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Professor John Carter

WELCOME

We live in an era of expanding demand for professionals in the broad fields of engineering, computing and the built environment – professionals who can tackle and solve the numerous problems that confront the modern world and may even threaten the existence of society as we know it. These problems include many significant challenges, such as those related to dealing with the ever increasing demands for energy and natural resources and the provision of food, water and shelter for a growing world population, while at the same time behaving responsibly as custodians of our fragile environment and providing sustainable solutions to meet all these demands.

The Faculty has an enviable reputation as a leader in Australia, responsible for educating and training cutting edge researchers and leading professionals in the various fields of engineering and the built environment. We educate future practitioners who will respond to these important challenges, and who will help to solve the various problems of survival and sustainability being faced by our society. We have achieved this high status by employing the best and brightest practitioners as educators, the most innovative researchers, and outstanding support staff, in order to ensure a dynamic and satisfying working and learning environment. Our numerous conjoint staff members are particularly valued for the nexus they help to provide between professional practice and education and research.

In this latest issue of EBE News we are delighted to present some highlights of the Faculty's achievements during 2009, achievements which have helped to meet the expanding demands on education, training and research in engineering and the built environment. The Faculty is proud of its strengths in teaching and research, so I trust you will enjoy reading this publication and the insight we hope it will provide into the extraordinary dedication of our staff and their achievements and those of our talented students.

Professor John Carter
Pro Vice-Chancellor

UPCOMING EVENTS

Imagining...

The 27th Annual SAHANZ Conference

The University of Newcastle, 30th June – 2nd July 2010

The 27th annual conference of the Society of Architectural Historians, Australia and New Zealand, will be held in Newcastle City Hall, Australia, from midday Wednesday June 30 until Friday afternoon July 2, 2010.

Members of the Faculty are helping to organise this conference which will explore the role of the imagination in architecture and architectural history. How are broad narratives distilled through subjective recollection? How does factual history intersect with fiction and the imaginary? How is personal experience embedded in historical narratives or architectural fantasy? How would we describe an "architectural imagination" in the context of C. Wright Mills? How does the act of imagining entwine with the work of history and the historian?

Conference registration includes attendance to all (3 days) conference programs, a printed copy of conference

proceedings, lunches, morning and afternoon tea.

Please contact Michael.Chapman@newcastle.edu.au for more information.

AWARDS

International Award for Top Researcher

IEEE has announced that Professor Reza Moheimani was a recipient of the 2009 IEEE CSS Control Systems Technology Award for outstanding contributions to nanopositioning for microelectromechanical systems (MEMS)-based storage and other applications. The award was shared with IBM Research scientists from Zurich.

The IEEE Control Systems Society (CSS) was founded in 1954 as a scientific, engineering and professional organisation dedicated to the advancement of the theory and practice of systems and control in engineering. It is the world's largest professional association advancing innovation and technological excellence for the benefit of humanity.



Professor Reza Moheimani

Newcastle Researchers Awarded National Fellowships

Faculty researchers Professor Reza Moheimani and Professor Michael Ostwald, along with two other University researchers, are among the first in Australia to be awarded Future Fellowships by the Australian Government totalling 3 million dollars over four years.

The fellowships are for mid-career researchers and promote research in areas of national priority, with only 200 fellowships awarded across Australia.

Professor Reza Moheimani is an electrical engineer working in nanotechnology - the science of manipulating matter at the atomic and molecular scale - to develop ultra-fast microscopes.

Architecture Professor Michael Ostwald will use robotics technology to develop a computer model that analyses architectural space, including buildings, from a social and cultural perspective.



Professor Reza Moheimani**Professor Michael Ostwald****Vice-Chancellor's Awards for Research Excellence**

Dr Thomas Fiedler from the School of Engineering has been awarded the 2009 Vice-Chancellor's Award for Research Excellence. The award formally recognises and rewards research excellence in outstanding early career and mid-career researchers from the University. The award is based on the excellence of the applicant's best research output in the previous calendar year.

Dr Fiedler has developed a number of innovative computational approaches to deal with the complex task of describing the mechanical properties of advanced composite material, permitting advanced applications in the aviation, automotive and space industries. He has also investigated the thermal and mass transport properties of these structures, with applications for energy storage in a coordinated intelligent approach to the problem of climate change.

Vice-Chancellor's Awards for Supervision Excellence

Dr Jamil Khan from the School of Electrical Engineering and Computer Science was awarded the Vice-Chancellor's Award for Supervision Excellence. This accolade recognises and rewards outstanding supervisors and provides the opportunity for colleagues to acknowledge the important role that supervisors play in our research achievements and in supporting our research higher degree candidates.

Pro Vice-Chancellor's Award for Research Excellence

Craig Wheeler, Tess Morrison and Daniel Quevedo have been awarded the Pro Vice-Chancellor's Award for Research Excellence.

The Pro Vice-Chancellor's Award for Research Excellence is a means by which the Faculty of Engineering and Built Environment recognises demonstrated excellence of individual researchers in their respective fields.

Craig Wheeler is currently a Senior Lecturer in the School of Engineering. His research interests focus on the area of Bulk Solids Handling, and more specifically Belt Conveying Technology. His current research involves the optimisation of belt conveying systems using theoretical and computational modelling to minimise cost and energy consumption.

Tessa Morrison's current research project focuses on the sacred architecture of Isaac Newton and his reconstruction of the Temple of Solomon. This reconstruction was written in the 1680s, at the same time that Newton was working on the *Principia*. In Newton's unpublished papers he revealed a connection between the architecture of the Temple and lost ancient knowledge of natural philosophy.

Daniel Quevedo holds a research academic position with the Faculty. His research interests are in the areas of automatic control, signal processing, power electronics, and communications. Specific topics include networked feedback systems, power control for wireless sensors, audio quantization, and predictive control of power converters.

This award aims to encourage and recognise the achievements of early and mid-career researchers. Research excellence is judged relative to career opportunity.



Craig Wheeler



Daniel Quevedo

2009 Weir Warman Design and Build Competition

The University of Newcastle Warman Design and Build team was placed third in the 2009 Weir Warman Design and Build Competition. The competition was held on 27 September 2009 at the Powerhouse Museum in Sydney.

The challenge was to design, build and prove a prototype device in a laboratory environment that uses two autonomous devices working together in series to pass a sculpture around two edges of a square.

The 2009 competition saw 17 universities take part in the competition including participants from WA, NSW, SA, VIC, QLD, NT and New Zealand.

The University of Newcastle team consisted of Nicolas Weightman (c), Francis Walsh, David Bradney and Joel Guy. The team initially tied for second place with the University of Adelaide and had to thrash it out in an extra run to decide second and third places. The University of Western Australia took out first place.



Nicolas Weightman (c), Francis Walsh, David Bradney & Joel Guy

Estimating Success

Bachelor of Construction Management student Nathan West has received the inaugural 2009 Master Builders Association (NSW) Student Estimator of the Year Award. Estimators develop and determine tendering strategies and profits, and calculate and monitor costs of construction projects, from feasibility to completion.

Nathan was recommended for the award by his lecturer, after receiving outstanding results for a project in which students estimated the costs of the current development opposite Newcastle Beach.

Newcastle Innovation Awards

Four staff members from the Faculty were recipients of various awards presented at Newcastle Innovation's 40th Anniversary on 9th October 2009.

Five prominent researchers from the University were awarded Excellence in Innovation Awards in recognition of world class innovation and their contribution to Newcastle Innovation's success over the past 40 years. The two researchers from the Faculty were Laureate Professor Graeme Jameson AO and Emeritus Professor Alan Roberts AM.

Dr Tristan Perez and Dr Elham Doroodchi were also presented with a Rising Star award in recognition of outstanding early career achievements in research and innovation.

The other three researchers Emeritus Professor Robert Clancy AM, Professor John Forbes and Associate Professor Darren Shafren from the Faculty of Health.



**Laureate Professor
Graeme
Jameson AO**



**Emeritus Professor
Alan Roberts AM**



Dr Tristan Perez



Dr Elham Doroodchi

Rotary Honour for Challenge Leader

Melanie d'Arbon has picked up Rotary's highest honour for her work as a team leader with the Science and Engineering Challenge.

The Rotary Club of Loganholme in Queensland awarded Melanie the Paul Harris Fellow to recognise her significant contribution to the community through the Challenge.

Melanie and her team deliver the Challenge to high school students in Queensland. The Challenge was devised by the University in 2000 as a way of addressing Australia's skills shortages in the engineering fields by showing students how interesting and challenging science and engineering-related subjects can be.

The Challenge is supported across Australia by local communities through Rotary International, Engineers Australia and the Department of Innovation, Industry, Science and Research.

2009 Vestas Winnovation Challenge

Masters of Philosophy (Electrical Engineering) students, Chris Rowe and Chris Townsend, from the School of Electrical Engineering & Computer Science, competed in the global final of the prestigious Vestas Winnovation Challenge for 2009. The final was held in Denmark on the third and fourth of December. There were 44 finalists from around the world including some of the best engineering students from Europe, Asia and America.

The Vestas Winnovation Challenge is open to Master of Engineering and Master of Business students worldwide. The rules of the competition required the engineering students to meet the challenge of devising methods of making wind energy more cost effective and consequently more attractive.

As finalists Chris and Chris were awarded an all expenses paid trip to Denmark and presented their concept of creating a “synergy between hydroelectric and wind generation in an appropriate environment” to top Vestas executives including the the President of Technology R&D, Finn Strøm Madsen.

Only one competition winner is selected from engineering and Chris Rowe was the winner for 2009, a fantastic result. His prize includes international travel and the opportunity to interact with Vestas’ best researchers.

Vestas is the leading manufacturer of wind turbines in the world with a capacity of some 4,500 megawatts installed globally in 2007. They have major installations in Australia with turbines installed in every state. Their core business comprises the development, manufacture, sale and maintenance of wind technology that uses the energy of the wind to generate electricity.

OPINION PIECE

With its primary laboratories and offices located in the ATC Building of the University of Newcastle, the Priority Research Centre for Energy (PRCfE) brings together academics at the University of Newcastle who have research interests in the abatement of greenhouse gases, and in clean and sustainable energy production.

The PRCfE provides new research and development opportunities flowing from the interaction between industry, government agencies and university researchers interested in the growing field of clean and sustainable energy production. The long term goal of the centre is to develop technologies that can reduce greenhouse gases internationally by 2% and nationally by 20% by 2030.

The Centre offers research, development and consultancy services, using its state of the art laboratories which span the University of Newcastle and off campus facilities, in a variety of research and development capacities.

The PRCfE focuses on four main areas of research:

- Low Emission Coal
- Renewable Energy Systems
- Transportation Fuels and Energy Conversion
- Energy and the Environment

The most recent achievement of the PRCfE was the opening of a 100 kilowatt pilot plant by the NSW Minister for Mineral Resources, Peter Primrose MLC, and the NSW Minister for the Hunter, Jodi McKay MP (see more detail in separate article below). The pilot plant is a revolutionary new technology platform that enables power generation from geothermal and low-grade heat sources. Called GRANEX, the technology delivers higher thermal efficiencies than conventional power plants and increases the amount of electricity that can be generated from low-grade heat sources such as geothermal and industrial waste heat.

The technology which has been developed by a team of researchers led by Prof Behdad Moghtaderi is particularly suited to power generation from geothermal sources, although with some minor adjustments can be equally applied to waste heat recovery applications and power generation from other renewables such as biomass, biogas, and solar thermal. It is envisaged that the research will establish the parameters to design and build a power plant of any size based on the GRANEX concept and put to use valuable heat sources that would otherwise be wasted.



Professor Eric Kennedy
Deputy Director
Priority Research Centre for Energy

RESEARCH

Faculty Receives \$5.5 Million in Research Funding

The University of Newcastle has received \$8.5 million in research funding from the Australian Research Council for Discovery Project grants commencing in 2010, with approximately \$5.5 million being awarded to Faculty of Engineering and Built Environment researchers. The emphasis has been on energy research, in particular renewable energy.

The Faculty has always been a front runner with research and this round of ARC funding further demonstrates the Faculty's research excellence.

New Revolution in Electricity Generation

Efficient large-scale power generation from geothermal and other low-grade heat sources is a step closer with the release of a revolutionary new technology platform called GRANEX.

GRANEX delivers higher thermal efficiencies than conventional power plants and increases the amount of electricity that can be generated from low-grade heat sources such as geothermal and industrial waste heat.

Over the past four years a team of researchers led by Professor Behdad Moghtaderi from the Priority Research Centre for Energy has worked in partnership with Granite Power Pty Ltd (GPL) on the GRANEX technology platform, developing and studying a one kilowatt proof-of-concept power plant.

"The one kilowatt model was a great success and demonstrated a 40 per cent improvement in terms of thermal energy efficiency and power generation," Professor Behdad Moghtaderi said.

"Our work from here will allow us to establish the parameters to design and build a power plant of any size based on the GRANEX concept and put to use valuable heat sources that would otherwise be wasted."

Several major power companies and industrial companies have already expressed a keen interest in the GRANEX technology for waste heat recovery programs. When testing is complete, the 100 kilowatt pilot plant will likely be relocated to Vales Point Power Station for further investigations.



Prof Behdad Moghtaderi and the Geothermal Research Team



GRANEX 100kW Pilot-Plant

Coal Production Research – Predicting the Future of Coal Production

Professor Geoffrey Evans and PhD student Steve Mohr have developed a new mathematical model to predict the future of coal production.

Their research reveals that the world's coal production could peak between 2010 and 2048, and Australia's coal production sometime after 2050. The researchers applied their new model to all coal producing countries and, unlike previous models, took into account supply and demand influences.

The model comprises more than 400 variables including new mines coming online, upgrades and shutdowns to existing mines and external disruptions to coal supply such as war and economic depressions. Importantly, the model takes into account how quickly industry can adapt to these changes.

Professor Evans said while the complicated model was limited because it relied on a number of assumptions and data about coal production in different countries, it sent a very clear message.

"We need to start thinking now about the future supply of coal and how best to manage the resource. This is another warning that we cannot wait for coal to peak, we need to act now to plan for the future."

Professor Evans and Mr Mohr presented their research at a forum hosted by the University's Tom Farrell Institute for the Environment in October.



Professor Geoffrey Evans

Considered a Research Higher Degree?

Do you want to develop new ideas, think creatively, solve problems and challenge conventional expectations?

Do you want to contribute to the global community and become part of a network of internationally renowned researchers and academics?

Completing a research higher degree is a unique opportunity for you to pursue your own interests, in an in-depth manner, for a period of between two and four years. It allows you to gain a deeper understanding of your chosen field.

During your studies you will work with internationally renowned researchers and have the opportunity to contribute to world leading research programs often linked with partner organisations. Our current PhD and Masters students work on research programs with Rio Tinto, BHP Billiton and Energy Australia to name a few.

Your research higher degree will prepare you for a leadership role in your profession; it will assist you to develop your career path in industry and it is essential for a career in research and academia.

More information can be found at:

- [Faculty of Engineering and Built Environment RHD Information](#)

TEACHING

[IN]TRANSIT – Visions from Final Year Students

37 Master of Architecture students showcased their final year designs at the [IN] TRANSIT exhibition at the University of Newcastle and Paddington Town Hall, Sydney in November 2009.

Some of the designs included a library for inner city Newcastle, public housing along Hunter Street, an Interpretive Centre and Heritage Park for Newcastle East and an Opera House suspended over the Brisbane River.

Industrial Design Exhibition

A ski lift for mountain bikes and a sandwich press that can be washed in the dishwasher are among more than 40 major projects by industrial design students displayed at the Final Year Exhibition held in December 2009. The exhibition showcased the work of the first cohort of students to progress through the unique industrial design program offered jointly by the University of Newcastle and Hunter TAFE.

Under the agreement, students complete the TAFE three-year Advanced Diploma of Product Design and Innovation before moving to the University to complete the one-year Bachelor of Industrial Design degree.

This exhibition included works by final-year TAFE and University students. Other projects displayed included an innovative coffee grinder, a public garbage bin designed to minimise back injuries and a ski rescue sled.



Sample prototypes from the exhibition

ALUMNI

Graduate Profile

Grant Street

Bachelor of Computer Science

Grant completed a Bachelor of Computer Science at the University of Newcastle in 1995. His skills have taken him around Australia, Malaysia, Singapore, Thailand, USA and France. "I have worked in a lot of industries including research, software development, media, logistics and retail in small, large, corporate and creative companies, each presenting their own unique challenges."

Grant is currently working as a Senior Systems Engineer with Animal Logic, the Sydney based design, animation and visual effects studio. He began working with Animal Logic in 2005, during the production of the Oscar winning animated feature film *Happy Feet*. Since then Grant has worked on numerous high profile projects including *300*, *World Trade Center* and *Australia*.



Grant visited the Faculty in October 2009 and delivered a careers presentation about Animal Logic and his career path as well as explaining the numerous career opportunities that are available for the Faculty's undergraduate students.

"Animal Logic runs the only Australian super computer in the top 500 worldwide. This provides a range of unique challenges from storage, networking, monitoring and management, each pushed to the limit to ensure we deliver the best quality product."

"My time at Newcastle Uni gave me the start in my career path, which has taken me overseas, into industries that I had never considered. My current role exposes me to new challenges every day. I always found I.T. interesting, but I could never have foreseen the enjoyment I gain through my work."



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