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Student and Alumni Organisation

John Doherty  President Engineering Sydney Alumni Association
Nathan Byrne  SUEUA President
Two particular features of the welcome event were the award of the Sydnovate Prizes for Research Innovation by students presented by Dr Isaac Shariv, Director of Sydnovate, and the Alumni Awards presented by Mr John Doherty, President of Sydney University Engineering Alumni Association. Another feature of this year’s program was the inclusion of a CD-ROM containing a copy of the students display posters. Anyone who did not attend and would like a copy should contact Mr Keiran Passmore, Executive Director of Engineering Sydney.

The Faculty was again very successful in the Australian Research Council Discovery and Linkage Grants Programs for 2009 and beyond. There were 20 successful ARC Discovery Grants and 4 successful ARC Linkage Grants. The total for the Faculty for 2009 is $2.293m compared with $2.339m in 2008. The grand total from this round for the next 5 years is $8.158m. One particularly pleasing point is the number of grants received by younger and newer members of staff this year.

One grant of note was for Dr Mari Velonaki, our artist in residence in the Australian Centre for Field Robotics, who received a QEII Fellowship and total funding of about $750,000 for her project “Physicality, Tactility and Intimacy: Interaction between Humans and Robots”. Mari was invited to give a talk at the ARC announcements in Canberra last month.

Dr Tony Vassallo has taken up his appointment as the Delta Chair of Sustainable Energy Development in the School of Chemical and Biomolecular Engineering. Tony comes to us with a strong record in energy research at CSIRO and in industry and we welcome him to the Faculty. He hopes to work closely with the University’s new Institute of Sustainable Solutions launched in July.

Dean’s Message

The 2008 Research Conversazione proved to be an outstanding success as usual with over 300 people from industry attending.
The annual Research Conversazione is the Faculty of Engineering and Information Technologies’ major annual event to showcase the research undertaken by students over the past year. It was held at the Seymour Centre with all schools of the Faculty represented.

The event commenced with a welcome address from the Vice Chancellor, Dr Michael Spence and Dean of Faculty, Professor Gregory Hancock. The ceremonial proceedings incorporated the Engineering Sydney Alumni of the Year Awards, which was kindly sponsored by the Intellectual Property law firm, Spruson and Ferguson (see page 11 for winners); and the Sydnovate Prize for the most innovative and commercial viable projects. The winner and three runners up of the Sydnovate Prize were Andrew Gadd, Dorji Chavara, Andrew Howard and Anh-Dung Diep respectively.

Over 300 industry representatives attended the event.
The more formal part of the event was then followed by poster displays and prize presentations in the Schools of Civil Engineering, Chemical and Biomolecular Engineering, Aerospace, Mechanical and Mechatronic Engineering, Electrical and Information Engineering and Information Technologies. The schools were abuzz with activity as industry judges perused and assessed the poster displays.

Of particular note was the standard of research presented at the individual schools, prompting one industry partner to state that the event and the projects were of the highest standard considering the challenging economic climate we live in.

The Faculty extends its thanks for a successful Research Conversazione 2008 to the students who participated, the academic staff who supervised these students, our industry partners in attendance, our sponsors and prize givers, and the event staff.

Ariel Riveros
These are exciting times.

The Rio Tinto Centre for Mine Automation addresses the Grand Challenge of fully automating the mining process within the next ten years.

The Centre is a partnership, developed over more than a decade of previous collaboration, between Rio Tinto and the Australian Centre for Field Robotics. The Centre represents the largest single research investment by a company in an Australian University.

The Centre for Mine Automation is the largest civilian autonomous systems R&D project in the World to-date and cements Australia’s leadership in the Field Robotics arena. Over the next ten years, the Centre must address cutting-edge research issues in areas such as sensor data fusion, machine learning, autonomous control and systems design. At the same time it will deliver and field real autonomous systems into challenging mining environments.

To do this, the Centre has recruited a unique and outstanding group of researchers and engineering staff who will drive the essential research and development work. In concert, Rio Tinto have assembled an excellent team of committed individuals who will play the key role in implementing and realising the vision of the fully autonomous mine.

The work undertaken by the Centre will fundamentally change the entire mining industry. The work undertaken by the Centre will also have a substantial impact on the economic and social well-being of Australia.

(Photos below from left to right: Prof Hugh Durrant-Whyte, Dr Andy Stokes, John McGagh - Head of Innovation at Rio Tinto)
The work undertaken by the Centre will make major advances in our knowledge and understanding of autonomous systems.

Exciting times indeed.

I would like to thank the new staff of the Rio Centre for embarking on this great adventure and especially Eric Nettleton for taking on the challenge of running the Centre.

Finally, and most importantly, I would like to thank Andy Stokes. Andy and I together conceived the idea of the fully automated mine over 12 years ago. Through ups and downs, Andy kept the faith and we are both really pleased and excited to see this centre now come to fruition.

(Article courtesy of Prof Hugh Durrant-Whyte)

(Photos below from left to right: Natasha Tetradis, Ruth Olip and Dr Eric Nettleton)
There has never been a more important time to tackle the big issues and find answers to the tough questions. What sort of environment will our children inherit? Will our rivers run dry? Can our cities survive? How will we fuel the future?

The Institute for Sustainable Solutions at the University of Sydney will be a focal point for outstanding research about such issues, providing new ways of thinking about solutions. Our research will have a strong community focus and will guide our teaching of the next generation of students.

The Institute will bring together some of the world’s leading thinkers, researchers and educators in disciplines such as renewable energy, climate change, population growth, health, food and energy security. Many experts are already working at the University of Sydney. Many more will.

The Faculty of Engineering and Information Technologies will play a key role in the new Centre, especially in the area of Sustainable and Renewable Energy. We speak to two members of the Institute for Sustainable Solutions from our Faculty.

Professor Vassilios G Agelidis holds the Energy Australia Chair of Power in Engineering at the University of Sydney. He is Director of the Electrical and Information Engineering Foundation.

Professor Agelidis (top left) sees the challenges posed by current discussions on alternative energy. As he states:

“Take for instance the biofuels. They may help us to address our energy needs but it has a negative impact on developing countries and disadvantaged people as the price of food increases and they suffer.”

“Take for instance the biofuels. They may help us to address our energy needs but it has a negative impact on developing countries and disadvantaged people as the price of food increases and they suffer.”

Professor Agelidis continues:

“This solution is not truly sustainable although it can be seen as good for us as developing countries. Therefore it is important to be able to identify the solution that is truly sustainable and long term if possible.

This process of course is too complex, as the systems we are talking about are too complex and the links between them and possible solutions are also at many times unknown or change as we adopt solutions that are not truly sustainable.”

Brian Haynes (bottom left) is a professor in the School of Chemical and Biomolecular Engineering at the University of Sydney. He has just completed a four year term as President of the Combustion Institute.

He concurs with Professor Agelidis in terms of the complexity of the issues of sustainability:

“The issues of sustainability and the approaches to best engage with them are complex and they are going to take a long time to pan out.

There are clearly medical aspects to the whole sustainability question, there are legal aspects, there’s a lot of science that needs to be done, there’s geology that has to be done if we are to sequester CO₂.”

Professor Haynes’ research
Institute for Sustainable Solution (continued)

strength goes beyond combustion. Haynes further states:

"90 per cent of end use energy comes from combustion...anything you can do to improve combustion has a direct impact on CO₂ emissions.

Our job in combustion research is to make sure the work is done well, that combustion is done efficiently and that all of the gains that have been made in the past 50 years in air pollution control are not lost in the process.

The other work I do is in miniaturized process design. We work in an area of extremely efficient heat exchange. They in themselves have a great potential to improve the efficiency of chemical processes. So, typical heat exchange efficiency as it runs in the chemical industry is around 40-50 per cent. There's no reason why that can't be pushed up dramatically.

Coupled with that, we are now moving to building entire chemical plants using miniature systems. We are able to rethink how we do process design for many chemicals that are being produced. We are able to produce very significant energy efficiency gains in manufacturing processes that haven't been changed in 100 years."

Haynes concludes with his perspective on the Institute:

"I think the Institute's role is to facilitate the cross-disciplinary research that will make sustainability a viable path for us.

If we don't bring people with varying technical skills and perspectives then we are never going to win the sustainability argument.

Being able to provide high level advice from a respected and non-partisan standpoint I think is very important."

Faculty welcomes Dr Tony Vassallo to the Delta Chair

Tony started his career with CSIRO in 1980. He was originally employed to determine how hydrogen directly helped produce liquid fuels from coal, using isotopes and spectroscopy.

Following this and related work, he started a major research project on the use of high surface area carbons for electrical energy storage in devices called supercapacitors. This work was commercialised by an Australian start-up company called cap-XX which recently listed on the London stock exchange and leads the world in small, high power capacitors.

This research interest in energy storage has expanded to cover both technology and systems, and Tony is keen to look at how storage can improve the way energy is produced, delivered and used.

Of the Delta Chair appointment, Tony states: "I think this is a terrific opportunity to bring to a focal point a lot of the diverse areas of energy research and education to do with sustainable energy. But it's a very broad and fuzzy topic - 'What is sustainable energy?'

I am very honoured to have been offered the position and to lead this new initiative. I will be looking at issues such as how you would integrate and introduce renewable energy generation into much larger scale systems; how you could change the way electricity is delivered and used in cities, including the use of energy storage, and how you can integrate transport into sustainable energy solutions as well.

With the tremendous scope of relevant skills within the University to build up expertise in these project areas, I think it's a great position, and the timing is right."
Inventor Extraordinaire: Dr Saul Griffith alumni

For almost as long as he can remember, Saul Griffith has wanted to invent things.

As an eight-year-old, he began filling notebooks with sketches for fanciful machines such as levitating trains and aeroplanes in the shape of manta rays. He also put his ideas into practice, building grappling hooks for climbing trees, giant puppets and rocket-powered toy cars.

Today, Saul is living out his childhood dreams as a professional inventor, engineer and entrepreneur. At the age of 33, he has already developed and commercialised a series of projects ranging from a kite that pulls boats to smart rope that can sense its load.

In recognition of the impact he has already made on the world through his inventions, and his potential for even greater achievements in the future, he has just been awarded a 2007 US$500,000 MacArthur Fellowship to use as he likes. It is a high-profile award commonly nicknamed the “genius grant”, although Saul prefers to avoid using the concept.

Saul’s road to success as an inventor began with a strong grounding in both science and engineering. After his undergraduate degree in materials science, he went on to a Master of Engineering at the University of Sydney, where he says he “had a great time” and honed his expertise in the fields of composite structures and the mechanical properties of materials.

He then enrolled in the doctoral program at the Massachusetts Institute of Technology Media Lab, an interdisciplinary environment where his research drew on insights from materials science as well as physics, chemistry and mathematics. It was during this time that his inventions first came to public attention in the United States: he developed a compact device for producing very low-cost prescription lenses - now commercialised under the name OptiOpia - which garnered him two prestigious awards for inventing.

Since leaving MIT, Saul has co-founded his own company, Squid Labs, a design collaboration which provides innovative solutions to complex problems. He now says that taking the chance to strike out on his own as an entrepreneur has turned out to be the right decision.

“The entrepreneurial path seemed to be a good way to move forward with a different set of constraints to working for large companies or within academia,” he says. “Think tanks seem to be exactly too much

Did you know?

We have initiated a section called “Reconnecting Sydney”. If you wish to contact a past classmate we can place a small ad with your request. If your request is reciprocated, the Editor of this newsletter will facilitate contact between the parties.

If you are interested in making contact with an old classmate, please contact the Editor on ariveros@usyd.edu.au submitting a brief biography of your post-university activities, and the details of what years you attended the Faculty.
Engineering Sydney™ Engineering Alumni of the Year Award winners 2008

There were four winners of these awards: Nancy-Bird Walton in recognition of her pioneering work in aviation & services to the nation; David Hind for a lifetime of achievement in engineering & in the field of skills and training. Finally, the under-35 winners were Simon Ratner and Ryan Junee, co-establishers of software company ‘Omnisio’ which was recently bought out by Google/Youtube for $15 million.

Saul also has a strong social conscience – he once spent six months living in southern Africa learning about poverty - which has informed projects that have special applications in developing countries, such as pull-string power cords for laptops or his affordable prescription technology.

Other areas where Saul has found inspiration include the structure of biological systems, the properties of membrane-based structures and the science of textiles, which was the field his father worked in.

Saul loves the process of designing and testing out prototypes for its own sake and says that his working life and his hobbies often blur into each other. Now, he will have an even greater opportunity to follow his imagination because his funding from the MacArthur Fellowship is unfettered, meaning he will be able to pursue ideas in a freeform way rather than tailoring solutions to set problems.

“There are lots of projects with no apparent commercial return, though I feel they should exist,” he says, giving the example of a CAD program for designing paper aeroplanes.

“I’ll now have resources to execute on things like that: projects with no apparent or immediate reason, just an inkling they would be fun, useful or good. Many of the interesting inventions in the world started out as someone’s hobby.”

(courtesy of the Alumni office)