From the new Dean...

New Dean from 14 January 2002, Professor Brendon Parker gives his initial impressions of the Faculty and some thoughts on the way ahead.

This Faculty is big — in student numbers, in research, in reputation and in the physical space it occupies on campus and in the resources it commands.

It’s also clear that the Faculty is in good shape. It was reported on very favourably by the IE(Aust) accreditation panel in 2001. The present state of the Faculty is a tribute to the work of Professor Mark Wainwright during his 10 years as Dean and to Associate Professor Tim Hesketh who was Acting Dean when Mark became Deputy Vice-Chancellor and the search began for a new Dean.

The Faculty also has great staff who are committed to the very real challenge of maintaining excellence at a time when government support for universities does not match that in other countries.

Change is the only constant in universities these days, but we must be careful not to introduce change for the sake of being seen to do it. The need for change is driven by external forces as well as the wish to create a better future. Our new Federal Minister is talking about "two universities of world class", how do we ensure we are one of them?

The Faculty’s present undergraduate curricula are firmly focused on the analytic side of engineering — something we do well. To produce well-rounded graduates capable of taking on the diversity of careers that engineering offers we need more emphasis on the creative side of engineering, with a broad approach to design beginning early in the programs.

We attract a significant proportion of elite students and we could do more to challenge and excite them to achieve greater things, especially in some of our major research activities, perhaps even ‘apprenticing’ some of these students to our leading researchers early in their university careers.

Students need an international perspective and we encourage as many as possible to complete part of their degree at an overseas university, preferably in a country where English is not the first language. We also wish to strengthen research ties with overseas universities so that our research students and staff can spend time in other laboratories with similar interests.

Future economic growth will be founded on small businesses exploiting intellectual capital, and we need to give our researchers the skills to form and manage such businesses, in addition to the excellent training in research we presently provide.

Our Faculty has outstanding success in gaining grants from the ARC and other competitive programs and we have a strong collaboration with many major industrial companies, but our dialogue with smaller companies is less strong and I hope to strengthen these relationships.

Our staff is under pressure and some workloads are unsustainable. We need to carefully examine the deployment of our resources in order to reduce some of this pressure. This may include fewer courses (subjects) on offer and more effective use of new ways of teaching and learning. Our senior staff can also find themselves in leadership roles without adequate preparation and we are looking at improved staff development programs and better planning for leadership succession.
I am privileged to have been selected to lead the best Engineering Faculty in the country. I am aware of the responsibility to sustain and enhance its reputation and will work with the leadership team to achieve that goal. I would be very pleased to hear from alumni or staff on their views for making the Faculty even greater.

Professor Brendon Parker, Dean of Engineering

Professor Brendon Parker, the new Dean of the Faculty of Engineering, hails from Shrewsbury in the United Kingdom, and with a cadetship from the steel industry, he graduated from Imperial College with First Class Honours in Metallurgical Engineering in 1965.

The same year, Brendon was sent to Australia on an industry visit and three years later, he returned to take up a lectureship in Adelaide. In 1969, he moved to Monash University where he remained for 27 years, during which time he became a founding member of the highly successful materials engineering department, Associate Professor and Deputy Head, and developed his reputation as a teacher. Brendon’s research has mainly been in the deformation processing of metals and alloys, including work with Comalco and BHP.

Brendon was appointed Professor and Head of the Gippsland School of Engineering in 1993, where he came to appreciate the effectiveness of distance education delivery techniques. Due to his work there, he was encouraged to apply for the Deanship at the University of Wollongong where he spent six years. He restructured the Faculty of Engineering, ensuring significant change in the curriculum and the development of some very successful industry research groups.

So what does Brendon have in mind for Engineering at UNSW? “I believe in engineering programs that stimulate creativity and innovation and convey the excitement that the profession can offer,” said Brendon. “We want to produce research students who not only achieve excellence in their chosen topic, but are equipped to start new companies or revive older ones, and we want staff to feel appreciated for their contributions. We also want the Faculty of Engineering at UNSW to have a reputation which sustains the value of the degrees and awards held by our alumni.”

Cochlear wins Faculty award at IE(Aust) Engineering Excellence Awards

In 2001, the Faculty of Engineering sponsored the R&D, Training & Processes Award at the IE(Aust)’s Engineering Excellence Awards. The awards showcase engineering excellence and expertise within the Sydney region.

Finalists for the Faculty’s award included Hicom International for the production of novel industrial mineral powders; Hedweld Engineering, for a self-propelled mobile vehicle for the mining industry; Arnold Dix and Roads and Traffic Authority, for their facilitation of the debate on the M5 East tunnel; Transgrid, for its Fibre Optic Current Transducer; and Bovis Lend Lease for its ProjectWeb project management system. Cochlear Limited, the worldwide leader in the manufacture and sale of cochlear implant systems through its Nucleus® product range, won the Faculty’s award for its Contour™ implant.

Cochlear Limited was founded in Australia in 1981. Its Nucleus® Contour™ Cochlear Implant is an electronic device that enables useful hearing and improved communication ability for adults and children who have a severe to profound hearing loss. Cochlear partners more clinical and technical specialists globally than any other cochlear implant company, with more than 600 implant centres in more than 60 countries worldwide.

President of the IE(Aust) Sydney Division, Andrew Leventhal, said the Engineering Excellence Awards demonstrated not only engineering design and innovation, but also business and management skills. “They demonstrate the enormous breadth and strength of engineering skills in the Sydney division, and within Australia,” he said. “The entries represent innovative design solution, originality and ingenuity. They provide a benchmark for future comparison.”
The University’s first graduates

On 20 May 2002, the University will celebrate the 50th anniversary of its first graduation ceremony held in the Great Hall at the University of Sydney in 1952, by holding a re-enactment in Leighton Hall at The Scientia, to be attended by the Chancellor, Dr John Yu, AO; the Vice-Chancellor Professor John Niland, AC; the Registrar, Crystal Condous; the Dean of the Faculty of Engineering, Professor Brendan Parker; the Dean of the Faculty of Science, Professor Dennis Lincoln; the New South Wales Minister for Education and Training, the Hon John Watkins MP; and Her Excellency the New South Wales Governor, Marie Bashir, and past Deans and Heads of Schools.

At that first graduation there were 32 engineering graduates from the University’s four founding Schools — Civil, Electrical, Mechanical and Mining Engineering — who attended classes in rooms at the Sydney Technical College in Ultimo. We profile four of those first engineering graduates and see where 50 years has taken them.

NORMAN EMSLIE
Brisbane-born Norman Emslie (BE(Elec)(Hons) ’52) came to Sydney in 1947 and heard about the new Institute of Technology being formed at Ultimo. “Power station engineering was what I was really interested in,” said Norm. “At that time, there were a lot of power blackouts because during the war the demand for electricity had outstripped the capacity of the various power generation companies.”

Armed with a cadetship from the Electric Light and Power Supply Corporation, Norm spent the next four years studying intensively for six months, followed by six months training in industry. Though Norm is now proud to have been the University’s 13th graduate, his first impressions of the Ultimo facilities weren’t promising. “My memory is of dark, musty, smelly buildings jammed close together, not much light and dusty wooden floor boards. We had lunch in a lecture room and we were given an urn and a teapot to make our own tea. There were no grassy spaces or anything like that.”

There was also not much of a social life at the fledgling university, but young Norm and his mining engineering friend, John Baker, would head off to the Petersham Town Hall to try their luck with the girls at the Saturday night dance.

Norm especially appreciated the General Education aspect of his studies. “An American psychologist spoke to us generally on industrial relations and the handling of men. He gave me a phrase that stuck with me all my life. “People don’t act according to logical behaviour, Mr Emslie, they act the way they feel, according to their hopes, fears and ambitions”.

On graduating in 1952, Norm worked as an engineer at the Balmain Power Station for six months before, as part of a graduate overseas experience program, he travelled to the UK to work with boiler makers Babcock and Wilcox; on the construction of turbo generators in power stations with English Electrics; and with the British Electrical Authority on the operation of power stations. He then travelled to the USA to work with Westinghouse.

By the time Norm returned to Sydney in 1955, the Electricity Commission had been formed, subsuming all other power generation companies, and he was sent to work at Lithgow where he met his wife, Noella. From there, he worked at the Wangi Power Station, before transferring to the Tallawarra Power Station south of Wollongong where he eventually became the power station superintendent and later manager.

After retiring in 1987, Norm travelled and continued his involvement with the Dapto Rotary Club where he is past President and a member for 32 years. He is also past President of Keira Probus and is now in his 10th year as program Chair.

JOHN BAKER
In 1947, John Baker’s (BE(Mining)’52) high school teacher in Albury told him about a new university starting in Sydney and the range of engineering scholarships on offer — especially in the mining industry. With his Joint Coal Board scholarship in hand, John took up mining engineering at the new University and for the next four years alternated between his studies at Ultimo and field work.

“All the mines were underground in those days, but the Kurri Kurri mine was way behind the times with its horses and equipment. The other two mines at Wallerawang, outside Lithgow, and at Mount Nebo, south of Wollongong, were far
more modern. I spent time with the mechanical engineers, electrical engineers, surveyors and safety officers to develop an idea of a mine manager's responsibilities."

After graduating, John worked at the Brington Colliery, near Cessnock, and at an associated mine at Helensburg on New South Wales' south coast. After five years, John decided that he really didn't want to spend the rest of his working life underground. The engineering company, GKN Lysaght, was working at the mine at the time, experimenting with rock bolts which they sold to the industry and John expressed an interest in the work.

At GKN Lysaght, where John was to spend the next 15 years, he worked mainly in marketing and initially on the development of new products, including rock bolts, frame scaffolding and other building supplies. He later became President of the Building Suppliers Association (Australia), and was invited to sit on the Metric Conversion Board in relation to building industry products. He was responsible for establishing GKN depots throughout New South Wales, including the Snowy Mountains development, and at the Gove Peninsula in the Northern Territory. In 1960, John married his wife Jacqueline.

"Engineering's a wonderful background to have. If you want to branch out into something else, particularly in marketing, you're very well accepted. When people see the 'BE' on your card, they think, 'Now here's a guy who knows what it's about and won't just be a salesman'.

In 1971, John joined Boral as Divisional Manager. Then, in 1979, in search of a lifestyle change, he bought into a youth hostel. "I wanted to be independent, to get away from a nine-to-five job and to see what else was out in the world. These days I own and supervise boarding houses for people with mental disabilities.

Changes to government policy have seen people with mental disabilities being moved into the community and there's a desperate need for caring accommodation. "I've been semi-retired for the last 20 years and now I like to play golf and enjoy life."

RAYMOND ROGERSON

In 1944, at the age of 15, Raymond Rogerson (BE(Mech) (Hons)'52, MBA '71) attended the Pre-Apprenticeship School at the Sydney Technical College. From there he began a much sought after apprenticeship with ACI Engineering as a fitter and turner while attending night courses to complete his trade certificates and begin a Mechanical Engineering diploma course.

In 1948, ACI and other industry leaders were asked to sponsor their best and brightest apprentices for enrolment at the new University of Technology. One of ACI's two chosen apprentices, Ray studied mechanical engineering, graduating in 1952, the year he also married his wife, Helen.

"I'd walked through the grounds of the University of Sydney and of course there was no way you could compare institutions," said Ray. "One had open spaces and green grass, and the Sydney Technical College had concrete and tall buildings. It was just so different, and yet at the end of your course you would have a recognised degree. There was an excellent sense of camaraderie between the very small numbers of students and lecturers alike because everybody was working enthusiastically for the success of the new University."

After graduating, Ray served as the Graduate Representative on the University's fledgling Council.

For 27 years Ray worked with many ACI companies, progressing from Technical Manager to Manager, and travelling around the world to investigate new equipment and production processes.

In the mid 1960s, along with other senior ACI managers, Ray was selected to train and implement a new year-long inhouse management training program for the 400 ACI managers. This stimulated him to return to UNSW to undertake an MBA at the AGSM, graduating in 1971.

Ray resigned from ACI in 1972, becoming Commercial Manager and then Managing Director of the heavy engineering company, Bliss Welded Products. From 1980 until 1993 when he retired, Ray worked in his own engineering
management consultancy, taking on projects for several major clients. He also developed his long-standing family interest in competition sailing and worked on the redesigning and building of several racing yachts.

Ray now works as a voluntary teacher with U3A and Computer Rels for Seniors, teaching basic and advanced graphics and developing manuals for these courses.

IAN SOMERVAILLE

In 1945, Ian Somervaille (BE(Mech) ’52, PhD ’74) was keen to study physics at university, but his family’s financial position didn’t allow this luxury and, living in Newcastle, he took on a five-year BHP traineeship in mechanical engineering. He then opted to study at the new University of Technology where his diploma could be converted to a bachelor degree.

While he studied, Ian also worked at CSIRO as a technical officer, but after he graduated a similar position became available at the new University in the School of Civil Engineering. "There was a certain amount of overlap between mechanical and civil engineering, especially in the materials area," said Ian.

After a short while, it was suggested that Ian become a lecturer in materials. "By the end of the year I didn’t ever want to go back to being technical officer. I loved teaching and knew I’d found my niche. It was a great time. The staff were mainly young and enthusiastic and the place buzzed, it was so full-of-life."

In 1966, Professor Al Willis, then Dean of the Faculty, also took over the management of the School of Civil Engineering, with Ian as his executive assistant. Ian reduced his teaching load over this time, and also made the switch from materials to structural analysis using engineering computations. He also began his doctoral thesis on finite elements —the highlight of his research work.

In the late 1950s, though not in favour of compulsory union membership, Ian decided to join the Staff Association. "It seemed interesting because it involved interacting with people from different parts of the University," said Ian.

Ian served as Secretary of the Staff Association and as President in 1977 and on many later occasions, working with three UNSW Vice-Chancellors —Sr Rupert Myers, Michael Birt and John Niland.

Ian retired in 1997, though he maintained his position as President of the Staff Association for another couple of years. He has since taken up croquet and while steadily improving his game, is currently serving as President of the Coogee Croquet Club.

"When I first came to Sydney, I had only been inside one university —Melbourne," said Ian. "Going to university was so remote for me as an idea that I hardly even thought about it. Becoming part of a university, in the sense of being a graduate was one thing, but becoming part of the staff was quite remarkable. I grew to be very attached to the idea of being part of the University. I was certainly there at a wonderful time."

On 20 May 1952, the University awarded Bachelor degrees to:

School of Civil Engineering
Honours
Maxwell White (Class I and University Medal)
John Forrester (Class II)
Lance Spooner (Class II)
John Walker (Class II)
Rass
Raul Rekete
John Murray
William Ruge
Kevin Quinnian

School of Electrical Engineering
Honours
Edward Hopkins (Class I)
Robert Mondel (Class I)
Norman Emson (Class II)
Ronald Keith (Class II)
Rass
Richard Clarke
James Jacobs
Riter Meulman
James Strong
William Wheeler

School of Mechanical Engineering
Honours
Alexander Carmichael (Class II)
Geoffrey McNeil (Class II)
Raymond Rogerson (Class II)
Ian Somervaille (Class II)
Rass
Allan Cox
Oyde Davey
Kenneth O’Brien
Alexander Rolley
Geoffrey Ward

School of Mining Engineering
Honours
Francis Gardner (Class II)
Mitchell Muir (Class II)
Rass
John Baker
John Duncan
Kenneth Findlay
Leonard Wright

At the same graduation ceremony, the University awarded three honorary doctorates to Viscount Nuffield, Lieutenant-Colonel Sir Charles Blackburn and Professor Marc Orphant.

School of Applied Chemistry
Honours
John Robert Anderson (Class I)
John Ragnar Anderson (Class I)
Stanley Livingstone (Class I)
William Pickering (Class I)
Blice Swinbourne (Class I)
Ronald Warner (Class I)
Gordon Aylward (Class I)
John Quinton (Class II)
John Garnett (Class II)
June Griffith (Class II)
Glive Harris (Class II)
Prosper Lark (Class II)
Geviahe Sutton (Class II)
Rass
Wallace Stephen

School of Chemical Engineering
Honours
Robert Cairns (Class I and University Medal)
Ronald Warner (Class I and University Medal)
Andrew Bellingham (Class II)
Keith Bowing (Class II)
William Briggs (Class II)
James Macmillan (Class II)
John Pillington (Class II)
James Smith (Class II)
Rass
Keith Johnson

UNSW ENGINEERS | Issue 6, May 2002
Biomedical ENGINEERING
Blood flow and micro biomechanics by Laura Poole-Warren and Chris Bertram

The cardiovascular system brings blood within diffusional range of every cell in the body, in order to supply metabolic needs and remove wastes. This exchange with cells occurs across the monolayer of endothelial cells (ECs) which form the wall of the microscopic, but extremely numerous capillary blood vessels.

Lacki ng smooth muscle, ECs were originally thought to provide only a lining to all blood vessels that prevented blood clotting. In the 1980s, they were recognised to have a vital role both in mediating responses of muscular blood vessels to circulating hormones and in regulating the blood concentration of some of these agents. Recent research by Professor Geert Schmid-Schönbein at the University of California, San Diego (UCSD), suggests that capillary ECs may also play a vital role in distribution of blood flow.

In a new collaborative project between the School’s Associate Professor Chris Bertram and Professor Geert Schmid-Schönbein, measurements in animals pointed towards a blood flow regulatory function for the capillary ECs. While vessels upstream are the main controllers of blood flow, the ECs in capillaries are ideally positioned to confer fine control of flow at the tissue level, ensuring even perfusion.

Back at UNSW, Chris Bertram has teamed up with Dr Laura Poole-Warren to investigate how isolated ECs in dynamic culture alter their ‘height’ in response to flow changes. Such remodelling of their structure could equalise flow between capillaries. Despite much literature on responses of ECs to fluid shear in general, these shape changes remain largely uninvestigated.

The project will commence with Charles Williams, a Year 5 BEChem/MBiomedE concurrent-degree student, culturing endothelial cells in parallel-plate fluid flow chambers, and will use mechanical and optical techniques to measure cell height and other geometrical parameters.

This work could end up defining the direct and immediate effects on physiological function of EC remodelling. Aspects of remodelling have been documented previously, but without a role being found for them, except as possibly necessary steps in the endothelial sensing of fluid shear and consequent chemical releases.

For further information, please contact Associate Professor Chris Bertram on +61 2 9385 3928 or email cbertram@unsw.edu.au

Chemical ENGINEERING AND Industrial Chemistry
Water demand and reverse osmosis desalination by Roya Sheikholeslami

Meeting the water demand for the world’s growing population is a daunting task. Water scarcity threatens an increasing number of countries, especially in southern Europe, the Middle East, North Africa, South East Asia, Australia and many parts of the USA.

Potable water and industrial process water can be produced through desalination of seawater, brackish water, and saline wastewater using RO technology. These waters contain high quantities of dissolved solids, and seawater also contains high amounts of biological matter which needs to be removed. Dissolved inorganics precipitate and along with biological material accumulate at the surface and foul RO membranes, causing their performance
Civil AND Environmental ENGINEERING

Long distance water research by Ian Turner

A team of coastal engineers led by Dr Ian Turner at the School’s Water Research Laboratory (WRL) are using a network of four video cameras — installed on the roof of a 33-storey apartment building — and the Internet to study beach erosion 650 km away in Queensland.

The cameras capture 2400 digital pictures of the northern Gold Coast every daylight hour. These images are automatically pre-processed at the site by a Silicon Graphics workstation, then transferred via the Internet to WRL where sophisticated digital mapping and digital image processing techniques are used to extract a wide range of quantitative information. In this way, WRL researchers regularly map the shoreline to measure beach width and complete a ‘virtual’ 3-D beach survey that enables the eroded or accumulated sand volume to be quantified.

“The key to coastal imaging is the ability to measure an object’s precise location in three-dimensions from a time-series of two-dimensional digital images,” said Ian Turner. “We do this by digital rectification and merging of images, using surveyed ground control points (GCPs), as well as real-time information of the prevailing wave and tide conditions.”

The database of images is freely available, with the website receiving more than 60,000 ‘hits’ in two years, and resulting in collaborations with researchers in the USA, UK and Netherlands, as well as supporting UNSW graduate student research.

Research is underway to develop the coastal imaging system so that nearshore processes including wave height and direction and the strength of rip currents can be measured, offering benefits to coastal engineers and managers, as well coastal researchers.

The Gold Coast City Council is providing three years of funding to maintain the cameras there, and a recent three and a half year research agreement between UNSW and the New South Wales and Queensland State Governments will fund a further 16 cameras straddling the New South Wales-Queensland border. Images from these new cameras will support WRL graduate student research, as well as being used by the two State governments to assess the condition of border beaches.

For further information, please contact Dr Ian Turner on +61 2 9949 4488 (x229), email ian.turner@unsw.edu.au or visit www.wrl.unsw.edu.au/coastalimaging/

A key concept in coastal imaging is the ability to merge and rectify images so that the real-world (Australia Map Grid) coordinates of an object or objects can be measured.
Computer Science AND ENGINEERING
RASCL Lab, architecture group by Hossam El-Gindy

The School’s RASCL Laboratory focuses on the research and teaching of fundamental methodologies for the development and use of novel computing technologies. RASCL, an acronym for Reconfigurable Algorithms, Systems, Compilers and Languages, was chosen to encapsulate the research interests in reconfigurable computing of Associate Professor Hossam El-Gindy and Dr Oliver Diessel.

"Our research concentrates on the design, management and use of reconfigurable and FPGA-based systems," said Hossam. "We also train our students how to use such devices to develop cost-effective solutions, thereby answering some of the industry’s need for hardware designers. Building up special hardware or circuits is an expensive process. It takes training time and then time to build, debug, fabricate and validate the hardware design. The use of reconfigurable devices speeds up this prototyping process. To some extent the design resembles a program written in a special language. That design can then be loaded onto the chip to see if it works—if not, we can rapidly modify it and test it again."

The RASCL Lab acquired sufficient resources to support a sizable group of fourth year Computer Engineering students at the beginning of 2001.

"During the last year, we established expertise in developing solutions on FPGA-based systems, developed active research links with research groups in Australian and international universities and guided our students to produce research findings that have been recognised in national and international conferences. Three student papers have already been accepted for presentation in international conferences, and two more are being considered. Three of those students have progressed to postgraduate research in the lab. These are great achievements in such a short period," said Hossam.

For further information, please contact Associate Professor Hosseam El-Gindy on +61 2 9385 4034 or email hossam@cse.unsw.edu.au

Electrical ENGINEERING AND Telecommunications

New photonic engineering degree by Iain Skinner

After more than 20 years research into optical fibre and waveguide technologies and almost as long teaching subjects on photonics, the School has recognised the emergence of photonics as a discipline in its own right by the establishment of a new undergraduate degree program leading to Bachelor of Engineering in Photonic Engineering.

From 2002, the new program, offered in conjunction with the School of Physics, will provide students with a balanced syllabus, combining the education of a professional engineer with study of the fundamental properties of photonic devices, the requirements and integration of photonic systems, and a wide range of applications, including, of course, telecommunications.

Photronics is about generating, manipulating (processing) and detecting light (photons), and specifically light that is carrying useful information, whether voice telephony, images, data-files, or measurement signals, or performing some other useful purpose, such as remote illumination. Photonic engineers unlock the enormous bandwidth that is in an optical fibre;
they deliver the huge storage capacity of a CD-rom; their expertise provides the images making keyhole-surgery possible; they implement the all-optical control networks which enhance safety in industrial environments wherein electrical signals are fire hazards.

"In this 21st century, photonics will become as important, fundamental, and generic as electronics was in the 20th," said Dr Iain Skinner. "This will occur because photonics offers a faster, more flexible, and more efficient way to collect, shift and process information. This, in turn, is one of the basic concerns of engineers as we meet society's needs.

"Soon photonic engineers will develop processors with speeds thousands of times faster than anything currently available and laser instrumentation for new medical procedures. Photonics is an area of great excitement and possibilities and the opportunities for graduates with expertise in photonics during this coming decade are outstanding. Australia's photonics industry has an established reputation as one of the most successful and innovative in the world, and exports to every continent. In a truly global marketplace, our photonics engineers, too, will always be needed, prized and rewarded."

For further information, please contact Dr Iain Skinner on +61 2 9385 5153, email i.skinner@unsw.edu.au or visit www.eet.unsw.edu.au

Mechanical AND MANUFACTURING ENGINEERING

Endowed scholarships support students by Kerry Byrne

Over the last year, the establishment of three endowed scholarships represents a major effort to support students, especially those from rural areas, who are wanting to study in the School. Each endowment, comprising a donor’s contribution and matching funds from the School, Faculty and University, is invested by the UNSW Foundation and the interest earned results in a substantial scholarship of around $6000—$8000 per annum for a standard four-year program, which can be offered in perpetuity.

The Peter Oxley-UNSW Memorial Scholarship, which is available for any program in the School, was established in memory of Professor Peter Oxley, an eminent and long-standing member of the School who worked in metal machining. The NSK-UNSW Scholarship was established in conjunction with NSK Australia Pty Ltd and is available for Mechanical Engineering students. NSK is a major Japanese bearing manufacturer and a supplier of bearings in Australia to the automotive and agricultural machinery industries.

The AE Bishop-UNSW Endowment was established by the Bishop Technology Group to acknowledge the lifelong contributions of its founder, Sydney engineer, Arthur E Bishop to the automotive industry. The scholarship is available for students in the Mechanical Engineering and Mechatronics programs. The Arthur Bishop and NSK scholarships are specifically for students from regional or rural Australia and will be offered for the first time in 2003.

Bruce Grey, Managing Director of the Bishop Technology Group said, "Bishop has had an association with UNSW for more than 30 years. Establishing this scholarship supports our commitment to teaching the innovation process to tomorrow's engineers. Bishop has found that young people with a farming background often become inventive engineers who are essential to an innovation driven organisation such as Bishop Technology Group.''

Barnaby Smeaton, current holder of the Peter Oxley Memorial Scholarship, is a Year Two student from tiny Binalong, near Yass. Barnaby’s UAI was 99.2, and he is studying for a double degree in engineering and arts. "Engineering offers the opportunity to work creatively and have intellectual satisfaction, to be well-rewarded and hopefully, help other people while you're at it," said Barney. "UNSW has a good reputation and I wanted to study here, but I wouldn't have been able to without the scholarship. It takes a lot of pressure off, knowing that your living costs are covered throughout session."

For further information, please contact Professor Kerry Byrne on +61 2 9385 4088 or kbyrne@unsw.edu.au

Mining ENGINEERING

Virtual Reality Training and Research Laboratory by Phillip Stothard

The School has established a Virtual Reality (VR) Training and Research Laboratory from funds provided by an Industry Research Grant and a University Infrastructure Grant.

VR technology is ideal for 3D visualisation and training where the underground or surface mine environment can be experienced through simulation -with the advantage of offering a comfortable, safe, and forgiving environment. These VR
environments replicate real mine sites and can be generated at remote locations.

The Industry Grant was awarded with the aim of performing a Scoping Study to assess the feasibility of using VR Simulator Technology to train mineworkers and management in a broad range of disciplines including equipment operators and maintenance, mine ventilation, safe-working procedures, and emergency response.

VR Technology was also evaluated to assess its potential as a tool for identifying personnel who may be prone to risk-taking and was found to be well suited to this application. It is proposed that the identification of ‘risk takers’ will lead to a reduction in accidents.

VR simulation was also found to offer flexibility in time, place, rate and privacy of learning; the development of understanding and retention of learning; customised on-the-job training; fault finding; easier communication of complex data; evaluation of the consequences of poor decision making; trainee assessment; identification of training program flaws; accident investigation and reconstruction.

Realisation of these potential benefits requires the VR simulator to be interactive; immersive (using either using large screens or immersive headsets); a realistic approximation to the real environment; built on best-practice safety documentation; simple and quick to update.

The Industry Grant was awarded with the aim of performing a Scoping Study to assess the feasibility of using VR Simulator Technology to train mineworkers and management in a broad range of disciplines including equipment operators and maintenance, mine ventilation, safe-working procedures, and emergency response.

The School of Mining Engineering’s VR simulator addresses these requirements and development and evaluation of the simulator is continuing with real man-machine interfaces which add a further level of realism.

For further information, please contact Dr Phillip Stothard on +61 2 9385 6663 or email pmstothard@unsw.edu.au

The School of Mining Engineering’s VR simulator addresses these requirements and development and evaluation of the simulator is continuing with real man-machine interfaces which add a further level of realism.

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The School of Petroleum Engineering is the only IADC and IWCF training provider in the southern hemisphere.

Petroleum ENGINEERING
Accredited blowout prevention training by Maria Tarabay

The School of Petroleum Engineering has been providing training and assessment to oilfield professionals through the National Drilling & Well Control Program (NDWCP) since 1998. The Program is a joint venture between the School and the International Association of Drilling Contractors – Australasian Chapter (IADC-AC) and is managed by the School which provides three full-time staff to conduct the training and develop training materials.

The major objective is to provide the core knowledge and job-related skills which drilling personnel require to handle well control situations with competency. Through the provision of expertly written teaching materials and computer-based simulated training, industry personnel are able to obtain qualifications that are both current and applicable to this ever changing industry. The Program is recognised and accredited by industry bodies such as the International Association of Drilling Contractors (IADC) and the International
Well Control Forum (IWCF). Excellence in training is achieved and maintained via a rigorous quality assurance process.

Major benefits to industry include confidence that rig crews have consistent quality instruction by high standard industry trainers; internationally-recognised training; and documentation of training and certification of records to meet safety case requirements.

In the past two years, the NDWCP has strengthened its position in Australia and South-East Asia and remains the only joint IADC and IWCF training provider in the southern hemisphere. Most oil and service companies in Australia are located in Brisbane and Perth and the program provides some 40 five-day training courses a year from training centres there. Courses are also offered in Adelaide and other cities.

Most clients are Australians based in Australia and South-East Asia, but the program is also attracting increasing interest from petroleum companies in Africa and South America. The program has exceeded expectations and expanded its client base to include clients who previously trained their own personnel or trained them elsewhere.

Since the formation of the National Drilling and Well Control Program in 1998, hundreds of drilling professionals have enjoyed the practical, relevant and professional training that they have received. For further information, please contact Maria Tarabay on +61 2 9385 5184, email drilling@unsw.edu.au or visit www.petrol.unsw.edu.au/ndwcp/

Photovoltaic Engineering

Light-emitting silicon now to be used in microchips.

But, while researching novel ways of doing this, Martin Green and Drs Jianhua Zhao and Aihua Wang realised their expertise could allow them to reverse their technology and convert electricity into light. They also immediately realised this had a potentially huge application in allowing computer microchips to communicate with each other by using light signals instead of being able to use only electronic signals.

The results of their first experiment were reported in Nature on 23 August last year ('Efficient silicon light-emitting diodes') and indicated, essentially for the first time, that light-emitting diodes (LEDs) could be directly integrated into microchips. This would streamline the link between two of the world's biggest industries — microelectronics and telecommunications.

Martin Green said: "I think the most important result of this development will be the opportunities it gives us to change the way microelectronics develops, because it allows us to break through the restriction of the present two-dimensional structures, the 'flatland', and into a technology of fully three-dimensional chips.

"Present-day micro-chips will still communicate electronically in two dimensions, but will have the extra ability to communicate 'up' and 'down' using optical signals. This will allow the rapid evolution of microelectronics to be sustained well into the future, by freeing it from the constraints of communication over metal wires. 'Moore's Law', which says the speed of computer chips doubles every 18 months, will be extended yet again."

Before publication of the Nature paper, appropriate patents were secured and the inventors have since been negotiating with leaders in the microchip and photonics industries.

For further information, please contact Professor Martin Green on +61 2 9385 4018, email m.green@unsw.edu.au or visit www.pv.unsw.edu.au

Surveying and Spatial Information Systems

Surveying in the fine arts

by Bruce Harvey

Admittedly, the idea of engaging the skills and concepts of surveying to the service of fine art seems at first glance a little incongruous. A second glance reveals a fascinating combination of knowledge and technology to produce
accurate computer models and holograms, that in turn allow the study of shadows and areas of darkness in paintings.

Dr Paula Dawson, from the School of Art at UNSW's College of Fine Arts, is internationally famous for her holographic art and was investigating the way in which early painters, like da Vinci, portrayed 'shadows' or 'darkness'-a close inspection of his work shows that light must have fallen from different angles upon the drapery to give the shadows portrayed — whereas when the painting is viewed uncritically the shadows appear entirely natural.

As an expert in holography, Paula saw synergy between her work and the models produced by the Laser Scanner, with its capacity to create 3-D images and to show shadows. Together with team members John Damina from CR Kennedy and Co, and Andreas Starick from the Department of Surveying and Scanning at the Dresden University of Applied Science, Paula Dawson and Dr Bruce Harvey conducted a survey as part of an Art Research project to transpose the historic use of shadow to a hologram. The finished hologram will be exhibited at the Ivan Dougherty Gallery, UNSW, in September 2003.

A 3D model was needed to replicate the 2D paintings, so art historian, Dr John Gage, was positioned, draped with cloth, and scanned with a Cyrax 2500 3D laser scanner from two locations. Each scanner location measured around one million points in the scene and captured 3D coordinates of each reflected point. Using two scanner locations enabled the back, front, and one side of the model to be measured, allowing the final hologram to be rotated through around 180 degrees. Measurements to four special control mark targets from both scanner locations, allowed the two data sets to be combined by software, in a process similar to transformations in photogrammetry. The resulting 3D computer model can be rotated and magnified, as seen on the website.

For further information, please contact Dr Bruce Harvey, email b.harvey@unsw.edu.au or visit www.gmat.unsw.edu.au/News/Cyrax/cyrax_news.html

To continue our attempts to more accurately represent the Faculty's history, if anyone knows the names of the students in this classic UNSW photograph (above), would they please let us know.

Do you know someone who would like to receive UNSW ENGINEERS?
Please contact Marjorie Fox at the Faculty of Engineering Administrative Unit, on +61 2 9385 4023 or email marjorie.fox@unsw.edu.au
The founder of the University's Sunswift solar car project in 1996, Byron Kennedy (BE '96) has taken up the cause of energy efficiency as a complement to alternative energy sources.

As an electrical engineer involved with solar car teams for both UNSW and the Northern Territory University (NTU), Byron Kennedy has helped develop energy-efficient motors that are proving useful far beyond their original applications. With research partners Dean Patterson and Steve Camilleri, Byron Kennedy heads up In Motion Technologies for the commercialisation of energy-efficient technology.

"Basically, the motors we have all derive from the same (NTU) solar car wheel-motor concept and we just scale it up or down depending on the application," he says. "Our motor is two discs that are next to each other, two plates that rotate. The initial reason for that design was so that it would fit into a wheel very easily. After we did the analysis, we found there was a whole range of other advantages to this motor."

For instance, their smallest motor fits in a normal ceiling fan. Whereas a normal fan uses around 75 Watts, a fan using In Motion Technology's uses 20 Watts.

"The Australian Greenhouse Office are encouraging people to put up solar panels, and we're saying if you use energy efficient appliances, you're achieving the same thing. If the two technologies are combined, you can get really good results."

First drawn to environmental as opposed to electrical engineering, Byron settled on electrical engineering because, as he says, "chemistry wasn’t my forte. "One of the things you learn as you’re going through your uni course is that most engineers end up in management. And you either accept that or look for an alternate career path," says Byron.

His involvement with, and subsequent thesis on the University's 1996 solar car and its performance in the Darwin to Adelaide World Solar Challenge (they came ninth), ensured interest in his skills and experience, and after six months with communications company Telegnosis, he joined members from Queensland University's solar car team in developing a hybrid electric bus.

After a year's travelling, Byron moved to Darwin to keep a previous agreement to work with Dean Patterson at NTU. "Dean and the team at NTU had designed a motor for a solar car, and the aim was to take that motor and put it into a conventional car. At the time, it was exactly what I wanted to do. I wanted to understand the technical aspects of a project before I got into in a position of telling other people what to do."

Three years have been spent converting the car to electric power, and free time was spent modifying the motor for other applications — bikes, scooters and ceiling fans. Indeed, motors that Byron and the team have modified could soon turn up in some interesting places.

"The dream of the US Navy is to have a completely electric ship; to make less noise and to replace the hydraulics, for simplicity. Dean is currently working on aircraft launchers where we're looking to replace the steam catapults used to shoot planes off the ships with what is essentially a big rolled-out solar car motor.

"We're also trying to work out how to sell our ideas - which is not something taught in engineering. There's a whole raft of people with an interest in our technology, it's just about us getting out there and selling it to them."

Byron has always been interested in hands-on research and started the Sunswift solar car project when looking for a Year 4 thesis topic. "I had done industrial training and that gave me hands-on with the normal electrical engineering jobs you would get, but a local power authority or private company doesn't usually have the ability, time or resources to allow a student to build something different."

The Sunswift project threw Byron and the team in the deep end in terms of conceiving a project, finding funds and getting it up and running. "You can be enthusiastic about a lot of projects because you don't know all of the problems you're going to face. Some people thought we were mad, but that's not bad territory to stray into. I'd always encourage that."

The skills and the experience acquired through his university project are now enabling Byron to make the most of his latest venture — establishing a business and licensing the kind of new technology that will support a more energy-efficient future.
Naval Architecture and Aeronautical Engineering

I note that in the latest issue of the UNSW ENGINEERS newsletter neither Aeronautical Engineering nor Naval Architecture get a mention in the ‘Around the Schools’ article. Have these been moved elsewhere in UNSW?

Paul Buchler

Dear Paul,

Both Aeronautical Engineering and Naval Architecture are programs within the School of Mechanical and Manufacturing Engineering. See article on Sydney SuperCat ferries on page 10 of the December 2001 issue for a Naval Architecture story.

Editor

The changing face of engineering

The plan to publish... what has been a wonderful history of success by the Faculty impels me to [record] my impressions. I wish a much more frequent publication of Faculty of Engineering newsletter.

I obtained my MEngSc ’97 degree in construction engineering and management from the School of Civil and Environmental Engineering and my Bachelor of Civil Engineering ’83 from NED University of Engineering and Technology, Karachi, Pakistan. I have applied for PhD candidature in Innovative Construction Technology.

The intellectually stimulating research environment provided by the Department (of Construction Engineering and Management) coupled (though not explicitly) with the motto of continuous professional development in ethical perspective impels me to undertake research from the School. The Department also encourages freedom of expression and demands respect for the rights of others to express a different point of view together with inculcating tolerance in all aspects of life.

Professor John Niland, the Vce-Chancellor was very much correct in saying that there was a time when people would come to the University to go and serve in the field but in the present era the priorities have changed, now the people go to the field first and they come to learn and develop afterwards. This change is because of dynamically changing needs of the industry, society and the economy.

My own experience in the construction industry business extends back to more than 15 years and includes work with contractors. My transition to student life at UNSW was made much more easier by the camaraderie among faculty students population from very diverse backgrounds, a number of whom were also mature students who had taken career breaks to engage in full time study as I did.

I fully endorse the views of Lene Jensen, Head of Careers and Employment at UNSW, expressed in UNSW ENGINEERS Issue 3, November 2000, wherein she [spoke of the] growing interest of non-engineering companies in engineering graduates. The reason being that the department while teaching interdisciplinary subjects also attaches importance to ontological factors.

On June 11, 1995 at the occasion of ASCE’S Engineering Education Conference a keynoter posed most riveting comments when he said: “Engineers must know not only how to do things right, they must know the right things to do.” Based on these premises, the School during education and training emphasises non-engineering-specific skills like communication, both written and verbal, team building, business and management training, leadership skills, social consciousness and appreciating an interdisciplinary approach to teaching, research and development has attained reputation amongst academia and the industry thereby [leading] them to accept graduates of the department of construction engineering and management of UNSW.

Aftab Ahmed Siddiqui (MEngSc ’97)

Who are those people? UNSW ENGINEERS Issue 5, December 2001

I can help a little with identification. I am on the far left. Third from left and looking at the camera is Peter Carr-Boyd. The tall chap towards the far right with the open neck shirt is David Montgomery. The location is one of the lecture rooms in the old buildings at Ultimo where engineering at UNSW started. The others were mostly Colombo Plan students. The class was Electrical Engineering, and the graduation year for that class was 1960. I do not know which year the photograph was taken. I have lost contact with both Carr-Boyd and Montgomery. If you have any contact details I would appreciate receiving them.

Stephen Redman (BE (Elec) ’60)

This accords with the memory of Tony Stuart (BE (Elec) ’60, ME ’63) who advises the following: From left to right, Steve Redman; unknown sitting man, Riter Carr-Boyd, David Montgomery, unknown standing man, Henry Chinn, Norman Heamden and far right Oliver Wilson.

Many thanks to Steve and Tony for searching their memories.
please stay in touch

If you have changed your address

Name  Mr/Mrs/Miss/Ms/Dr/Prof

New Postal Address

Old Postal Address

Telephone (h) (w)

Email

Company Name

Company Address

Position

Date of Birth

please return this to:
Facility of Engineering Administrative Unit
The University of New South Wales,
UNSW SYDNEY 2052, AUSTRALIA

telephone +61 2 9385 4023 fax +61 2 9385 5456
email <unswengineers@eng.unsw.edu.au>