The Faculty of Engineering’s Professor Anatoly Rozenfeld and research staff from the Centre for Medical Radiation Physics (CMRP) have had their research into ways to improve quality assurance for radiotherapy outlined in an article in the June 2011 issue of Incite, the journal of Cancer Institute NSW. The Incite article is further detailed below:

In recent years, there have been exciting discoveries in radiation treatment. As radiation therapy becomes more complex, clinicians need to be confident about the treatment they choose for their patients. To overcome any problems that may arise CMRP have been looking at new ways to improve quality assurance for radiotherapy.

CMRP have been researching a pioneering radiation semiconductor detector system, known as the Dose Magnifying Glass (DMG) to provide feedback to clinicians during and after test treatments to authenticate the treatment plan for each patient.

The DMG uses a novel silicon strip detector embedded in a special plastic insertion, which allows for real-time mapping of dosage in a phantom and improves spatial resolution, compared with existing commercially available real-time quality assurance tools from 5–10mm to 0.2mm.

The benefits of the DMG can be seen in the use of them for quality assurance in Stereotactic Radiosurgery (SRS). With this form of treatment, ‘phantom studies’ (using a dummy or model to approximate the effect of radiation on human tissue) are required for each patient prior to treatment to develop an appropriate patient treatment plan. DMG provides dose verification during and after plan delivery in a phantom model to give immediate confirmation of the plan prior to patient treatment.

Every year there is a major celebration of the contributions made by University of Wollongong staff. This occurs at the ‘Vice-Chancellor’s Awards’ ceremony in June, where awards are made in several different categories. These include awards for ‘Outstanding Contribution to Teaching and Learning’ (OCTAL awards); ‘Excellence in Research’; ‘Outstanding service for General Staff’; ‘Excellence in Community Engagement’; and awards for 25-years of Service.

This year’s ceremony had particular significance as 2011 marks the 60th anniversary of the University’s original establishment in 1951 as the Wollongong Division of the New South Wales University of Technology, later to become the University of NSW. In 1972 the University of Wollongong was set up by a special act of the NSW parliament which paved the way for the Division to become a fully independent University in its own right.

Faculty of Engineering staff were prominent in many of these awards. David Hastie, a Mechanical Engineer, received an OCTAL award for his teaching particularly for his pioneering work with some of the Faculty’s largest classes, as did Nadeesha Dharmasiri for her development of new ways to enliven tutorials in Civil Engineering. From Electrical Engineering Sasha Nikolic received the Vice Chancellor’s award for General Staff for creating new ways to assist and train demonstrators and tutors in laboratory classes.

As a result of the positive outcomes CMRP is currently testing DMG on other new radiotherapy techniques including Intensity Modulated Radiation Therapy (IMRT) and Volumetric Modulated Arc Therapy (VMAT).

For the full article please see the Cancer Institute NSW website:


Message from the Dean

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From page 1...

Cholochat Rujikiatkamjorn from Civil Engineering received a highly commended ‘Emerging Researcher’s Award’ for his pioneering research into ground improvement, with particular application to improving rail track stability, and Vic Gosbell and Sarath Perera, Electrical Engineers, received an ‘Outstanding Achievement in Research Partnership’ award for founding and running the immensely successful Power Quality Institute with Integral Energy, one of Australia’s largest electricity utilities. Montserrat Ros from Electrical Engineering received well deserved recognition via a ‘Community Engagement Award’ for her work in promoting engineering to young people in high schools, including setting up and running engineering summer schools for women in January of each year.

Several of our staff also received awards for 25 years of continuous service to the University. Awards were made to: Joe Abbott who has provided multi-skilled technical support to many of our laboratories over this time, including in robotics, steel rolling, automation, and civil and mining; Ernest Baafi who has provided sterling leadership in Mining Engineering teaching and learning, and via major research projects with the mining industry; Joanne George, now with the Innovation Campus, but formerly a mainstay of our environmental laboratories; and Rod Vickers currently our sub-Dean and Head of School of Physics with an academic career championing and contributing to the discipline on which much of engineering and science is based.

It’s very fitting that the contributions of our staff are rewarded publicly in a formal ceremony in front of a large audience of family, friends and colleagues, followed by informal refreshments in the foyer of the McKinnon Building, named after the University’s Vice Chancellor, Professor Ken McKinnon, who initiated these awards. My hearty congratulations to all the recipients.

3 Minute Thesis Competition

The Faculty of Engineering recently held heats for the UOW 3 Minute Thesis Competition. The Three Minute Thesis Competition supports the development of research students’ capacity to communicate ideas effectively to a range of non-specialist audiences and to the wider community.

It is an exercise in developing academic and research communication skills. Selected Higher Degree Research Students (PhD and Masters Research) have three minutes to present a compelling oration on their thesis topic and its significance using one powerpoint slide to help illustrate, in language appropriate to an intelligent but non-specialist audience. http://www.uow.edu.au/research/rsc/news/UOW074626.html

Students were nominated from each of the schools in Engineering to present their research. Judges present at the competition were Professor Chris Cook and Professor Chao Zhang, and also Lorelle Pollard and Pam Burnham.

The students were judged on the following:

- Engagement – did the oration make the audience want to know more?
- Communication style – was the thesis topic and its significance communicated in language appropriate to an intelligent but non-specialist audience?
- Comprehension – did the presentation help the audience understand the research?

The winner of the Engineering heat was CME student, Shiran Galpathage for his presentation titled, “Improvement of soft grounds using native vegetation”. The aim of his research is to provide important tools for practicing engineers to use native vegetation as an environmentally friendly, cost effective and flexible ground improvement method; especially in the construction of railways in the vegetated coastal areas. Shiran is currently supervised by Professor Buddhima Indraratna and Dr Vinod Sylaja.

Shiran will represent Engineering at the UOW 3 Minute Thesis Final on the 29th June, 2011. The UOW winner will receive $1,500, runner-up $750 and Peoples Choice prize $750. The UOW Winner will automatically be entered into the National/Trans-Tasman competition at the University of Western Australia on Thursday 29th September 2011, with all travel and accommodation costs covered by the Research Student Centre.
Vice-Chancellor Awards 2011

Congratulations go to Dr David Hastie, who has been awarded the 2011 OCTAL Faculty Early Career Academic Award in Engineering.

The Vice-Chancellor’s Awards for Outstanding Contribution to Teaching and Learning (OCTAL) are awarded each year to staff who have made a major contribution to teaching and learning excellence within the University of Wollongong. This is a very significant achievement in a very short period of time since David has been working as a full time academic in MMM.

Dr Cholachat Rujikiatkamjorn from CME has been awarded the Emerging Researcher (Highly Commended) award for 2011. The Vice-Chancellor’s Excellence in Research Awards recognises the outstanding contributions that academic staff and their partners are making towards research excellence.

Since completing his PhD in 2006, Dr Cholachat has been Chief Investigator on 5 ARC projects, author or co-author of a research-based book and over 30 journal articles and 50 conference papers. Cholachat’s past achievements and his current research efforts through the Centre for Geomechanics and Railway Engineering will definitely contribute to pioneering Australia’s soft-ground engineering technologies in the years to come.

Cholachat’s research in the areas of ground-improvement technology, soft-clay engineering and rail-track geotechnology is outstanding by world standards and he receives a special commendation in recognition of his contributions to geotechnical engineering.

Mrs Nadeesha Dharmasiri was a recipient of the Vice-Chancellor’s Sessional Tutor / Demonstrator Award for 2011. Nadeesha was recognised for her innovative ways of engaging and inspiring her students by using combinations of quizzes, videos and real-life examples to relate the often complex theoretical problems of the subject. Her method of teaching not only encourages independent learning but also offers comprehensive student support.

Also acknowledged at the presentation evening were Associate Professor Ernest Baafi, Associate Professor Rodney Vickers and Mr Joe Abbot for 25 continuous service with the University.

The achievements of David, Cholachat, Nadeesha, Ernest, Rodney and Joe were formally acknowledged at the Vice Chancellor’s Awards ceremony on the 10th June.
2011 Asia Pacific Coal Bed Methane Symposium

Two of our PhD Mining students, Dennis Black and Lei Zhang attended the 2011 Asia Pacific Coalbed Methane Symposium, which was held at the Royal on the Park Hotel, Brisbane, on May 3-6. The 3rd Asia Pacific CBM Symposium was hosted jointly between the University of Queensland and China University of Mining and Technology (CUMT) and was sponsored by CSIRO, Santos, Weatherford and other Mining and CBM service companies. The theme of this year’s event was “CBM - A Clean Fuel for a Hot World”, recognising that fuel switching to gas from coal in power generation and from diesel and petrol in transportation, can be very cost-effective ways to reduce the greenhouse gas emissions and global warming. This year’s symposium, with 95 papers, included four keynote, four invited speakers, 60 oral presentations and 10 poster presentations.

Dennis Black presented a paper titled “Enhanced Gas Drainage from Undersaturated Coal Bed Methane Reservoirs, authored by Dennis Black, Naj Aziz and Ting Ren”, while Lei Zhang hosted a poster presentation titled “Influence of Temperature and Moisture on the Gas Content of Coal”. This paper was co-authored also by Dr Ting Ren and Associate Professor Naj Aziz and Zhongwei Wang.

The symposium was well attended by more than 300 participants, with engineers and scientists from various mining, drilling, coal seam gas industries as well attendees from other research organisations and universities. Both Dennis and Lei found the symposium a good opportunity to communicate with different researchers around the world.

University of Wollongong Role in the New DMTC Personnel Survivability Program

On the 14th of June the Federal Government announced the approval of a new DMTC program on Personnel Survivability. The proposal from DMTC has been developed over the last year and UOW has been a key supporter of the program since its inception. The aim of the program is to enhance the protection of ADF personnel by improving mobility and protection. This will largely be achieved by providing effective but lightweight body armour, clothing and ancillary equipment. Areas of the research currently planned include:

- Ballistic, Blast and Flash and environmental protection
- Signature reduction, utility and fit of clothing
- Human systems and injury modelling
- Integration with mounted operations

The program builds on the successful DMTC projects currently underway at UOW which supports 5 staff and 6 PhD students in areas such as lean automation and material development for land based personnel carriers. UOW engineering materials expertise will be called upon to assist with effective lightweight body armour development and the utility and fit aspects of the work are complementary to the existing personnel employment standards program currently underway in Health and Behavioural Science. The 5 year program currently has a budget of $20M funded from government and industry sources. There is scope for industry partners and researchers with innovative ideas for reducing effective payloads (lighter batteries or integral power generation) or enhancing protection to participate.
Support for early career researchers within ARC Centres

The ARC Centre of Excellence for Geotechnical Science and Engineering has been successful in securing 1.25M funding to support two early career researchers under the Discovery Early Career Research Award (DECRA). The DECRA scheme is a separate element of the Discovery Program and provides more focused support for researchers and creates more opportunities for early-career researchers in both teaching and research, and research-only positions.

Dr Cholachat Rujikiatkamjorn, from the School of Civil, Mining and Environmental Engineering, was one of only two successful DECRA candidates. His successful research application was based on the UOW study into the Ballina Bypass for innovations in vacuum preloading of soft soil foundations for highways, including the design and instrumentation of 3 trial embankments. The design of the embankments and FEM simulation of vacuum application work have already begun, through the research work of Dr Geng Xueyu in another ARC-Linkage project between UOW, RTA and industry. From July, Dr Geng will start on a five year appointment in ARC Centre of Excellence through the UOW’s contribution to the Centre.

Dr Rujikiatkamjorn is the first fully funded ARC Early Career Researcher in the Faculty under this new initiative. This is the result of the proposal written by Professor Buddhima Indraratna and Professor Scott Sloan at the University of Newcastle.

Congratulations to both Dr Geng Xueyu and Dr Cholachat Rujikiatkamjorn for their excellent research.

Lithium Ion Batteries: The Next Generation

Researchers from ISEM and China have made a nano-tin/polypyrrole composite as an anode material for use in large lithium ion batteries with good capacity retention and rate capability.

Developing large cells with high energy density, long cycle life, excellent rate capability, low cost and environmental compatibility for electric vehicles and hybrid electric vehicles is a challenge. To meet these requirements, substantial efforts have been made to develop new electrode materials and to design new structures for existing electrode materials.

As an anode material, tin has attracted interest, owing to its high theoretical capacity, which is significantly higher than that of the currently used graphitic carbon. Tin has another advantage over graphite: it doesn’t encounter solvent intercalation, which causes irreversible charge loss.

For more information please view the link from Dalton Transactions http://pubs.rsc.org/en/content/articlelanding/2011/dt/c1dt10396b.

Dr Shulei Chou, Australian Postdoctoral Fellow with ISEM, acknowledges the financial support for the project was provided by the Australian Research Council through a Discovery Project and ARC Centre of Excellence funding. Additional funding was from the Department of Innovation, Industry, Science and Research, Australia via an International Linkage Project.
EMI Workshop – Advanced Experimental Techniques for Materials

On the 9th of June, 2011 the Engineering Materials Institute (EMI) Research Strength held a successful Workshop on Advanced Experimental Techniques for Materials Characterisation. More than 85 postgraduate students and researchers from UOW, UNSW, ANSTO, University of Sydney and BlueScope Steel participated. The invited talks by external and internal speakers focussed on applications of synchrotron and neutron X-ray diffraction, transmission and scanning electron microscopy, electron back scattering diffraction (EBSD), energy dispersive X-ray spectroscopy, 3D FIB/EBSD and atom probe tomography.

The Workshop was opened by EMI Coordinator Professor Elena Pereloma with a brief overview of the future Electron Microscopy Centre at the Innovation Campus to be operational by the end of 2011. Among the presenters were Dr Rob Robinson Director of the Bragg Institute at ANSTO, Drs Klaus-Dieter Liss and Saurabh Kabra from ANSTO, Associate Professor Julie Cairney and Mr Kevin Xie from the University of Sydney, Professor Michael Ferry and Dr Zachary Quadir from UNSW, as well as Drs David Wexler, Azdias Gazder, Ali Dehgan-Manshadi, Mr Mark Reid and Professor Pereloma from UOW.

More Engineering Prize Night Photos

Craig Innes Memorial Prize
2011 is the first time the Craig Innes Memorial Prize has been awarded. This prize was established by the Faculty of Engineering as an ongoing memorial to Craig Innes, who was tragically killed in a car crash on 17th April 2010. Craig was an excellent student (being awarded both the Mechanical Engineering 2nd year prizes for 2009), which he combined with a passion for the F SAE project.

This memorial prize is awarded to a student who emulates some of Craig’s outstanding contributions to the UOW F SAE team (enthusiasm, mentoring new team members, contribution to team leadership), has completed at least 2 years of the Bachelor of Engineering degree, and has maintained a weighted average mark of above 65. The very deserving inaugural winner of this prize is Richard Darlow. His contributions in completing the 2010 UOW car were absolutely vital. Every inch (excuse the lapse from SI) of the 2010 space frame chassis bears the imprint of his design and manufacturing expertise. Richard’s academic performance is well beyond the specified criteria, a great achievement considering the stress of 2010. Richard was Craig’s best mate here in Wollongong – they both travelled here from Canberra to study engineering. It was a very poignant, but fitting, outcome for this inaugural award.

Jae Dawes was awarded the Mining Engineering Discipline Prize for the best performance in 3rd year Mining.

Institute of Materials Engineering Australasia (Illawarra Branch) Materials Prize
Louise Hodges was awarded the Institute of Materials Engineering Materials Prize for the highest weighted average mark for materials graduate. Louise Hodges also received on the night the BlueScope Steel Materials prize, MM Kembla Products Prize and 4th year discipline prize in Materials Engineering.

Professor Gursel Alici presenting Louise Hodges with one of her many awards

Richard Darlow receiving the Craig Innes Memorial Prize from Professor Gursel Alici

Jae Dawes receiving the 3rd Mining Engineering Discipline Prize from Professor Buddhima Indraratna