ECE Research Structure: Plan for Research Organisation

Following intense discussions with key stakeholders in the subject area, Electronic and Computer Engineering is embarking on a new plan for restructuring its research in line with the main areas of strength identified in the RAE submission and documentations.

The main criterion applied for research “clustering” is based on the major areas of strength which the subject area is committed to sustaining and consolidating in the new RAE period. These thematic areas form the basis of our teaching and research expertise and justify the investment the university has committed in recent appointments and research infrastructure. These areas are also in line with the research portfolio presented in our recent RAE submission (RAE2008 documentation), the subject area track record in the corresponding disciplines and the staff population needed to support the activities of these clusters. Successful postgraduate teaching programmes have also been considered in order to identify areas of research strength that promote ECE’s reputation in the corresponding teaching provision. The identified two disciplines and the supportive underlying thematic areas are as follows:

**Telecommunications:**
- Wireless and Network Communications  
  (Prof. H. Al-Raweshidy / Prof. J. Cosmas)
- Media Communications  
  (Prof. S. Vaseghi / Prof. A. H. Sadka)

**Systems:**
- Power Systems (Prof. M. Irving)
- Electronic Systems (Prof. W. Balachandran)
- Sensors and Instrumentation (Prof. P. Hobson)

For each one of the 5 areas identified above, a URC (University Research Centre) will be formed with a rotational collegiate directorship provided by the corresponding named professors. The formation of URC’s is in line with the University’s new research direction (as advised by PVC Research) to structure research based on approved University Research Centres in a way that would ensure the monitoring and quality control of academic research groups across the board both scientifically and financially at the subjective and objective levels. Out of the 5 proposed URC’s, ECE has currently one approved URC (CMCR – Centre for Media Communications Research) which builds upon the “Media Communications” theme mentioned above. Furthermore, Professor M. Irving has recently obtained approval for his bid to set up a URC in the Power Systems area namely BIPS (Brunel Institute for Power Systems). Preparations are also under way for bids on the three remaining URC centres.

It is important to note that all URC’s proposed build on strong, existing or currently being developed, MSc or MEng courses which enhance ECE’s profile in the corresponding teaching areas. For instance, Wireless and Networks Communications URC builds on a successful Wireless MSc course that runs both in Uxbridge and Thessaloniki. The Power Systems group builds on the existing SEP (Sustainable Electrical Power) MSc course that has established itself with a good size cohort. Media Communications builds on the recently developed MSc course in Digital Signal Processing and also on the currently being developed MSc course in Media Communication Systems. Furthermore, Networks research theme builds on the recently approved-in-principle MSc programme, namely Advanced Multimedia and Virtual Reality Technologies which also support the Media Communications theme. MEng in Space Engineering supports Sensors and Instrumentation Systems centre and the MEng programme in Computer Systems Engineering supports the Electronic systems group and so on. It is also worth noting that ECE has in its 3-year plans a proposal for developing a new MSc programme in “Embedded Systems” which will also support the “Systems” based URC centres at large.

The Research staff membership to the 5 URC centres proposed will be decided based on the individual researcher’s interests and expertise in such a way that will result in a happy balance of staff population among the centres created and in line with the critical mass of expertise and research interests within the 5 thematic areas identified above. The new structure is not aimed at creating rigid boundaries between the centres created but is very much based on the clustering of research around the subject area strengths in both teaching and research engagements. The proposed system is also flexible enough (horizontally) to accommodate additional centres and is amenable to merges and splits as need arises in the future in line with the subject area’s vision, activities, successes, strengths and opportunities. This would facilitate the movement of staff around in a way that would ensure the optimal configuration of research organisation in the department/discipline both subjectively and objectively.

Professor A. H. Sadka
(Head of Electronic and Computer Engineering)
Recent Staff Publications:


ECE Welcomes:

Dr. Hai-Bin Wan

Dr. Hai-Bin Wan received his PhD in Power Systems from Bath University in 1997, and subsequently joined Brunel University as a Research Fellow. In 1998, he joined National Grid, managing a number of projects which covered power system planning, operation and research and development. Dr. Wan rejoined Brunel University as a Senior Lecturer in June 2008. His current research interests include power system operations, planning, optimisation and electricity markets.

Travel Grants Awarded:

Dr. G. Taylor has been awarded a travel grant by the Royal Academy of Engineering to attend and present a paper at the prestigious IEEE Power Engineering Society Annual Meeting (20-24 July 2008) with two of his research students.

Dr. M. Abbod has been granted £400 by the Royal Academy of Engineering to attend the ICCS2008 International Conference on Computational Science: Advancing Science through Computation, June 23-25, Krakow, Poland. Two papers will be presented:


Dr. Jonathan Loo, together with a team of international researchers, namely Dr. Yue Zhang (Anritsu Corp, UK), Dr. Jie Zhu (Intel Corp, US), Dr. Chih-Yang Kao (Ming Chuan University, Taiwan) and Prof. Yu-Hen Hu (University of Wisconsin, US) are the Guest Editors for a Special Issue on "Enhanced Physical Layer and Diversity Techniques for Digital Terrestrial and Wireless Broadband" for the *International Journal of Digital Multimedia Broadcasting*, Hindawi Publishing Corporation. The call-for-papers and submission details for this Special Issue can be found at:

http://www.hindawi.com/journals/ijdmb/si/dephy.html

For more information about the special issue, please contact Dr. Jonathan Loo (Jonathan.Loo@brunel.ac.uk).
Staff Achievements:

Dr. G. Taylor has been invited to become a member of the IEEE Task force on Cyber Security of Power Systems.

Dr. A. Amira has been honoured with the prestigious Senior Membership of the American Association for Computing Machinery (ACM).

Dr. A. Amira was invited to give the first seminar in 2008 organized by the Intelligent Systems Research Centre (ISRC) at the University of Ulster on his research in the area of multiresolution analysis for information retrieval.

Course Sponsorship:

The MSc Digital Signal Processing (DSP) has received generous support from Texas Instruments (www.ti.com) in particular through the in-kind sponsorship of the latest and advanced DSP equipments and software such as TMS320C6414, TMS320C6713, TMDXVDP6437, and Code Composer Studio. The equipment will be used largely in "Real-time DSP Systems" taught module, DSP Workshops and group/individual projects. Students will learn TI's digital signal processor and its embedded systems through comprehensive teaching materials that are fully in line with TI technical training requirements. Students will gain first-class hands-on experience through using the equipment to build real-time DSP applications.

For more information about the course, please contact the Course Director, Dr. Jonathan Loo (Jonathan.Loo@brunel.ac.uk) or visit http://www.brunel.ac.uk/about/acad/sed/sedcourse/pg/ece/dsp.

Agilityds and NVIDIA have both shown interest in the new MSc course on Embedded Systems developed by Dr. A. Amira and Dr. R. Li which is under consideration. Advanced laboratories equipped with FPGA boards and GPU platforms will be used to support this course.

Dr. A. Amira has secured an equipment grant from NVIDIA through a "professor partnership application" to equip his research laboratory with advanced GPU platforms (GeForce 9800 GX2) and support his teaching activities in the area of advanced embedded digital systems.

ECE at WIAMIS 2008:

On May 7-9, the International Workshop on Image Analysis for Multimedia Interactive Services (WIAMIS) was held in Klangenfurt, Austria. Dr. Huiyu Zhou, Prof. Abdul Sadka, and Dr. Min Jiang from ECE had two papers published in the proceedings of this prestigious conference. The first paper, '3D inference and modeling for video retrieval', was presented in a special session on 'RUSHES - Multimedia Indexing and Retrieval of Unedited Audio-Visual Footage'. This paper focused on an adaptive RANSAC algorithms for detecting flat areas in stereo images. The second paper, entitled 'Speech enhancement in noisy environments for video retrieval', was presented in a poster session of the main conference. It introduced a novel maximum likelihood estimation for speech enhancement.

ECE Researchers Prepare for LHC First Collisions

A research team led by Prof. Peter Hobson is gearing up for the first collisions at the massive Large Hadron Collider (LHC) at CERN in Switzerland. The 14-strong group has been working in the Compact Muon Solenoid (CMS) collaboration for many years, and now the first proton beams are expected to be sent around the 27-km circular accelerator tunnels, beneath the Swiss-French border, at the end of July. Having participated in the design, testing and construction of the CMS detectors, the team is now moving on to the analysis of simulated (and ultimately real) proton-proton collisions within the experiment. For this, extensive use is made of distributed Grid computing, and the team maintains an important cluster of computers within the UK Grid organisation.
Research Funding Successes:

Professor Peter Hobson (PI) and Dr. Paul Kyberd (CI) have received £215,000 from STFC for a Grid computing farm to support data analysis associated with the start-up of the Large Hadron Collider at CERN this summer.

Dr. Liliana Teodorescu has been awarded a 3-year research grant of over £315,000 for the project “Gene Expression Programming – new machine learning for supervised and unsupervised classification”.

This project will address common needs of many scientific, engineering and business fields which are facing the challenge of dealing with complex data for extracting field-specific knowledge. Efficient data analysis techniques are required in order to intelligently assist the user in extracting this knowledge.

Starting from the basic ideas of a recently developed computer algorithm, Gene Expression Programming, novel evolutionary data analysis techniques will be developed in the project. These techniques will be combined with state-of-the-art statistical methods in order to create novel supervised and unsupervised data classification algorithms. The datasets available from the particle physics experiments in which Dr. Teodorescu participates will be used as a test-bed for these algorithms.

The methods and algorithms developed in the project will be implemented in software applications made available as open-source in order to maximize the spectrum of the beneficiaries of the project. Apart from particle physics, fields such as genetics, medicine, environmental science, engineering, astronomy, finance and marketing are expected to benefit from the project outcomes.

iCSC Proceedings Published

Dr. L. Teodorescu was an organiser and lecturer at the 2006 iCSC at CERN, Geneva. She is also the editor of the proceedings of the 2005 and 2006 editions of iCSC, recently published by CERN. The proceedings contain lectures on applications of computational intelligence methods to particle physics and on more general topics such as parallel programming, software testing and database development.

Research Dissemination Events:

ECE was represented at two recent STFC “Kite Club” events where academics and industry exchange ideas and make new contacts. Professor Peter Hobson and Dr. David Smith attended an event on Instrumentation for Hostile Environments and displayed a poster illustrating the facilities and expertise that exist at Brunel in the area of radiation damage. At a second event, Professor Peter Hobson and Dr. Gary Taylor attended a Distributed Computing Workshop where we exhibited a poster outlining the contribution of the GRIDCC project to the distributed control and monitoring of small-scale electrical energy generators.

More information about the Kite Club, and a list of past and future meetings can be found at http://www.scitech.ac.uk/KE/Ind/KITE/KClub/kiteclubreg_info.aspx

With the Westfocus funded project, BITE (Barriers to interactive Television) coming to an end, Dr. Emmanuel Tsekleves demonstrated the key outcomes of the project at the Children in Virtual Worlds conference on the 22nd of May, organised by the BBC and the University of Westminster. Dr. Tsekleves provided a demonstration of the BITE prototype, a user-friendly dual screen digital media and Television advanced control system (see left). The prototype attracted the attention of several conference delegates and even the presenter of the Digital Planet of the BBC World Radio, Mr Gareth Mitchell, who interviewed Dr. Tsekleves on the day.

A second opportunity for demonstrating the BITE prototype arose at the Broadband TV 2.0 event held in Brighton on the 23rd of May. Dr. Tsekleves presented at the event. The event was organised by the User Experience Society (Use8) and included a number of academics and leading professionals in the field of Digital Television and Usability. In this knowledge transfer event Dr. Tsekleves provided a presentation of the BITE prototype and participated in the open discussion panel along with other experts on the subject of the future of usability in broadband and digital Television.
Undergraduate Work Placements 2008/9:

We have come to the time of year when some students are starting their placements for the next academic year. The total numbers placed so far are 22 Engineering and 14 Multimedia students, with more expected to be placed over the summer.

As usual, Intel Corporation have taken several engineering students, 3 this year, who should have a challenging but rewarding time. Other companies that are taking a student again this year are:

- Renesas (2 engineering)
- Webexpectations (2 multimedia)
- 3M (1 engineering)
- Assanka (1 multimedia)
- BMW Group Plant Oxford (1 engineering)
- Coca-Cola Enterprises (1 multimedia)
- Film Education (1 multimedia)
- Fujitsu Microelectronics (1 engineering)
- Hasbro (1 engineering)
- Mediatonic (1 multimedia) – company set up by two multimedia graduates
- SoSound (1 engineering)
- Stream UK Media Services (1 multimedia)
- Symantec (1 engineering)
- Ultra Electronics Command & Control Systems (1 engineering)
- Yell Group (1 multimedia)

This clearly shows the companies appreciate and value our students and we need to make sure we continue our partnership with them.

The remaining students have been placed at various companies and organisations including:

- Agilent Technologies
- Accenture Technology Solution
- Biomed Central
- Corus Group
- Daley-Rowner Ltd
- GlaxoSmithKline
- Hawker Pacific Aerospace Ltd
- Slough Grammar School
- Waldegrave School for Girls

The RUSHES Project:

The RUSHES project has had its fifth meeting on the VicomTech premises in the Basque city of San Sebastian. Following the successful annual review, the project consortium bent on analysing the review report with view to consider the recommendations set out by the reviewers and take the necessary steps that ensure the progress of the project towards achieving its global objectives in the second year. The VicomTech meeting put together representatives from the 9 RUSHES partners and included a number of sessions addressing WP and cross-WP issues which resulted in a long list of agreed action points. The integration aspects of the project were well present during the discussion and the consortium agreed on producing web services for all the video operators developed in the project so far e.g. flatness detection and facial detection. The meeting also incorporated a social event held at the “La Perla” restaurant at the seaside facing the French borders of the Basque country in North Spain.

Prize for ECE PhD Student:

ECE PhD student Esfandiar Zavarehei has been awarded one of this year’s Vice-Chancellor’s Prizes for Doctoral Research. He was nominated by the School of Engineering and Design and subsequently awarded the prize on the basis of research excellence evidenced by research output during his postgraduate study at Brunel. He won £500 and will be presented with a cheque and certificate for this prize at the graduation ceremony in July.

The subject of Esfandiar’s PhD was speech enhancement. He covered the breadth of the subject in great depth and developed effective methods for:

(i) background noise reduction,
(ii) extension of the bandwidth of narrow-band telephone quality speech to wide-band broadcast quality speech,
(iii) replacement of lost packets for Voice over IP systems.

Esfandiar’s PhD resulted in 5 high quality refereed journal papers including two outstanding papers published in top IEEE papers (where Esfandiar was the lead author) and 10 refereed conference papers. His PhD work was part of a collaborative EPSRC-supported project whose outcome was assessed by independent assessors as outstanding and internationally leading in every aspect of the evaluation field. The results of his PhD work are being marketed by Brunel Enterprise. Esfandiar completed his PhD research work within 3 years and currently works at Cambridge CSR.

The RUSHES consortium, including ECE’s Prof. A. Sadka, Dr. H. Zhou and Dr. M. Jiang