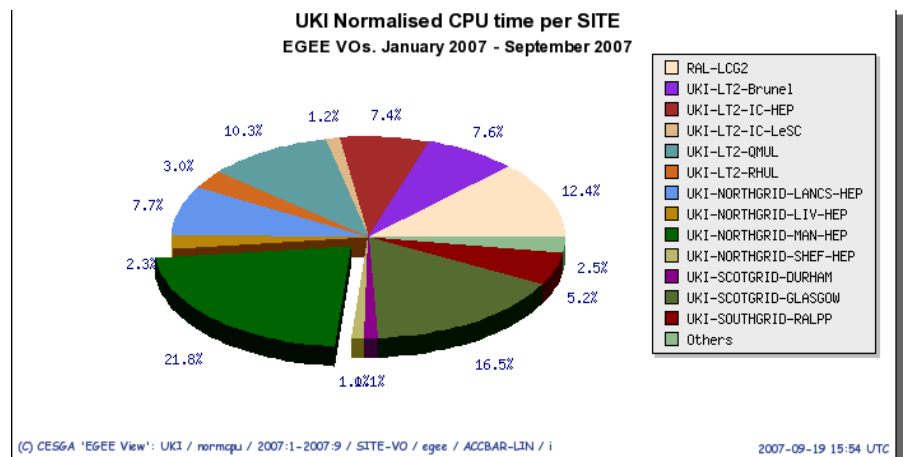


Recent news from the Sensors & Data Analysis Group

Firstly, let us welcome two new members of the group who have recently joined us. Already working in the School of Sport and Education, Dr. Dawn Leslie is carrying out her research with our group and has formally joined the Compact Muon Solenoid Experiment. She has recently been collaborating closely with Prof. Peter Hobson on the detailed simulation of fast vacuum photodetectors, and will present a paper at the 10<sup>th</sup> ICATPP conference in Como in October. Our newest member, Dr. Malcolm Ellis, joined at the end of August and is currently working with Dr. Paul Kyberd and Dr. Henry Nebrensky on the MICE experiment. He is also presenting his work at ICATPP.

The group continues to make use of new techniques in data analysis, Dr. Liliana Teodorescu (Gene expression programming) and Dr. Raul Lopes (2D Kolmogorov-Smirnov test) both presented papers at the ACAT 2007 conference in Amsterdam. Dr. Akram Khan and Dr. Ivan Reid attended the Computing in HEP conference in Victoria, BC, presenting work on Grid computing and algorithms for computing the 2D Kolmogorov-Smirnov statistic respectively. Also presenting work in Canada this summer was Dr. Henry Nebrensky, who gained a travel award from the Royal Academy of Engineering to present a paper on Grid computing for Digital Holography at an Optical Society of America topical meeting. Finally, in early summer, Prof. Peter Hobson presented a paper on Grid Computing Technologies For Renewable Electricity Generator Monitoring And Control at OCEANS07 in Aberdeen where he was also an invited Session Chair. This work was part of the EU FP6 collaboration GRIDCC and had many co-authors from ECE, in particular Dr. Paul Kyberd, Dr. Tatiana Kalganova and Prof. Malcolm Irving.

The group is now at full academic strength, has its funding assured for at least three years into the future and we are rushing to complete the Compact Muon Solenoid experiment in time for the start of the Large Hadron Collider at CERN next spring. As part of our contribution to CMS, and LHC experiments in general, our Grid Node manager Dr. Duncan Rand has enabled Brunel to provide a very significant fraction of the UK computing contribution over this calendar year. The UKI-LT2-Brunel cluster has provided over 1.3 million CPU-hours to a variety of virtual organisations, most of these are HEP related but we also provide resources for biomedical research and digital holography, to name but two other user communities. As shown in the pie-chart below, we are in the top 6 UK sites for 2007.



## Course News

### IET Accreditation

We have received the report from the IET regarding accreditation of our Engineering courses:

All the Electronic and Electrical Engineering courses, the Electronic and Microelectronic course and the Computer Systems Engineering course have been awarded 5 years' accreditation from the 2003 intake to the 2007 intake.

Graduates with a BEng (Hons) degree with a 2:2 classification or above and 'appropriate learning to Masters level', will have fulfilled the educational requirements for Becoming Chartered Engineers.

### New MEng Courses

From September 2007 the Electronic and Computer Engineering subject Area will be offering the following MEng courses:

- MEng in Electrical Engineering with Sustainable Power Systems Management
- MEng in Electronic and Electrical Engineering
- MEng in Electronic and Computer Engineering
- MEng in Computer Systems Engineering
- MEng and BEng in Network Media Engineering (from September 2008)

The above MEng courses are aimed at developing the key technological skills and building the key group and interdisciplinary abilities required for a professional engineer. The above courses will also aim to develop a strong theoretical background involving the future of electrical engineering, electronics, microelectronics, computer systems, communication networks and digital media engineering. They will also develop a detailed technical knowledge of the practical application of these technological areas. The MEng courses will not only offer the theory but also the practical aspects of respective technologies making use of the existing facilities in electronic, sensors, computer systems, computer networks, signal processing and media laboratories.

We will also be running a new off-campus MSc Wireless Communications course in Thessaloniki, Greece in collaboration with the Alexander Technological Educational Institute of Thessaloniki (TEI-Thessaloniki). This course is based on the successful on-campus wireless communication course which attracted 320 applications for this academic year, the most number of applications in the School of Engineering and Design. The off-campus course received forty one applications for the 2007/08 academic year and 37 offers were made to the applicants. We would like to thank every one who helped to set up the course and the staff who have agreed to teach in this course. Prof. Athanasios Th. Hatzigaidas will be the local coordinator for this course in Thessaloniki.



## Staff News

Congratulations to the following colleagues who have successfully passed their probation and transferred to permanent members of staff within ECE:

- Dr. Jonathan Loo
- Dr. Wenbing Yao
- Dr. Liliana Teodorescu

We wish them a brilliant career and successful future with us at ECE.

Congratulations to Dr. Abbas Amira, who has been elevated to the grade of Senior Member in the IEEE. He has also presented two invited papers and chaired a special session at the NASA/ESA Conference on Adaptive Hardware Systems, Edinburgh, and received a conference grant from the Royal Society to present two papers at the IEEE Symposium on Integrated Circuits, Singapore.

### Student success

Dr. Chandrasekaran, who graduated last July and was supervised by Dr. Amira, obtained the IET Younger Members' Conference Bursary to attend the VIE 2007.

### Recent Staff Publications

E. Tseklevs and J. Cosmas, "Semi-Automated Creation of Converged iTV Services: From Macromedia Director Simulations to Services Ready for Broadcast". Volume 4, no. 17, July 2007. *Journal of Virtual Reality and Broadcasting*. (Available Online)

D. Bouchaffra and A. Amira, "Structural Hidden Markov Models for Biometrics: Fusion of Face and Fingerprint", In Special Issue of *Pattern Recognition Journal*, "Feature Extraction and Machine Learning for Robust Multimodal Biometrics", available online.

## ECE success in the National Student Survey

The recent release of the 2007 National Student Survey (NSS) results showed a remarkably steady and consistent improvement in the scores obtained on the ECE H-code programmes over the last 3 years. Level-3 results revealed a considerable improvement in the NSS scores on several elements of assessment such as feedback, academic support, organisation and management, and personal development, hence putting ECE in a relaxed position above the inter-quartile range of other universities mean scores.

At level-2, ECE has made improvement in all aspects of the NSS survey, making in some cases significant rises such as 0.465 in organisation and management, 0.388 in academic support and 0.274 in assessment and feedback.

Our digital media programmes were assessed with the HW-code programmes under "Design studies" which have attracted significant student satisfaction in all elements of assessment of the NSS exercise. ECE will continue to address student satisfaction matters very seriously in the coming year with view to further improve the standing of this discipline at Brunel in the national league table.

Well done ECE!

## ECE Welcomes

Welcome to Dr. Malcolm Ellis, who has recently joined ECE. Dr. Ellis grew up in Australia and did his PhD on the Neutrino Oscillation experiment NOMAD at the University of Sydney. Since 2000, he has worked on research and development towards a Neutrino Factory at the Rutherford Appleton Laboratory, Imperial College London and most recently, Fermilab National Accelerator Laboratory. He is currently working on the Muon Ionisation Cooling Experiment (MICE) at RAL and simulation studies of a large scintillating detector for a low energy Neutrino Factory.



## Conference News

### Micro-Grids and Distributed Energy Resources Conference (MIDERCON)

A one-day conference organised by ECE, supported by the Institution of Engineering and Technology, took place on the 19<sup>th</sup> of September 2007. The drive towards renewable and distributed generation has resulted in many new issues with regard to the planning and management of energy resources. The embedding of smaller scale generation in relatively low voltage networks poses requirements for more active network operation and intelligent autonomous control. One technical option is the implementation of Microgrids – interconnected sets of generators, loads and other distributed energy resources, which have the possibility of operating for at least some of the time as an autonomous electrical system. The conference focused on the technical, economic and regulatory aspects of Microgrids, together with more general issues surrounding small-scale renewables and network integration. The event updated participants on some of the latest ideas and developments in the field.



L-R: Prof. C. Besant (Imperial College), Prof. C. Jenks (Vice-Chancellor, Brunel University), Prof. M. Irving, Dr. G. Taylor, Dr. S.P. Chowdhury, Dr. M. Darwish

More details on the Conference are available at:

[www.brunel.ac.uk/about/acad/sed/conf/midercon2007](http://www.brunel.ac.uk/about/acad/sed/conf/midercon2007)

ECE on the web: <http://www.brunel.ac.uk/about/acad/sed/sedsub/ece>

## Spotlight on ECE Research

### Monitoring and Optimizing the performance of a Laboratory scale Photovoltaic (PV) Installation

**Abstract:** Micro-grids involve the interconnection of small scale distributed generators comprising mainly renewable/sustainable energy sources and other micro-energy resources, typically as 1-5 MW units, to low voltage distribution systems in order to form new types of semi-autonomous power systems. Therefore, micro-grids require an associated control and communications infrastructure.

This project contributes to the facilitation of a laboratory scale micro-grid set-up at Brunel University, currently being used to compare the dominant **monocrystalline** technology used in the photovoltaic (PV) industry today with the more recent a hybrid **amorphous (a-Si) / monocrystalline** or **HIT** (Heterojunction with Intrinsic Thin layer) technology. This has been done by comparing the performances of monocrystalline NU-S5E3E PV modules produced by SHARP (the world's largest PV system manufacturer) and HIT-based HIP-210NHE1 (210 W<sub>p</sub>) modules currently produced by SANYO.

This research project focused on the hardware involved in the PV installation, including the communication infrastructure and with the main emphasis being on optimising the performance, as it was felt that the installation was performing below its operating capabilities; specifically the Sharp array was evidently underperforming, while the outputs were compared against the Sanyo array. To this end a variety of solutions were considered, a few tried and eventually a successful solution was achieved.

Biography: Phillip Day: Level 2 Electronic & Electrical Engineering undergraduate,  
This research is being funded by the Nuffield Science Bursaries for Undergraduate Research  
Supervisor: Dr. Gareth Anthony Taylor  
Lecturer & Course Director (MSc Sustainable Electrical Power)

Dr. G. A. Taylor is also the Principal Investigator for a 1-year Royal Society project that is already funding the development of a micro-grid laboratory facility at Brunel University (November 2006 - November 2007).



## Research Success

Congratulations to Dr. Sunetra Chowdhury, whose work on modelling, simulation and performance analysis for PV arrays and fuel cells, undertaken at Brunel in collaboration with Jadavpur University, India, has been widely recognised in the 42<sup>nd</sup> Universities Power Engineering Conference (UPEC) held in Brighton, UK in September 2007, with the Best Paper Award in UPEC 2007.

Dr. Chowdhury, Senior Lecturer in Electrical Engineering, Women's Polytechnic, Kolkata, India joined Brunel Institute of Power Systems, SED, Brunel University in November 2007, as a Visiting Research Fellow under Royal Society Incoming India Fellowship Scheme. This scheme aims to foster science and technology links between the UK and India enabling outstanding postdoctoral scientists to conduct cutting-edge research with their UK counterparts. Similar incoming fellowship schemes under Royal Society includes China, Japan, South Korea and South East Asia (Brunei, Burma (Myanmar), Cambodia, Indonesia, Laos, the Philippines, Singapore, Thailand and Vietnam). Under this scheme, the Royal Society provides funding for visits of between six months minimum and up to 12 months maximum.

Dr. Chowdhury is currently working on the Royal Society funded project entitled '*Integration of Distributed Energy Resources : An Evolutionary Power scenario*' under the supervision of Dr. G.A. Taylor, Lecturer in Power Systems & Networks and Course Director for MSc in Sustainable Electrical Power, SED, Brunel University. This 1-year project running from November 2006 to November 2007 aims at studying major technical and economic issues associated with the integration of small scale, on-site, low voltage Distributed Energy Resources as microgrids with the existing utility distribution grid to enhance power quality and reliability without sacrificing the stability, power quality and service reliability of the main grid and to meet the electric/heat loads in the most economic way. The scope of the project includes:

- a) Development of detailed mathematical models for performance analysis of the DERs like PV arrays, fuel cells, micro-CHP sets.
- b) Development of simplified mathematical models and Adaptive Neuro-Fuzzy Inference System (ANFIS) based models of DERs for modelling integrated DER systems and microgrids with low computational burden on the systems.
- c) Development of operation, management and control schemes for PV/storage and fuel cell-based microgrids
- d) Installation of a PV array system with its own weather station and collection of real time power output, energy output and weather data to study the correlation of PV performance with weather conditions
- e) Development of ANFIS-based models for the installed monocrystalline and HIT PV arrays and to compare the performance of the two technologies.

In collaboration with Jadavpur University, India, the major projects being pursued under the guidance of Dr. Chowdhury are as follows:

- 1) Application of Local Artificial Neural Network in Short Term Load Forecasting
- 2) Load Frequency Control with GRC & DB Deregulated Power System
- 3) Fuzzy Neural Network Based Computing Models for Electric Load Forecasting
- 4) Distribution Issues of a Deregulated Power System
- 5) Enterprise Resource Planning in Power Sector
- 6) Genetic Algorithm Based Takagi Sugeno Fuzzy Model for Electric Load Forecasting
- 7) GIS Based Power Utility Distribution Automation
- 8) Performance Analysis of FACTS Controllers IPFC & UPFC during Power System Contingency
- 9) CRM Solution for Energy Billing for Energy-Utility Companies
- 10) Distribution Automation Planning & Implementation in Deregulated Environment



L-R: Richard Simmonds of ERA Technology (sponsors of the prize for best paper at the UPEC 2007 conference, a copy of ERACS Power Systems Analysis Software), Dr. S. Chowdhury, Dr. G. Taylor

## Undergraduate Work Placements 2007/8

We have just about come to the end of the process for placing sandwich students in their work placements for the coming year. The total numbers so far are 29 Engineering and 28 Multimedia students, down from 33 and 49 respectively last year. The smaller number of Multimedia students in particular seems to be due to a lack of serious interest from the level 2 students this year rather than a lack of opportunities.

As usual, Intel Corporation have taken 4 engineering students who should have a challenging but rewarding time. Other companies that are taking a student again this year are:

- SoSound (2 engineering)
- Stream UK Media Services (2 multimedia)
- Mediatonic (2 multimedia) – company set up by two multimedia graduates
- Reading Room (2 multimedia)
- Yell Group (2 multimedia)
- Essence (2 multimedia)
- Webexpectations (2 multimedia)
- Coca-Cola Enterprises (1 multimedia)
- 3M (1 engineering)
- Hasbro (1 engineering)
- Fujitsu Microelectronics (1 engineering)
- Convertteam (1 engineering)
- AVCO Systems (1 engineering)
- Film Education (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:

- Symantec
- Richmond & Twickenham PCT
- BMW Group Plant Oxford
- Thales Training & Simulation Ltd
- Logica CMG
- Ultra Electronics Command & Control Systems
- Delphi Diesel Systems Ltd
- Group 4 Technology
- The Haberdashers' Aske's Boys' School
- Dolby Laboratories
- Visteon Customer & Technology Centre
- Perkins Engines Co Ltd (a multimedia student!)
- Royal College of General Practitioners
- Divertimenti

For more information regarding work placements in ECE, please contact Dr. Peter Turner ([Peter.Turner@brunel.ac.uk](mailto:Peter.Turner@brunel.ac.uk)).

## Freshers' Week Egg Race Success!

Following the successful ECE first-place entry in last year's freshers' week egg race event, ECE students put in another great performance this year, taking the first place prize for the second year running. The Egg Race is inspired by the classic 1980s BBC game show, which was presented by Brunel University's own Emeritus Professor of Bioengineering, Heinz Wolff. The challenge of transporting an egg down a rope to land unbroken on a small target disc once again proved very popular with our new students this year. The egg race scaffold was a hive of activity throughout the week, with a number of teams braving heavy rain on the Thursday to qualify for the Friday finals. The winning team, 'Electronics Guys', were each presented with a £30 book token prize, having produced a solution to egg transportation that gave very repeatable results on both days of the event and was fully deserving of victory. Thank you to all members of staff that supported and encouraged their tutees in the egg race during freshers' week and to those staff members that helped organise and run the event.

