Student News
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ENGINEERS AUSTRALIA

2006 – Year of the International Engineer

Neurofuzzy study for Rhodes scholar

Graduate from James Cook University (JCU) School of Engineering Elizabeth Murphy has been selected as an Australian Rhodes Scholar. Murphy is one of 11 graduates from throughout Australia to be selected for the Rhodes Scholarship program. The program provides for the student to study at Oxford University.

After completing a thesis that dealt with intelligent control - using methods such as fuzzy logic and neural network to control complex systems, Murphy said she will find a topic of interest in Oxford University's department of engineering science and will study toward a Doctor of Philosophy. The department has a research program in the application of neurofuzzy models to the control of robotics, passenger vehicles and in fault detection and isolation. She will fly to Britain to start her studies in October.

Murphy graduated from JCU with a joint degree in computer systems engineering and computer science. Excellent academic results combined with achievements in sport helped her selection.

Murphy received first class honours in engineering and was rated within the top honours bands for her final year thesis research. She received many awards during her degree including the School of Engineering Prize, the IEE Prize, the IEEE North Queensland Section Prize and the prestigious QNI Scholarship. Upon graduation Murphy received JCU's top award, the Graduate Association Medal.

Murphy's sporting achievements in heptathlon and high jump included being a member of the Australian team for the Oceania Athletics Championships in New Zealand in 2002. Representing JCU, Murphy won eight medals at the Australian University Games throughout her degree.

The Rhodes Scholarship program was set up in the Will of Cecil John Rhodes, who died in 1902. Rhodes was an ambitious colonialist who sought the expansion of British imperialism throughout the world. Selection was set out to be based on qualities of character and intellect. Rhodes' vision was to provide future leaders of the English-speaking world with an education which would broaden their views and develop their abilities.

Elizabeth Murphy ... "Meeting people from all over the world, the privilege of being able to study in such an inspiring environment, and being able to keep up my sport while studying for my DPhil excites me most about going to Oxford. I'm looking forward to training and competing at Iffley Road where Roger Bannister broke the four minute mile, and I've recently taken up rowing and hope to continue that at Oxford!"

Riding the resource boom

Western Australia is well into a resource boom. There were $13 billion of projects committed to or underway at the end of 2005. Read about some of the major WA projects in the April issue of Engineers Australia magazine.

Click here for a complete online copy of the magazine.

Student News

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Racing around the world

Australian universities are revving for international recognition as they prepare to compete in 2006 International Formula SAE events after success at the Australasian competition late last year.

The Australasian competition brought together 24 universities from the region. It was held last December at the Victoria University Driver Facility. The team from the University of Western Australia (UWA) raced through to collect first place, the University of Queensland (UQ) finishing second, with the University of Wollongong (UOW) just behind in third place.

UWA's winning FSL-005 car will be heading to Detroit Michigan in the US to compete in the Formula SAE competition in late May. The team came second in last year's Detroit competition. Since the Australasian event the team has been focusing on reducing weight where possible and spending more time on the test track.

UOW's team is preparing for take-off to California on the back of previous success in an international championship in 2003. The 2006 International Formula SAE at the California Speedway near Los Angeles will involve 70 other teams.

UOW team manager Nathan Simiana, a final year electrical engineering student, said there have been "some big improvements on the 2005 car," with modifications to the engine, suspension system and body work. UOW came third in Australasia falling behind in points allocated for acceleration, braking on the skid pad and endurance/fuel capacity.

The UQ team is focusing on the European Formula SAE competition in August. The European competition is to be held at the famous Hockenheim circuit in Germany, built by Mercedes-Benz in 1939. The Queensland engineering students won the acceleration event at the Australasian competition and their car will compete in Germany largely unmodified.

With the support of the biggest car manufacturers, the Society of Automotive Engineers conducts the competitions to encourage engineering students in a highly competitive environment.

High performance must be achieved in acceleration, braking, and handling. The car must be low in cost, easy to maintain and reliable. In addition, the marketability is judged by factors such as aesthetics, comfort and use of common parts.

Formula SAE team manager at UWA Aaron Yeak said the benefits of the competition include being exposed to real design problems, designing for manufacture, working with deadlines and budgets, working in diverse teams often under high-stress situations, and learning marketing and management skills. "We apply theory to practice and learn industry standards, computer packages, and methods we would otherwise not be exposed to until we reach industry. I've also made friends for life and played with fast cars," he said.

UWA's car (left) is to race in Detroit, where it came second in last year's competition. The UOW car (right) will compete in California against 70 other teams.

New institute for Southeast Queensland

A nonprofit organisation called the Queensland Development Research Institute (QDRI) has been set up to fund university research in civil engineering, architecture and urban design.

Students from Queensland University of Technology (QUT) and Griffith University Gold Coast will be involved in the research projects. QDRI will also sponsor four research scholarships for QUT and Griffith Masters students.

QDRI received a start-up $680,000 grant from Japan's Ogasawara Foundation for the Promotion of Science and Engineering, founded by Nifsan chairman Toshiaki Ogasawara. QDRI director Darren McLean said these funds will assist in gathering scientific information on the future growth and development of the Gold Coast and Southeast Queensland.

The Emerald Lakes development on the Gold Coast, currently under construction by Nifsan, will be used for case studies exploring the scientific relationships between development and the environment. The development includes 1600 homes on low-lying floodplain areas, incorporating provision of environmentally sustainable designs in subtropical regions, community facilities, waterways and parklands.

QUT Faculty of Built Environment and Engineering's assistant dean of external relations, Leigh Shutter, said the initiative fits well with the university's current focus for promoting integrated research and teaching activities that focus on problems confronting the local region.

In addition to the undergraduate subjects, Masters research topics funded by QDRI will allow for further study into subjects including the improvement of water quality in ephemeral wetlands and soil characteristics of the flood-plains.

Good prospects for graduates

Justin Liew

Engineering graduates can expect to find employment easier and be renumerated better than most other graduates, according to Engineers Australia's study titled The Engineering Profession: A Statistical Overview published last month. The study provides a statistical glimpse into the engineering profession in areas of employment, salaries, skills distribution, workforce demographics and education.

Starting salaries for graduates under 25 years and in their first fulltime job rose by 25% between 1999 and 2005, slightly less than the 29% increase for all graduates. Engineers maintained their ranking of fourth best paid graduates, with only dentistry, medicine and optometry graduates earning more. This was generally the case across both private and public sectors.

Engineering graduates earned a median starting salary of $44,000 in 2005. This measured favourably against the $40,000 average for all graduates. With many years of experience, an engineer who has achieved executive, group manager or associate director status was found to average a package worth $185,300.

The proportion of engineering graduates in fulltime work was 87.7%, while the proportion of all graduates in fulltime work was 80.9%. This suggests that there are more jobs available for engineering graduates than for graduates in other disciplines. The study interpreted this as a relative skills shortage.

The most acute skills shortages in terms of graduate availability were in mining, civil, chemical and structural engineering.

Female engineering graduates claimed more equal starting salaries compared to other graduates. They also had starting salaries higher than some of their male counterparts in some of the years studied.

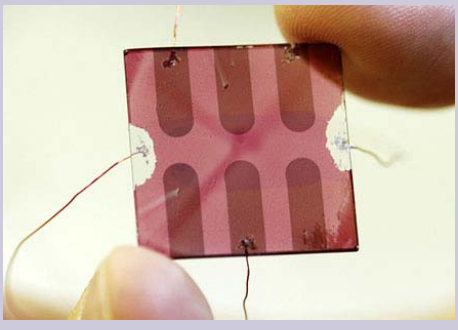
Relatively few women practise engineering, comprising 10% of the engineering workforce. Women were also found to work more often in engineering-related fields rather than practising engineering. These are areas where engineering qualifications are necessary but where responsibilities are not solely related to those qualifications and skills. They might include management, marketing or communications.

Overall, Australia had 316 first degree graduates in engineering per million population. When compared internationally, Australia had more engineering graduates per million population than the USA, Germany, Sweden and India, but fewer than Japan, Singapore and the UK.

Research into personal solar power

An alternative photovoltaic material to silicon is currently under research at Queensland University of Technology (QUT). Professor Nunzio Motta of QUT's School of Engineering Systems and Dr Eric Waclawik from the School of Physical and Chemical Sciences are developing the new material using nanotechnology.

The team is attempting to create thin film composites from the conductive polymer poly (3-hexyl thiopene) by including carbon nanotubes. When light strikes the material, electrons are knocked free to create electron-hole pairs. If the electron can be intercepted before reuniting with its hole, by entering a nanotube and passing through to an electrode, a circuit is created.



Conductive polymer and nanotube solar cells may one day power laptops and mobile phones.

Honours student Anthony Musumeci is synthesising carbon nanotubes and PhD student Roland Goh is using scanning tunnelling microscopy to see how the molecular structure of the composite is affecting photoconductivity.

Two vacant studentships are currently available to further test and modify nanotube strands by doping them with ion-beam implantation and by finding ways to orient them within the polymer composite using electron fields. The aim of the project is to develop cheap, portable, personal solar cells that will be able to recharge laptops and mobile phones.

Scholarships for mining students

Two students have been presented with the Rio Tinto/Sir Frank Espie Premium Scholarship this year, an award that recognises the most outstanding students to receive an Education Endowment Fund (EEF) Minerals Industry Scholarship.

The Australasian Institute of Mining and Metallurgy (AusIMM) presented Richard Gelson and Jennifer Meikle with the scholarship worth $12,000 per annum for two years. Gelson is in third year at the University of New South Wales and is studying mining engineering. Meikle, also in third year, is studying engineering (minerals process)/commerce at the University of Queensland.

The scholarships are designed to encourage the recipients into careers as leaders in the minerals industry, while also inspiring other young engineers to take up careers in the mining industry. The premium scholarship is awarded to the best applicants of 21 other EEF scholarships.

The premium scholarships by Rio Tinto and the Espie family are in memory of Sir Frank Espie who made contributions of leadership, dedication, and technical management to the mining industries of Australia and Papua New Guinea. A leading member of AusIMM for over 65 years, he was involved in many large CRA projects in the 1960s and 1970s. CRA and RTZ unified into a dual company structure of Rio Tinto in 1995.

Students in mining engineering will be encouraged by a recent survey of minerals sector professionals undertaken by Macquarie Securities and AusIMM. The survey found 73% of the professionals believe the skills shortage had left their company short staffed, and only 16% believe the shortage would even out in the next three years.

by Nick Harley
Vice-chair, National Committee, Young Engineers Australia

Benefits of double degrees with engineering

There appears to have been a growing trend among engineering students to study a second degree in conjunction with their engineering degree, with up to 50% of students in some faculties taking this option. This is an excellent trend and should be encouraged by universities and policy bodies as it is good for the engineering and Australian communities.

The benefits from studying another degree aren't limited to the immediate knowledge gained from attending lectures and completing subjects. The real value of a degree is the thought process and view of the world that another degree brings. Naturally, engineers perceive the world around us differently from economists, scientists, mathematicians and those studying the fine arts. This different view brings an alternative perspective to problem solving situations. A problem may then be tackled with not only a technical and design approach, but also with a behavioural, economic or scientific frame of mind.

Whether a student wishes to become a technical engineer, an engineering manager or work outside the engineering realm, double degrees offer additional training that will help him or her achieve success in their chosen career path. A person who is interested in purely the technical side of engineering might choose a science or maths double degree, whereas someone more interested in managing and business may choose economics or finance. An arts double degree, offers the student an opportunity to "think outside the box", or pursue an interest in politics which might lead him or her into a policy making or community leadership position.

The extra training typically only adds one more year to an engineering course (about five years) and when comparing this to law (five to six years), medicine (six years) and dentistry (five years), it is not a particularly long time to study. The additional view of the world that a student gains from a second degree will lead to graduates with greater balance.

> "Greater balance and knowledge will help lead to engineers in positions of greater influence."

Greater balance and knowledge in engineering graduates will help not only change the public's perception of engineers, but also lead to engineers being in positions of greater influence. This will in turn lead to more senior year secondary students choosing engineering as a career, which will also address issues such as the shortage of engineers and lack of engineers in positions of power and policy making. The skills gained from a second degree are indeed invaluable, not only to the student's career but to the engineering community and society in Australia as a whole.

Industry experience

Vacation handbooks which contain a list of organisations offering vacation and graduate employment opportunities to engineering students and graduates are available to download from the EA website. Students of WA, Victoria and Queensland can upload their updated versions from the Members Zone. Once in the Members Zone go to engineer.career and click on students.

Engineers Australia online

Engineers Australia's monthly news magazine is online, freely available to student members.

Click on the cover to access the online version.

Subscriptions

Student members can subscribe to the printed version of *Engineers Australia* magazine at the special student rate of $35.20 for 12 issues. Click here to subscribe online, or contact Pam Chenery at Engineers Media on 02 9438 1533. You will need to provide your Engineers Australia Membership number and credit card details.

Jennifer O'Donovan
National Manager Careers
Engineers Australia

Jennifer O'Donovan can be contacted toll free on 1300 366 613, email careers@engineersaustralia.org.au

Making the most of careers fairs

Over the next couple of months there will be many careers fairs for students to attend. These will be run by universities, professional bodies, event management companies and even some companies that run their own.

The fairs are designed to give students direct access to the relevant people within companies that are interested in graduate recruitment. Company representatives are often people who have been through the graduate recruitment process in the previous few years.

Students need to prepare before attending these careers fairs. Here are some tips on how to get the most from the experience:

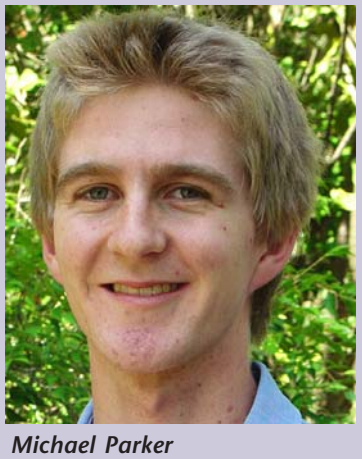
- Present yourself in a professional manner – in terms of dress, speech and, if leaving contact details, write legibly.
- Come early – many recruiters agree that as the time goes on at careers fairs the quality of candidates drops off.
- Have a résumé prepared and have copies to give out.
- Think about what you can tell the employer. Have some points ready and be prepared to pitch yourself. Keep it succinct, relevant and in their industry terminology.
- Don't hang around in groups – is there really a need to bring your boyfriend or girlfriend along?
- If there is a map with listings and details of the companies represented, choose the ones you want to approach and go armed with some industry knowledge. Do some research on the internet or via your networks before you go.
- Don't ask for the "freebies". If offered an item, feel free to accept and thank the person. You are not there on a shopping spree – this is to potentially find an employer.
- Have some questions prepared such as what are the basic details of the graduate roles offered, the role of the person to whom you are speaking, do they offer a graduate program etc.
- Find out if the organisation offers vacation work as well as graduate placements. Often one can lead to the other.
- Find out the best way to apply. Ask for the details on paper or on a business card. This will make your follow-up easier.
- In the days following the fair, find out more about the companies you were interested in and send off applications. Mention where you found out about the company and with whom you spoke.

Most important of all is to be happy, personable and confident. Good luck.

References: www.careers.usyd.edu.au and www.uow.edu.au.

Linking with industry

The University of Newcastle Industry Scholarships Scheme (UNISS) has created a link between local industry and University of Newcastle students. UNISS allows students to work full-time during their course. Industry experience is providing students with financial support throughout their degree and insight into their chosen career.



Michael Parker

The UNISS program currently includes 101 students and 49 industry sponsors.

"Students are placed with their sponsor for 78 weeks over a five-year period, including a 10-week placement in each of their first three years and a 12-month placement in year four," Bob Nelson, executive director of UNISS, explained.

UNISS scholar Michael Parker from the University of Newcastle has gained valuable work experience as an undergraduate chemical engineer. The 20 year old recently completed his second 10-week placement with Eraring Energy.

"It has been a great experience to observe and apply the theory I have learnt through the year at Eraring Energy," Parker said. "My most recent placement involved tracking down excess water usage in the fire services system and checking the accuracy of the monthly accounting system for water usage."

ENGINEERS AUSTRALIA CAMPUS COORDINATORS

The campus coordinators are representatives of Engineers Australia on university and TAFE campuses around the country. Contact them for information about Engineers Australia and its activities on your campus.

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Division News

Electronic copies of Engineers Australia's Division newsletters are posted on each Division's website. These newsletters keep members informed of the issues pertaining to their Division, and to notify members of upcoming events.

Access your Division newsletter by clicking on the links below:

Canberra | Queensland | Tasmania

Newcastle | South Australia | Victoria

Northern | Sydney | Western Australia

YEA Activities

CANBERRA
Contact Nathan Munro on 02 6285 1822, *email nmunro@northrop.com.au, web can.youngengineers.com.au.*

ILLAWARRA REGIONAL GROUP
Contact Elaine Bailey on 02 4221 4086, *email ebailey@engineersaustralia.org.au.*

NEWCASTLE
Meetings: Young Engineers Newcastle meet on the first Monday of every month at 122 Parry St, Newcastle West, Engineers Australia Newcastle Division office at 6pm. All welcome.
Contact Sam Wong on 02 4964 5597, email samuel.wong@defence.gov.au.

NORTHERN
Meetings: YEA Northern Division committee meetings are held on the first Wednesday of each month at the Northern Division Offices of Engineers Australia, 14 Shepherd Street Darwin at 5.15pm
Contact Louise McCormick at louise.mccormick@nt.gov.au.

QUEENSLAND
Meetings: YEA Queensland holds its meetings on the first Monday of the month at Engineering House, 447 Upper Edward Street, Brisbane.
Contact Laura Winkle on qld.rep@yea.au.com, web qld.engineersaustralia.org.au/jetspeed/?zone=groups.

SOUTH AUSTRALIA
Meetings: YEA-SA meetings are held on the first Monday of every month at Engineering House, 11 Bagot St, North Adelaide.
Contact Nick Harley on Nicholas.Harley@student.adelaide.edu.au, web sa.youngengineers.com.au.

SYDNEY
Meetings: YEA Sydney committee meetings are held on the second Monday of each month at the Sydney Division office, 118 Alfred Street, Milsons Point, starting at 5.30pm.
Contact Anny Joseph on Anntonette.Joseph@commerce.nsw.gov.au, web syd.youngengineers.com.au.

TASMANIA
Contact Nicholas Dwyer on dwyern@hobartcity.com.au.

VICTORIA
Meetings: YEA-Victoria committee meetings are held on the second Tuesday of each month at the Victoria Division Office in the Boardroom, Level 2, 21 Bedford Street, North Melbourne, commencing at 6pm. *Contact vic@youngengineers.com.au, web vic.youngengineers.com.au.*

WESTERN AUSTRALIA
Meetings: YEWA hold their meetings on alternate Tuesdays and Wednesdays once a month at the Engineers Australia Office, 712 Murray St, West Perth.
Contact Karyne Wong on , web wa.youngengineers.com.au.

WESTERN SYDNEY REGIONAL GROUP
Meetings: YEA Western Sydney committee meetings are held every second Thursday in the month in Level 3 Conference Room, Engineering Building X, UWS Penrith campus, starting at 6.30pm.
Contact Pamela Noal on 02 4736 0144, fax 02 4736 0145, email p.noal@uws.edu.au.

Visit www.youngengineers.com.au to keep updated on the latest news and events for Young Engineers Australia. Also check out the extensive list of links to recruiting firms and other engineering organisations from around the world.