with the data: “Banal therapy”, the “non-therapeutic relationship” and “power to the client”. How are these implicated within the wider context of popular culture? What do they signify for therapists, as well as clients who have no first-hand experience of psychotherapy? Do we all really need therapy? These are some of the questions we will reflect on in the light of representations of psychotherapy in pop music.
Supercapacitors for Vehicle Applications: Benefits and Future Perspectives

Alberto Santucci, Aldo Sorniotti

Supercapacitors for automotive applications represent one of the most promising vehicle research areas in academia and industry. However, despite a flourishing research activity focused on the development of new materials for these devices, an objective evaluation of the potential benefits deriving from the next generations of supercapacitors is still missing. This contribution, in the frame of the European FP7 AUTOSUPERCAP project, will investigate, through a detailed simulation model, the potential adoption of high specification supercapacitors for Full Electric Vehicles and Mini-Hybrid Vehicles (Stop & Start application). A wide range of conventional and experimental driving cycles will permit the assessment of the energy efficiency benefit, together with the reduction of the battery workload, with the subsequent increase of its lifetime. The results, obtained in collaboration with a vehicle manufacturer and a Tier 1 supplier, will be discussed in detail and critically analysed. Finally, the conclusions will outline the future perspectives of supercapacitors for automotive applications.
A Sociological Study on the Practices and Process of Investigative Interviewing in England and Wales

Fiona Wadie, Professor Nigel Fielding, Dr Karen Bullock

This paper draws on a doctoral research project into the role of investigative interviewing by police in England and Wales. A key aim of the research is to explore how theories of investigative interviewing are operationalised by police officers in their day-to-day work; looking at how theory is put into practice. Although it is clear that research is increasingly being utilised by policy-makers, there is a need to explore how this research is used by other members of the police organisation.

Whilst previous research into investigative interviewing has been largely dominated by the psychological discipline, this project uses an under-employed methodology of qualitative semi-structured interviews with police officers; trainers; and national interview advisors, to explore the uses of investigative interviewing. Using this method will facilitate a more in-depth understanding of the opinions of those working in the field using the investigative interview techniques and the practices and processes involved.

This paper will primarily focus on how officers use legislation and guidance when interviewing suspects, witnesses and victims, and what has shaped these practices. It will also consider how research is utilised within the training structure.
An Overview of a Low Carbon Transition: Transitioning the Domestic Sector via Microgeneration

Rehan Khodabuccus, Dr J Lee, Dr K Burningham

The need to abate carbon emissions from the domestic sector is an essential component of a low carbon UK; however it requires substantial socio-technical changes to domestic energy production and consumption. Socio-technical change theory views the current carbon intensive infrastructure as stable and this creates many practical problems to replacing it with a new low carbon one. This presentation gives an overview of the problems for an alternative energy infrastructure based on zero carbon housing designs, which use niche market low carbon technologies. It then identifies how best to integrate them into commercial house building practice.

The presentation is divided into three parts; the first part summarises a critical review of socio-technical change theory, the second part introduces a transitional framework, and the final part focuses on the identification of key issues and pertinent social research questions. What is identified is that based on current policy infrastructure, technical viability and market pricing, price based barriers are dominant in the market. What is also identified is that these can be overcome with significant economic and political will. It concludes by noting that other key socio-technical factors are just as pertinent and but ways of overcoming these are still poorly understood.
Reviewing entrepreneurial motivation generates an insight into entrepreneurs as individuals and entrepreneurship as a process. Encouraging positive entrepreneurial motives as opposed to unproductive or destructive motives (Baumol, 1990) can affect the growth and development of an economy. Previous research has discovered that many factors encourage entrepreneurship. Profit opportunity was the factor first assumed to effect an increase in the supply of entrepreneurs, although more recent scholars believe that money is not necessarily now the most important motive. Research has therefore extended into the fields of psychology and sociology to generate different perspectives. Recently, research in the tourism and hospitality industries has revealed that entrepreneurs here are also driven by lifestyle motives which might supersede the economic incentives. There is debate therefore as to whether economic incentives in fact still apply for these entrepreneurs. Entrepreneurial motivation not only affects the policies for encouraging individual to become entrepreneurs, but it also affects how the businesses once started are operated and managed strategically. Recognising the variety of factors that motivate individuals to become entrepreneurs raises important questions of whether the psychological and sociological perspectives can subvert the position of the dominant economic logic.
Molecular Motor Models

*Neville Boon, Dr Rebecca Hoyle*

Molecular motors are nano-scale (very small) proteins that exist within biological cells. They use the energy produced from a chemical reaction to move. Myosin-V is one such example, moving along linear tracks and typically transporting a variety of cargoes around the cell. It achieves this by walking hand-over-hand along the track, passing through a sequence of biochemical reactions and mechanical motions, taking several successive steps before detaching.

The exact nature of how these types of protein step remains unresolved as the very small is difficult to measure. However, some experimental quantities can be observed such as the average velocity of the molecules against varying cellular conditions. Our work focuses on theoretical methods to extract more information - such as how the molecule steps - from these experimental results.

Mathematical methods which use experimental evidence to determine the parameters of stepping models are discussed. Improvements on existing methods are presented. Methods for assessing the degree to which each model can reproduce the experimental evidence are introduced. A novel quantitative analysis of competing stepping models and their agreement with experimental results is also discussed.
Emotional Responses to Multiple Sclerosis: A Pluralistic Qualitative Exploration of Idiographic Experiences

Bridget Jones, Dr Victoria Senior, Dr Adrian Coyle

Background
Multiple sclerosis (MS) is a fluctuating, unpredictable and life-long condition, which is varyingly progressive and untreatable. Symptom management is good but evidence indicates poor psychological adjustment with anxiety, fear, shame and emotional identity change.

Aims
To explore participants' emotional responses expressed in accounts of personal experiences of diagnosis and living with MS.

Method
Eleven participants from the Multiple Sclerosis Therapy Group participated in 1¼ – 1½ hour semi-structured interviews. Interviews were transcribed verbatim. Data were analysed using pluralistic narrative analysis. Firstly, pivotal emotional experiences were defined and extracted using structural narrative analysis (Labov, 1972). Secondly, analysis of linguistic characteristics revealed latent as well as semantic aspects (Gee, 1991). Finally, reflective analysis of the researcher's contribution completed the pluralistic exploration.

Findings
Past, present and future-orientated emotions, fluctuating in type and intensity, were defined by four overarching themes: Emotional isolation; Future-orientated fear; Resentment; and Influence of prior emotions.

This presentation focuses on emotional isolation – self selected or socially inflicted – as it hindered psychological wellbeing. Emotional isolation could become a personal burden that was not necessarily linked with social isolation. This finding provides a basis for interventions to promote adjustment to, and coping with, MS.
The Three Myths of the United States Constitution. How the Individual Mandate has Exposed the Mythological Nature of Federalism Through a Misconstruction of American Federalism

*Jamie Fletcher, Dr Jane Marriott*

The debate surrounding the constitutionality of President Obama's flagship legislation, the Affordable Care Act, and more specifically the individual mandate contained within that legislation, has exposed a partisan divide within American constitutionalism. The debate and jurisprudence that has occurred across the United States over the last twenty four months has shown how three vastly different visions of American federalism have developed with constitutional analysis. Through reading the recent District Court and Appeal Court opinions it can be shown that these three schools of thought are largely built on ideological myths and misconstruction of jurisprudence. A more objective analysis of the issue is required that properly considers the intellectual merits, historical roots and constitutional acceptance of all three schools of thought. Only once this has occurred will constitutional analysis of the individual mandate properly respect the job of the Commerce Clause and its constitutional necessity. This paper will propose that all three of these theories; the national, states right, and individual liberty theories of federalism cannot exist independently of each other. Only when taken together and contextualised with each other can these theories be used effectively in constitutional analysis, to explain previous jurisprudence and outline a blueprint for the future.
Arsenic is considered to be a toxic element under certain environmental conditions which can cause severe health problems. Cyprus, a beautiful island in the Mediterranean, has never had any arsenic contamination issues until a routine check of a small village's water supply showed elevated levels of arsenic in local well water. In collaboration with the State General Laboratory (SGL) in Cyprus, the University of Surrey has undertaken an investigation and collected water, soil, stones from the boreholes and poultry manure samples from the contaminated area to examine and find the source of the arsenic contamination. The arsenic contamination seemed to be located only in a few boreholes with values above the safe guideline of 10 μg/l As set by the World Health Organisation (WHO). Soil samples were found to not be contaminated compared with literature data from other countries and data suggested that the poultry manure and borehole stones might have been a contributing factor for the high arsenic levels in ground water. Arsenic speciation analysis confirmed that the main As forms were As5+ and little evidence of methylation. Future studies are necessary to investigate the impact and the possible pathway of arsenic from source into humans and animals.
Forensic Fingerprint Analysis – Unmasking Overlapping Fingerprints and Inks

Nicholas Bright, Karen Kirkby, Melanie Bailey, Roger Webb, Neil Ward

Police and forensic scientists frequently need to establish whether a fingerprint found on a paper document was deposited before or after any ink/text e.g. those found on a potentially fake suicide note. A suspect could simply claim they handled the paper before the text was written and had no knowledge of the text. If police can prove the suspect is lying about one thing it will lead to the rest of their testimony being discredited. Despite rapid advances in fingerprint development technologies over the last decade, it is not possible to confirm the deposition order of a fingerprint and text on a document using current methodologies.

In this work Secondary Ion Mass Spectrometry (SIMS) was used to investigate the molecular composition of the surface of the documents and to attempt to determine the deposition order of fingerprints and ink. This work is of huge value to the forensic and archaeological community as this is just one way in which surface mass spectrometry can be used for analysing samples - not to mention helping proving someone’s guilt or innocence.
Determining the Contribution of the Firearm to the Elemental Composition of Gunshot Residue Using Ion Beam Analysis

Matthew Christopher, Prof. Karen J. Kirkby, Dr Melanie J Bailey, Prof. Neil I. Ward

Ion Beam Analysis (IBA) consists of a suite of techniques that offer non-destructive, highly sensitive analysis of a huge range of materials. Using both photon emission and particle backscattering spectroscopy, elemental composition analyses can be performed with higher sensitivity and greater discriminatory power than SEM-EDX, the technique currently used by forensic practitioners for the analysis of gunshot residue1.

In theory, IBA could be used to set up a classification system that goes beyond the discriminatory power between different types of ammunition currently available to forensic service providers. However, before such a system could be devised, it is important to consider the contribution of the firearm to the elemental composition of GSR at trace level. If that contribution was found to be large, it could severely reduce the value of a classification system. GSR was collected from shooters that fired the same ammunition from a number of different firearms, and subsequently analysed by IBA. Elemental composition results show no major effect from the firearm on GSR composition, meaning that an attempt to classify GSR using IBA is worthwhile.
Planes, Trains and Automobiles: Characterisation and Novel Toughening Techniques of Benzoxazine Polymers

Lisa McNamara, Dr Ian Hamerton, Dr Brendan Howlin, Dr Gabriel Cavalli, Prof. Paul Smith

Heat resistant, mechanically tough and lightweight polymers have been in demand over the last few decades for high-speed aircraft structures and structural components of aerospace structures and vehicles. The polymers of interest in this work are polybenzoxazines (PBZ) and are a relatively new class of polymeric resins, which have many beneficial properties for such applications, such as low moisture absorption and good mechanical strength, but at a lower cost than many competitor resins. However PBZ tend to be brittle, limiting their application in structural components. The polymerisation reaction of a range of commercial PBZ has been investigated using various techniques including thermal and spectroscopic analysis. Many factors, such as the presence of initiator and the purity of the monomer influence the polymerisation reaction and network formation of the polymer, leading to different physical properties. The knowledge gained about the nature of the polymerisation reaction and the resulting structure property relationships in the pure resin can in turn be applied to develop the best toughening regime for these polymers for application in the aerospace industry.
From Quantum Tricks to Quantum Computing

Ellis Bowyer, Prof. B. Murdin, Dr S. Clowes

In the quantum world things can behave in strange ways. Whereas in the classical world around us things can be described as particles or waves, as you shrink down in size these boundaries start to blur and unexpected phenomenon are seen. Electrons can spread out into two different places while light particles can counted. The even stranger fact is that how the particles are observed will determine what sorts of properties are seen: look for a particle you will see a particle but look for a wave and you will see a wave.

These strange properties of the quantum world are what allow quantum computing. The 0s and 1s of modern computers are mixed together to carry out many calculations at once to drastically reduce the time needed for some a variety of problems.

This presentation looks to explain some of the features of the quantum world and the tricks can be done; show how the building blocks of a quantum computer can be formed and try and explain how a cat can be both alive and death at the same time.
Kinematic Analysis of Submarining in Older Children

Barbara Girard, Srdjan Cirovic

The law requires children to seat in Child Restraint Systems (CRSs) in cars. This helps with protecting the child should an accident occur. However the CRSs themselves can also lead to injuries. Such injuries can be the consequence of what is called submarining. Submarining consists in a complex torso-pelvis motion where the seat belt can cause injuries especially if it loads the abdomen.

CRS are tested for ability to protect the child during a crash using dynamic sled tests. A sled is accelerated and stopped suddenly to mimic a crash. As part of a European funded project (EPOCH), our research looked at the possibility of pointing out when submarining occurs in these tests. We analysed the motion of the dummy as well as the recordings from sensors within the dummy. Based on these we found that there were potential novel criteria to be used for assessment of submarining.
Environmental Monitoring of Geothermal Waters in New Zealand

Gillian Lord, Prof. Neil I. Ward

Environmental monitoring is an important area of research in terms of the relationship between environmental contamination and human health outcomes. Contamination with elements such as arsenic, lead and mercury, directly affects the quality of the environment and may contribute to health issues. A major source of elemental contamination to the environment of New Zealand arises due to the volcanic and geothermal settings in the country. Geothermal water discharges have a direct influence on the elemental content in some surface waters and can be used as a sample matrix for monitoring purposes. In collaboration with the Environment Waikato Regional Council, geothermal water samples from the Taupo Volcanic Zone of New Zealand were analysed for total elemental content. Elevated arsenic concentrations were observed across the region, with three features revealing arsenic levels ~900 times the WHO Drinking Water Limit of 0.010 mg/l As. Analysis of arsenic forms showed that inorganic arsenic species predominate in these waters and that arsenite (AsIII) - the more toxic inorganic arsenic species, contributes to a higher percentage of total arsenic in most samples. Future research will compare these geothermal studies in New Zealand with geothermal waters in Argentina and the implications towards local water consumption and health.
Dynamic Analysis of Railway Bridges for Robustness Evaluation

*Nurul Fadzlina Yahya, Dr Boulent Imam, Prof. Marios Chryssanthopoulos*

With the passage of time, the design and maintenance of metallic bridges attracts more focus from structural engineers. It is often required to forecast the root cause of failure events and their effect on the overall bridge response. There have been many bridges in the past that have deteriorated or have been damaged by external effects having an adverse effect to their behaviour. There is also a need to develop a framework for the quantification of robustness in bridge structures. This study concerns a typical metallic railway truss bridge. Two types of analyses have been carried out, a linear static finite element analyses under different modelling and damage scenarios and a modal analysis to determine the fundamental dynamic properties of the bridge. The purpose of these analyses was to identify the most efficient modelling assumptions for representing the behaviour of the bridge under railway loading and to investigate the response of the bridge under different damage scenarios in the form of element removals. The work so far serves as a first step towards developing more refined bridge models for dynamic analysis to quantify the effects of different damage scenarios on the structural integrity and robustness of the analysed bridge through non-linear analysis.
How Does Norovirus Enter Host Cells?

Nicole Doyle, Prof. Lisa Roberts

Viruses are one of the simplest forms of life on Earth; they simply consist of nucleic acid material (or their genome) enclosed in a protein shell. Because of this simplicity, they need to infect a living cell in order to replicate. One of the first stages of a virus infecting a cell is to enter the cell – a process called endocytosis. Endocytosis is a complicated process and involves many possible pathways of entry into the cell. I’m interested in how a particular virus, norovirus, gains entry into cells. Norovirus causes gastroenteritis (diarrhoea and projectile vomiting) in humans, commonly the cause of outbreaks on cruise ships and in hospitals which costs the NHS millions of pounds. To study the endocytosis of this virus, we use inhibitors of some of the pathways to investigate which route norovirus uses to enter cells. Using this information, we could potentially prevent the virus entering cells and therefore design new antiviral drugs.
A Motion Prediction Framework for Reducing the Planing Target Volume Margin in Radiotherapy

Rangika Bernadette Abeygunasekera, Dr Kevin Wells, Dr Emma Lewis

External beam radiotherapy is a method that is widely used in treating tumours in cancer patients. Image acquisition methods such as (4DCT) and (CBCT) are used frequently when planning and delivering treatment strategies. However, patients’ involuntary movements such as respiratory motion cause ambiguities (blurriness, etc ...) when locating tumours in these scanned images. These aforementioned ambiguities in tumour location could lead to higher dosed treatment plans. This could be highly undesirable for the patients, as it will easily damage healthy tissues around the tumour as well. When estimating the tumour motion, two main problems that occur needs to be taken into account. First, the tumour movement as the patient breathes and second, the delay in the time needed for the treatment delivery system (usually a linear accelerator) to move and produce a beam profile that conforms to the treatment plan at a particular angle. This means that ideally the patient’s internal organ configuration should be dynamically predicted in order to minimize treating normal tissue at the tumour margin.

We propose that a dynamic CT volume (one breathing cycle) was used to determine a patient specific motion model by using iterative registration methods to determine the transformation parameters to locate the tumour and its movements. Therefore, when the treatment beams hit the patient during radiotherapy the tumour position can then be determined and targeted within ±3mm from the CTV-PTV margin in any direction which accounts for geometric errors in treatment planning. As a consequence, reduces the overall CTV-PTV margin of error in tumour motion considering imperceptible penetration, which leads to reduced patient’s dose in the treatment plan. The proposed method is also concomitant in finding the correlation of chest and tumour motion in radiotherapy.
Audio Description & Semiotics: Translating Film Symbolism for Visually-Impaired Audiences

Frances McGonigle, Prof. Margaret Rogers, Dr Sabine Braun

A function of audio description (AD) is to make audio-visual media accessible to visually-impaired people. Guidelines for writing and voicing descriptions for different audiences and 'genres' are available to audio describers(1), but outside the scope of these guidelines, since they are aimed at television access, is an exploration of how visual scenes are put together in films. As a consequence, the AD of artistic elements in film, such as symbolism, is ad-hoc and often overlooked.

Using semiotics to understand symbolism and applying this to media translation, my study investigates if and how symbolism can be audio-described, and whether this type of AD can contribute to meanings that can be successfully constructed by target audiences. As Eco states: “Every semiotic device can be used, if not from the point of view of the sender, at least from the point of view of the interpreter, in order to actualize further meanings”(2), which leads to the question of whether visually-impaired audiences can actualise further meanings from the AD of film symbolism.

Beginning with a brief outline of the theory underpinning this research, this presentation will discuss some of the findings from a qualitative study into the AD of symbolism from 30 popular films.
The Development of Polymer Electrolytes for Fuel Cells

Sam Murphy, Dr John R Varcoe

Due to rising fuel prices and mounting concern about CO2 emissions, increased investment and focus has been placed on the development of electric vehicles. Inherently, battery-powered electric vehicles are limited in range and recharge rate, which will severely limit market penetration. Fuel cells could alleviate this, because rather than requiring a lengthy recharging period, you could simply refuel in a similar way to today's petrol vehicles.

Novel alkaline anion exchange membrane (AAEM) fuel cells are being developed at Surrey. These currently are formed with a stable polymer back-bone and functional groups for the conduction of hydroxide anions from the cathode to the anode in a fuel cell. The hydroxide anions are formed at the cathode from the reduction of oxygen with water. After travelling through the AAEM, these hydroxide anions react with hydrogen at the anode to form water and an electron; the electron flows around a connecting circuit to the cathode, yielding an electrical current.

The research has involved adding various amine functional groups onto the polymer back-bone in an attempt to enhance the AAEM's ability to conduct hydroxide anions, thus, improving the performance of a fuel cell. To accurately analyse the AAEMs, there has been further development on existing techniques to quantitatively measure the content of useful functional groups, complicated by the presence of similar, but “inactive”, groups.
Learner Autonomy in Interpreter Training: The Role of Spoken Corpora

Richard Bale, Prof. Margaret Rogers, Dr Sabine Braun

Autonomous learning is an elusive concept, and it can be difficult to observe whether a student is learning in an autonomous way. According to Little (1995: 175), “[t]he basis of learner autonomy is that the learner accepts responsibility for his or her learning.” This means that students must be proactive and reflective in their learning, and they must be able to identify knowledge gaps and seek methods to fill such gaps. This is of particular importance in interpreting, since interpreters must continue to learn and supplement their knowledge throughout their career.

In language pedagogy, it has been claimed that learner autonomy can be promoted through the use of corpora – electronic banks of texts in written or spoken format. One benefit of corpora is that they provide an abundance of texts and resources that can be exploited independently.

Moving from language pedagogy, it is also suggested that students should be encouraged to become more autonomous in interpreter training. This paper outlines a study which was conducted with undergraduate interpreting students to explore how spoken corpora can be used to promote learner autonomy. It concludes with the suggestion that spoken corpora can provide useful resources for the implementation of student-led interpreter training.
Predicting Badly Behaved Brain Tumours with a MiNiMUS of Fuss

Adam Cole, Dr Norman Kirkby, Prof. Karen Kirkby, Dr Raj Jena

In 2008, 30% of all deaths in the UK were attributed to cancer. Glioblastoma Multiforme (GBM) is one of the most aggressive forms of brain tumours. With supportive treatment median survival times are around 14 weeks, rising to 9-12 months with aggressive treatment.

Effectiveness of radiation treatment is assessed by treating cells and letting them then grow into colonies, known as a clonogenic survival assay.

Issues arise with cell lines that don't readily form colonies or are extremely slow growing such as GBM cell lines. Another method of analysis is to use micronuclei frequency as this is a rapid way of collecting results. Micronuclei as a result of ionising radiation form when fragments of DNA broken away from chromosomes during irradiation are not pulled into either of the two nuclei when the cell divides.

MiNiMUS is a model that aims to predict the numbers of these micronuclei. It is based on a decision tree with Monte Carlo sampling where the ultimate question is: will a double strand break form a micronucleus? It is currently the only known model of micronuclei formation based on fundamental science.

The MiNiMUS model is the newest of a host of biophysical models from the medical applications (of ion beams) group based in the ATI. The next steps are to validate parts of the decision tree experimentally.
South Asian Women have Denser but Smaller Tibia (Lower Leg) bones than Caucasian women, Contributing to a Reduced Bone Strength.

Andrea Darling, Professor Susan Lanham-New, Professor Sara Arber, Professor Debra Skene, Dr Kathryn Hart

There is a lack of research into the bone structure of South Asian females. This work is novel in examining bone structure in older South Asian women and how it compares to same age Caucasians. A pQCT scan (a form of X-ray), was undertaken of the lower leg (tibia) in fifty-seven South Asian and Caucasian women. This measured the size of each bone (cross sectional area) and the densities of the cortex (outer) and trabecular (inner) bone layers. Estimated bone strength was then computed using these measurements.

Basic statistical tests showed that despite similar bone length, Asians on average had narrower bones (smaller cross sectional area) than did Caucasians. Asian tibia bone was also denser, including a denser cortex, but not a denser trabecular layer. Calculated fracture load (amount of force required to break the bone) of the bone was lowest in Asians, meaning the bone was easier to break. This finding is important for health as it suggests South Asians have a bone structure which may lead to more chance of a fracture with ageing. Further statistical analysis is underway to assess the physical, dietary and lifestyle factors that may be influencing these differences in bone structures by ethnicity.

The repeat D-FINES study was funded by a joint University of Surrey FHMS-FAHS Faculty studentship awarded to AD.
Annotated Sketches for Intuitive Video Retrieval

Stuart James, Dr John Collomosse, Dr Krystian Mikolajczyk

Free-hand sketch provides a natural and expressive modality for interaction with computers. This project explores methods to intuitively search video databases using sketches. Although video search is typically performed using keywords that specify content, text is cumbersome for describing scene appearance. Rather, a sketched depiction of a scene represents an orthogonal channel to constrain search. Although sketch based image retrieval (SBIR) has received much attention, the related problem of video retrieval (SBVR) is only sparsely researched – especially the fusion of text and sketch.

Building upon prior SBIR (Hu, 2011, ICIP) and SBVR (Collomosse, 2009, ICCV) we describe results from such a hybrid system. Our sketches describe objects based on their semantics (e.g. horse), a sketch of their motion trajectory, and their colour; collectively representing a natural interface for conveying multiple facets of events. A “fingerprint” (descriptor) is extracted for each object; descriptors are matched to identify relevant videos.

Our results show annotated sketches retrieving clips from a database of sports footage. Natural user interfaces such as sketch will have significant impact in the near-term, given the trend toward non-classical platforms such as tablet, mobile and large-scale touch-screen devices. SBVR also motivates cross-disciplinary studies of user perception and depiction of event.
Sex, Pies and Publishing Blogs: Exploring the Boundaries of Humour and the Erotic

Tim Miles, Dr Rosina Marquez-Reiter, Dr Matt Wagner

What is the relationship between humour and the erotic? Is the best way to get someone into bed to make them laugh? If so, can this be explained best in psychological or neuro-scientific ways? This paper explores the development of a model that seeks to begin to answer these, and other, questions, from its inception at a chance meeting, to an interactive Surrey University blog, and, finally, to a published academic article. The paper explores a wide-range of cultural texts (from Joyce's Ulysses to Carry on Camping), as well as looking at theory from the post-modern philosopher, Jean Baudrillard, and the humour theorist, Henri Bergson. Contemporary current affairs are also considered including, for example, the Danish film director, Lars Von Trien's, 'joke' about being a Nazi at the 2010 Cannes film festival: are there some areas which are just no laughing matter? If so, can this also be applied to areas of human sexuality?
Removing the Pest from Pesticides and the Bite from Metabolites

Oliver Webb, Prof. A. F. Danil de Namor

Advances in chemistry have led to the production of pharmaceuticals and pesticides which have allowed for increased longevity in both man and plants. Despite that each of these chemicals fulfil their roles, their release into the ecosystem has resulted in widespread contamination of water bodies. Through the development of suitable receptors, attempts have been made for their removal from water. In doing so modified calix[4]arenes (host) have been anchored to silicates and used efficiently for the removal of obsolete pesticides (guests) from water [1]. As far as pharmaceutical guests are concerned several host receptors [2] have been designed, synthesised and characterised taking into account the speciation of the pollutant in solution (neutral or ionic). Several techniques were used to establish the presence of host-guest interactions in solution and the extraction process has been investigated under different experimental conditions to optimise the removal of these pollutants from water. The presentation will be illustrated with representative examples to demonstrate the scope of Supramolecular Chemistry in the environmental field.
Assimilation of Vertical Motion from Cloudy Satellite Imagery

Matthew Wakeling, Ian Roulstone, Sue Hughes, John Eyre

Forecasting the weather requires an accurate and detailed description of the current state of the atmosphere. Data is collected from multiple sources, including weather stations and satellite imagery, and processed to produce values such as temperature, humidity, and horizontal wind. However, there is currently no mechanism to measure vertical motion in the atmosphere. In the case of severe storms, there is a rapid build-up of cloud visible in satellite imagery, which can only be explained by upwards motion. This research investigates the feasibility of using 4D-Var Data Assimilation techniques that process a sequence of images as a whole to retrieve a value for vertical motion. A simplified computer model of the atmosphere is used to simulate the effect of vertical motion on a column of air and on the corresponding satellite observation. The simulated observations over time are compared against possible profiles, and a minimisation algorithm used to find the best match. Results are presented showing how this method needs only minor adjustments to be successful at discovering both humidity and vertical motion values.
Bone defects are one of the main causes of long-term pain. Traditional bone grafts used by surgeons for bone repair are fraught with limitations ranging from rejection by the immune system to insufficient supply. Electrospinning, a novel fibre fabrication method, has been employed by some researchers to produce gelatin-hydroxyapatite scaffolds to serve as templates for bone formation outside the body. However, the effects of processing conditions such as the applied voltage and the hydroxyapatite content on the resulting scaffold properties that are vital for bone tissue growth and subsequent integration with the existing bone at the defect site have not been thoroughly investigated. This study investigates the effects of applied voltage, hydroxyapatite content and crosslinking time on the fibre diameter, pore size, porosity, water stability and mechanical strength of gelatin-hydroxyapatite scaffolds and how they could be tailored to produce scaffolds with optimal properties for bone tissue formation. The results of this study reveal a pattern in the scaffold properties in relation to the processing conditions. The next stage of this study is to grow bone cells on the scaffolds, observing how the various properties affect bone cell growth and determining how to optimise bone formation.
Monetary Policy and Banking Regulation: Is There a Conflict of Interests?

Diana Lima, Professor Paul Levine, Dr Ioannis Lazopoulos

The institutional mandates between monetary policy and banking regulation remain an open-ended question in academic literature. There are strong arguments for and against separation and therefore it is difficult to find a theoretical answer to the question of what would be the most efficient institutional mandate concerning social welfare.

The objective of this paper is to assess empirically the theoretical argument of “conflict of interests”, which claims that institutional mandates of central banks have an important impact on inflation outcomes in the advanced industrialised countries. Particularly, a central bank that is simultaneously responsible for monetary policy and banking regulation will be more flexible in its inflation mandate, if it fears that tight monetary conditions may cause bank failures. Under these circumstances, it is likely that flexibility in guiding monetary policy will lead to an inflation bias. Conversely, a central bank entitled only for monetary policy will just focus on the maintenance of price stability and, hence, inflation bias will not occur.

We perform an econometric analysis using panel data, for 25 industrialised countries from 1975 to 2007. In our regression model, we seek to explain the behaviour of the inflation rate by the country’s institutional mandate (separate or combined), among a number of other explanatory variables.
Redox Flow Batteries: Making Renewable Energy Viable

Sarah Mallinson, Prof. R.C.T. Slade

With the increasing cost and lack of supply of non-renewable energy supplies, such as coal, oil and gas, more research has focused on alternative renewable energy sources. The intermittency of renewable energy sources is a major issue. Energy storage provides the solution by allowing excess energy (produced during optimum conditions) to be stored until it is required or facilitates load levelling for maintaining constant power output.

The all-vanadium redox flow battery (RFB) involves the electrochemical reaction of the two redox couples; vanadium $2^+ / 3^+$ and $4^+ / 5^+$, dissolved in an electrolyte (sulfuric acid) which are flowed through the cell. The energy output of the cell is related to the volume and concentration of the electrolyte. The cell is split into two halves each containing an electrode and a current collector, separated by an ion-exchange membrane. RFBs are capable of long life cycles, quick response times and no gas emissions.

This new area of energy storage at The University of Surrey involves; the synthesis of novel ion-exchange membranes to alleviate potential problems associated with vanadium ion crossover, additional development of the electrolyte via increasing vanadium concentration and modification of the electrodes, will all potentially improve overall cell efficiency.
Pilot Perspectives on the Performance of the Surrey Virtual Reality System

Mohammad Al-Amri, Dr David Ewins, Dr Daniel Abasolo, Dr Salim Ghoussayni

There is a need to consider a new framework for the development of virtual rehabilitation systems that are suitable for routine clinical use. With this in mind, a three-dimensional virtual reality (VR) system - the Surrey Virtual Reality System (SVRS) - that has been developed at the Centre for Biomedical Engineering, with the aim to be used as part of a rehabilitation programme for children with cerebral palsy (CP). Prior to the use of the SVRS with children with CP, opinions on the SVRS were gathered from 13 young adults aged between 19 and 25. The young adults were invited to review static 3D images and then to interact with two VR scenarios. They were then asked to walk on a treadmill at a number of self-selected and self-controlled walking speeds. During the tests, each participant answered a questionnaire that provided feedback on the SVRS and its practicality. The analysis of their opinions shows that the young adults were satisfied with the quality of the SVRS presentation. The results also show the feasibility of an algorithm for a self-controlled treadmill speed based on kinematic marker data with minimal encumbrance to the subject. All the users who used the SVRS were satisfied with the performance and the safety of the SVRS. In conclusion, the SVRS appears to provide a safe and visually acceptable virtual training environment.
Automated Detection of Cancerous Cell Nuclei in Microscopic Images

Violet Snell, Prof. J Kittler, Dr W Christmas

Cancer starts with certain genetic mutations, in a process called oncogenesis. One of the most advanced methods for early detection of these chromosomal abnormalities involves microscopic examination of cell nuclei from a tissue sample. Special stains allow visualisation of DNA distribution within the nucleus, as well as pin-pointing the location and number of cancer-related genes. A typical sample will contain many thousands of cells, only a few of which may be abnormal in early stages of the disease. This makes examination of every nucleus by a human expert into a prohibitively expensive and error-prone process. This paper describes the use of machine learning and computer vision methods such as shape and texture analysis to automate the detection of appearance changes caused by the faulty gene. By training the computer to identify cells that are most likely to be abnormal, we can save many hours of a pathologist's time, as well as reduce the risk of missed diagnosis.
It was first discovered that smoking can be detrimental to health in 1950 (Doll & Hill) but it was not until 2007 that this knowledge led to a public smoking ban in the United Kingdom. There were a number of policy changes within those years around tobacco advertising. What lead to these changes and to the eventual complete public smoking ban? A chronological analysis of media advertising was conducted in order to help to answer this question. 240 advertisements between 1950 and 2007, 40 from each decade, were analysed using content analysis and coded in terms of who they were aimed at, how they promoted their product, the medium used and their content. Differences were seen throughout the decades in the methods used by manufacturers. The analysis also revealed both differences and similarities in the methods used by anti-smoking and pro-smoking advertisers. The next study aims to build on the first study and further answer the research question by conducting a chronological analysis of the scientific research. It is important to understand this area in the current economic climate with large amounts of money currently being spent on both advertising and research; which has the biggest impact?
On the Natural Selection of Apoptosis

Aasis Vinayak, André Grüning

Why apoptosis (programmed cell death) occurs in a large number of species including human beings? Why natural selection favoured organisms that naturally die? There are two fundamental questions in quantitative biology that remains unanswered. In this paper we show how our attempts could possibly lead to answering these questions. In our model, ageing occurs as a result of a deterministic process which could be shown as a good approximation of the underlying stochastic accumulation of ageing factors. We further demonstrate that system reliability theory can be used to qualitatively explain the old-age levelling-off of mortality rate.

Ageing and apoptosis in yeast is chosen as a standard model. Computer simulations and numerical analysis based on population dynamics, Reliability theory, matrix representation and Game theory are used to support the argument. Finally, using these models we prove that natural selection is likely to favour the organisms in which apoptosis is seen. Deriving inspiration from biological world, we further propose a new model for genetic programming where apoptosis is built into the framework. Experimental results using the new computational model are also presented. We also found that the new model could improve performance in cases which are insensitive to time.
Efficient Technology and Intentions to Save Energy

Laura Cowen, Dr Birgitta Gatersleben

Technology that makes our energy use more efficient is often seen as the solution to energy shortages and high energy prices. Energy economists, however, have observed that when technology is used to make energy use more efficient, the energy savings are often not as large as expected.

For example, after replacing all your lightbulbs with energy-saving lightbulbs, you might start to leave some lights on for longer because you know they’re not using as much electricity as they were before.

Little research has been done to understand what psychological processes cause this behaviour in individuals. My initial PhD findings suggest that people’s intentions to save energy might be affected if they are made aware of a technological solution to automate energy-saving in their home, but it depends on how much risk they perceive in using a lot of energy in the first place.

I am currently replicating my initial study to try to get stronger results. I am also starting to investigate other psychological processes that might influence energy-saving intentions more than risk perception; for example, whether individuals’ perceptions of control over their energy use are affected by technological automation.
Dielectrophoresis Technology; a Novel Approach to Investigate Cells Electrical Properties Through Their Division Cycle to Help Improve Cancer Therapy

Nafiseh Naeemi Khondabi, Dr Fatima Labeed, Dr Rita Jabr, Prof. Micheal Hughes

Cancer, as one of the most fatal diseases in the world, is generally caused by uncontrolled cell growth and spread throughout the body. The cell cycle represents a chain of events leading to cell replication and its dysregulation is the common reason for abnormal cancer cell growth. Thus, cancer is considered a cell cycle disease and scientists are interested in cell division events to help improve cancer therapy. Determining the proportion of cells in each cell cycle phase is valuable for targeting cancerous cells, as many anti-cancer drugs are most effective when used at a specific phase. Dielectrophoresis is a technique to characterise cells based on their intrinsic dielectric properties. This study has used DEP to investigate cell dielectric properties through the cell cycle to detect specific cell cycle phases. A human Leukaemia cell line was synchronised at different stages of the cell cycle using “Serum Starvation” and “Hydroxyurea” cell treatment methods. The results indicate that there is a change in cell radius and dielectric properties after each treatment. They revealed that DEP has the potential to characterise and differentiate cells at particular stages of the cell cycle.
Examination of the Reaction Mechanism and Structure - Property Relationships of New Initiators for Curing Epoxy Resins

Fiona Binks, Dr Ian Hamerton, Dr Brendan Howlin, Dr Gabriel Cavalli

Epoxy resins, in their initial application, were primarily used as glue under the trade name Araldite. The product, marketed successfully through the 1983 advertising campaign involving a real Ford Cortina glued to a billboard, consisted of two tubes - one containing the resin and the second containing the hardener. Epoxy resins are essentially transformed from a viscous, sticky material into a hard substance which claims to be impervious to boiling water and common organic solvents through interaction with a hardener in a process known as curing. Whilst the material was - and continues to be - very effective, there is inconvenience associated with the need to store the resin and the hardener separately to prevent premature curing occurring. Therefore this research focuses on gaining an understanding of the chemical reaction which occurs when the two are mixed together with the aim of developing novel heat dependent hardeners which are able to be pre-mixed with the resin without curing taking place. Such products would have application in larger structures such as wind turbine blades or the automotive industry and could be sold as one-pot systems.
Dying Stars in a Grain of Sand

Matthew Pang, Ben Murdin, Jeremy Allam

White dwarfs are the remains of dying stars once much like our own Sun. The original star is compressed down by factor of a million to become a very dense object, and the magnetic field from the star also gets condensed. This makes for a celestial object with a very high magnetic field, about a 100 million times stronger than your fridge magnets. Hydrogen atoms on the star emit certain colours of light, and magnetic fields changes which colours the atom can emit. By looking at the star’s light, astronomers can work how strong the magnetic fields are based on models and calculations.

We made a scaled down hydrogen atom in Silicon (which we can get from sand) and exposed it to very high magnetic fields in order to create the same splitting of colours that one sees in a white dwarf. This is the first time anyone has experimental proof of the models to such extremes, and allows astronomers to study these stars in a lab closer to home.
Form and Being: An Analysis of the Experience of Dancing

Karen Cann, Dr Jean Johnson-Jones

Dancers, choreographers, writers, scientists and philosophers have written beautiful and poetic statements about the transformative nature of dance. Although such statements intuitively ring true, I propose that a more detailed analysis of the experience of dancing is called for. This project is a first step towards that goal, exploring how the formal elements of dancing (such as movement vocabulary and rhythm) contribute to experience.

To research the relationship between form and experience, I have adopted an interdisciplinary methodology that represents a convergence of theory and method in the Arts and Sciences, based on a theoretical framework drawn from Dance Analysis, Psychology and General System Theory. Data collection focuses on the experiences of recreational Balkan, Ballet and Ballroom dancers, to compare experience and evaluate the degree to which the proposed methodology results in a valid description of dancers’ experiences. Analytical methods include Thematic Analysis (from Phenomenological Psychology) and Dance Analysis, informed by the principles of General System Theory.

This methodology represents a new approach in both Dance and Psychology, with an opportunity to apply a ‘systems’ approach to research questions that explore the relationship between form and experience in terms of emergent properties.

Seung Youn, Professor David Uzzell

Recently, greater attention has focused on a social role of historic architecture in identity within the social sciences. However, there is little research that theoretically and empirically demonstrates this. In the light of these considerations, based on the ideas of social and environmental psychology, this study explored the way colonial architecture affects people’s sense of national identity, with an emphasis on people’s perception and its transformation. For this study, Japanese colonial architecture built between 1910 and 1945 in Seoul, South Korea’s capital, was taken as a case study. By employing a life history approach as a methodology, this study found that colonial architecture and its relation to identity would be perceived from the various levels of context, such as personal, community and an institutional context. It also identified that various events in people’s lives and in the broader social context also play a crucial role in their perception of the architecture in relation to national identity today. This finding will be useful to scholars and cultural heritage and to urban practitioners who are concerned with historic architecture as a mediator of national identity.
Deception Detection for the Tangled Web

Anna Vartapetiance, Lee Gillam

Deception exists as reasonably common part of daily life, society sometimes demonstrates a degree of acceptance of it, and occasionally people are very willing to be deceived. But can a computer identify the difference between deceptive and non-deceptive information?

In this presentation we will explore deception in various guises. We initially discuss the nature of deception, including its verbal, vocal and visual transmission, and how the cues to deception vary according to the means (medium) by which the deception is transmitted. Our investigations to date have uncovered disagreements relating to the measurements of such cues, and variations in interpretations, and we are now looking at whether it is possible to reconcile such differences and how such cues behave in collections of texts in which there is a very deliberate attempt to deceive.

We envisage one outcome of such research to include the creation of a deception filter. Such a filter could be used as an assistive service for human readers on the web; it also offers the basis of a vital mechanism for systems being developed to learn from the web, and the presentation concludes by highlighting the importance of this research given near-future technological developments.
Oxidative Stress, Vascular Dysfunction and Ageing

Sarah Cahill-Smith, Prof. Jian-Mei Li, Prof. Chris Fry

Excess production of reactive oxygen species (ROS) has been found to play a major role in the development of cardiovascular diseases. Ageing is a primary risk factor of cardiovascular diseases, however the role of ROS in the development of endothelial (lining of blood vessels) dysfunction and vascular disorders found in the elderly is largely unknown.

In this study, we used mice of the strain C57BL/6J at young (3-4 month) and old (20-24 month) age to investigate the potential role of ROS in age-related vascular dysfunction. The blood pressure was measured and there was a significant increase in blood pressure in ageing mice compared to young mice. Assessment of the ability of the mouse aorta to relax was carried out. There was no significant difference in endothelium-independent relaxation, however there was a significant decrease in endothelium-dependent relaxation in ageing mice compared to young mice. Measurement of ROS levels revealed a significant increase in the levels of ROS production by the ageing aortas compared to young aortas.

In conclusion, there was a significant increase in the levels of ROS production in the vasculature of ageing mice, which may contribute to endothelial dysfunction and high blood pressure leading to cardiovascular disease.
Online Brand Image in the Hospitality Industry: A Preliminary Study

Duangthida Nunthapirat, Dr Hesham Al-Sabbahy

The internet has reshaped not only how products and services are distributed and purchased, but also how brands are perceived and managed. Online branding is defined as the interaction between customers and companies in computer-mediated environment (Hoffman & Novak, 2009). Scholars have been focusing on the emotive aspects of brand experience and subjective evaluation of the brand (Mollen & Wilson, 2010; Morgan-Thomas & Veloutsou, 2011), stressing the importance of brand personality (Okazaki, 2006), and image (Da Silva & Syed Alwi, 2008). Yet, little has been done to identify dimensions of online brand image and how marketers manage their brands in virtual space.

This study aims to address this research gap by investigating the dimensionality of online brand image in the hotel industry and examining how hotel operators respond to the impact of the Internet on customer perceptions. A preliminary research has been conducted using semi-structured interviews with marketing experts in branded hotels both in Thailand and the UK. Thematic analysis was used to analyse the data. The results show that interactivity, ease of use, online brand associations and online community are constituents of online brand image which consequently impact on customer perception both in emotive and effective aspects. By adopting multi-disciplinary perspective and based on the interview findings, this study suggests avenues for further research and proposes recommendations for hotel operators to create positive online brand experience for customers.
POSTER
PRESENTATION
ABSTRACTS
Antibacterial Properties of a Heat Treated Honey-Casein Mixture against Campylobacter Jejun

Najla Albaridi, Dr Simon Park, Dr Jonathan Brown

Introduction: In recent years there has been an increased interest in using natural products to combat bacterial infection as the number of pathogens resistant to one or more antibiotics continues to rise. Indeed, the majority of people around the world rely on traditional medicine as well as natural products for their primary health, according to the WHO. Honey is a well known antibacterial agent effective against most bacteria and is one natural remedy which has been over centuries. Honey contains many different components that have antibacterial properties but it is feasible that its antibacterial activity may be enhanced by mixing it with other compounds. Casein and more specifically its hydrolysate have been shown to have antibacterial activity. This work explored the effect of adding casein to honey in terms of its antibacterial effect against Campylobacter jejuni.

Aim: To determine the effect of combining honey with casein in combating Campylobacter jejuni growth.

Methods: Equal amounts of honey and casein (2 g) were mixed and dissolved in sterile distilled water and then autoclaved. The mixture was added to the media (2 % w/v) and tested against Campylobacter jejuni. The antibacterial activity of the mixture was investigated using growth curves, survival in culture and by disc diffusion.

Results: The honey-casein mixture at low concentration (2 %) showed good activity against C. jejuni with a killing time of three hours in media. On the disc diffusion test an 8-mm zone of inhibition was observed with 2 %. Interestingly, the effect was confirmed in milk. From these preliminary studies it appears as though some compounds are created when casein is heated with honey and these have antibacterial activity.

Significance of Study: We already know that honey has antibacterial activity. The significance of this study is that the activity of honey is enhanced when mixed and autoclaved with casein. If new compounds are created it may be possible to identify them and use them in treatment and foods to reduce hazards due to Campylobacter jejuni.
Filling Carbon Nanotubes: Devices of the Future

*Liam McCafferty, Dr Vlad Stolojan, Prof. Ravi Silva*

Carbon nanotubes have been an area of great research interest since they were discovered twenty years ago due to their unique electrical and physical properties. They are exciting materials for future applications ranging from data storage to drug delivery devices. The ability to efficiently fill carbon nanotubes is crucial to the success of using these materials to advance technology. Filling nanotubes allows functional materials to be put inside nanotubes that change their properties. As filling leads to a modification of the properties the nanotubes the new materials produced are known as meta-nanotubes.

The paper highlights important processing steps required before filling can take place, such as purification of the sample and opening of the carbon nanotubes. The effect of those steps on the quality of the sample has also been assessed. Filling materials and methods have been investigated and compared for feasibility to produce sufficiently filled materials. Analysis techniques used to establish the change in electronic properties of the new meta-materials have been explained. Characterisation techniques have been undertaken to determine filling efficiency and improvements to current procedures outlined.
Region Specific Up-Regulation of Glutamate mGlu5 Receptors in Brains of Opioid-Withdrawn A2A-Receptor Knockout Mice

Sherie Smith, Dr Alexis Bailey, Prof. Ian Kitchen

Drug addiction is a mental health disorder characterised by chronic relapsing to drug use after withdrawal. Preventing relapse would have significant health and socio-economic benefit. To develop an effective drug to block relapse, it is important to understand what chemical changes take place during chronic drug use. Recent evidence has shown that A2A and mGluR5 receptors are centrally involved in addictive processes and located in brain areas associated with reward (caudate putamen (CPu), nucleus accumbens) and memory (hippocampus, (Hi)).

These receptors form important interactions under physiological conditions but the nature of this interaction is unknown. As a result we investigated the mGluR5-A2A receptor relationship in opioid withdrawal. Both wild-type (WT) and mice lacking the A2A-receptor (KO) were treated with an opioid-withdrawal paradigm and brains collected to measure mGluR5 binding. Significant up-regulation of mGluR5 binding was observed in CPu and Hi of withdrawn KO mice vs. KO saline controls. No difference in binding was observed in WT mice. This data indicates the A2A-receptor exerts region-specific control of mGluR5 up-regulation during opioid withdrawal. Because the CPu and Hi play key roles in cue-associated learning (memory) and motivation, exploiting the mGluR5-A2A relationship in opioid withdrawal could have implications for developing targeted addiction pharmacotherapy.
Vulnerability of Cable-Stayed Bridges

Oluremi Olamigoke, Prof. Gerry Parke, Dr Boulent Imam

Cable-stayed bridges have been becoming increasingly popular around the world because they provide economical solution for carrying traffic loading for spans ranging 200m to 1000m and above.

The key elements of this bridge type are the cables which are vital to ensure stability and load carrying capacity of the bridge structure. These cables can break due to accidental or intentional extreme events, lack of maintenance over a long period, excessive corrosion of the connection or loosening of a cable before replacing it. Likewise, the pylon can be subject to blast, impact or fire loading which can also lead to the vulnerability of this structure and thus progressive collapse.

Previous work has focused on the effect of the loss of one cable on the bridge and individual work has been done on the response of cable-stayed bridges to blast loads.

A non-linear dynamic analysis to the sudden and gradual failure scenario rather than the quasi-static analysis that is recommended by codes will be carried out.

It is therefore of importance to study whether these highly redundant structures which are huge in size and exhibit complicated nonlinear structural behaviour can withstand this accidental/intentional loads and fulfil their economic benefit to the society.

Measuring the Impact of Market Coupling on the Italian Electricity Market

Elisabetta Pellini, Ms Joanne Evans, Professor Lester Hunt

This paper evaluates the impact on the Italian electricity market of replacing the current explicit auction mechanism with market coupling. Market coupling, maximizing the use of the cross-border interconnection capacity, increases the level of market integration and facilitates the access to low-cost generation by consumers located in high-cost generation countries. Thus, it is expected that a high-priced area such as Italy could greatly benefit from the introduction of this mechanism. In this paper, the net welfare benefits are estimated under alternative market scenarios for 2012, employing the optimal dispatch model ELFO++. The results of the simulations suggest that the improvement in social surplus is likely to be of a significant magnitude, especially in case of tight market fundamentals.
**Dual Wavelength Multi-Angle Light Scattering System for Cryptosporidium Detection**

*Somporn Buaprathoom, Prof. Stephen J. Sweeney, Dr Steve Pedley*

A simple, dual wavelength multiple-angle light scattering system has been developed for detecting cryptosporidium suspended in water. Cryptosporidium is a coccidial protozoan parasite and the causative agent of cryptosporidiosis; a diarrheal disease of varying severity. The parasite is transmitted by ingestion of contaminated water, particularly drinking-water but also accidental ingestion of bathing-water, including swimming pools. It is therefore important to be able to detect these parasites quickly so that remedial action can be taken to reduce the risk of infection. The proposed system employs two diode lasers (violet AlGaInN-based and red AlGaInP-based) as light sources and silicon photodiodes as detectors mounted on a rotating system. Its design combines multiple-angle scattering detections of two wavelengths, to collect relative wavelength angle-resolved scattering phase functions, and multivariate data analysis techniques to obtain information of samples under investigation. The system was used initially to make differential measurements of the concentration of polystyrenes latex beads of different sizes in a mixed aqueous suspension. The measured results showed good agreement with the control reference values. The results also showed specific relative wavelength scattering pattern of each sample which will be used as selecting means for cryptosporidium detection.

---

**Salt Solution to Energy Solution**

*Donna Hillman, Dr John Varcoe, Prof. Robert Slade*

Between 2007 and 2035, there is a predicted increase of global energy consumption of 49%. With non-renewable fuels rapidly depleting there is a growing need for sustainable affordable power.

Reverse Electrodialysis (RED) is the process of mixing sea and fresh water to create electricity. When salt is dissolved in water charged ions are formed. Sea water contains a higher concentration of ions than river water. These Na+ and Cl- ions migrate through polymer membranes which in turn generates an electric current. It has been reported that up to 2.5MJ of energy can be generated per M3 of river water if it is mixed with an excess amount of seawater.

This research looks at adapting current membrane technology as well as developing new membranes, similar to those used in low temperature polymer fuel cells, for use in RED Cells. Initial investigations are looking at the formation of cation exchange membranes via a low toxicity route by grafting vinylbenzyl sulfonate onto electron-beam irradiated membranes such as PVDF (reducing problems associated with the traditional route using carcinogenic styrene and corrosive chlorosulfonic acid).
Hadron Therapy – A Promising Radiotherapy for Glioblastoma Patients

Ming Tsuey Chew, Professor Karen J Kirkby, Dr Norman F Kirkby, Dr Rajesh Jena, Dr Masao Suzuki

Glioblastoma (GBM) is a common and most malignant glial tumour of the brain. The prognosis is 14 months (median survival) with current aggressive combinations of treatments including surgery, chemotherapy and x-rays therapy.

Hadron therapy is a novel radiotherapy that employs beams of charged ions and proton unlike x-rays. It has the advantages over x-rays by its ability to spare normal tissues surrounding the tumours, concentrating its full radiation energies to the tumours and can be accurately targeted to the tumours.

Three GBM cell lines were irradiated with carbon, neon, iron, silicon and helium ions beam in comparison with x-rays. All the charged ions experiments are performed at the world renowned Heavy Ion Medical Accelerator at Chiba (HIMAC), Japan after hospital routine treatment time. X-rays experiments are performed at the Royal Surrey County Hospital and at the National Institute of Radiological Sciences (NIRS).

The standard colony assay is employed to measure the survival fraction of the irradiated cells. The preliminary results show that the charged ions radiation kill more GBM cells compared to x-rays radiation. We aim to provide biological evidences for hadron therapy to be introduced to treat GBM patients to increase overall survival and quality of life.
NATO and CSDP: Are the Two Western Military Alliance Institutions Complementary or Contradictory?

Ioannis Dandoulakis, Dr Tom Dyson

This is a study into European defence and security politics. It examines the role of alliance institutions NATO and EU’s Common Defence and Security Policy (CSDP) in the formulation of patterns of cooperation amongst their allied member-states’ armed forces. Also, the political relationship between the two military alliance organisations is studied and the interaction between their respective cooperation structures and military capability procurement programmes. A primary focus is provided on the issue of technological interoperability amongst the national armed forces of both organisations.

The research aims, firstly, to bring together existing separate accounts on NATO and CSDP and, secondly, to add to the limited existing literature on the cooperation between them. This study aspires to provide a most up-to-date account of the period from 1990 since today and an all-inclusive comprehension of the major developments of that era.

The research has been split into two main sections. The first section includes the gathered empirical evidence of all military capability procurement projects and developments in command structure, that have taken place in Europe over the past two decades, within NATO, the EU and outside NATO or EU. The second section will provide a theoretical analysis of the empirical data, based on the vast analytical toolbox of International Relations Theories.
The Use of Dielectrophoresis for Screening Chemotherapeutic Agents

Ruth Torcal Serrano, Prof. MP Hughes, Dr KF Hoettges, Dr FH Labeed

In the pharmaceutical industry there is a need to cost-effectively screen and determine the efficacy of drugs which induce cancer cells to undergo programmed cell death (apoptosis). Dielectrophoresis (DEP) is a label-free technique that can be used to obtain measurements of intrinsic cell electrophysiological properties. DEP is a phenomenon whereby a particle, such as a cell, is induced to move under the influence of a non-uniform electric field, as a result of polarisation effects. In this study, a new DEP kit is validated with cancer cells exposed to chemotherapeutic agents.

The DEP kit consists of well electrodes which are novel lab-on-a-chip devices that can characterise several cellular electrophysiological properties within minutes. In this investigation, DEP was used to measure the electrophysiological properties of cervical carcinoma (HeLa) cells following treatment with a chemotherapeutic agent. The results show that there are differences in the electrophysiology of cells induced to undergo apoptosis compared to non-treated controls. This study shows that the DEP kit has the potential to be used as a rapid, low-cost screening tool for drug discovery based studies.
**Freakbeat: Interstice or Category Existence?**

*Simon Licourinos, Professor Allan Moore*

The term Freakbeat, used in music journalism in the eighties, is still current. The Cherryred title, *The Psychedelic Snarl* implies Freakbeat to be a precursor to Psychedelia.

Arguably, Freakbeat has category rather than pseudo-existence status through being interstitial. In order to understand the nature of the mechanism to describe the interstitiality of Freakbeat, it is important to examine categorisation.

While Kant offers a taxonomic construct using hierarchy, Aristotle’s ‘conceptualization’ allows anomaly to exist, and thirdly Lakoff (1993) suggests metaphoric similarity. Rosch (1976) claims that we define category ‘prototypically’, finally, Umberto Eco says nuclear and molar content refers to the obvious and ambiguous.

Freakbeat exists between British Beat and Psychedelia in history. These terms are a priori in musicological and established ‘spaces’ (Fabbri, 1999). However, Freakbeat or ‘the birth of psychedelia’ is synonymous with being neither British Beat nor Psychedelia. In light of this, the question may be raised: Can Freakbeat change from being interstitial to a full-status category? The aim of the proposed research is to examine whether this is possible by a mechanism of connections, relationships and traits.
The Impact of Installer Business Models on the Uptake of Renewable Energy in Homes

Richard Hanna, Professor Matthew Leach, Doctor Jacopo Torriti

Over 3,000 businesses are certified to install renewable energy in UK homes through a Government-backed scheme.

Microgeneration refers to the small-scale application of renewable heat or electricity. This doctoral thesis compares the impact of alternative installer business models on: the rate at which microgeneration is taken up in homes; installation standards; and learning and experience effects occurring across installation businesses, customers and potential adopters. A pilot web survey of 235 certified installer businesses was carried out in June 2011 and achieved a response rate of 30%.

Following optimisation of the design, the main survey is currently in the field. Over 2000 businesses have been emailed and 150 responses have been received with 20 days of the survey remaining. This is the first large-scale academic survey of businesses certified to install residential microgeneration. The surveys will be complimented by semi-structured interviews with installers, manufacturers, certification bodies and trade associations. Additionally, the user-installer interface is examined through two means: a case study of design, installation and maintenance of solar PV and solar thermal in 12 sustainable new build homes in Woking; and action research into a free solar PV installation on the researcher’s parents’ home in the Isle of Wight.
Public Private Partnerships in the Health Care Sector

Ahmed Alsaleh, Simon Lusignan

The debate concerning management of health care systems is ongoing; is it the government’s role or the private sector’s role? Each party has its own arguments, advantages and disadvantages, so perhaps a third way raises the possibilities to achieve the best of both sides. This paper addresses the challenges faced by the healthcare system by evaluating the Public Private Partnership (PPP) experience in the Kuwait health care system - Yiaco Adan Diagnostic Centre (case study)- and critically examining its effect on the health care system objectives of effectiveness, efficiency, equity, and choice.

A realist evaluation approach has been adopted aiming to produce detailed answers to the questions of what makes PPP work, for whom, and in what circumstances. A detailed qualitative study to obtain the opinion from both the public and private sectors has been carried through a series of open-ended, semi-structured interviews. Data collected has been analysed in a framework approach and the themes extracted have been mapped onto a Context, Mechanism, and Outcome structure.

The research has found that PPP significantly impacts on the healthcare levers (resource allocation, finance, organization and service delivery) and better achieves the healthcare objectives if implemented well. Mechanisms that can support healthcare policy makers and managers to improve PPP implementation have been highlighted.

Increasing the Capacity of Satellite Delivered Multimedia Services Using Orthogonal Circular Polarisation

Unwana Ekpe, Dr Tim Brown, Prof. B. G. Evans

Wirelessly delivered communication and entertainment services will be pervasive in the near future. However, the exponential growth in demand for such services will lead to severe service delivery problems if radical upgrades are not made to the supporting terrestrial and satellite infrastructure. One of such upgrades proposed for the satellite delivered aspect is the use of orthogonal circular polarisation. Here, satellites serving large numbers of sparsely distributed users in rural areas are designed to have two orthogonally polarised beams per served area instead of the usual one beam. To determine the practicability and the working limits of such a system, a series two-beam per served area measurement campaigns have been carried out. From the measurement campaign data, channel models which take into account the level of correlation–with regard to the rate of change of their amplitudes and phases–of the two beams have been developed. These channel models are then used in determining the capacity that can be supported by such channels for the delivery of multimedia services. Also investigated are the effects of channel parameters like interference and background noise and the methods of eliminating them in order to achieve good quality of service delivery.
Sortase A: A Molecular Stapler for Use in Conjugation

_Thomas Waller, Dr Gabriel Cavalli-Petraglia, Dr Ernesto Oviedo-Orta_

Unmodified proteins such as insulin have been used within medicine for a number of years. These unmodified proteins have some distinct disadvantages such as poor stability, complex storage conditions, short time window of availability and poor uptake in the body and high toxicity. However, by joining these proteins to a large molecule like a polymer it is possible to negate these problems by firstly providing a secure anchoring point and secondly providing a shield for the protein that prevents degradation and increase availability.

Modification of proteins has historically involved chemical reactions with amino acids. However, producing polymer-protein conjugates in this way results in a number of sites of modification on the protein, a loss of protein activity and undesired protein cross-linking.

A new synthetic route employs an enzymatic methodology to carry out generic, site specific modification of protein. The _S. aureus_ Sortase A enzyme has previously been shown to conjugate selectively to any protein containing a short sequence with amino acids to molecules that contains di-Glycine amino group. This provides a general, robust, and gentle approach to the selectively immobilize of proteins onto a range of polymeric supports.

Currently the use of the Sortase enzyme is being investigated in the synthesis of Novel protein-polymer conjugates containing green fluorescent protein modified with di-Glycine containing polymers of poly(ethylene glycol) methyl ether methacrylate.
Improvement of Tumour Detection in Breast Cancer

Sarene Chu Saifuddin, S. Pani, D.A. Bradley

Many techniques to improve the detection and characterization of tumours in the breast have been developed in the last few years. Dual-energy technique is a recent development in where contrast agent is use in conjunction with the breast cancer imaging. However, the clinical application of dual-energy technique has been limited so far by the absence of suitable X-ray sources.

Standard dual-energy technique is typically implemented with a ‘single-wavelength’ X-ray beam. However, only a few facilities around the world have ‘single-wavelength’ X-ray tube to produce these beams. This work proposes an approach using a ‘multi-wavelength’ X-ray beam produced by a standard X-ray source in the normal laboratory, to provide for better accessibility for the technique, to be used for the benefit of the patients.

This work is carried out in conjunction with an iodine-based contrast agent. Images of a test object with different tube sizes have been obtained and reconstructed to form the final images to be analysed. The results are being presented in terms of tube visibility, quantified using the contrast-to-noise ratio. Effects of integrating different energy window, contrast agent concentration and entrance dose have been investigated for different tube size.

Delayed Weaning Influences Depressive, but Not Anxiety-Like or Social Behaviour in Rats

Pamela Farshim, Dr Alexis Bailey, Prof. Ian Kitchen

There is evidence to suggest that manipulating weaning age influences brain development and may affect mood and social behaviour. Weaning rats at postnatal day (PND) 21 activates a population of delta-opioid receptors (DOPr) in the brain and this has been shown to be dependent on loss of dietary casein. DOPRs have a role in mediating mood and social behaviour and transgenic mice lacking DOPr exhibit depressive and anxiogenic behaviours. We hypothesise that time of weaning or exposure to maternal milk may influence mood and social behaviour via DOPrs. We investigated the effect of delayed weaning on anxiety, depressive and social behaviours. Weaned (PND21) and nonweaned (PND25) rats were tested for the aforementioned behaviours. Weaned rats showed lower depressive-like behaviour compared to nonweaned rats, as evidenced by significantly lower immobility time and higher latency to immobility as measured in the forced swim test. Only the weaned animals exhibited diving behaviour, a key indicator of anti-depressant activity. No significant differences were found in anxiety-like or social behaviour between the two groups. These findings provide the first evidence to show that weaning time may influence depressive-like behaviour. Whether this is mediated by a DOPr mechanism remains to be determined.
Enhancement of Light Coupling to Solar Cells Using Plasmonic Structures

*Keyur Gandhi, Prof. SRP Silva, Dr. Simon Henley*

Researchers are now aiming to develop low cost solar cells which can be achieved by using organic semiconductors. Organic semiconductors are not very efficient but they are very cheap compared to silicon. Recently discovery in plasmonic based design structures has shown significantly improve the absorption phenomenon of EM spectrum in photovoltaic devices. Photovoltaic using plasmonic structures will reduce the physical thickness and increases the optical absorption which will significantly improve the efficiency of the organic cells compared to current organic solar cells.

The project is aim to study the effect of localized surface plasmon on performance of the organic solar cells and there by optimising its efficiency. This project is divided in to two sections which consist of simulation of organic solar cells using TCAD software Silvaco and experimental work.

Characterisation of the Spread of Antibiotic Resistance on a Pig Farm

*Irene Freire Martin, Roberto La Ragione, Emma Laing, Simon Park*

The beta-lactam family of antibiotics are frequently used by medics and vets treating many commonplace infections. The presence of resistance to these antibiotics in the offending bacteria complicates treatment and often results in prolonged illness. Furthermore, the resistance to the antibiotics is often carried on plasmids, independent units of DNA which can be transferred from one species of bacteria to another. In the studies presented here we aimed to characterise the resistance spread on a pig farm in which an outbreak of beta-lactam resistant Salmonella occurred. Furthermore, we investigated the potential benefits to the bacteria conferred by the carriage of the antibiotic resistance plasmids.

To date our studies have shown that the same plasmid is present in many strains of bacteria which have the potential to cause disease and that this plasmid can be easily mobilised. To investigate whether the plasmid confers additional beneficial characteristics, mutant strains that do not have the plasmid, but which are otherwise identical to the original strains, are being constructed. This will allow us to test whether strains with and without the resistance behave any differently in terms of their virulence, metabolism, etc.
Carbon Nanotubes as Bioelectrical Sensors for Studying Brain Function

Margaret Gompers, Prof. S.R.P. Silva, Dr Y. Chen

Carbon nanotubes are tubular structures made of carbon, with diameters close to 1 millionth of a millimetre (1 nanometre). Their shape, strength, electrical properties and biocompatibility make them promising materials for varied applications, including development of bioelectrical sensors. The aim of this project is to develop such a sensor based on an individual carbon nanotube, thus utilising its size and shape to the fullest. The sensor will provide new information about the brain, allowing us to better understand its function and uncover new treatment opportunities. Such a sensor has never before been used to detect bioelectrical signals from brain tissue.

A prototype sensor was constructed by attaching an individual carbon nanotube to a tungsten support using techniques which allow the components to be moved, joined and trimmed with nanometre accuracy. The prototype was successfully integrated with the electronic equipment necessary to amplify and record the tiny biological signals. Preliminary testing gave promising results, with detected signals very similar in appearance to those recorded with established techniques. When optimised, this design of sensor will allow the study of smaller biological compartments than previously possible. It will also cause less tissue damage, allowing us to better study the details of brain function.
Determination of Phenotypic Resistance of M. Tuberculosis in the Chemostat

Kwaku Owusu-Darko, Prof. Johnjoe McFadden

A fundamental challenge in the treatment of Tuberculosis is the presence of a sub population of bacteria which are resistant to host defence reactions and antimicrobial challenge. These persisting cells do not contain antimicrobial resistant genes but are phenotypically resistant. They are characterised by slow growth, non-replicating state immune to the harsh environmental conditions; amino acid deprivation, acidic pH, hypoxia, nutrient starvation and antibiotics challenge. They hardly grow in rich nutrient conditions and neither dies in the presence of antibiotics.

Using single cells E. coli strains, in the presence of antibiotic treatment, Balaban, (Balaban et al., 2004) identified these persisting cells as part of heretogenous cells able to switch from drug tolerance to drug susceptible on removal of the drug. However, drug tolerance to mycobacterium species has not been modelled in-vitro.

We are growing Mycobacterium in the chemostat as a continuous culture, with M. smegmatis [Mc2 155] as surrogate for Mycobacterium tuberculosis to induce drug tolerance at different growth rate with rifampicin and streptomycin. We hypothesise that kill rate is a determinant of drug tolerance and explore the phenomenon of mycobacterium persistence in its host.

The Use of Ge-Doped Optical Fibres as a Radiation Dosimeter

Noramaliza Mohd Noor, M.Hussein, D.A.Bradley, A.Nisbet

In this study Ge-Doped optical fibres have been investigated as a novel radiation detector. Their use in measurement of radiation dose to the tumour and normal tissue in patients receiving Intensity Modulated RadioTherapy (IMRT), a technique that is used for prostate cancer treatment has also been investigated. Our results show the fibres offer good dosimetric characteristics for use as a radiation dosimeter. They are capable of detecting dose over a wide dose range with reproducibility of better than 5%. The fibres offer dose rate-, angular- and temperature-independence, while a small radiation energy-dependent response was found, of between 3 to 5%. When held at room temperature results show the signal loss in the fibres is 11% 133 days post-irradiation. In addition, the fibre was observed to verify doses to within 3% of the IMRT treatment planning system predicted radiation doses.
Cancer: A Variety of Cells to Kill?

Deborah Guest, Norman Kirkby, Karen Kirkby

Glioblastoma (GBM) is an aggressive and fatal brain tumour. It accounts for more years of lives lost per patient than any other tumour. This is thought to be because of the variety of cells in the tumour population and their resistance to conventional radiotherapy. These different types of cells have different sensitivities to radiation dose at different points of the cell cycle. Exploiting the different sensitivities would engender better and more effective treatments; however, to achieve this, the types of cells and their proportions in a tumour population must be determined.

A brain tumour initiating cell (BTIC) is a cancerous brain stem cell and therefore has the capability to divide and differentiate down a cascade to many different types of brain tumour cells. Cell Cycle Model University of Surrey (CelCyMUS) successfully simulates the growth of one BTIC into a population of four different types of tumour cells; BTIC, precursor cells and two terminally differentiated cells. This is achieved using transition rules to specify the differentiation of cells from one cell type to another or the division to the same cell type.

It is necessary to validate the model with experimental data using patient derived GBM BTIC cells from the Addenbrooke's hospital in Cambridge. The cells were grown for up to six days, during which they were stained, at intervals, with fluorescent markers so that each cell type can be isolated and counted.
Chemical Constituents of East European Forest Species

Dorota Nawrot, D.A. Mulholland

The development of modern and environmentally friendly products, materials and processes to make use of abundant sources of wood waste as starting material for value-added products is an important area of research. This work is part of the EU FP7 (FP7-KBB-2008-2B-227239) ForestSpecs project whose aim is to utilize diverse types of wood residues from the forestry industry including Pinus sylvestris, Pinus pumila, Picea abies, Picea ajanensis, Larix gmelinii, Larix sibirica, Larix sukaczewii, Larix decidua, Abies nephrolepis (Pinaceae) and Populus tremula (Salicaceae) as raw materials, to produce bioactive molecules and environmentally benign technical products as well as bioremediation chemicals. A comparative analysis was carried out of the performance of the MARS microwave extraction system against traditional extraction methods, Soxhlet extraction and shaker extraction. A number of compounds have been isolated and identified from L. gmelinii, L. sukaczewii, L. sibirica, P. sylvestris, P. pumila and P. abies. Amongst them the novel labdane diterpenoid 6β,13-dihydroxy-14-oxo-8(17)-labdene (1) from L. gmelinii, the novel pumilanoic acid (2) from P. pumila, the known and quite unusual serratane triterpenoid, 3β-methoxyserrat-14-en-21-one (3) as well as E and Z bornyl ferulate (4, 5) also from P. pumila. Pure compounds are being screened for the following activities: insect antifeedant activity, herbicidal, fungicidal, antiviral and antibacterial, anti-inflammatory and antidiabetic by collaborating institutions.

A Bayesian Method for Identifying Intakes of Uranium

Graeme Burt, Professor David Bradley

Exposure to ionising radiation can increase the probability of an individual developing cancer or other radiation related health effects. Therefore, monitoring of potentially exposed individuals following an airborne release of radioactive material is important in order that the potential dose of radiation to each individual can be assessed. Monitoring of the uranium level in urine is a common technique used to determine if an intake of uranium has occurred and for estimating doses from these intakes. However, there are a number of factors that make the detection of an intake difficult, including the fact that any accidental intakes must be distinguished from dietary intakes of natural uranium from the environment. This study uses a computational approach, based on a branch of probability theory known as Bayesian inference, to address this problem. A computer program has been written to perform Bayesian analyses of measurements of uranium in urine. This approach offers an improvement on the traditional assessment method. It is shown that knowledge of the chemical form of the uranium is important for determining whether an intake has occurred. Beyond this application, the described technique will have wider uses in modelling the movement of radioactive material in the human body.
Strategies of Politeness Expressions in Thai Hospitality Settings

Nattana Leelaharattanarak, Dr Rosina Marquez-Reiter, Dr Eva Ogiermann

This study aims to examine strategies in which Thai speakers use to express politeness to hearers in hospitality talks. Its purpose is also to investigate whether Thai cultural norms and non-verbal behaviour have a significant impact on the strategies that Thai people use to express politeness. 80 naturally occurring conversations were audio- and video-recorded in Thai hospitality settings, i.e. a tour agent, two hotels and a tourist information centre for doing conversational analysis. The attributes of commercial hospitality and consumers’ expected good hospitality, including power of money over tourist officers’ behaviour may motivate expressions of politeness. In addition, the previous study of politeness expressions in Thai culture focuses on linguistic politeness in various types of speech acts at the sentence level, e.g. orders, compliments and requests, through linguistic data, e.g. questionnaires and idioms, for example, Cedar (2006), Ukosakul (2009), Kummer (2005), Wannaruk (2008), as well as Thijittang (2010). They do not consider the analysis of the holistic conversation and non-verbal behaviour of participants in a conversation. Therefore, my study can contribute an in-depth understanding to the strategies of politeness expressed in naturally occurring conversations. It results are not limited to the analysis at the linguistic level which does not provide the full picture of politeness in Thai society.

ZnO Hexagonal Nanodiscs

Mohammad Alenezi, Professor S. R. P. Silva, Simon Henley

Density and size controlled ZnO nanowire arrays have been synthesized successfully via simple template-free large scale cost efficient electrodeposition technique. The density and size of the nanowires were controlled by changing the rate of introducing the precursor in the solution. The results showed that the nanowires density increases at slow rates while the size of the nanowires decreases. The ZnO nanowires array was characterized by scanning electron microscopy (SEM), Energy-dispersive X-ray spectroscopy (EDX), Cary Eclipse Fluorescence Spectrophotometer, and Raman spectroscopy. Electrical measurements are also reported.
The Ability of Front-of-Pack Nutrition Labelling Systems to Guide Healthy Choices

Charo Hodgkins, Prof. Linda Morgan, Dr Monique Raats, Dr Michelle Gibbs

The use of nutritional information on food labels can be perceived as preventive health behaviour as it has the potential to lead to the choice of healthier foods. This study aimed to quantify the ability of participants to accurately infer the healthiness of food from 4 labelling systems varying in levels of ‘directiveness’. Participants (n=2068, stratified for gender and age) were recruited across four countries (UK, Poland, Turkey and Germany). The systems were tested across 12 products representing 3 levels of healthiness within each of 3 categories (biscuits, pizzas, yoghurts) and 2 portion sizes. Participants provided subjective healthiness ratings with a baseline labelling system prior to rating the same foods with a labelling system applied. It would appear that participants judge healthiness within category rather than across categories, e.g. did not recognize the yogurts as being the most healthy followed by the pizza and then the biscuit. It would seem that where there was a shift in the rating it was likely to be in the middle category of healthiness. Overall the results are in line with previous research where when asked to compare or rank 2-3 products within a product category in terms of overall healthiness, using some form of FOP labelling, participants are able to do so and the results do not differ greatly across FOP formats. That is, any structured and legible presentation of key nutrient and energy information, regardless of FOP format, is sufficient to enable consumers to detect the healthier alternative.

Energy Transfer from Nanostructures to Organic Materials

Sofia Siddique, Prof. Jeremy Allam, Dr Richard. J. Carry

The properties of nanometer size crystals (or ‘quantum dots’, QD) change with respect to the size of the crystal allowing control of the absorption and emission of light packets (photons). When a QD absorbs energy it gets excited and after some time (say a few billionths of a second or nanosecond) releases its energy. We can utilize its excited state energy by transferring its energy to another crystal, having longer time of energy release. Energy transfer would possible only when the excited state of second crystal (‘acceptor’) will match the excited state of first crystal (‘donor’); this process is called resonance energy transfer.

We have been performing experiments to find such donor-acceptor pairs, where donors are QDs and acceptors are organic dyes. In future we will study that how energy transfer process takes place in less than 1 trillionth of second (picosecond). Such experiments will be executed using very short (femtosecond) laser pulses, split into an exciting beam (pump) and another diagnostic beam (probe). This study will be favourable to design photovoltaic and light emitting composites with enhanced performance.
Investigation of the Impact of Cellular Defence Proteins in the Human Liver on the Endogenous Hormone Estradiol

Joanna Sier, Dr Nick Plant, Dr Alfred Thumser, Dr Katherine Fenner

Chemical levels in the body are constantly changing: This can be as a result of normal body processes, disease states, or the exposure to external chemicals such as therapeutic medicines or environmental pollutants. In order to function normally, the human body must alter the levels of biological processes to respond to this chemical challenge: These processes can result in the increased production of, for example, fat cells if too much food is taken in, or the increased expression of cellular defence proteins if we are exposed to dangerous chemicals. Understanding these biological processes is important to predict human responses to chemical exposure, and to further our understanding of human diseases.

Within the body, the liver plays a key role in this adaptive response, acting as a ‘sorting office’, ensuring an efficient response to chemical challenge. A computer model of how the liver takes-up, sorts and excretes the endogenous hormone estradiol has been generated. We will next show that the model behaves in similar manner to liver cells in the body. Finally, we will use this model to study the key design features in the liver that allow it to efficiently sort and respond to chemical challenge.
Pose Invariant Face Recognition with Multi-Resolution 3D Morphable Model

Guosheng Hu, Josef Kittler, William J. Christmas

Face recognition is an important approach to person identification. Although face recognition technology using 2D images taken in controlled environments has reached high performance rates, its reliability declines when pose variations are introduced. More recently, the face recognition research has been extended to the 3D domain. Since 3D shape does not change under different viewpoints, 3D pose-invariant face recognition could be more reliable than its 2D counterparts. 3D Morphable Model (3DMM) is a well-known 3D face model. Its main use is to synthesize a face image, which resembles the probe face image by selecting suitable model parameters. Pose correction using 3DMM is a promising method for face recognition. It exploits prior knowledge of 3D shape and texture of faces, thus allowing predictions of the appearance of face, even in areas that may be occluded in the probe image.

This paper introduces a new Multi-Resolution 3D Morphable Model (MR-3DMM). This MR-3DMM consists of several separate 3DMMs, which have different number of vertices and polygons. Given a probe image of any resolution, the MR-3DMM can select automatically the best 3DMM to fit the given probe image.

Experiments are carried out with frontal and non-frontal images in the XM2VTS database. The MR-3DMM in our experiments consists of two levels: High-Resolution 3DMM (HR-3DMM) and Low-Resolution 3DMM (LR-3DMM). Experimental results shown that HR-3DMM works better than LR-3DMM if the probe image resolution is greater than 180x144 and vice versa for LR-3DMM.
Gin and Tonic Anyone? Not for Me I’m a Rat!

Grace Edmund, Dr Brendan Howlin, Prof. David. F. V. Lewis

In India, in the early 18th century, the British East India Company introduced the ‘Gin and Tonic’ in an attempt to encourage the consumption of a compound called quinine (found in tonic water) known to prevent malaria in humans. However, while quinine is not harmful to humans it is toxic to rats (so no gin and tonics for them!).

When ingested by humans, quinine is broken down into harmless by-products by an enzyme (a biological catalyst), known as cytochrome P450. However in rats quinine cannot be broken down at all causing toxic levels to build up. Another compound, almost identical to quinine called quinidine has exactly the opposite effect being toxic to humans but not rats. So why is this?

By using computer based modelling techniques we will investigate the differences between these rat and human enzymes by looking at their three-dimensional structures. We will model the interactions of quinine and quinidine with the aim of discovering why these compounds have such different effects and how this might impact on more modern drug compounds.

The Tree Hugger: A Portable NMR Imaging System

Marc Jones, Peter McDonald

The unique design and construction of the ‘tree hugger’, an open access, portable, 1.1 MHz 1H nuclear magnetic resonance magnet for the in-situ analysis of living trees in the real-world is presented. The feasibility of imaging living trees in-situ using the ‘tree hugger’ is demonstrated.

Wood is a renewable resource with important and widespread uses including building construction, furniture manufacture, paper and energy production. The wood may be used directly as in timber for construction or indirectly as in chipboard products or pulp. The social, economic, climate change and sustainability environments in which the wood industry operates are collectively driving interest in the scientific basis of tree farming and in post-felling timber treatment. Issues associated with living tree management include those of water uptake, storage and loss by the tree. Wood drying is a major factor in timber processing. Neither of these subjects is yet well founded. Magnetic resonance imaging offers the opportunity to non-destructively and non-invasively study moisture and moisture transport in wood and in particular living wood. We look to develop this opportunity through the design and demonstration of an NMR magnet suitable for measurements on living trees in the field.
Persistent Up-Regulation of the Vasopressin Receptors in the Brain Following Chronic Cocaine and Morphine Administration and Withdrawal

Panos Zanos, Prof. Ian Kitchen, Dr Raphaelle Winsky-Sommerer, Dr Alexis Bailey

Drug addiction is a chronic relapsing brain disorder characterized by compulsive drug taking and emergence of a negative emotional state during drug withdrawal. Arginine vasopressin peptide is associated with stress, a key factor of relapse to drug-seeking during abstinence.

To investigate the effects of chronic cocaine and morphine administration and subsequent withdrawal from these drugs on the vasopressin system, vasopressin receptor binding was measured in brain regions of mice treated with chronic cocaine or morphine, or withdrawn from these drugs.

Chronic cocaine and morphine administration as well as acute withdrawal from these drugs significantly increased vasopressin receptor binding in brain regions associated with reward and mood (e.g. amygdala, nucleus accumbens). This up-regulation persisted after protracted withdrawal where significant increase of the vasopressin receptor binding was also observed in regions associated with stress and social interaction (e.g. septum, hypothalamus).

Our results indicate a prolonged activation of vasopressin receptors after chronic cocaine and morphine administration which persists after acute and long-term abstinence. This set of data strongly suggests that alteration of vasopressin receptors may be a common mechanism involved in the pathophysiology of cocaine and opioid addiction. This may constitute a new target for the development of novel pharmacotherapies to prevent relapse.
Designing Thermally-Switchable Pressure-Sensitive Adhesives for Recycling Applications

Robert Gurney, Professor J.L. Keddie

Pressure-sensitive adhesives (PSAs) adhere instantly and firmly to a substrate upon the application of a light pressure. This presentation will describe the development of a new type of environmentally-friendly PSA that has thermally-switchable adhesion.

There are continuing demands for more environmentally-friendly PSAs, leading to greater reliance on PSAs made from colloidal dispersions of soft polymers in water, known as latex, to avoid the emission of organic solvents during processing.

Furthermore, with increased emphasis on recycling and re-use of materials, there is also interest in adhesives that de-bond or “switch off” on demand, when triggered by an external stimulus. For instance, switchable adhesives can be used in electronics disassembly. Other applications include medical dressings and label removal.

PSAs require the right balance of elastic and viscous properties in order to perform well. By introducing a hard nanoparticle phase around the soft PSA particles, we were able to retain initial adhesive properties, but after a period of heating, the nanoparticles formed a hard honeycomb structure around the PSA and the adhesion was switched off.

Inkjet Printed Silver Electrodes for Organic Thin Film Transistors

Abdullah Alshammari, Professor S. Ravi, P. Silva, Dr Maxim Shkunov

Inkjet printing is one of the most promising techniques for depositing organic compounds and the production of printed electronics. The technique is simple, low-cost and a non-contact. In this work, we report on inkjet printing of conducting and semiconducting materials for electronic applications. Conductive line patterns of silver were obtained by ink-jet printing of silver nanoparticles ink. Morphological and electrical properties of the printed patterns as function of the curing temperature were investigated. Results show that the resistivity of the patterns is in the range of $10^{-5} \, \Omega \cdot \text{cm}$ and decreases with increasing the curing temperature. The optimum conditions of printing nano-silver ink were applied and silver source/drain electrodes with channel length of $25 – 30 \, \mu \text{m}$ were inkjet printed to fabricate thin film transistor. An air stable p-type conjugated polymer was inkjet printed on top of the silver electrodes as an active layer of the device. The printed transistor shows an on/off ratio $\sim 103$ and field effect mobility in the range of $10^{-3} \, \text{cm}^2/\text{V.s}$. 
The Acute Effects of Resistant Starch on Appetite and Satiety

Najlaa Almana, Dr. Denise Robertson

By NM Al-Mana and MD Robertson, University of Surrey, Guildford, Surrey, GU2 7WG,
Numerous studies have linked higher intakes of dietary fibre to the management of body weight (1,2). The effect of fibre on weight may be mediated by different mechanisms; such as changes in blood glucose and insulin concentrations, reduction in food intake, slowing gastric emptying time and changes to anorexic hormone release after fibre consumption. Resistant starch (RS) is a form of dietary fibre which can be consumed at higher doses than similar fibres. RS, therefore, may have an important role in weight regulation, as we have previously demonstrated in normal weight individuals (3). The aim of the present study was to investigate the short-term effects of RS on appetite and satiety in overweight/obese subjects and to investigate the effects of the RS on gut peptides released (GLP-1 and PYY).

Eleven healthy male obese subjects (aged 18 - 32 years, BMI 28 - 37kg/m²) participated in this single blind, randomized, crossover study. Subjects were required to consume a test breakfast and lunch, containing either 48g of an RS supplement or an energy and carbohydrate matched placebo. Subjects recorded ratings of hunger, satiety, fullness and prospective food consumption using visual analogue scales (VAS) every 30 min for 7 h. Postprandial blood glucose and insulin responses were also measured. Energy intakes from an ad libitum dinner and for the remainder of the day were assessed.

The 48 g dose of RS had no significant impact on qualitative feelings of satiety or hunger. However, the RS supplement significantly reduced the energy intake at the ad libitum meal (4465 (SEM 700) kJ for RS versus 5319 (SEM 805) kJ for placebo, p=0.02), suggesting it may indeed have short-term beneficial effects in obese subjects.
Gamma Spectroscopy of Nuclei in the Vicinity of 208Pb on the Chart of Isotopes

Emma Wilson, Zsolt Podolyak

One of the aims of nuclear physics research is to find new information about nuclei which have more neutrons than protons. Such nuclei are called neutron rich, and knowledge about them generally comes from the collision of a beam of ions and a target. These reactions are observed by a multitude of types of detectors, which can give various sorts of information about what is produced.

In the work discussed here, the beam and the target are both comprised of 208Pb. When the collision between these occurs, the Gammasphere detector array is used to detect the gamma radiation which results. This radiation gives information about the interior structure of nuclei which are produced by the reaction. Nuclei have a series of energy levels, and these nuclei, when excited by the collision of a beam and a target, then emit a series of gamma-rays to return to the unexcited ground state. A number of never previously detected gamma-rays have been seen in this data, including ones from 208Pb and 209Bi.

In the long term, such data can help to improve theoretical models of nuclei, and perhaps contribute to the accumulated knowledge on astrophysical processes which produce nuclei.
A Double Blind Exploratory RCT: Enhancing Cognitive Behaviour Therapy (CBT) with Exposure Response Prevention (ERP) Based Obsessive Compulsive Disorder (OCD) Treatment Outcome - Imagery Rescripting and Reprocessing Therapy Effects on Shame and Cognitive Inflexibility

**Davis Mpavaenda, Dr Ann Gallagher, Dr Laura Simonds**

Context: Approximately 40 to 60% of Obsessive Compulsive Disorder (OCD) patients adequately treated with pharmacotherapy and cognitive behaviour therapy (CBT/ERP) respond well. Comparatively, the percentage of treatment refractory incidents is equally high. Shame emotion and the deficit in brain’s Executive Function (cognitive inflexibility – switch shifting/inhibition deficit) have been implicated in poor treatment outcome for OCD. Imagery Rescripting and Reprocessing Therapy (IRRT) usually for post traumatic disorder (PTSD) may also treat OCD, but it appears no study has yet examined the effects of IRRT on shame and cognitive inflexibility in adult OCD sufferers. Objective: To examine the impact of IRRT in reducing shame and cognitive inflexibility, and whether any changes have a direct effect on OCD improvement following CBT/ERP. Design: RCT will be used to compare group receiving IRRT to two control groups receiving Imagery Exposure (IE) and Prolonged Exposure (PE). Setting: OCD Specialist Psychiatric outpatients QEII Hospital. Participants: 21 randomly selected consenting adults with OCD characterised by aggressive, sexual and religious obsessions are expected to participate. Main Outcome Measures: Yale Brown Obsessive Compulsive Scale (OCD severity), test of self-conscious affect (Shame), CANTAB battery – Intradimensional/Extradimensional task (Cognitive Inflexibility) will be used. Results Analysis: Appropriate SPSS statistical analysis test will be used.
A Comparison of Protocols for External Beam Radiotherapy Beam Calibrations

Salma Al Ahbabi, M.Beyomi, Z.Alkatib, S.Adhaferi, M.Darmaki, D.A. Bradley, A. Nisbet

The accuracy of radiation dose delivered in radiotherapy is critical in seeking cure with minimal side effects. A number of Codes of Practice (CoPs) for electron and photon beam dosimetry are currently in use. Present work focuses on a comparison of the predominant CoPs, specifically those of the IAEA (IAEA TRS-398), the American Association of Physicists in Medicine (AAPM TG-51) and the Institute of Physics and Engineering in Medicine (IPEM), based on calibration of ionization chambers in terms of absorbed dose to water. The analysis investigates the theoretical basis of the calibration coefficients employed for a range of beam qualities, i.e. energies. Electron beam comparisons have been carried out using measurements made in Tawam hospital (in the United Arab Emirates) and the Royal Surrey County Hospital, while photon beam comparisons were carried out at Tawam hospital. Photon beams of nominal energies 6 and 18 MV and electron beams of energies 6, 9, 12, 16 and 20 MeV were made using Varian 600C/2100C linear accelerators. The absorbed dose for photon and electron beams obtained following these CoPs are all in good agreement, with deviations of less than 2% between each.
The Role of Intangible Resources (IR) in Improving Quality in Hospitals

Hussain Hamed, Professor Simon de Lusignan, Dr Tom Chan

Literature Review, Background: Intangible Resources (IR)- human capital, structural capital, and relational capital- are known to contribute to the value and performance of organisations. The literature shows that IR have been widely explored in different disciplines (i.e. accounting and economics) but less is known about their impact on quality in health care.

Objectives: To identify the impact of Intangible Resources (IR) which have the greatest impact on delivery of quality in hospitals.

Method: Literature review of related text books, journals, databases. Peer reviewed articles between years 2000 and 2010 were reviewed. EBSCO, Emerald, and JSTOR databases were used. The key words which used where intellectual capital, intangibles, intangible resources, intangible assets, quality, quality management, health care.

Results: Similar to other management disciplines, Human capital, Structural Capital, and relational capital were found to be the best elements which have impact on improving quality in health care. Further research will be conducted to identify key IR that have impact on quality in health care.

Conclusion: Hospital managers, doctors, and other health care professionals should consider the impact of Intangible Resources (IR) on quality improvement particularly in hospitals.
Barrier Properties of Polymers Anticorrosion Coatings

Yang Liu, Joseph Keddie

Waterborne polymer colloids consist of polymer particles - up to a few hundred nm in diameter - that are dispersed in water and used to deposit coatings. An important development is to use polymer colloids to create coatings for metal protection. Broadly speaking, the purpose of the coating is to prevent the ingress of water and ions, which would otherwise lead to corrosion of the substrate (e.g. rust formation). The presence of water and ions can significantly affect corrosion properties, and hence their transport through polymers is of great importance to investigate. This poster will present studies of water and ion transport through different kinds of polymer films. Moisture sorption analysis is used to determine the rate at which water is absorbed in the polymer. GARField magnetic resonance profiling is used to determine the concentration of water as a function of depth in the polymers films, when they are exposed to water. To study the transport of ions through the polymer, Rutherford backscattering spectrometry (RBS) and particle-induced x-ray emission (PIXE) are used to determine depth profiles of the cations and anions in the films after they are exposed to salt solutions. Analysis of the data enables the diffusion coefficients of water and ions to be calculated for the various types polymers. The work will lead to the development of waterborne polymer coatings that will be better able to prevent corrosion.
Development of Rapid Diagnostic Tests for Detection of Antibiotic Resistant Bacteria

Onyinye Diribe, Prof. Roberto La Ragione, Prof. Lisa Roberts, Dr Jason Sawyer, Dr Sarah North, Dr Noel Fitzpatrick

Surgical site infections (SSI), complicated by antibiotic resistance can be a major problem in veterinary practices. SSIs are important as they can have health, welfare and economic impacts on the patient and practice. Thus, it is important that the causative agents (most commonly bacteria) of these infections are rapidly identified and treated with the most appropriate antibiotics.

The standard approach to identifying the organisms responsible for these infections is to isolate the organism and then run various biochemical tests. This approach often requires 3-4 days, as well as a purpose-built laboratory and specially trained scientists. The speed of diagnosis can often be improved to provide identification within a day, by using a technique which identifies specific genes carried by the bacteria. However, this approach is often too expensive and less mobile, as it involves rapid alteration of temperature, and thus an instrument capable of doing this. The work presented here describes a novel approach to solving this problem, by using a gene amplification tool which works by using a single temperature. This diagnostic tool provides a rapid and economical point-of-care test that can identify the bacteria and the antibiotic resistance genes they carry.
The Determination of the Work Function of Conductive Polymers

Simon Ng, J F Watts

In novel polymer electronic devices the work function of the hole injection layer plays a significant role in the overall device efficiency. Unfortunately, existing methods for determining the layer’s WF becomes problematic when dealing with polymeric materials. Scanning Kelvin probe (SKPFM) allows determination of contact potential difference at individual points within a mapped area. Ultraviolet photoemission spectroscopy (UPS) and X-Ray photoelectron spectroscopy (XPS) offer broader analysis of the sample surface. Degradation is experienced in many polymers under UV electro-magnetic radiation whilst current techniques using XPS are difficult to interpret. Charging shifts in two materials in intimate contact when isolated from the spectrometer remain constant with respect to each other in mono-chromated XPS. This work demonstrates referencing to a known material to enable calculation of the work function of complex materials. We measured the work function of the polymer poly(3,4-ethenedioxythiophene)/poly(styrene) sulfonate (PEDOT/PSS) in response to the addition of dimethylsulfoxide (DMSO), which improves the conduction of the polymer by several orders of magnitude through a range of interactions, including the increased ratio of the highly conducting thiophene group at the surface. Previous studies of PEDOT/PSS/sorbitol films have shown that work function can vary between 5.1eV to 4.8-4.9eV by similar mechanisms to the DMSO addition.
Examining the Effects of Exercise Intensity on Subsequent Appetite, Food Intake, 24 Hour Blood Pressure and Resting Energy Expenditure

Ghalia Shamlan, Denise Robertson, Adam Collins

Exercise, in isolation, or in combination with dietary restriction, has long been recommended for successful weight loss and/or weight maintenance.

Exercise has been shown to be more effective than dietary manipulation in attenuating energy intake in the short term. Various studies have demonstrated that exercise has beneficial effects in reducing appetite, modifying energy intake and allowing better energy compensation for high energy loads. Indeed, this acute suppression of hunger has often been coined as “exercise-induced anorexia”, and has been shown to operate partly through modulation of gut hormone secretion. Despite this overall conclusion, there still remain some inconsistencies in the evidence on exercise and appetite, partly due to differences in the intensity and energy cost of exercise used in studies to date. As a result, it is unclear, for a given overall energy cost of exercise, what the independent effect of exercise intensity is on appetite, food intake and other factors. In addition, the current trend is towards promoting high intensity, short duration exercise, which is less time consuming for a given energy cost whilst exhibiting comparable beneficial metabolic effects. We have designed a crossover study which aims to investigate differences in high versus low intensity exercise on post exercise appetite and ad libitum intake of a post exercise meal, post 24 hour blood pressure, gut peptide secretion and substrate utilisation. Differences between interventions for individuals will be assessed parametrically and non-parametrically depending on distribution of the data.
Modulation of Mid-Infrared Light in Group IV Materials

Milos Nedeljkovic, Dr Goran Mashanovich

Silicon has over recent years become a popular material for photonics at telecoms wavelengths; the hope is that cheap integration of electronics and optics on the same chip will lead to realisation of high-speed short-reach optical interconnects. An emerging area for the field involves migration of silicon photonics to mid-infrared wavelengths (2-14 μm), where the possible applications grow to include “lab-on-a-chip” systems for chem-bio-physico sensing, missile countermeasures and free-space communications. A wave of research in this field has been enabled by recent advances in sources and detectors of mid-infrared light. The greatest difficulties lie in finding compatible material systems that have low absorption at these longer wavelengths, while still being able to guide light around a chip. To this end, low-loss mid-infrared waveguides have been demonstrated at Surrey. Another challenge is accurate modelling of mid-infrared group IV modulators. Modulation of an optical signal by an electrical one is a function that is sure to be significant in any mid-IR optoelectronic system, and here we present quantitative predictions of the main modulation mechanism in silicon and germanium, and we outline a route towards experimental realisation of devices that exploit this effect.

Modelling the Menstrual Cycle

Kaylee Moakes, Dr Adam McNamara, Prof. Annette Sterr

Behaviour and cognition as well as central nervous system disorders are affected by the gonadal hormones oestrogen and progesterone. Potentially this is due to the modulating effect of progesterone and oestrogen on the “work horse” neurotransmitters (chemical brain messengers) glutamate and GABA (Smith, 1994). Although there is evidence for the separate effects of these hormones on cognition and behaviour, as of yet no model explains the complexities of interactions across several measures.

Using a mathematical approach we aim to provide novel insight to an old problem. To facilitate this we will collect temporally rich data from 30 naturally menstruating female participants 12 times over the menstrual cycle. Saliva samples to measure hormone concentrations and reaction time data from a figural comparison task (Hausmann and Güntürkün, 2000) shown to be sensitive to the menstrual cycle shall be collected on each session. Measures of GABA and Glutamate will not be measured in vivo but will be modelled as latent (unobserved) variables using prior knowledge of the effect of hormones on neurotransmitters to constrain the model.

We hope that this model will enable us to better understand and predict behaviour. We also aim to gain some insight into time courses of CNS disorders.
Failure of a Waterborne Primer Applied to Zinc Coated Steel

Siavash Adhami, Prof. J.F. Watts, Dr M.L. Abel, Dr M. Baker, Dr C. Lowe

The durability of a high performance coating system based on a polyester topcoat and a water based primer system has been studied by exposure of coated panels to salt spray and 100%RH. The humidity exposure is less deleterious than the salt spray with a higher concentration of an adhesion promoter further enhancing durability in each case. XPS analysis establishes that in both cases failure occurs as a result of a weak boundary layer of zinc oxide corrosion product. Further testing of these pre-exposed panels using a wet adhesion test and a mechanical pull-off test confirms the superior performance of the formulation with a higher level of adhesion promoter in both tests. The locus of failure is generally in the organic phase, although those specimens at the lower end of the performance spectrum show a significant amount of failure at or close to the coating/substrate interface. For samples pre-exposed to the salt-spray, chloride residues the presence of chloride ions at the failure interface indicates that such a treatment may have a deleterious effect on subsequent performance.
An Interpretative Phenomenological Analysis of the Lifeworld Experiences of a Treatment Day-Centre Attendee

Philip Cox, Dr Robert Owen

£½-billion ‘up-in-smoke’?
The subjective psychological experience of marijuana (‘skunk’) smokers in early day-center treatment is insufficiently understood. This exploration contributes to existing multi-disciplinarily research by exploring an unaddressed intimate account of addictive behaviour.

Methodology
Single case study data was subjected to in-depth qualitative analysis using Interpretative Phenomenological Analysis (IPA). IPAs methodology brought forth a rich description of experience, meaning- and sense-making, which was subjected to systematic application of the concepts of Being (subjectivity in-the-world), horizontalization (of issues to avoid researcher bias), and awareness of epoché (bracketing the researchers meaning-making).

Results
The coded text yielded a table of three coherent higher order themes; temporality and meaning-making; the effect of smoking skunk upon and within the embodied lifeworld (experience), and how this affects one’s way of Being (inter- and intra-personal relating).

The big picture
The study holds the potential to extend multiple fields: Health Psychology (treatment engagement/design); Occupational Psychology (counsellors in-recovery); nursing (Best Practice), and; administrators (cost-benefit analyses). The £½-billion of questionable direct treatment funding and wider socio-health costs raises fundamental questions - how we treat or ignore an issue that may itself force some form of unwanted resolution.
Supply Chain Optimization: Profit Maximization and GHG Minimization on Stover to Ethanol Production

Mingyen Yu, Dr Franjo Cecelja, Dr Syed Ali Hosseini

In recent years, biofuel is seen as a viable solution to replace the depleting fossil fuels based on economic as well as environmental reasons. With the tighter environmental regulations, many countries have developed strategic approach to target relevant resources (and technologies) which could be used with cost effective adaptations. One such promising raw material is corn stover, which can readily be converted into ethanol. Also, Stover itself is a by-product of corn and other plantations which can be found in many countries available in large quantities.

In this work, for the analysis of supply chain, linear programming is used which accounts for the variability of technologies that uses Stover as input. The analysis includes economic and environmental factors targeting ethanol as main product with ash, carbon dioxide and DDGS as by-products. Also, the analysis is constrained with supply chain sustainability, which conditions that all parties involved should be profitable, as well as the overall supply chain.

In addition, compliance of carbon production with existing GHG regulation was performed with the European regulation in the case study. To this end, GHGs are converted into carbons and added onto the financial objective. Optimisation part of the analysis was implemented in GAMS.
Abnormal Heart Rhythms – Identification of a Fundamental Cause and a Potential Strategy for Their Reversal

*Samantha Salvage, C. H. Fry, R. I. Jabr*

Abnormal heart rhythms occur when conduction of intrinsic electrical signals is distorted, and in severe cases can be fatal. A low electrical resistance between cells of the heart is essential for normal conduction. Such abnormal rhythms are predominantly mediated by increased calcium inside the cell (intracellular), which can both directly and indirectly affect this resistance between cells [1]. A protein that has been implicated in abnormal heart rhythms is calcineurin [2]. Calcineurin is activated by raised intracellular calcium. Our aim was to determine if raised intracellular calcium increased electrical resistance between heart cells and if this effect could be reversed by a specific calcineurin inhibitor.

Experiments used an oil-gap chamber that permits measurement of the resistance between heart cells (see [3]). These were done using guinea-pig heart tissue under control conditions and when intracellular calcium was raised, with and without a specific calcineurin inhibitor (cyclosporin-A).

Experiments showed that elevated intracellular calcium significantly increased electrical resistance between heart cells. This effect was reversed by the calcineurin specific inhibitor cyclosporin-A, which suggests a role for calcineurin to increase resistance between heart cells, leading to abnormal heart rhythms. This also identifies a potential drug target to reverse these abnormalities.
Radiotherapy Treatment Planning Using Cone Beam CT Images

Fouad Abolaban, Dr Vlad Stolojan, Dr David Cox

Cancer is one of the leading causes of death in the developed world. There are number of treatments that can treat cancer, such as radiotherapy. In radiotherapy, Computed Tomography CT scan is used as a main source for treatment planning. The CT scan shows a complete image of the tumour at the beginning of the radiotherapy treatment plan, where the plan is based on it. A new scan technology called Cone-Beam CT (CBCT) is used to assist the radiotherapist in positioning the patient in the centre of the radiation beam. Since the tumour may deform during the treatment, new treatment plan is essentially to achieve curative treatment.

In this research, CBCT scan images is re-used for treatment planning. Since the CBCT gives fewer doses than the CT, it can also be used to acquire images on daily bases.

The CBCT scans were imported to generate treatment-plans; then comparison between the CBCT and CT based treatment-plans were applied. The results showed that the CBCT images are applicable for adapting the radiotherapy plan. This technique of using the CBCT directly in re-planning should improve the outcomes of the radiotherapy treatment.
Does Liver Fat Influence the Plasma Triacylglycerol Response to a High Sugar Diet?

Aryati Ahmad, Professor Bruce Griffin, Professor Margot Umpleby

An increased intake of dietary sugars has been associated with the formation of an atherogenic lipoprotein phenotype (ALP), an established marker of cardio-metabolic risk, primarily by raising plasma triacylglycerol (TAG). The extent to which dietary sugars exert this effect, may be determined by the accumulation of fat and insulin resistance in the liver1. The aim of this study was to determine how the percentage of liver fat influences the plasma TAG response to a high sugar diet. A cross-over dietary intervention study was performed in men (aged 40-65) at increased cardiometabolic risk (according to ‘RISCK’ study criteria)3, and subdivided into two groups with a low liver fat (< 4.2%, n=13) or moderately-high liver fat (> 4.2%, n=12). Subjects were randomised to receive either a high or low sugar diet for 12 weeks and then cross-over to the alternative diet. Dietary intakes achieved target ratios of starch to sugar 1:1.2 (High total sugar) and 3:1 (Low total sugar). After adjusting for baseline TAG, plasma TAG was significantly increased after the high sugar diet as compared to the low sugar diet (p=0.003, ANCOVA). Comparison between the liver fat groups revealed a significant increase in TAG in the group with moderately raised liver fat after the high sugar diet (p=0.02), but not the low sugar diet. This study provides evidence to suggest that a high sugar diet produces a greater TAG-raising effect in individuals with moderately raised liver fat (10-25%). This finding may have major implications for the potentially detrimental impact of dietary sugars, on lipid-related cardio-metabolic risk in people with moderately raised liver fat.

En-Flo Laboratory Showcase of Various Flow Visualisation Techniques in Fluid Dynamics

Nicholas Martin, Dr Alan Packwood, Dr Nick Hills

The fundamental issue when studying fluid dynamics is that conventional measurement techniques fail to provide an overall picture of the intricacies of the flow in questions. Visualisation of a given flow allows the observer to gain otherwise immeasurable insight into these qualitative features, generally at low cost and in a relatively short period of time. Using various methods the poster will showcase the current facilities that the En-Flo laboratory employs. Such examples will include: flow visualisation on the lifting surface of an inclined aerofoil; smoke visualisation of a synthetic jet in still air and over a bluff body using a laser sheet; soap film interferometry for two dimensional turbulent flow. The visual nature of these results makes it an ideal medium for communicating complex results to a wider audience. Since the majority of fluids in the real world are invisible to the naked eye, an appreciation of the immense detail that occurs in the natural world around often goes unacknowledged.
**Development of an Enzyme-Based Electrochemical Fuel Cell: Optimisation of a High Performance Glucose Oxidase Bioelectrode**

*Ross Milton, Professor Robert Slade, Dr Alfred Thumser*

There is an increasing demand for clean and cheap energy to help combat global warming. In the Fuel Cell Research Group we are investigating the feasibility of developing enzyme-based electrochemical fuel cells. In this study, glucose oxidase (GOd) is being investigated as an enzyme component of a biological fuel cell (BFC). The enzymatic oxidation of glucose, as catalysed by GOd, produces electrons (and protons) which can be harnessed to produce electricity.

This study reports unprecedented performance of a GOd bioelectrode which is “wired” to an electrode via carbon nanotubes, the latter facilitating electron transfer from the redox centre of the enzyme to the electrode. The design of the bioelectrode allows the use of inexpensive and readily available materials without the use of potentially toxic chemical mediators. Redox peak currents of 1 mA cm\(^{-2}\) have been recorded which are, in most cases, a 20-fold increase on performance reported in the literature and more than double the highest performance reported to date. Clear electrochemical response to glucose is observed alongside good stability which reflects the potential for this system to be employed into a BFC.

In conclusion, an inexpensive yet robust GOd bioelectrode has been prepared, which exhibits a far greater performance in comparison to relative literature.

**Manufacture of Optical Components Near Diffraction Limit**

*Mark Langridge, Dr Vlad Stolojan, Dr David Cox*

Due in part to the shrinking of consumer electronics, the manufacture of optical components with sizes nearing the wavelength of light is becoming much more popular. They can be used in laser focusing or optical cable alignment among other things. We aim to explore the manufacture of micron sized parabolic dishes via ion milling. Whilst the manufacture of spherical dishes and lenses has been demonstrated by many means there are known problems with spherical aberration. By using a very precise technique, such as ion milling, the creation of highly accurate parabolic shapes can be achieved, overcoming this aberration. These dishes can potentially be used in optical spectroscopy to concentrate light, improving the collection at low intensities. This may give more accurate results when looking at samples that cannot be viewed under high intensity light, such as biological samples.
Supramolecular Chemistry Can’t Kill the Polluting Ion, but Can Capture It

Weam Abou Hamdan, Prof. A. F. Danil de Namor

Metal contamination of water bodies is a worldwide problem, as consumption of water contaminated by polluting metal speciation can lead to physiological mutations, mental impairment and even death. Subsequently the research focused on the extraction of metal ions from aqueous systems by the use of supramolecular receptors. Hosts derived from three macrocycles (calixpyrrole [1-4], calixarene [5-11] and resorcarene [10] derivatives) were produced. The hosts were designed to be selective for specific metal(s) through the insertion of functionalities selected for their ability to interact with the selected guest(s). A selective host can act in a similar way to a net when placed into a water body, being porous to most metals but capturing the ones for which it is selective By employing structural, electrochemical and calorimetric techniques it was possible to study the host : guest ratios (stoichiometries) of interactions and also the selectivity of the host for specific guests over others in different media. Based on fundamental studies, new materials based on the immobilisation of these receptors were produced for the removal of polluting ions from water.

Semantic Clustering for Heterogeneous Wireless Sensor Networks

Alia Ibrahim, Professor Andrew Nisbet, Professor Nicholas Spyrou

Wireless Sensor Networks (WSN) can be used to collect information in a variety of applications, like intrusion detection, habitat monitoring, fire detection, etc. One of the biggest challenges of WSN is to reduce energy consumption in order to prolong the life span of the network. Clustering the nodes in a WSN is considered to be one of the most efficient approaches to reduce energy consumption and extend the network’s life span. But most of the algorithms introduced to cluster WSN consider the network to be homogeneous, meaning: all the nodes are identical. However, many applications do require the deployment of sensor nodes that enjoy different characteristics for instance regarding their energy level, computation energy and sensing capabilities. We therefore talk about Heterogeneous Wireless Sensor Networks (HWSN). Clustering the network has also been used widely in HWSN in order to benefit from the higher capability nodes for further extension of the network life span. Most clustering algorithms proposed for HWSNs consider heterogeneity in the network in terms of nodes’ energy and computational power but very few have considered the heterogeneity of applications or nodes’ data type as an important factor for grouping the nodes together. We believe that introducing the semantic of data as a factor for clustering the network may result in even more expanding of network’s life time by allowing more data aggregation and reducing the amount of data set through the network.
Nutritional Status in Older Adults across Care Settings in Surrey

Noraida Omar, Dr Kathryn Hart, Dr Michelle Gibbs

Malnutrition is a serious and common problem in older adults. The aim of this study was to determine the nutritional status and factors affecting satisfaction with food-related life in older adults in different care settings.

Seventy-six older adults aged ≥ 75 years old were recruited from different care settings in Surrey to complete the Mini Nutritional Assessment (MNA), the Satisfaction with Food-related Life questionnaire and three 24hr diet recalls. The data were analysed with Dietplan6 and SPSS(v16).

MNA results showed that 15% of the free-living were malnourished, 13% care homes and 24% hospital, MNA scores did not differ between care settings (p>0.05) and in the prevalence of malnutrition (p=0.19). Significant differences were found between care settings for individual MNA items: including neuropsychological problem, prescribed drugs, number of meals/day, protein, fruit and vegetable intakes, and comparative health status with others (p<0.05). Risk of malnutrition was significantly correlated with intakes of energy, protein, fat and carbohydrate whilst number of meals per day was a significant predictor of energy intake. Multiple regression analysis by setting suggested that independence, prescription drugs, total number of meals/day, protein and fluid intakes were the primary predictors of malnutrition in free-living older adults, whilst for those in care home, appetite and nutrient intakes and disease-related stress (hospitals) were of greater importance.

The importance of adequate energy and protein intakes for malnutrition risk, were expected this study has highlighted the importance of additional, often overlooked issues such as satisfaction with food.
The Effect of Aggregate Grading on Fracture Characteristic of Concrete

Atur Siregar, Dr M. Imran Rafiq, Dr Mike Mulheron

Concrete as a composite material has been used widely in construction. Due to aggregate is the largest volume occupied in concrete, the mechanical characteristic of hardened concrete will be influenced significantly by its properties. Studies on the size, shape, texture, and amount of aggregates and also compressive strength of concrete have been shown to influence the fracture mechanics parameters of concrete. Since compressive strength of concrete is common mechanical properties to determine the quality of concrete, the fracture parameters is always correlated with the compressive strength with taking into account some properties of aggregate such as maximum diameter and texture. However, the volume fraction of coarse aggregate which corresponds with aggregate grading is not significantly considered. As the strength and fracture behaviour of concrete are dependent on interaction between bulk matrix and aggregate, the effect of aggregate grading will be significant on the fracture energy and fracture toughness. Therefore, quantifying the effect of aggregate grading on fracture behaviour of high strength concrete is needed to refine predicted fracture energy and fracture toughness formula in developing design criteria based on fracture characteristic.

Semantic Technologies and Translation

Joanna Gough, Prof. M Rogers, Dr Sabine Braun

In the last few decades globalization, digitization and the evolution of the Web brought about a massive growth in content that requires translation as well as a demand for faster delivery of translated material. Current statistical approaches take advantage of the abundance of data on the Web and the huge storage and computing capabilities of cloud computing, and offer translation solutions that are effective, but often below the expectations of translation professionals. This is because the statistical approaches operate on the surface level of language structures and lack insight into the meaning of what is being translated. Semantic technologies are designed to capture connections and relationships between various entities, to combine and manipulate them, thus adding a new ‘semantic’ layer to the Web resources. Although employed in many areas such as text analytics and information retrieval, they seem not to have been well developed or commercialized in the area of translation technology. In my research I intend to examine whether semantic technologies will impact translation technology and bring it to the next level of sophistication and leveraging potential. I will present my initial findings and talk about the next steps in my research.
Breast Tissue Contrast-Simulating Materials Using Energy-Dispersive X-Ray Diffraction

Shyma Alkhateeb, Dr Silvia Pani, Prof. David Bradley

Breast lesions and normal tissue have different characteristics of density and molecular arrangement that affect their diffraction patterns. The aim of this project is to look for materials that simulate the contrast between different types of biological tissues, in order to build a phantom that can be used to assess the performances of an X-ray diffraction imaging system to be used for breast tissue characterisation.

Different mouldable and non-mouldable materials were analysed using an energy dispersive X-ray diffraction system based on a conventional X-ray source (operated at 70kVp), and a CdTe detector (Amptek XT-100) with a conventional spectroscopic chain.

Combinations of materials were identified having a contrast comparable to that achieved in diffraction imaging between healthy and neo-plastic breast tissue at the momentum transfer values carrying most information in this application (1.1nm\(^{-1}\) and 1.6nm\(^{-1}\)). These materials will be used to build test objects with shapes simulating those of details of mammographic interest. Images of the test objects were assessed in terms of both contrast and accuracy of shape reproduction for different combinations of scanning step and incident x-ray fluence.
Assessment of Inhibitory Effect of Heated Wood of Scotch Pine, Japanese Larch and Rhododendron on the Spread of ‘Sudden Oak Death’

*Mina Kalantarzadeh, Pro. Dulcie Mulholland, Dr Frans de Leij*

Phytophthora ramorum and *P. kernoviae* are the causal agents of ‘sudden oak death’ (SOD). Since 2009, SOD has become particularly virulent towards Japanese Larch, causing the death of large numbers of trees in the West of the UK. Despite emergency felling of infected stands of Japanese Larch, the disease continues to cause widespread damage.

We found that heating of wood shavings of a wide variety of wood types caused the shavings to become highly anti-microbial against both bacteria and a range of fungi. Subsequently, the chemicals responsible for this effect were identified using GC-MS.

This project aims to investigate the use of heated wood shavings as a practical means to reduce the spread of SOD. The methodology promises not only to kill the pathogen in infected wood, but a mulch made from the treated wood(chips) could be used to limit the spread of the fungus. Heated heartwood chips of Scotch Pine, Japanese Larch and Rhododendron were tested in micro-cosm studies. It was found that a layer of treated woodchips placed on inoculated topsoil reduced the spread of the pathogen significantly. Whereas the method shows promise for reducing spread of SOD, efficacy is affected by wood type and pathogen strain.

Development of TES-Anthracene/Polymer Blends for Laser Applications

*Kittiyaporn Singsumphan, Prof. Joe Keddie, Dr Maxim Shkunov*

Blends of polymers with small organic molecules, including acenes, are widely used in high performance electronic device, especially in transistors, where charge transport is the key requirement [1,2]. For an alternative application, this current research considers acene/polymer blends as candidate materials for lasers. The research aims to correlate the photoluminescence (PL) and quantum efficiency (QE) of the films with the TES-anthracene crystal shape and size. (These properties are related to how much light is emitted by the material when it is in an excited state.) In turn, the crystals' characteristics are found to depend on these important factors: the amount of TES-anthracene; the viscosity of the polymer (adjusted by its molecular weight), and film processing (casting from solvent or melting and cooling). The highest QE was obtained when the TES-anthracene was blended with a lower molecular weight polymer, and the resulting film was processed by heating and cooling, rather than by merely casting from solvent. Thus, by increasing the light emission from the novel organic materials, our work is an important first step in the development of a new candidate for lasing applications.
Lower Limb Surgery After Injury: Does Whether Surgery is Elective or Emergency Make a Difference to the Patient Experience in Saudi Arabia?

Nouf Alkhamees, Prof. Peter Buckle, Dr Nicola Christie, Prof. Molly Courtenay

Background: Injury is a condition that has been given substantial academic attention over recent decades. This has largely been as a result of significant mortality and morbidity rates. For example, in Saudi Arabia, the Traffic General Directorate (2008) records showed that 36,000 people are injured annually.

Several prospective epidemiological studies have indicated that 40% to 50% of injury patients experience moderate levels of disability, up to 80% produce lower quality of life scores than the healthy adult population, and up to 50% delay their return to work for up to two years.

Method: The research used a qualitative methodology to achieve its objectives. This will involve a semi-structured open-ended interview (either face-to-face or by telephone); using a thematic sampling approach.

Results: Our preliminary findings indicate that although some of the participants who have experienced traumatic event (both elective and emergency cases), appears to be doing reasonably well at present, it can be seen that patients who have had emergency surgical intervention, still struggling with some doubts and fears, that ranges between biological to social and/or psychological concerns.

Conclusion: Given patient's experiences and perceptions; treatment of injury seems to have wider implications than the physical trauma. Suggesting a healthcare pathway that incorporates both biomedical and psychosocial aspects.
Transfer Learning for Action Classification in Racket Sports

Nazli Farajidavar, Dr Teofilo Decampos, Prof. Josef Kittler

During the last two decades, everyone has become capable to process and make information available to the entire world which introduced the challenge of organizing information. Automated video annotation is a way which can enable the users to perform tasks such as video search, object-based video encoding and to extract enhanced broadcast content. The domain of sport broadcasting in particular is the subject of the current research attention because each sport modality has its own set of rules, types of actions and objects (ball, Shuttlecock, etc). So far no generic system for sport annotation is available. The main aim of this work, in correlation with current ACASVA (Adaptive Cognition for Automated Sports Video Annotation) project, is to build such a system focusing specifically on court-based games, such as Tennis and Badminton. While the main implemented system has been trained for a specific game like Tennis, the goal of the work described in this report is to adapt the players action recognition module for a new domain such as Badminton or even Table-Tennis and other court based games in the future without an explicit system redesign. Actions are derived using the HOG3D feature extraction method and for transfer learning we used a method based on feature re-weighting and a novel method based on feature translation and scaling.

Solution Phase ZnO Nanowires

Mohammad Alenezi, Professor S. R. P. Silva, Simon Henley

ZnO nanostructures have been synthesized successfully over large area via a non-template, low temperature, and cost efficient hydrothermal method. By controlling the precursor concentration, reaction temperature, growth time, and HMTA concentration ratio in the solution, we were able to grow different ZnO nanostructures such as nanowire arrays, nanodiscs, nanoring, nanoflakes, nanocotton-like, nanoflowers, and nanostars. The size and shape of the nanodiscs were found to be related to the temperature and growth time. Two different methods were used to make contacts to the nanodisc to measure its electrical properties.
Studies on Glucoraphasatin Extracted from Japanese Radish Kaiware Daikon for Anti-Cancer Agent

Ahmad Faizal Abdull Razis, Constantina Kinni, Gina Rosalinda De Nicola, Eleonora Pagnotta, Renato Iori, Costas Ioannides

The objective of the study was to evaluate whether glucoraphasatin extracted from Japanese radish Kaiware Daikon is potent modulator of various enzymes that involved in the metabolism of carcinogen in human cancer cell line. Glucoraphasatin was isolated from Daikon sprouts. The cells were incubated with glucoraphasatin at various concentrations for 24 hr. Glucoraphasatin caused significant increases in CYP3A4 and glutathione S-transferase enzyme activities at the highest concentration studied. Overall, glucoraphasatin was found to modulate carcinogen-metabolising enzymes at the activity level at concentrations that are unlikely to be achieved by dietary consumption of Daikon. As these enzymes are involved in the detoxification of carcinogens and particularly since this substance is now administered as supplement. It is our belief that glucoraphasatin should be further studied as potential chemopreventive agent.

Study the Linear Attenuation Coefficient of the Hydrophilic Materials for Tissue Equivalent Phantoms

Hanan Aldousari, Prof.Nicholas Spyrou

The aim of the study is to determine the linear attenuation coefficients of the hydrophilic materials with the objective using their as issue equivalent phantom in the radiation studies. Hydrophilic materials, which is refers to ‘hydro gels’, are actually cross-linked hydrophilic copolymers. They are commonly characterized by their ability to integrate water into their structure without being dissolved in it. Four different types and thickness of the hydrophilic materials were tested. Measurements were obtained for each one type separately and by placing them together between the Na22 positron emitter (511keV energy) source and a single scintillation detector. The measurements show that the measured intensity of the radiation beam transmitted through the hydrophilic materials became attenuated when the thickness of the hydrophilic materials increases. Also, it was found that the hydrophilic materials have linear attenuation coefficients that closely match those of the soft tissue across the range of energies used. This work was initiated in order to evaluate the suitability of the hydrophilic materials for tissue equivalent phantom.
A Systematic Review of the Social and Economic Risk Factors Associated with Land Degradation in Tropical Developing Countries

Peter Johnson, Prof. Nigel Gilbert, Dr Kate Burningham

The social and economic causes of land degradation are complex and contextual. Processes that lead to degradation in one area may have insignificant or opposite effects in another. A review of the currently identified risk factors that drive these processes helps to give a broader understanding than localised studies. This aids the formation of policy at levels above the local. A systematic review was carried out on all peer-reviewed literature relating to the identification of social and economic causes of land degradation in tropical developing countries. A well defined search, inclusion and synthesis approach was used, aimed at understanding the state of the art in this area, and exposing trends and weaknesses in the literature. The results of the review highlight the factors of importance and identify the most commonly cited. These are broken down by discipline and methods, showing the strong effect these can have on the factors cited. Finally an analysis of the impact of studies is used to show which factors are most likely to have entered the mainstream thinking in this area. This review implements a methodology seen too rarely in the social sciences and puts forward a novel approach to the synthesis of previous studies.
Feature Extraction and Selection for the Classification of Electrocardiogram and Respiration Signals

Ana Matran, Dr Daniel Abásolo, Dr Miguel Hernández-Silveira, Dr Su-Shin Ang

In recent years, portable devices have been widely used for recording long-term data with a minimum interference with the normal life of the subject. However, these systems are often unable to cope with motion artefacts. This situation is aggravated with a decrease in the number of leads used for recording. In this project, a body-worn device was used to collect both single-lead electrocardiograms and impedance pneumography signals in order to select and test several features that can be used in the future as part of an intelligent classification system.

Two sets of features were initially pre-selected. The first set comprised a number of statistics applied to the signals, as well as variables previously used in biomedical signal processing. The second set contained time-frequency features.

The evaluation and selection of the features was performed by means of decision trees and linear discriminant analysis, both on the original variables and on features extracted by means of principal component analysis.

For the electrocardiogram, the lowest misclassification rate (21.8%) was obtained for the central tendency measure. On the other hand, impedance pneumography signals were best discriminated (22.06%) with a linear discriminant technique based on the standard deviation and range of amplitude of the signal.
A Biological Cone Model and Simulator, with Rod-Cone Coupling and Light Adaptation

Kendi Muchungi, Dr Matthew Casey

The mid 1860s saw the beginning of amazing discoveries as pertains to aspects of the visual system. Schultze in this period discovered the existence of two distinct photoreceptors; Rods and Cones. Santiago Ramon y Cajal a little later, 1930's, discovered the existence of distinct retinal ganglion classes. Great strides in the understanding of how visual information is processed have been made from this time. In the recent past aspects pertaining to the visual transduction process have become more apparent. One such aspect is the importance of the convergence of the rod and cone systems to local adaptation, a process that is extremely vital to the visual transduction process and therefore to adequate vision. Existing retina simulators may not therefore, adequately capture this aspect. We therefore propose a new photoreceptor simulator, which is biologically plausible, computationally simple and effective, and one that captures a component of the convergence of Rod and Cone systems, Rod-Cone coupling during mesopic luminance. This simulator helps bridge the divide between neuroscience and computational simulations of psychophysical functionality.

Live Digital Storytelling: Performative Experience Design for Autobiographical Storytelling

Jocelyn Spence, Professor David Frolich, Dr Stuart Andrews

The scope of the field of human-computer interaction (HCI) has been widening over the past three decades. New perspectives have allowed researchers to investigate an increasingly broad range of the experience of interacting with technology. Storytelling is an area in which the uptake of digital technology has been lopsided, with any number of options for creating stories with personal photos online, but little support for live, conversational storytelling. This disparity is reflected in the practice of Digital Storytelling. How can new designs for the performance of personal stories using digital media technology, seen through certain lenses of performance theory and inspired by practitioners of autobiographical performance, advance the understanding of the interactions between people and their personal digital media?

This project uses performance theories and practices that apply to autobiographical storytelling using digital media technology in order to look into emerging technologies, or emerging uses of technology, that stem from and point towards a more engaged, embodied, improvisational, personal, and possibly ‘live’ experience of telling stories in conversation using digital media. This design-oriented research project seeks to create designs for performative experience and to evaluate those designs using standard techniques of participant observation and interview as well as performance analysis.
Investigation of Two Layer Image Compression Scheme Used by Interactive CAD Teaching System

*Syed Ashar Akhtar, Dr Wei Xu*

Image compression is not only useful in storage but also equally important in transmission. Large image data over a network is usually lossy compressed before transmission to reduce network traffic. The target CAD teaching system utilizes two way transmissions of acceptable quality of image data in real-time to maintain interactivity of teaching within limited processing and network resources. In this research, impact of various binary compression algorithms over several encoding schemes was explored deeply by changing colour depths and scaling on our test images. To cater the system requirements certain measurements were taken for all the combinations of our tests. For quality of images Peak Signal to Noise Ratio (PSNR) was monitored while compressed image size and processing time were measured to achieve good frame rate on given network and machine. In this research, space-time tradeoff for acceptable quality was highly optimized for the target application’s needs. Finally strict criteria were applied to recommend a suitable combination to be implemented in the target system.

The Study of the Nature and Practice of New Public Management in Brunei Public Sector

*Thuraya Farhana Haji Said, Dr Paul Tosey, Dr Eugene Sadler-Smith*

This research investigates the nature and impact of New Public Management (NPM) in Brunei. Within the public sphere, NPM has been the dominant global model for reform in the past three decades (Hood, 1991; Osborne and Gaebler, 1993; Pollitt, 2007) wherein the implementation of NPM, management techniques drawn mainly from the private sector, has entailed a paradigm shift away from traditional public administration (Dunleavy and Hood, 1994; Peters, 2002). There has been evidence that this global trend has influenced in Brunei’s public sector. For example, the strategic importance of performance management (PM) has been highlighted in Brunei public sector organisations.

However, the compatibility of NPM with Brunei’s public sector is questionable. Although NPM ideas are highly influential, many researchers have argued that the public sector has adopted NPM more in rhetoric than in practice (Talbot, 1999; 2001; Araujo and Branco, 2009; Siti Nabihah and Scapens, 2005). Therefore, in looking at Brunei’s monarchical government, this study aims to explain the process of PM’s institutionalisation in the bureaucratic public sector. An interpretive case-study approach will be adopted to understand how and why organisations change their PM systems. Qualitative data will be collected through semi-structured interviews, document analysis and observation. Research implication of this research will add new insights into NPM practice, particularly PM, in a non-western context.
Combining Radiation with Targeted Therapies in Glioblastoma

Lara Barazzuol, Prof. Karen Kirkby, Dr Norman Kirkby, Dr Roger Jena, Prof. Roger Webb

Glioblastoma (GBM) is the most common and aggressive primary tumour of the brain. Present treatment is based on a multidisciplinary approach including surgery followed by radiotherapy with concomitant and adjuvant temozolomide (TMZ) chemotherapy.

Although TMZ administration significantly improves median survival, almost all patients eventually develop tumour recurrence and die. For this reason, we are evaluating a novel targeted agent (i.e. poly(ADP-ribose) polymerase (PARP) inhibitor, ABT-888) as both chem- and radio-sensitizer. PARP are a family of proteins that are involved in the repair of DNA single strand breaks (SSBs).

In this study, we exposed four human GBM cell lines to ABT-888 for 5 h prior to radiotherapy and TMZ. Immunofluorescence detection of poly(ADP-ribose) synthesis showed that ABT-888 inhibits PARP activity to baseline levels. Cell survival curves showed radiation enhancement ratios ranging from 1.28 to 1.4, without overlapping cytotoxicities. Further ongoing experiments are attempting to clarify the role of ABT-888 in apoptosis, and therefore in necrosis. Despite our highly promising initial in vitro results, we require further evaluations in real clinical trials.
Shifting Between Modes of Thought: A Mechanism Underlying Creative Performance?

Andrew Pringle, Dr Paul Sowden

Creativity has been conceptualised as requiring both divergent and convergent modes of thought; with divergent thinking involved in generating the variability required for new ideas and convergent thinking in evaluating and turning ideas into useful and appropriate outcomes (Cropley, 2006). Established measures of creativity exist that assess the ability to produce divergent and convergent creative outcomes. However, current measures do not allow for an examination of the dynamic deployment of convergent and divergent thinking on the same task. It has been suggested that the ability to shift between these two modes is an important feature underlying the capacity to be creative (Gabora, 2010; Howard-Jones, 2002) and such an ability may be important in professions such as creative design (Lawson, 1997). The present research will examine if there are differences between groups of high and low creative achievers on a behavioural task requiring participants to repeatedly shift between convergent problems, with a single solution, and divergent problems requiring the generation of multiple solutions. Preliminary findings examining the link between levels of creative achievement and the ability to efficiently shift between modes will be discussed.
Investigating the Use of Fluorescence Microscopy as a Method of Analysing Phase Delay for Low Dose Particle Irradiations

Miriam Barry, Karen Kirkby, Norman Kirkby, Andrew Nisbet

Investigating the phase delay of cells after irradiation is important in the field of radiotherapy research, as data from these studies may be vital in implementing clinical trials which aim to optimise fractionation regimes. Therefore with the increase in particle therapy centres around the world, phase delay of cells after proton and ion beam irradiation is particularly relevant. Irradiation of cells causes delay of the cell cycle which can be quantified using a number of different methods. Some low dose phase delay studies for low LET radiation such as X-rays have been performed but there is limited literature relating to high LET radiation such as protons and heavy ions. This is due in part to the high RBE of, especially the heavier ions, resulting in a lower limit of dose which it is possible to give, i.e. the dose relating to one particle and also the need for microbeam irradiation of cells to avoid problems associated with the stochastic nature of broadbeam irradiation. Unfortunately, there are practical limitations in delivering the required dose to an adequate number of cells, as required by traditional techniques. Therefore I am investigating whether fluorescence microscopy, which require far fewer cells, could be used to analyse phase delay.
An Investigation of a Rehabilitation Training Programme to Facilitate the Benefits of Hearing Aid Use for Hearing Impaired Adults in Saudi Arabia

*Aseel Alkhamees, Prof. Karen Bryan, Dr Merle Mahon (UCL)*

In 2000 there were 250 million people with hearing impairment worldwide. The trend continued in 2005, when the estimate rose to 278 million people with a disabling hearing impairment worldwide.

Saudi Arabia takes third place after Algeria and Iraq with the highest population of deaf people. That equals to 100,000. However, it has the highest percentage rate of deaf people in the general population, with a figure of 3.55%. In Saudi Arabia this number is higher because of the frequent practice of consanguineous marriage (marriage between close relatives), increasing the chance of transmitting inherited conditions such as certain types of hearing impairment.

The effects of a hearing impairment can impact on an individual’s life in many different ways – in terms of their communication skills, their social life, their academic progression and their overall quality of life. The current rehabilitation model available for managing hearing impairment is to use the hearing aid. Research in the USA and Western Europe suggests that a programme of auditory rehabilitation enhances the benefit of the aid. There are no auditory rehabilitation programmes in Saudi Arabia, and no research to investigate this in Arabic-speaking countries, and no investigation of rehabilitation outcomes in Islamic cultures.

In the study a rehabilitation programme was designed and piloted for adults who suffer from hearing impairment in Riyadh city, the capital of Saudi Arabia that focused on listening training, education in information and hearing strategies.
Assessment of Contamination of Water Sources Due to Human Activities in Kaduna Metropolis, Nigeria

Aliyu Dadan-Garba, Dr SK Ouki, Dr SJ Hughes, Mr BA Clarke

Air and water are the most important resources necessary for life, whether humans, animals, plants or micro-organisms. Water can, however, be a vehicle of diseases and mortality to the living organisms.

The research investigates the contamination of water sources due to human activities in Kaduna Metropolis, Nigeria. The study region was classified according to different land use types namely domestic, commercial, agricultural, refinery, industrial and control areas. Water samples were collected from groundwater and surface water sources in the delineated areas and were analysed in laboratories for water quality parameters which included pH, temperature, electrical conductivity, total dissolved solids, dissolved oxygen, biochemical oxygen demand, total coliforms, thermotolerant coliforms, trace elements and oil and grease.

The results from the field data were subjected to statistical analyses to ascertain mean values, standard deviations, ranges and correlation coefficients. The data were then compared with World Health organization (WHO) Guidelines, United States (US EPA) and Nigerian Government standards on drinking water quality. Serious water contamination in all sample points with low levels of dissolved oxygen and high levels of coliforms. These levels were outside of the limits of the regulatory bodies. The data also revealed more contamination in surface water than groundwater samples and more contamination in domestic, industrial and refinery areas than in commercial, agricultural and control areas.

The levels of the parameters and the areas with high intensity show clearly contamination of water sources caused principally by human activities.
Arsenic in Hair and Nails from Exposed and Unexposed Regions of Argentina

Hannah Farnfield, Prof. N.I. Ward, Dr M. Bailey

Arsenic in drinking water is a global health concern and naturally elevated levels of arsenic have been reported in many countries worldwide. Prolonged exposure to high concentrations of arsenic in drinking has been associated with several health disorders including cancer (lung, bladder and skin), cardiovascular disease and diabetes type-2. The World Health Organisation (WHO) provide a guideline limit for arsenic in drinking water of 10 µg/l As; however levels more than 100 times greater than this have been reported in countries such as Argentina (<4 – 14,969 µg/l As), Bangladesh (<1 – 2,500 µg/l As), India (<10 – 6,000 µg/l As) and the USA (<1 – 3,000 µg/l As). Human exposure to arsenic can be evaluated using biomonitors such as hair, nails, blood and urine.

The aim of this study is to evaluate arsenic levels in hair and nail samples from two Argentinean towns: General Roca (< 0.2 – 16.4 µg/l As in local water) and Eduardo Castex (0.8 – 7,490 µg/l As in local water). Few studies on arsenic in hair have been conducted in Argentina and no known studies have been conducted using nails. This study would provide a database of arsenic levels in exposed and unexposed regions of Argentina.
On the Importance of Quantification of Amount of Cavitation During Ultrasonic Dispersion of Carbon Nanotubes

Achilleas Sesis, A.B. Dalton, D. Carey, G. Hinds (National Physical Laboratory)

Dispersion of carbon nanotubes (CNTs) is a critical processing step for many potential applications, since optimising the interaction between their nanoscale surface and the bulk media could substantially improve the performance of the macroscale structure. Ultrasonic agitation is widely used to overcome the tendency of CNTs to agglomerate due to van der Waals forces; the medium is typically either aqueous solution containing surfactant or an organic solvent. However, the dispersion process is often poorly controlled and there is a clear need for standardisation of the multitude of recipes quoted in the literature, most of which specify only an input power and an exposure time for the ultrasonic step.

In this work we highlight the importance of quantifying the amount of cavitation in the solution (rather than simply quoting the input power) during ultrasonic dispersion of CNTs. Cavitation is the implosion of bubbles formed by pressure waves generated by an ultrasonic transducer and is the primary mechanism for nanoparticle dispersion in solution. Measurement of the amount of cavitation is made possible using the NPL Cavimeter™ and can be related to the degree of dispersion and various physicochemical changes induced in the CNTs and the solution. We demonstrate that the effectiveness of a given ultrasonic bath for the dispersion of CNTs is critically dependent on the acoustic properties and thickness of the container material and the location of the container with respect to the acoustic field profile. The significant implication for researchers in the field of nanomaterials is that recipes quoted in the literature are of little value unless the amount of cavitation during ultrasonic processing is well defined and controlled.
Individual Differences in the Response to Sleep Extension and Restriction

Emma Arbon, Prof. Derk-Jan Dijk, Dr Julia Boyle

Sleep deprivation is associated with deterioration of cognition and may lead to health problems. Individuals might differ in their response to sleep deprivation. We quantified the effects of sleep restriction (6hs time in bed for one week) and sleep extension (10hs time in bed for one week), as well as total sleep deprivation, using a cross-over design in 36 participants. The study population was stratified on the basis of genotype for a PER3 Variable Number Tandem Repeat polymorphism, which was previously shown to predict effects of total sleep loss. Participants' total sleep time was in accordance with the sleep extension and restriction protocol, with an average total sleep time of 8.6hs and 5.8hs respectively. Individual differences in total sleep time were evident, even when sleep was extended or restricted, with sleep duration ranging from 7.20-9.60hs in the sleep extension condition and from 5.36-5.94hrs in the sleep restriction condition. Individual differences were also observed in participants' sleep architecture, and time spent in SWS and REM sleep remained stable across the sleep intervention conditions within individuals. After analysis using a mixed model, some of the individual differences observed could be explained by the PER3 polymorphism.

High Temperature Eutectic Cells for Self-Validation of W/Re Thermocouples

Oijai Ongrai, Prof. Stephen Sweeney

Reliable high temperature (>1000 C) measurement is crucial for a huge range of industrial processes as well as specialised applications e.g. aerospace. It is particularly difficult at high temperature control, where sensor decalibration is often rapid. W/Re thermocouples are widely used temperature sensor for high temperature applications due to their utility up to 2300 C. However, the achievable accuracy of this thermocouple is seriously limited by effects of inhomogeneity, drift and hysteresis. Ideally, these thermocouples require some mechanism to monitor their drift in-situ. Here, we describe how a miniature Co-C eutectic fixed point cell in a graphite crucible was fabricated to evaluate the stability of type C (W5%Re/W26%Re) thermocouples by means of in-situ calibration.
The Action of Beta-Adrenoceptors in Brain Addiction Pathways

Margaret Gompers, Prof. S.R.P. Silva, Dr Y. Chen

Drug addiction has massive consequences for society. Whilst most drug use begins voluntarily, the drugs involved cause changes in the brain's reward pathway that causes individuals to continue their drug taking despite increasingly adverse consequences. Whilst prevention is better than cure, for the millions who are affected, effective treatment strategies are needed. This study aims to better understand the behaviour of the cells which are central in the activity of the reward pathway, which will help us to understand how they are affected in addiction and therefore allow us to develop new and improved treatments.

By studying the electrical activity in living brain cells, and how it varies when stimulators or inhibitors of different receptors are added, we have discovered the presence of beta-adrenoceptors, which were not previously known to be in this area, and begun to uncover the effects they have on their target brain cells. This has uncovered an interaction between two chemical messenger systems, the dopaminergic and noradrenergic systems, which is known elsewhere in the body but not in this area of the brain. Learning more about how this interaction affects this brain pathway will help us better understand addiction and how to treat it.

The Effect of Anti-Epileptics/Mood Stabilisers Valproic Acid and SAHA on Glioblastoma Cells

Paul Farrell, Prof. Karen Kirkby

Glioblastoma (GBMs) is a form of malignant primary brain that is quite rare compared to other forms of cancers but is associated with a high mortality rate. Standard treatment includes surgery, followed by radiation therapy and then concomitant and adjuvant chemotherapy. The main form and most effective chemotherapeutic drug used in is temozolomide (TMZ). This drug works by methylating the DNA of tumour cells, which damages the DNA and leads to tumour cell death. However, not all patients seem to benefit from TMZ treatment. This is mainly due to the DNA repair enzyme O6-methylguanine-DNA-methyltransferase (MGMT) which removes the methyl group added by TMZ and effectively reverses TMZ treatment leading to resistance. This is a major problem but has lead to studies to help combat resistance. A possible way could be the using drugs concomitantly with TMZ to enhance activity. Two possible drugs include valproic acid and SAHA which have both shown anti-tumoural activity. The aim of this study is to see if these drugs enhance TMZ activity in resistant GBM cells and thus could possibly be used in clinical treatment.
Regulation of Matrix Metalloproteinase by Farnesoid X Receptor in Breast Cancer

Noura Alasmael, Karen Swales, Nick Plant

Breast cancer is a major health problem and threatens life of thousands of women yearly. If the cancer spreads from the breast to other organs, the survival rate is lower as it is much harder to treat. There are enzymes called matrix metalloproteinases, which can help the cancer cells spread by breaking down the surrounding tissue. Our project investigates whether a protein, Farnesoid X receptor, which has already been shown to kill breast cancer cells when activated by chemicals, can change the behaviour of the matrix metalloproteinases and thus be a target for breast cancer treatment.

When human breast cancer cells MCF-7 and MDA-MB-468 were treated with FXR activating chemicals, cell death was observed. Moreover, the activity & expression levels of matrix metalloproteinases were changed. In both cell types one of the FXR activating chemicals CDCA decreased and the other chemical GW4064 increased matrix metalloproteinase activity. In addition, the levels of matrix metalloproteinases were increased in MCF-7 cells by both chemicals, whereas in MDA-MB-468 cells, levels changed in line with activity in response to the two chemicals. These findings suggest that FXR might be a novel regulator for matrix metalloproteinases and requires further investigation.
Selection of Donor and Acceptor Nanotubes for Energy Transfer

Sofia Siddique, Prof. Jeremy Allam, Dr Richard J. Carry

When photons (light packets) fall on a nanoscale carbon tube (whose diameters is a billionth of a meter or nanometer), it absorbs energy. It also has also the ability to transfer its absorbed energy to another (acceptor) tube sufficiently close (within a few nanometer scales). These properties are relevant to solar cells where the addition of carbon nanotubes is proposed to improve the performance compared to conventional materials.

We present an inclusive theoretical study of energy transfer (ET) in carbon nanotubes. We propose criteria for effective ET and then use a MATLAB programme to assess all available nanotube combinations against these criteria. We thereby identify the donor-acceptor pairs in which there are most likely chances of transfer of energy on the basis of our proposed ET criteria. We classify the possible ways to study ET by using very short duration laser pulses (100 trillionths of second) split into source beam (pump) and diagnostic beam (probe). Our study and conclusions will be valuable in the field of optoelectronics to design light-harvesting and light-emitting composites with enhanced performance.
Materialising and Crafting Treasured Digital Media

Connie Golsteijn, Prof. David Frohlich, Dr Elise van den Hoven, Dr Abigail Sellen

People nowadays accumulate vast amounts of digital media, such as photos and e-mails, and media archives are often poorly organized. Because of this people have difficulties knowing what they have, and they hardly access their media. In addition to these ‘digital possessions’ people have collections of physical possessions of which some are particularly treasured, for example because of their roles in everyday life or sentimental associations. In the digital realm few possessions are treasured, which results in limited use of digital media for practices such as reminiscing or storytelling. However, treasuring a collection of digital media can support meaningful use and active selection of media and thus limit digital overload. This PhD investigates how newly designed systems that combine the advantages of physical and digital for the collection and display of treasured possessions can make digital media more treasured. A focus group study has shown that digital possessions that are treasured are often crafted and they embody accomplishment. Therefore, this PhD aims to inform the design of systems that integrate physical and digital realms to encourage novel creation or augmentation of digital media, or ‘digital craft’, as a promising means to increase treasuring and meaningful use of digital possessions.
Employment of Dielectrophoresis in Early Diagnosis of Oral Cancer

Karen Graham, Dr Fatima H. Labeed, Professor Mike P Hughes, Dr Kai Hoettges

Oral cancer is one of the most common cancers worldwide. However, the 5 year survival rate is only approximately 50% and of those who survive, many are left permanently disfigured by surgical intervention or suffer impairments of speech, swallowing and saliva production. Early detection has been identified by the World Health Organisation (WHO) and clinicians, as the key to improving survival rates for oral cancer, but currently available methods of detection have failed to improve survival rates over the past several decades.

Thus far in this project, the electrophysiological characteristics of normal, dysplastic and cancerous exfoliated oral cells, collected from patients via brush biopsies, have been studied using dielectrophoresis (DEP).

Preliminary results of dielectrophoretic testing suggest differences in membrane morphology when comparing abnormal (cancer and dysplasia samples grouped together) and normal samples, cancer and normal samples and dysplasia and normal samples. A difference in cell radius, when comparing cancer samples and normal samples, was also observed.

Future work on this study will include modifying the DEP testing and analysis system for exfoliated oral cells, obtaining more clinical samples and improving sample preparation, as this is crucial to the success of DEP testing.

The long-term goal of this and similar future projects, is to incorporate DEP testing and analysis into a bench-top diagnostic tool for clinicians which will provide fast, accurate and non-invasive evaluation of oral samples, facilitating the early diagnosis of oral cancer.
Mapping Citizens’ Political Considerations Under the Lens of the Ideological and Political Evolution in Turkey

Stavroula Chrona, Dr Tereza Capelos, Dr Simon Usherwood

This article examines the impact of the changing ideological and political environment of modern Turkey on citizens’ attitudinal political orientations. We focus on the ongoing conflict between Islamism, Kemalist secularism and nationalism and how they shape the political behavior of Turkish citizens. Using insights from the field of political psychology we follow the classic methodology of Lane (1962) and Hochschild (1981) which allows capturing the role of these complex political ideologies in the changing political environment of modern Turkey. In this paper we present our findings from our pilot study with 10 in-depth qualitative interviews with Turkish citizens in Istanbul in July 2011. Our analysis shows that both ideological orientations of Islamism and Kemalism share common arguments and considerations as well as their understanding of political conditions. However, they often appear to shape conflictual attitudes based on the motivational elements that lie behind citizens’ political arguments and considerations as well as their self ideological placement. Our results make clear that along with the political changes of the main political actors in Turkey the public has to be studied under the lens of this transformation, in order to understand the way that the public perceives and reflects on the current political evolution of the country.
Optimal Utilisation of Biomass Feedstocks: A Case Study Based on Rice and Sugar Mills in Thailand

Piyalap Manakit, Franjo Cecelja, Aidong Yang

Renewable energy, is seen as a viable solution for energy security and climate change problem. Many countries, including Thailand, have set common objectives for utilisation of alternative resources. In order to deliver biofuel production set targets, this research develop processing facilities that is capable of utilising available biomass.

In this paper, proven technologies for rice and sugar production to produce electricity and ethanol, as well as energy/fuel generation are considered. Different scenario are analysed changing the economic parameters such as prices of input materials, value of by-products or energy cost to define the limit of profitable process. An economic analysis for every scenario is also performed. An exhaustive simulation is proposed as a tool.

In total, 16 scenarios for both rice and sugar productions representing typical situations for ethanol production and electricity generation are considered using benchmark situation of 120 ton of rice paddy and 10,000 ton of sugarcane per day.
Characterization of Equine Monocyte-Derived Dendritic Cells

Nathifa Moyo, Dr Falko Steinbach, Dr Ernesto Oviedo-Orta

Groups: Microbial Sciences, University of Surrey & Virology Department, Animal Health and Veterinary Laboratory Agency.

Dendritic cells (DC) are the main immune regulators and the only cells able to induce primary immune responses. The establishment of in vitro species specific DC systems can be used as models to better understand host-pathogen interactions, eventually aiding therapeutic development. Equine dendritic cells (DC) are not well characterized compared to the human and mouse systems.

Blood monocytes (Mo) were differentiated with equine granulocyte macrophage colony stimulating factor (GM-CSF) and interleukin-4 (IL-4) generating immature DC (iDC). These cells were further activated with a combination of pro-inflammatory and anti-inflammatory cytokines to obtain mature DC (mDC). Phenotypic experiments revealed the cell surface marker CD83, considered to be a maturation marker in the human system, showed already a high expression on immature DC. Functional attributes of DC included endocytic and phagocytic activity, T cell activation potential and the ability to present antigen to autologous T cells, as expected.

In order to determine the expression of a broad range of markers for which no monoclonal antibodies are available in the equine system, quantitative real-time PCR and microarray experiments were performed to analyse the gene expression profiles between Mo, iDC and mDC. Those revealed the differentially expression of molecules involved in key pathways of DC biology such as the migration of DC and the ability of DC to sense pathogens. In summary, this study demonstrates that equine iDC and mDC can be distinguished but some attributes and markers are not similar to the human system.
Multiscale Modelling and Optimisation of Hybrid Desalination

Maryam Aryafar, Professor Adel Shari, Dr Tom Dyson

Current water treatment plants are operated under low recovery (produced water / feed water), high fossil or electric energy consumption, more chemical usage and negative impact on environment due to more brine discharge to sea or wells. In this work the forwarding osmosis (FO) system is integrated with the second separation process in series (e.g. membrane distillation (MD) or freezing or crystallization or stripping-distillation or adsorption by activated carbon or ion concentration polarization) to regenerate the draw agent solution which is used in FO system and to increase the amount of produced pure water. It is expected from such configuration to evaluate Hybrid Desalination method as an economical process with the higher fresh water producing recovery, about 70-80%, than the usual methods which is operated on maximum 40% recovery. In addition, the brine concentrated water which is rejected to environment will be decreased by raising the recovery of system; therefore the minimum negative impact on environment is some expected result of this project. By using the low-grade waste energy in plants or solar energy as heat resource energy as driving force, lower energy consumption is resulted from this project too.

Attachment of MS2 and ØX174 on Clay Minerals

Florence Lee Chi Hiong, Katrina Charles, Stephen Pedley

The mobility and survival of virus in natural environment are determined by their attachment on fine soil particles, with clay minerals as the main substrate. There has been an emerging interest recently in this field due to many environmental viral diseases. This study investigated the attachment of bacteriophage MS2 and ØX174 (surrogate viruses) onto three type of clay minerals, namely the Montmorillonite KSF, Montmorillonite K10, and Kaolinite using batch experiment with double layer agar method. Results showed that KSF was more effective than K10 and Kaolinite in attaching both MS2 and ØX174. The attachment of MS2 to KSF, K10 and Kaolinite was log 1.59, 1.24 and 0.31 pfu/ml respectively. ØX174 attachment to KSF and K10 was log 6.55 and 0.09 pfu/ml. Literature implies that KSF has more Bronsted acid than Lewis acid attachment sites, as compared to K10 and Kaolinite. Bronsted acid attachment sites are preserved by interlamellar water molecules and cations among the aluminosilicate lattices of clay minerals, but weathering causes the lost of the water molecules and cations. The findings suggest that Bronsted acid attachment sites in clay minerals are more effective than Lewis acid sites in attaching viruses, and hence weathered clay minerals are less effective in attaching viruses.
Supercapacitors: Materials, Fabrication & Testing

Foivos Markoulidis, Dr C. Lekakou, Dr A. Sorniotti

Supercapacitors are electrochemical capacitors that function under the principle of double-layer capacitance. They can be alternatively termed as ‘Electric, Double-Layer Capacitors’ (EDLCs). During the course of this work supercapacitor cell specimens were successfully fabricated and tested. All cells utilised a salt-based, organic electrolyte, porous separator and various carbon-based electrode materials. Special focus was given to the electrode fabrication process and electrolyte selection, given that certain environmental and structural conditions had to be met. Electrode surface topography was also investigated with two different approaches: scanning electrode microscopy (SEM) and transmission electrode microscopy (TEM). The generated images led to conclusions about sample preparation, material selection and specimen quality. Also, appropriate measures were taken to prevent potential electrolyte evaporation and increase cell life (e.g. cell sealing), hence, facilitating accurate electrochemical testing. Supercapacitor performance was evaluated with a multi-channel potentiostat/galvanostat/impedance analyser. Thus, three types of electrochemical tests were completed: Cyclic Voltammetry (CV), Charge-Discharge and Electrochemical Impedance Spectroscopy (EIS). Useful data and figures for all three aforementioned tests were successfully produced, thus specific power and energy density values were obtained.

Chemical Constituents from the Southern African Hyacinthaceae Family

Jaspreet Kaur Sihra, Prof. D. A. Mulholland

Southern Africa is known as one of the richest centres of diversity of plants in the world, with approximately 6000 species present. It has a range of climatic zones, from sub-tropical to Mediterranean climate and varied habitat types ranging from Afro-alpine grasslands to coastal deserts. The Hyacinthaceae family is the most important family in ethnomedicine in southern Africa and is used to treat various ailments ranging from the treatment of hangovers, inflammation, sprains, syphilis, rheumatism and teething. The Hyacinthaceae family consists of five sub-families, the Hyacinthoideae, Ornithogaloideae, Urgineoideae, Chlorogaloideae and Oziroeooideae. The Hyacinthaceae is the largest subfamily and the interest in the chemistry of this subfamily was started by reports of stock losses following the ingestion of aerial plant parts of Ornithogalum thyrsoides. In drought seasons certain members of the Hyacinthaceae family may be the only greenery for stock to eat, leading to stock poisoning.
Dielectrophoretic Spheroid Formation of Breast Tumour Cells for Clinical and Biomedical Research

Erin Henslee, Prof. Michael Hughes, Dr Fatima Labeed

Three-dimensional (3D) cell culture systems provide an attractive alternative to monolayer (2D) cell cultures in their ability to provide clinicians with a more in vivo like environment for primary cell studies such as patient specific drug screening. 3D cultures can provide more reliable data on cell-cell and cell-ECM interactions, as well as more realistic models for cell proliferation. For breast cancer in particular, 3D models have shown varying responses to drug therapies when compared with 2D models, and in most cases 3D models proved to be more resistant to treatment than their 2D counterparts. Enabling clinicians to accurately predict the outcome of treatment is critical in determining optimal treatment regimes, especially in late staged cancers when time and treatment options are limited. There have been many proposed systems for 3D spheroids formation however, despite ease of use and mass fabrication, they have difficulties maintaining a uniform size in spheroids around 200 µm, calling for more precise methods. Dielectrophoresis (DEP), has much potential as a technique for spheroid formation. Advantages include: controlled spheroid size easily varied; ease of extraction and no cell damage, high throughput, small footprint; and since DEP force can take positive and negative directions, potential for more complex microenvironments through cell separation as well as the creation of layers within a spheroid.

What Constitutes Individual Workplace Performance? Towards a New Generic Model

Céline Rojon, Dr Almuth McDowall, Prof. Mark Saunders

The paper at hand is based on research focusing on the conceptualisation and measurement of individual performance in the workplace, which we define as behaviours in line with previous literature (e.g. Bartram, 2005). This is an important construct both in research and practice, which, as a result of a systematic review of the literature, was shown to benefit from further examination. Thus, the aim of the current study was to contribute to the extant evidence-base by exploring individuals’ understanding of the critical components underlying performance in order to devise a generic performance model. To this end, we conducted individual interviews utilising the Repertory Grid Technique (Kelly, 1955; 1963) with a professional/managerial sample of 25 participants; interviewees mentioned over 300 performance-related behaviours they thought important. Interview data were group analysed using Honey’s (1979) aggregation method. Following expert discussions, a performance model consisting of 11 categories (e.g. ‘Engaging with Others’) and 57 subcategories (e.g. ‘Supporting Others’) was developed, providing a generic framework of components underlying individual workplace performance. To test and improve the new model, a generic performance measure will be developed and implemented as part of a subsequent study.
A Surface Chemistry Study of Etching and Passivation Treatments for Cadmium Zinc Telluride (CdZnTe) Radiation Detectors

Shumaila Babar, Dr Mark Baker, Prof. John Watts

The performance of single crystal CdZnTe radiation detectors is dependent on the bulk and surface properties of the material. After single crystal fabrication and mechanical polishing, modification of the surface to remove damage and reduce the surface leakage current is generally achieved through chemical etching followed by a passivation (oxidation) treatment. In this work, CdZnTe single crystals have been chemically etched using bromine in methanol (BM) treatment. The BM concentration and exposure time have been varied. Angle resolved XPS and depth profiling has been employed to characterise the surfaces for the different exposure conditions. The Te rich surface which develops is found to be very reproducible for the range of BM concentrations and exposure times studied and only for very low BM concentrations or exposure times is a reduced thickness of the Te rich layer observed. The etched surfaces have subsequently been passivated in a H2O2 solution and the oxide layer composition and thickness determined. The XPS determined oxide layer thicknesses have been calculated using different methods and software packages and the results are discussed.
Afterword

Afterword by Prof. Sir Christopher Snowden FRS, FREng

Vice-Chancellor

On behalf of the organisers here at the University of Surrey, I would like to welcome you to the 2012 Postgraduate Research Conference. This conference builds on the previous very successful events and I am sure that it will turn out to be the best yet as every year it has grown bigger and better!

Taking part in the conference gives our postgraduate community the opportunity to present their work and research results to colleagues and friends. This is the perfect venue to share your thoughts and ideas and get some advice from fellow researchers. I am sure that if you haven’t presented work at a conference so far in your career you will discover here that your own work attracts a great deal of interest and you are making valuable contributions. I still remember the first conference where I presented my research results as a postgraduate research student, and to be honest I really wondered if I had done anything that would be of interest to other conference delegates. I was amazed to find that other people were really interested in my work and it attracted the interest of several leading international researchers (who I was more than a little intimidated by!). So I am certain you will find this an exhilarating experience. If you are not presenting your work (why not?) then I am sure you will find that this is a fantastic opportunity to find out what everyone else is doing in their research.

I would like to thank the organisers of the conference - they are themselves fellow researchers and postgraduates, without their enthusiasm and dedication this conference would not be possible.

I look forward to seeing you at the Conference and I am certain you will remember this year’s event as a valuable step in your research career.

Acknowledgements

Committee Members
Spencer Angus Thomas (Chair)
Helen Keyworth (Vice-Chair)
Gary Chaffey
Adam Godbeer
Christopher Smith
Hannah Farnfield
Lisa McNamara
Joanna Sier
Vicknaeshwari Marimuthu
Artemis Lamprinou
Catherine Waller
Sammy Li
Malachy Nnaemeka M Ujam

S. Anne G. Bostanci
Adun A Okupe
Karendale Pereira
Nafisheh Naeemi Khondabi
Georgia Eleftheriou
Kim Gordon

Special Thanks To
Prof. Karen Kirkby
Francine Elson-Vining
Prof. Sir Christopher Snowden
Prof. Steve Williamson
Sam Jones
Julia Duffy

Luke Harrison
Dr Dawn Duke
Maddie McGowan
Prof. Margaret Rogers
Prof. Mark Saunders
Prof. Chris France
Prof. Alison Firth
Dr Jane Marriot
Dr Brendan Howlin
Dr Geoff Cooper
Grace Edmund
PGR Conference 2010 Committee
Prof. Jeremy Watson
Hilary Wilson
And all the academic Judges

www.surrey.ac.uk/pgrconference