



Campus News

UNIVERSITY OF WOLLONGONG

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March 1999

Spotlight on our sporting facilities
Pages 6&7



PROFILE
Ernie Blackmore **PAGE 5**

New surgical probe offers a major boon for cancer patients

Cancer patients facing radical surgery will benefit from a University of Wollongong and Gammasonic's Institute for Medical Research development which helps surgeons distinguish breast cancer and melanoma cells from healthy tissue.

The Faculty of Engineering's Medical Radiation Physics Group (MRPG) is collaborating with the private organisation of Gammasonics, on a new generation Surgical Radiation Probe.

Before surgery, patients are administered a radioactive

compound which finds and 'labels' lymphatic cancer cells.

The probe finds the labelled cells, ensuring only cancerous lymph nodes are removed. Surgeons no longer need to remove surrounding tissue.

This technique helps limit the spread of cancer cells through the body.

The first generation of the probe was developed during the past three years and manufactured by Gammasonics and now a new probe is on clinical trial for different cancer modalities at the Royal Adelaide, Princess Alexandra, Royal Brisbane, Strathfield, Wesley and John Hunter

hospitals. It has been on trial over the past four months and has demonstrated excellent technical performance.

Gammasonics is Australian-owned and a Sydney-based organisation and has a long history of collaboration with the MRPG on research and development of new radiation detector technology and teaching support.

The MRPG has been working successfully on different medical radiation detectors for five years and has strong international collaboration and recognition.

Masters students from MRPG Peter Mackowiak and Armia Moussa won Gammasonics scholarships to work in this field. The joint projects are helping to bring the results of R&D faster to practical implementation in new instrumentation, and to develop new skills among the students in the Medical Radiation Physics Group which are required by the medical community.

"The development of this new technology will put Australia at the leading edge of high technology in medicine. The collaboration of the university, hospitals and private industry will help Australia take its place with the world's leaders in the field," according to Associate Professor Anatoly Rosenfeld of the MRPG.

The development is attracting interest overseas.

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UOW and Metal Manufactures win energy award for superconducting technology

The University of Wollongong and Metal Manufactures Ltd, one of Australia's leading electrical and merchandising companies, have won an award from the NSW Department of Energy for a two-year program to research power engineering applications of high temperature superconductor (HTS) coils.

It is one of 14 new research projects into sustainable energy technologies aimed at reducing greenhouse gas emissions.

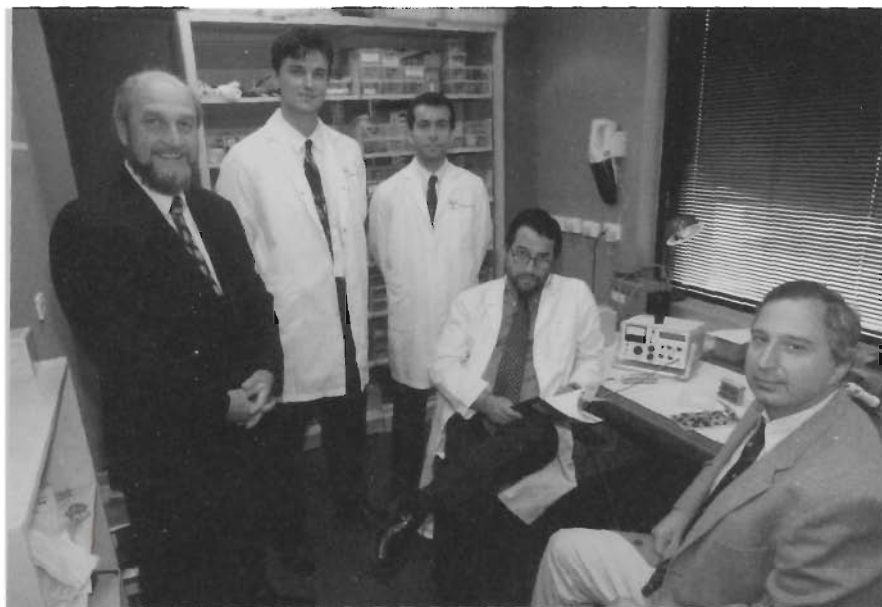
NSW Energy Minister Bob Debus said the development of superconductor technology by UOW and Metal Manufactures Ltd has enormous potential for producing environmental and commercial benefits world wide.

The HTS coils will be manufactured from Bi-2223/Ag high temperature superconductor tape by Metal Manufactures and supplied from its \$2 million HTS tape and coil pilot plant in Sydney.

The University of Wollongong will undertake advanced calorimetric measurements to determine their energy loss values, on equipment to be designed and constructed as part of the program at the Institute of Superconducting and Electronic Materials (ISEM).

The Power Quality Centre at UOW will use the techno-economic data obtained from these coils to assess the impact of HTS electrical engineering devices in the Australian electricity grid.

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Associate Professor Anatoly Rosenfeld (seated foreground) with (from left) Mr Peter Rose Director of the University Foundation (the Foundation is helping to fund the project); master research students in medical radiation physics Peter Mackowiak and Armia Moussa and Dr Carl Munoz-Ferrada, Managing Director of the Gammasonics Institute for Medical Research.

University of Wollongong claims ARC crown Pages 8 to 12

Solar energy powers into the new millennium

In the early hours of the new millennium scientists from the University of Wollongong and New Zealand's Massey University will be participating in an event which is set to capture the imagination of a global audience.

Literally at the dawn of 2000, the two universities will be harvesting and storing the first rays of solar energy in New Zealand as part of The Millennium Solar Project (MSP).

The collection of the first rays of sunshine will be beamed by satellite around the world, as governments and consumers heed the growing importance of solar energy and its applications.

Professor Gordon Wallace, director of UOW's Intelligent Polymer Research Institute, said solar energy was coming of age, after years of painstaking research. It had been boosted by advanced chemistry and emerging technologies, such as conducting polymers.

He said the MSP was recognition of solar energy's global significance. "A group of internationally renowned scientists have agreed to collaborate on this historic solar

research and development project," Professor Wallace said.

An outline of the MSP's plans was conducted at the University of Wollongong on 25 January.

Swiss researcher, Professor Michael Gratzel, who developed the Gratzel solar cell, the first of its kind in the world, contributed to proceedings via a telephone hook-up from Europe.

Technology developed during the MSP will be used to make solar power accessible and affordable for everyone. This will be especially good news for developing countries where the environmentally unfriendly energy sources such as fossil fuels can be bypassed in favour of clean, green solar energy.

Work being done at the Intelligent Polymer Research Institute could lead to the biggest breakthrough in the development of solar energy use.

Professor Wallace said the work involved developing polymers (plastics) to conduct electricity.

"The potential for this is huge as cells could then be moulded to any shape or purpose."

Meanwhile, at Massey University researchers are creating 'man-made chlorophyll' in the form of groups of porphyrin molecules. While individual porphyrin molecules have been used in solar cells in the past, the Massey team has found a way to link the molecules to form larger, more efficient energy converting groups.

Professor Wallace said that combined with the porphyrin energy harvesting technology from the Massey University team, solar cells could be incorporated into the actual equipment that uses electricity, such as computers and refrigerators, so they would have self-generating power sources.

This compares to current solar technology where the sun's energy is harvested, turned into electricity and stored to be used through conventional electrical circuitry. These cells would be less efficient but

would be very cheap to make and could be recycled.

Researchers are also working to develop solar cells that can emit light as well as gather it. This technology could replace LED, light emitting diodes, currently used in all kinds of electrical goods.



Some of the MSP International Advisory Board members are (clockwise): Professor Alan Macdiarmid, University of Pennsylvania (chair); Professor Naoya Ogata, Chitose University, Japan; Dr David Officer, Massey University; Professor Robert Anderson, Pro Vice-Chancellor, of the College of Sciences at Massey University; Professor Gordon Wallace, University of Wollongong; and Professor Peter Robinson, Deputy Vice-Chancellor, University of Wollongong.

Revolutionary electricity forecast model adopted

What do electricity forecasting and horse handicapping have in common?

A revolutionary model for forecasting short-term electricity demand has been developed by a senior academic in the University of Wollongong's Department of Accounting and Finance.

Professor David Edelman's neural network model has recently been adopted via the National Electricity Marketing Management Company or (NEMMCO), as the standard used to price most of

the electricity sold in Australia.

Professor Edelman said energy pricing was now becoming increasingly market-driven as the trend towards privatisation of energy suppliers continued worldwide.

"And it appears Australia is fast becoming a world leader in energy market management technology," he said.

Professor Edelman said his algorithm, which had been shown to reduce forecasting error by as much as 50 per cent, had gained international attention.

He will give an address in the USA on the subject in July at a high level Stanford University workshop on *Applications of Planning Under Uncertainty*. He will be among 24 other international speakers on various related areas including Nobel prize-winners Harry Markowitz and Kenneth Arrow.

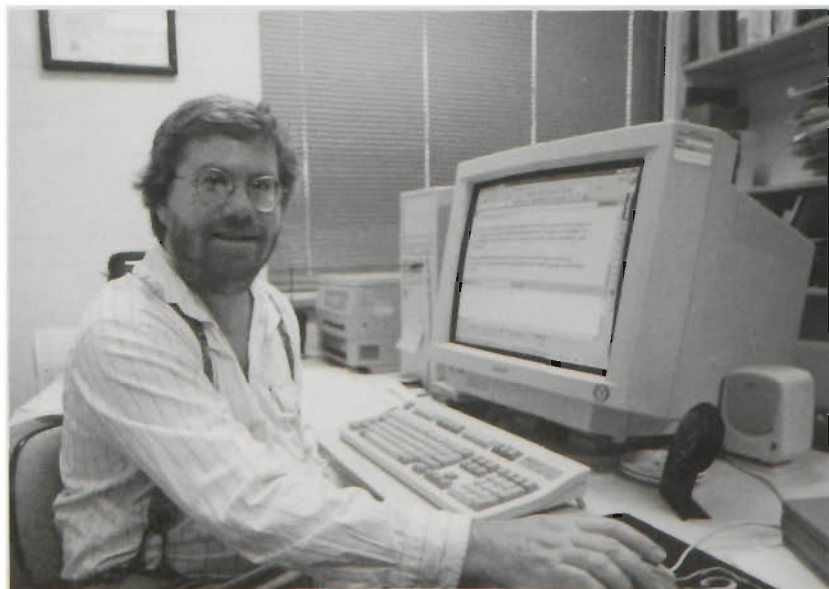
Professor Edelman's latest neural network technology model follows an earlier model he developed (and demonstrated on ABC's *HotChips* and Channel 7's

11am television programs) for horserace handicapping.

He said the Neural Network technology was a branch of Artificial Intelligence which uses the structure of the brain as a prototype for the process of learning from experience.

Professor Edelman wrote the software and adapted it for the latest model. He said the link with racing was that both predicted a chance outcome in relation to past behaviour.

He has earlier been involved in developing a



Professor David Edelman . . . joining Nobel prizewinners at Stanford workshop

Rio Tinto funds UOW to study social change in South East Arnhem Land

The University of Wollongong (UOW) has received funding and other support from Rio Tinto of over \$800,000 to undertake a study on negotiating social change in South East Arnhem Land.

The Professor of Sociology at UOW and director of the project, Professor John Bern, said the study was to be community focused.

The three-year study will investigate the cultural, social, political and economic circumstances and potential changes in the Aboriginal communities of South East Arnhem Land of the Northern Territory.

"As the study proceeds, it will address issues concerning potential impacts on communities of proposed developments related to mining and other ventures and how these are managed by and with the communities affected," Professor Bern said.

The people of Ngukurr (population 900 which will be the primary location of the study) have enthusiastically endorsed the project. Work will begin in April/May this year and the research team will include people from the community.

Other organisations participating in the broader regional study include the

Australian National University, Northern Territory University and the Northern Land Council.

In 1995 Rio Tinto publicly embarked on a new direction welcoming the Mabo decision and recognising the central tenet of the Native Title Act — recognition of and respect for Aboriginal rights.

Rio Tinto's Vice-President (Aboriginal Relations), Mr Paul Wand, said Rio Tinto would

continue its efforts to remain at the forefront in this area for sound business reasons and aligned with its Policies for community and Aboriginal Relations.

Attending the funding launch are (from left): the Vice-Chancellor, Professor Gerard Sutton; the Deputy Vice-Chancellor, Professor Peter Robinson; the Dean of Arts, Professor Anne Pauwels; Professor John Bern and Mr Paul Wand.



Wollongong strengthens ties with Macedonia



Signing the agreement are St Kliment University Chancellor, Professor Sofanija Miladinovski and UOW Vice-Chancellor, Professor Gerard Sutton, with the Lord Mayor of Wollongong, Councillor David Campbell, looking on.

Wollongong's close ties with Macedonia were recognised with the signing of an agreement at the University of Wollongong on 26 February.

The city of Wollongong, which has a large Macedonian community, has only two sister city relationships including one with Ohrid City, Macedonia.

The Vice-Chancellor, Professor Gerard Sutton, signed an agreement with St Kliment University, Ohrid. The Lord Mayor of Wollongong, Councillor David Campbell, also attended the signing ceremony.

In 1997 the Mayor of Ohrid City, accompanied by the President of Ohrid City Council, visited Wollongong as part of the Wollongong Ohrid Sister City Committee.

It was established to develop business and cultural relationships between the cities of Wollongong and Ohrid. Councillor Dragi Bogoevski is the Chairman of the Wollongong Ohrid Sister City Committee and he serves as the main contact at the council.

The establishment of formal links between the University of Wollongong and St Kliment University is seen as an important part of developing this relationship. During the 1997 visit a draft agreement was established and a delegation has now visited Wollongong to sign that agreement.

The Ohrid delegates met university staff to finalise details in the agreement. Among those in the University of St Kliment delegation were their Chancellor, Professor Sofanija Miladinovski and their Vice-Chancellor, Professor Violeta Paunovska.

Calling all 'couch potatoes' for world first study

Researchers at the University of Wollongong hope to reveal within six to 12 months the type of exercise program required for people to avoid the life threatening situation of insulin resistance.

Insulin resistance means the body is no longer sensitive to the effects of insulin which is a disorder that leads to the development of diabetes. It has also been linked to other debilitating diseases such as heart disease, high blood pressure, obesity and increased amounts of fat found in the blood.

UOW is calling for volunteers, males aged between 18 to 35, who have a history of diabetes in their family, who do little exercise and are moderately overweight.

"Basically, we are looking for 'couch potatoes' who wish to have a free 12-week personally supervised fitness training and dietary advice program, according to PhD student in the Faculty of Health and Behavioural Sciences, Mr Adam Fraser, who is leading the research.

Mr Fraser said research has shown that exercise improves a person's insulin resistance but he hopes to show how exercise achieves this and the type of exercise program different people require.

"For instance, is aerobic exercise such as running more beneficial than resistance training where people use weights?" Mr Fraser said.



The Wollongong study will be the first of its kind in the world as it will also involve studying how exercise affects muscle tissue. Muscle tissue is the most important tissue for insulin's actions to occur in the body.

Volunteers for the 12-week program will be required to have a muscle biopsy where a sample of tissue will be taken.

Mr Fraser said he expected to have results from the exercise training program in about six

to 12 months' time. UOW is working in collaboration with the Copenhagen Muscle Research Centre in Denmark on the project.

Mr Fraser said he was still seeking volunteers wanting to take part in the exercise training program. They should contact him on (02) 4221 4095 or (02) 4221 3881.

Adam Fraser with one of the study's volunteers undergoing the training program.

Student numbers double for Discovery Day



Discovery Day organiser Natalie Chapman (seated centre) with Moruya High School students (back row, from left): Gemma Knight, Stephanie Smith, Hayley Tronson and Martha Facey along with Ben Wright (left) and Chris Seery.

More than 2,500 students from 67 schools across the Illawarra, South Sydney, South Western Sydney, Goulburn, South Coast and ACT attended this year's Discovery Day.

Discovery Day organiser Ms Natalie Chapman, of UniAdvice, was delighted at this year's attendance — twice as many as last year.

She said it was the Year 12 students' chance to become university students for a day. The Discovery Day program was held over 16 and 17 February.

The comprehensive program looked at everything from the impact of the August storms to science programs in Antarctica.

The aim of the program was threefold:

- To increase the number of students visiting the campus since the campus itself is one of the University's major selling points
- To give Year 12 students a taste of a real university experience with lectures, interactive case studies, hands-on workshops so they would be more informed about what university study involves
- To provide students with University of Wollongong course and careers information.

Ms Chapman said overall feedback has been extremely positive from students and school staff with many keen to see the program continue next year.

Ernie beats the odds to tell his stories...

The work of Creative Writing postgraduate student Ernie Blackmore is attracting interest nationally and in the US.

Ernie, the son of Gamilaroi Aboriginal woman from Moree and an English Seaman, didn't learn to read until he was 25.

Just shy of 60-years-old, and a battle with prostate cancer behind him, Ernie is making up for lost time.

He wrote his first play *Treated as Trash* after enrolling as an undergraduate Creative Writing student in 1995. It attracted an Emerging Artists grant from the Australia Council.

The Australian National Playwrights Centre plans to make it a part of the 1999 Australian National Playwrights' Conference in Canberra, from 18 April to 2 May, and it has already attracted enough interest to qualify for inclusion in the US National Playwrights' Conference.

Treated as Trash is fiction informed by fact. Set in a NSW country town, the play looks at black and white responses to interracial marriage. It looks at poverty, bigotry and injustice.

"It is about the destructiveness of not understanding the perspective of others," Ernie said.

"It is not simply about black/white relationships.

"The play strives to highlight the dichotomies of how black and white communities treat one another and the way they treat themselves when the so-called "rules of society" are broken."

The landmarks in *Treated as Trash* could be drawn from Ernie's life or ten thousand others. Ernie is now turning the text into a screenplay, while working on other creative projects.

He can't speak highly enough of the Aboriginal Education Centre (AEC). As a man who came to reading later in life, the AEC was crucial in giving him the tools to take command of academic language and demands.

The intellectual and emotional support offered by other indigenous

students has been invaluable. Ernie deplores threatened cuts to ATSI's education budget, due to take effect at the end of the year.

He's had first-hand experience of why well-directed support programs are crucial for indigenous students.

The odds he has overcome make him a successful role model for indigenous and mature age students everywhere.

He's a calm, confident, purposeful man, without a trace of conceit. He's lived hard, but the full extent of it doesn't show in his face immediately. Then his sensitivity brings yesterday's emotions up, expressions working his face like

clay: early years on the grog and on the streets, then picking himself up at 25, drying out and working for the next 30 years.

He drove trucks at first, then rose to senior management of a national transport firm.

When prostate cancer struck, he reassessed and knew he had stories to tell. He enrolled in Creative Writing and discovered a clear talent for dialogue-driven narrative, making him a natural for theatre and film writing.



Web re-enrolment program goes to the top of the class

A final year computing science class project at the University of Wollongong has led to the development of Australia's most successful web program to handle the complex issue of re-enrolling students.

The program designers and university administrators were astonished to learn that almost half of its re-enrolling students chose to use the new program.

Team student leader, Mr Richard Willson, said when they first started the project they predicted about a 10 per cent participation rate. As a direct result of the student project, Mr Willson is now also working in the University's Administrative Information Services.

"We were over the moon when we found 47 per cent of students had used the system. This really exceeded all our expectations," Mr Willson said.

Other members of the team are Steve Varga, Brendan Bailey and Andrew Hoy. The project was supervised by university staff.

A total of 3,727 UOW students chose the web-based option to organise their enrolment in subjects for 1999 of the overall 7,859 students returning to studies this year.

Mr Willson said only several other universities in Australia offered such an option for students but their re-enrolment usage was less than 30 per cent.

• **Continued Page 13**

The University of Wollongong Computing Science team responsible for designing a web re-enrolment program which attracted almost half of the University's students are (from left) Steve Varga, Richard Willson, Brendan Bailey and Andrew Hoy.



Elite athletes flock to



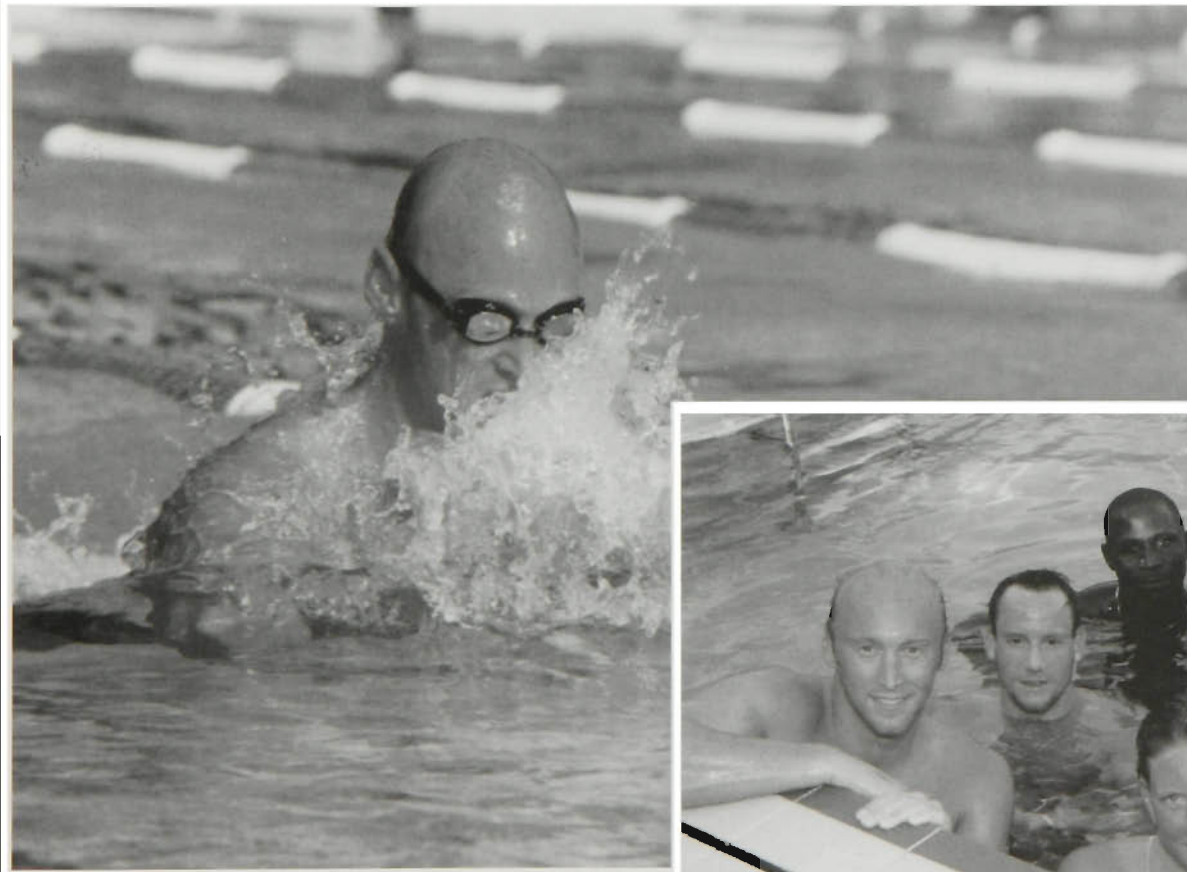
*The Daewoo Korean soccer team pose for the camera before training.
Phil Rogers (below) of the Australian Institute of Sport in action at the pool.*



The German swim team at poolside (above)

The Waratahs' Phil Kearns (far right) off loads the ball at the University Oval.

John Welbon (right) goes airborne during lineout practice for the Waratahs.

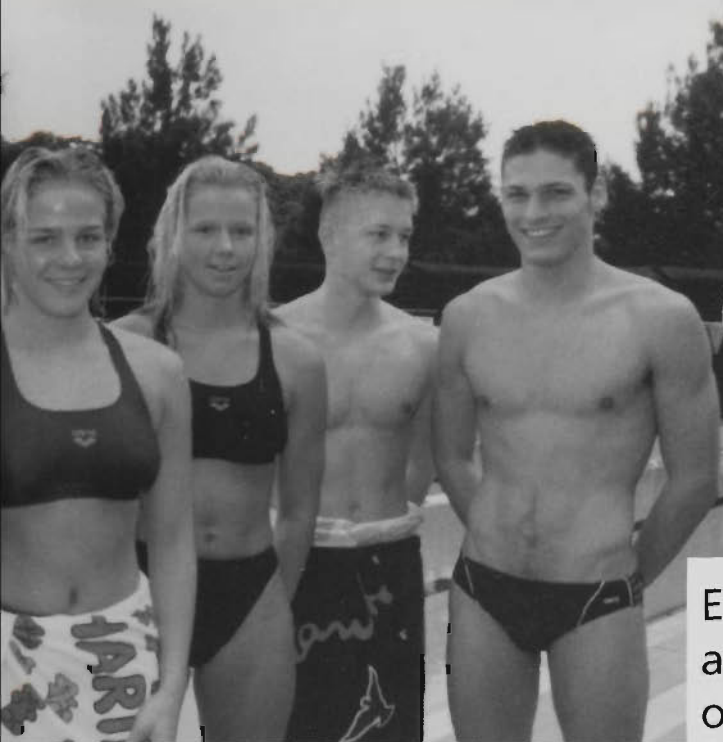


*Martin Zijldweg (left) of the Dutch swim team pounds through the water.
The Australian Institute of Sport team pose poolside for our photographer.*

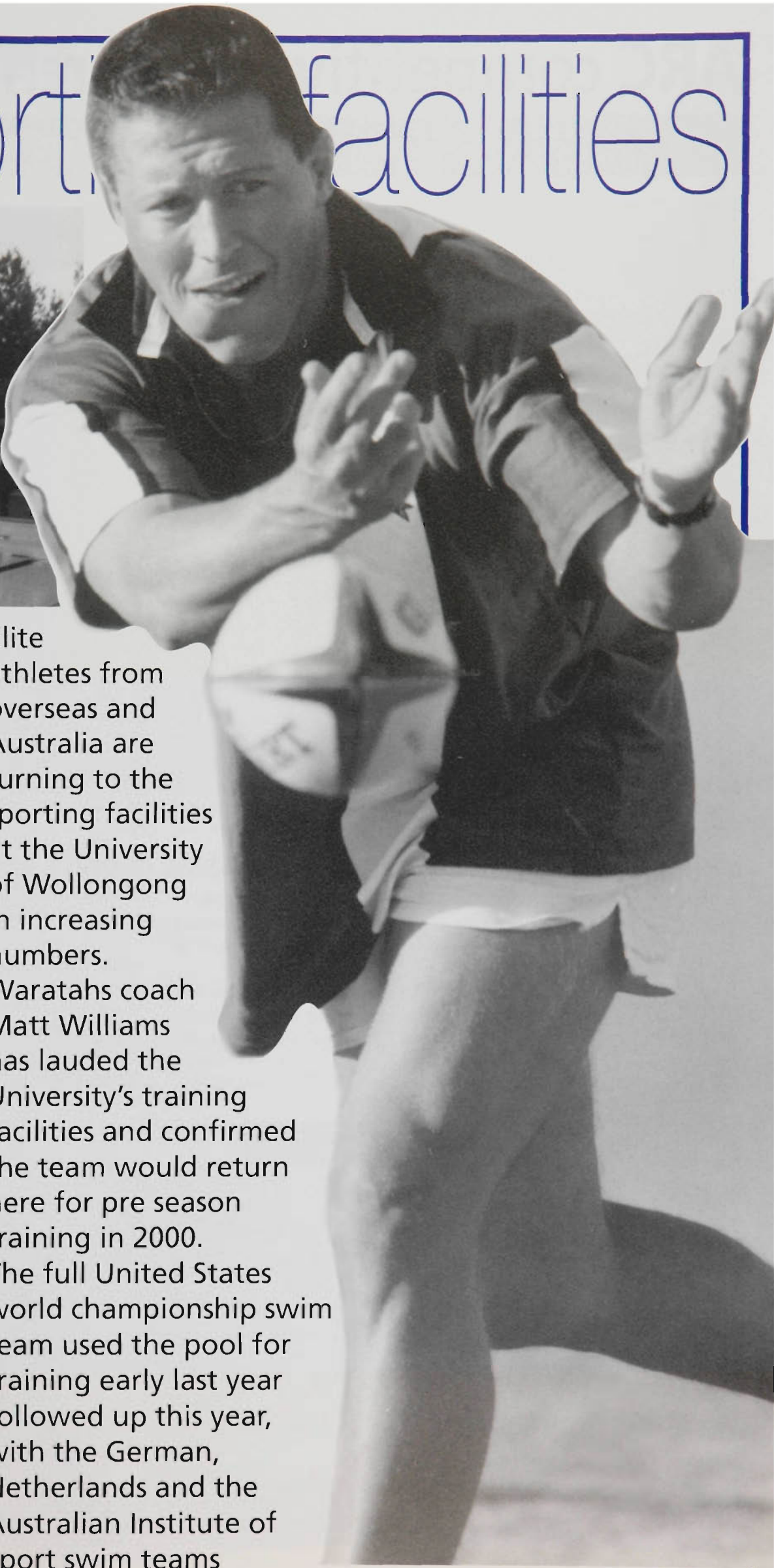
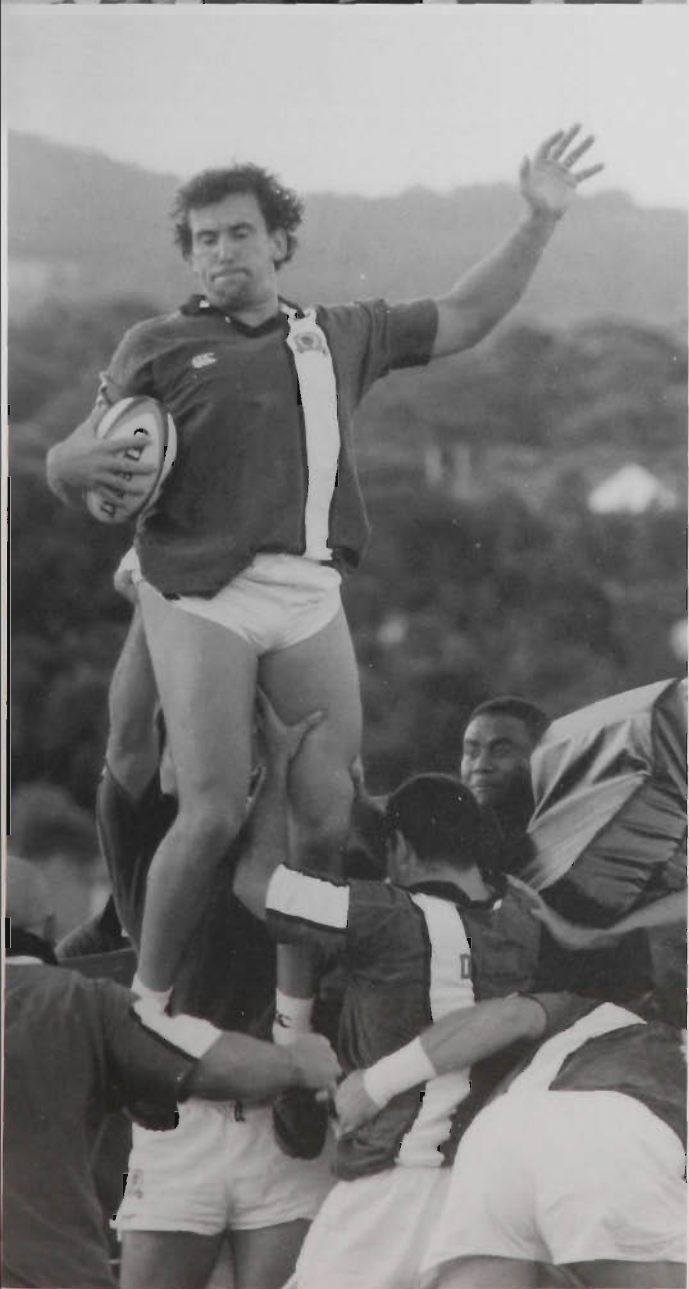


PHOTOS: Sean Maguire

our sporting facilities

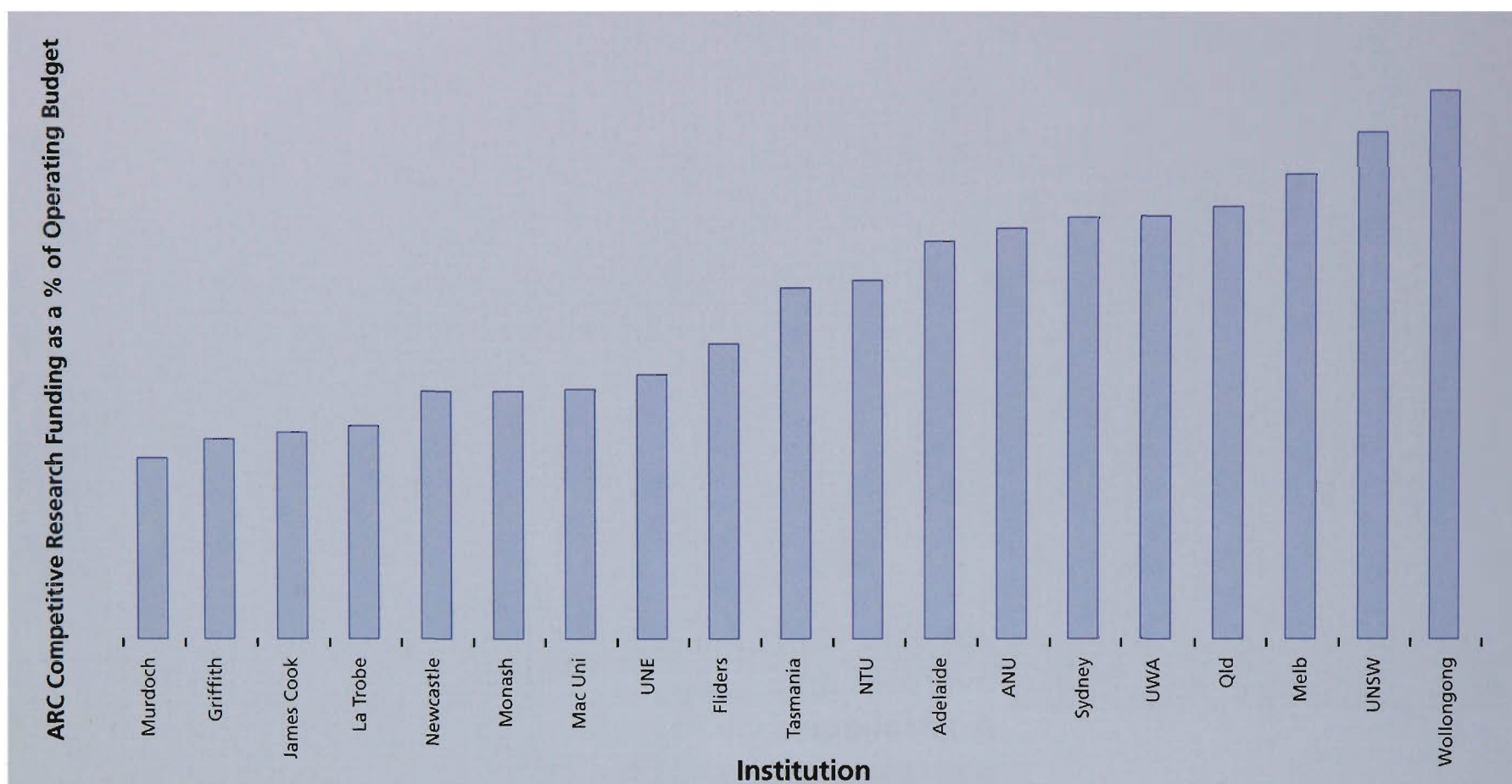


Elite athletes from overseas and Australia are turning to the sporting facilities at the University of Wollongong in increasing numbers. Waratahs coach Matt Williams has lauded the University's training facilities and confirmed the team would return here for pre season training in 2000. The full United States world championship swim team used the pool for training early last year followed up this year, with the German, Netherlands and the Australian Institute of Sport swim teams



ARC competitive research grants

Competitive Research Funding 1999



Note: The ARC schemes in the graph include the ARC Large Grants; ARC SPIRT Grants; and ARC Key Centres for Research and Teaching.

University of Wollongong claims title as nation's leading ARC research institution

The Illawarra can boast having a higher education institution of international standing judged by the recent record levels of competitive government and industrial support for research at the University of Wollongong.

"For its size, the University of Wollongong can claim to be the best performing university in the country following the release of the hotly-contested Australian Research Council (ARC) grants," according to the Vice-Chancellor, Professor Gerard Sutton.

Proving size is no barrier to research excellence, UOW secured funding

for two out of eight available Key Centres — equalling the best result nationally.

Such centres promote excellence in teaching and research in areas of national significance.

The Smart Foods Centre, under the directorship of Professor Peter Howe, aims to develop a better food industry for Australia while the Universities of Wollongong and Newcastle have submitted a joint proposal to fund the Centre for Asia Pacific Social Transformation Studies (CAPSTRANS), for the period 1999-2004.

SPIRT

| 1st Named Investigator | Other Internal Investigators | Project Title | Industry Partner |
|------------------------|------------------------------|---|-------------------------------------|
| Peter Beadle | | Information Flow Optimisation for Next Generation Multimedia Call-Centres | Net Map Solutions Pty Ltd |
| Peter Beadle | | Robust Speech Commands for Personal Mobile User Interfaces | Hewlett Packard Australia |
| Hugh Brown | Geoff Spinks | Adhesion of small particles to paint films | Broken Hill Proprietary Co Ltd |
| Ian Burnett | Joe Chicharo | Improving perceptual quality in GSM Digital Cellular using plug-in replacement Audio Coding | Motorola Australian Research Centre |
| Andrez Calka | Druce Dunne David Wexler | Synthesis, Structure and Properties of Novel Hard Materials for Thermal Spray Coatings | L & A Ashbolt Pty Ltd |

| 1st Named Investigator | Other Internal Investigators | | Project Title | Industry Partner |
|------------------------|------------------------------|----------------|---|--|
| Paul Carr | Allan Chivas | Adrian Hutton | The impact of igneous intrusions on coal mining and the alienation of coal reserves | Dartbrook Coal Pty Ltd |
| Rian Dippenaar | Michael Ferry | | The Peritectic reaction and the quality of continuously cast steel | Broken Hill Proprietary Co Ltd |
| SX Dou | | | Effective transverse matrix resistivity of multifilamentary BiHTSC/AG tapes in response to variation of strand architecture and processing method | Metal Manufactures Ltd |
| Leonie Dunn | John Norrish | | Distribution quality monitoring of automated gas metal arc welding for transmission pipeline | PipeWelders Association |
| Druce Dunne | | | Optimisation of Postweld Heat treatment of steel pressure vessel equipment | WTIA Panel 1 |
| Michael Ferry | Rian Dippenaar | | Cast structure development of steel during simulation of thin-slab casting | BHP Research |
| Josip Horvat | Mihail Ionescu | | Substrates for large-area Y-123 films obtained by pulsed laser deposition | Metal Manufacturers Ltd |
| Philip Laird | | | Greenhouse gas reductions from mainline track upgrading and competitively neutrality | Rail Access Corporation of NSW |
| Hua Kun Liu | Miles Apperley | R Zhao | Reduction of Heat Leak of High Tc Superconducting Current Leads | Metal Manufactures Ltd |
| Peter McLennan | Len Storlien | Peter Howe | Docosahexaenoic acid metabolism, the essential fatty acid in cardiac muscle and skeletal muscle function? | Clover Corporation |
| John Norrish | Paul Cooper | | Assessment modelling and control of breathing zone fume exposure in fusion welding | Welding Technology Institute of Australia |
| Brendon Parker | Tara Chandra | | Direct hot processing of microalloyed steel strip from thin cast slabs | BHP Integrated Steel |
| Rei Safavi-Naini | | | Secure Compression Systems for Digital Images | Motorola Australian Research Centre |
| Jennifer Seberry | | | Elliptic curve generation and analysis for elliptic curve public key cryptosystems | Motorola Australian Research Centre |
| Wee King Soh | | | An investigation on efficiencies for the pickling process in steel production | BHP Steel Products, Coated Steel Research Laboratories |
| David Steel | | | Estimation and inference for household surveys | Australian Bureau of Statistics |
| Julie Steele | Nigel Taylor | | Brassiere design and active women | Berlei Australia |
| Janice Turbill | Brian Cambourne | | The relationship between teacher professional learning, Classroom practice, and student outcomes in early literacy development | Broken Bay Catholic Schools Office |
| Mark Walker | | | Development of a recombinant oral vaccine against porcine enzootic pneumonia | Bioproperties Ltd NSW Agriculture |
| Colin Woodroffe | Brian Jones | Bryan Chenhall | Sedimentation in the Minnamurra River estuary | Dept of Land and Water Conservation, Wollongong |
| Alan York | Robert Whelan | | Sustainability of fuel-reduction burning regimes in commercial Blackbutt forests | State Forests of New South Wales |

Large

| Project Title | Chief Investigator | 2nd Named Investigator |
|---|--------------------|------------------------|
| Social exclusion in NSW: causal processes and prevention strategies | Stephen Castles | Ellie Vasta |
| Investigation of internal and external membrane resistances in crossflow microfiltration for water treatment. | Hagare Dharmappa | |
| Investigation of Growth Mechanism and Flux Pinning in Spiral-Grown Bi-High Temperature Superconducting Single Crystals. | SX Dou | Josip Horvat |
| Multiple isotope determination of atmospheric trace gas budgets. | David Griffith | Stephen Wilson |
| Prehistoric cultural landscapes of the Keep River region, Northern Territory: archaeological and geographic approaches | Lesley Head | Gerald Nanson |
| Development of quasi-static granular flow theory with an application to underground rock caving design | Jim Hill | |
| Patterns and processes of current internal mobility in China, with a focus on Minority Nationalities | Robyn Iredale | |
| The activation and catalytic mechanism of the plant carbon-fixing enzyme, rubisco | Ross Lilley | |
| Cryogenic Deformation and High TcPhase Formation-Partial Decomposition of superconducting Tapes | Hua Kun Liu | Bernhard Zeimetz |
| Communication technology for nonviolent struggle | Brian Martin | |
| Power supply process interactions and control of metal transfer in the metal arc welding process | John Norrish | Chris Cook |
| Maximum likelihood inference for aggregate data | David Steel | |
| A general method for analysing social data for modifiable geographical areas | David Steel | |
| Plant-animal interactions in relation to fire patchiness | Robert Whelan | Louise Rodgerson |

Summary

Social exclusion refers to a situation in which individuals or groups cease to be full citizens due to multiple forms of disadvantage, such as segregation in poor areas, unemployment, lack of educational opportunities, poor social amenities and exposure to crime. Social exclusion particularly affects certain ethnic minorities. Australian research has so far concentrated on analysis of statistical indicators of exclusion. This project will carry out qualitative research in three differing areas of NSW, in order to understand the processes which cause social exclusion, and to seek strategies to alleviate such processes.

Cross-flow microfiltration (CFMF) is an interesting treatment technology as it can remove most of the pollutants present in water and wastewater, including harmful bacteria. However, the membrane fouling remains as the major impediment in their widespread application. Although several researchers have investigated the cake deposition on the surface of the membrane, no many research works have focused on the internal clogging of a microfiltration membrane. Proposed study focuses on the quantification of the internal clogging of the membrane and attempts to model the same using granular filtration models. Also, this study proposes a methodology for optimal design of a membrane process, which can be used for practical designs.

The aim of the proposed research is to investigate the new growth mechanism and the influence of the associated screw dislocations on crystal characteristics of doped and un-doped $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_y$ and $\text{Bi}_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_y$ monocrystals. Comparative studies between differently grown crystals grown using different procedures, including complex flux technique, co-doping, nanorod inclusions and irradiation, will lead to a better understanding of the pinning behaviour of Bi-based HTSCs. It is expected that the outcome of the research will be the identification of methods for introducing effective pinning centers into Bi:HTSC in order to raise the critical current density to a level suitable for applications.

Our understanding of the budgets (i.e. sources, sinks and transformations) of many atmospheric trace gases must be improved for the evaluation and effective management of climate change issues such as the greenhouse effect and ozone depletion. To address this need, we will apply new techniques developed in our research group for the simultaneous high precision determination of both the concentrations and all major stable isotope ratios for four key trace gases (CO_2 , CO, CH_4 and N_2O) using infrared spectroscopy. This multi-isotope, multi-species characterisation of air will provide major improvements in global and regional trace gas budget determinations.

Our objective is to understand longterm Aboriginal cultural landscapes - both physical and symbolic - in the Keep River region, NT. We integrate archaeology, ethnography, geomorphology, rock art studies and biogeography in order to explore relationships between the changing environment, the archaeological record and human marking of the landscape. This project will help Australians understand relations between Aboriginal people and specific places, and will advance international theoretical debates about long term hunter-gatherer interactions with environment.

The theory of flowing granular materials remains controversial and there does not presently exist a reliable numerical algorithm which accurately models their behaviour. The purpose of this project is to develop a nonlinear density-development continuum mechanics model for industrial granular flows in the quasic-static regime, and specifically to study the flow of granular materials in underground stopes. The project proposes to develop a robust numerical scheme capable of modelling many industrial processes involving granular materials

The project is focussing on internal mobility of China's Minority Nationalities since the introduction of economic reform in 1978. In particular, the study is analysing the level of mobility of Minority Nationalities compared with that of the majority Han and the relationship between internal migration and education, employment, skills transfer, society and identity. The research will contribute to both Chinese Government policy and theories underpinning the relationships between migration, social integration, ethnic identity and modernisation.

Rubisco, a plant leaf enzyme, fixes atmospheric carbon dioxide into organic carbon. This project seeks to better understand why the catalytic performance of rubisco is poor and how the accessory protein, rubisco activase, is able to restore function to inactivated rubisco. The specificity of rubisco for substrates will be studied using chemiluminescence and inhibitors. Work will commence on determining the structure of rubisco activase, to help reveal its function. Better knowledge of rubisco is required for its future improvement by protein engineering, which could underpin major gains in crop productivity.

This proposal presents two novel concepts: cryogenic process and high T_c phase formation-partial decomposition for processing high temperature superconducting (HTSC) materials. The aim of this project is to investigate the mechanism of these two processes and the effect of these two unconventional approaches on microstructure, critical current density (J_c) and flux pinning behaviour of Ag-clad $\text{Bi}(\text{Pb})\text{SrCaCu}$ tapes. The associated critical issues including the formation mechanism of $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10}$, Pb distribution and Ag addition in the precursor powder will also be addressed and clarified through comparative studies on various forms of the same HTSC compounds. A new approach will be proposed by taking advantage of cryogenic process, 2223 formation-partial decomposition and hot deformation.

- 1) The study of communication technology for nonviolent struggles develops a pioneering fusion of the two scholarly fields of nonviolence and technology studies.
- 2) The project involves investigating a number of communication media—the post, radio, television, telephone, fax and computer networks—to assess their relevance to nonviolent struggle. The findings will be used to determine what specific measures can be taken to adapt, promote or develop communication technology to serve the purposes of nonviolent struggle.
- 3) The project is based on an original approach to the theoretical task of assessing the social shaping of technology

It is aimed to establish an understanding of the interaction between transient electrical phenomena and metal transfer mechanisms which take place in both gas and self shielded metal arc welding processes. These processes predominate in the welding of common engineering materials and it is known that improved control of metal transfer will provide higher weld quality, improved productivity and enhanced occupational safety. In the proposed work the metal transfer events will be identified using high speed data acquisition. Adverse transfer phenomena will be identified and corrected using novel modelling techniques, high speed electronically controlled power sources and fast feedback control.

Standard statistical analysis of unit level (eg person) relationships typically requires data to be available at that level. In many cases data are only available in aggregate form for groups of units (eg postcode areas). This project will develop a general statistical theory and new methods that can be used to analyse unit level relationships using group level data. This will lead to the development of generalized methods and software which can be applied to unlock a vast amount of data to researchers. A significant improvement in methods of social, health and geographical analysis will occur as a result.

The results of analyses based on areal units are only applicable to the particular set of units used, severely limiting the significance of the research. This project will develop and evaluate methods that will allow researchers to analyse data for areal units to make valid inferences about relationships that are not specific to the particular set of areal units used. This will involve a substantial contribution to social science methodology and increase the range and usefulness of analysis of spatial social data that can be carried out, leading to a significant change in methods used in social and geographical analysis.

Ecological processes are strongly influenced by interactions that occur in and around patches of vegetation. All fires are patchy, yet very little is known of the ecological consequences of patchiness at different scales. Herbivory and seed predation in burned vegetation are predicted to be greater around large unburned patches of vegetation, and pollination and seed dispersal are predicted to be reduced in small unburned patches. This study will compare the intensity of plant-animal interactions within and surrounding small and large unburned patches of vegetation, in a set of wildfires and controlled fires, and assess the management implications

Fellowships

| Applicant | Title | Summary | |
|---------------------|---|---|---|
| Phillip R England | What role does the stored seed bank and fire history play in determining effective population size? | Inbreeding and loss of genetic diversity threaten the survival of small populations. These processes occur in proportion to the effective population size. This idealised measure is often different to the census size of a population. It is important to determine the relationship between the two if genetic threats to small populations are to be minimised. The relationship in plants is complicated by the seed bank, which buffers a population against genetic drift and inbreeding. This study will determine how effective population size relates to established plant population size, seed bank size and the fire history in a threatened, fire-adapted plant | Australian Postdoctoral Research Fellowship |
| Peter Innis | Electrochemical processing and process control system development for the production of water soluble conducting polymers | Conducting electroactive polymers (CEP's) have shown great promise but a major impediment to their use has been their lack of a convenient processing technique that produces materials with consistent properties. This project will investigate the electrochemical processing of novel water soluble CEP's using electrochemical flow cells and process control systems. Fundamental aspects of electrochemical polymerisation will be modelled with the aim of establishing a generic control technology to facilitate the synthesis of novel polymers. This technology will provide the synthetic flexibility needed to produce CEP's with tailored properties. | Australian Postdoctoral Research Fellowship |
| Hua Kun Liu | Processing and applications of high Tc superconducting Ag-clad Bi(Pb)SrCaCuO tapes | This ARC SRF proposal presents a number of novel concepts: cryogenic process, high Tc phase formation-partial decomposition and continuous tube filling and forming technique for processing high temperature superconducting (HTSC) materials. The aim of this program is to investigate the underlying mechanism of these processes and the effect of these two unconventional approaches on microstructure, critical current density (Jc) and flux pinning behaviour of Ag-clad (Bi(Pb)SrCaCu tapes. As an example of HTSC applications, a study of the feasibility of applying HTSC magnet technologies to applications in the mineral separation industry will be carried out. | Australian Senior Research Fellowship |
| Dr Karen Joy Miller | Evolutionary and ecological implications of small-scale population structuring in reef corals | This study will use genetic technology, in combination with ecological experiments, to describe the small-scale population structure in reef-building corals and to understand the processes which maintain that structure. I will examine the extent and scale of gene flow as mediated by gamete and larval dispersal in four species of coral which have contrasting reproductive strategies. The results from this study will be central to estimations of effective population sizes of the four coral species and will be a fundamental component in the management of Australia's coral reefs and for the conservation of genetic diversity. | Australian Postdoctoral Research Fellowship |

REIF

| Chief Investigator | Title | \$ Received |
|--------------------|--|--------------|
| John Carver | High-field NMR spectroscopy of bioactive molecules, biological macromolecules and synthetic polymers | \$570,000.00 |
| SX Dou | Multi-layer thin film deposition facility using pulse laser ablation | \$400,000.00 |
| Margaret Sheil | Animal Holding and Testing Facilities for Ecological and Biological and Physiological Research | \$520,000.00 |
| Mark Wilson | Confocal microscope facility for biological and biochemical research | \$150,000.00 |

Can exercise really reverse the ageing process?

There is ample scientific proof to show that ageing results in a slow deterioration of our ability to perform physical activities.

For example, most older people find they can no longer participate in strenuous exercise, while some even find it more difficult to undertake routine household and gardening duties.

There is also ample evidence that this change in function may not simply be an acceleration of the ageing process associated with trends to a more sedentary lifestyle. Will a short duration exercise program partially reverse the effects of ageing — in particular in the control of blood pressure and heart rate?

Researchers at the Department of Biomedical Science at the University of Wollongong (UOW) and the University of Sydney are now investigating the relationship between:

- Ageing and inactivity on physical function and performance
- And determining if blood pressure control and heart function can be improved with supervised short-term exercise

Researchers at both universities will be studying the effects of exercise on blood pressure and heart control. Those taking part in the study are Mr Herb Groeller (UOW), Dr Greg Bennett (Sydney), Associate Professor Glen Davis (Sydney). These scientists are seeking volunteers from the community to take part in this project. They are specifically interested in healthy non-smoking, sedentary males aged between 18 to 35 years and 55 to 75 years of age.

The project involves a comprehensive study of the heart. Tests will be performed on heart function, blood pressure and general fitness with results from these tests provided and interpreted at no charge to all participants in this research. Participants will then be able to attend a supervised progressive 20-week training program at the Department of Biomedical Science at the University of Wollongong.

People wishing to take part in, or find out more information, about this research should contact Mr Herb Groeller at the Exercise Science and Rehabilitation Centre on (02) 42-21 3057 (business and after hours).

Australia-Korea workshop to target manufacturing technology

A senior University of Wollongong academic will lead a team of eight Australians to Korea in April to help pinpoint strategic opportunities in the manufacturing technology sector between the two countries.

The Australian convener, Professor Peter Robinson, who is the Deputy Vice-Chancellor of the University of Wollongong, said the accent on the bilateral workshop would centre on steel processing.

For this reason, members of the delegation to Korea from 6 to 9 April include key researchers connected to BHP.

Professor Robinson said the workshop was aimed at developing an understanding of the R&D and commercial imperatives in each country, to develop organisational and individual relationships leading to joint development projects and to arrange research staff exchanges.

The workshop is sponsored by the Australian Academy of Science, the Academy of Technological Science and Engineering and the Korean Science and Engineering Foundation (KOSEF). It will be held in the Pohang Institute of Technology (POSTECH) and the Research Institute for Advanced Studies.

The Australian Academy and KOSEF will initiate reports to their respective governments on the outcomes of the workshop.

Before his appointment as Deputy V-C at the

University of Wollongong, Professor Robinson was Chief, CSIRO Division of Manufacturing Technology. He has also held positions as Director, Invetech Operations Pty Ltd, Group General Manager, Technical, with Metal Manufactures; Research Associate in Metallurgy, Massachusetts Institute of Technology, USA and Senior Research Officer, John Lysaght Ltd (Newcastle).

Professor Robinson is Deputy Chair of the Australian Research Council and Chair of the University/Industry Research Collaborative Committee.

Others on the delegation are: Professor Rian Dippenaar (University of Wollongong and Director of the BHP Institute for Steel Processing and Products); Professor Hugh Brown

(Professor of Coatings Technology, BHP Institute for Steel Processing and Products); Professor Peter Hodgson (School of Engineering and Technology, Deakin University); Professor David Young (School of Materials Science and Engineering, University of New South Wales); Professor Ian Henderson, Co-operative Research Centre for Materials Welding and Joining, University of Adelaide; Professor Grier Lin, (Director, Centre for Advanced Manufacturing Research, University of South Australia) and Dr Laszlo Nemes (R&D Manager, Manufacturing Systems and Automation, CSIRO Manufacturing Science and Technology).



Professor Peter Robinson

Web re-enrolment program

• From Page 5

The University's Academic Registrar, Ms Gillian Luck, said about 20 per cent of UOW's students were from overseas and many have experienced difficulties in re-enrolling by the deadline because of postal delays.

"We have also found that southern Sydney students have also benefited especially students with children who are delighted they can save time and money by not having to travel," Ms Luck said.

The service also gives instant online feedback, eliminating lengthy administrative delays in processing applications, and it gives students an automatic copy of their timetable, solves timetable clashes and the trouble of leafing through a thick manual.

Ms Luck said in future the University hoped to offer the service to new enrolling students, for online fee payment, communication with lecturers and tutorial enrolment.

She said the web technology had allowed the University to compress its processing time and therefore extend its deadline for re-enrolment by a further two weeks beyond the normal deadline. Students were able to re-enrol on the web from 22 December.

There has been a stream of positive comments about the new program when students were provided with the opportunity to comment via the web.

Students re-enrolling on the web are also in the running to win a desktop computer when the prize is drawn in March.

The re-enrolment web page address is <http://www.uow.edu.au/student> (then open the hyperlink to Online Services).



The University of Wollongong team (from left): Gene Awyzio, Michael Conlan and Julian Douglas.

Students' international success in Limbo competition

Three University of Wollongong students have proved to be hot competitors in a new computer language competition open to university and college students in the United States, Canada, Taiwan and Australia. The students, Gene Awyzio, 32, Julian Douglas, 24, and Michael Conlan, 33 took out second place in Inferno's first Limbo championship. Entrants had to learn a new language called Limbo, then use it to write a program for the Inferno operating system developed by Lucent Technologies in the US.

The competition was won by a team from the University of Sydney, who had spent almost five months devising its rapid application development tool, called Hades.

Successful Wollongong student Ms Gene Awyzio said team members were astounded by their success, and considered it to be a reflection on the teaching skills of university staff.

The team was drawn from the Institute of Electrical and Electronic Engineers (IEEE) campus branch. Their prize-winning entry was an academic tool that could store references in a database so that they could then be extracted and put straight into a report or thesis.

Ms Awyzio, who is studying for a masters degree in telecommunications engineering, said: "We entered mainly to get some experience in taking things that aren't really well known and trying to come up with a product, which is what engineering is about."

She said that it had taken two days to be able to understand the operating system, and then three days to do the programming.

The tool would be useful in an academic environment where conference papers or journal papers were being written.

"The goal is to eventually develop it into an online note-taking system so people can type notes as they are reading, keep track of them, and search for information by keyword," she said.

Entries were judged on the effective use of the Limbo programming features, overall application design, use of Inferno Namespace capabilities, code footprint and program performance from an end user point of view.

The students' prize was a Philips Internet screen phone valued at \$US649.

University Council opposes government push for voluntary student unionism

The University of Wollongong's supreme governing body, Council, has voted to reject a Federal Government proposal to introduce voluntary student unionism on university campuses.

Council has voted to:

- Recognise the University of Wollongong Students' Representative Council (SRC) as the democratically elected voice of students at the University, to ensure that students are properly and adequately represented;
- Support the principle of universal student organisation membership as the best way of ensuring that students' interests are represented and that appropriate services are provided at this University;
- Ask the Vice-Chancellor to convey Council's resolution on this matter to the Australian Vice-Chancellors' Committee (AVCC) and the Federal Minister for Education.

Council was told that the government was acting on a 1998 election promise to guarantee "freedom of association" on university campuses and provide all students with a choice about whether they wish to belong to a student organisation.

The AVCC, university staff and students at Australian universities have opposed the legislation maintaining it could put at risk the services available to students and have a negative impact on student life in general.

The Vice-Chancellor of the University of Wollongong, Professor Gerard Sutton, has publicly condemned the proposed legislation arguing that the student unions are not 'unions' as most people interpret that word.

He said the student unions were primarily service providers and that 95 per cent of compulsory student service charges were to provide fundamental service facilities on university campuses. These include child care, counselling, sports facilities, food halls, housing and employment assistance, concerts, clubs and societies.

Wollongong should capitalise on billions needed for gas pipelines

The Illawarra region has a golden opportunity to capitalise on the billions of dollars needed to be spent on new natural gas pipelines over the coming decade, according to a materials welding expert.

Professor John Norrish, who is the Co-operative Research Centre Professor of Materials Welding and Joining at the University of Wollongong, believes Wollongong could play a pivotal role as the first of the new pipelines will be constructed from Longford in Victoria to Sydney via the Illawarra.

Professor Norrish said the replacement cost of the Australian pipeline infrastructure exceeded \$100 billion and many pipelines were approaching, or have already exceeded, their design life. It is presently forecast that about \$7 billion of new natural gas pipelines will be built over the next 10 years.

The natural gas transmission pipelines exceed 14,000km and a recent report by the Australian Gas Association predicts an additional 11,000km will soon be built.

The Welding Technology Institute of Australia, in collaboration with the Co-operative Research Centre for Materials Welding and Joining, and the Australian Pipeline Industry Association conducted two major events in early March.

The first International Conference on Weld Metal Hydrogen Cracking in Pipeline Girth Welds was held on 1 and 2 March and was followed on 3 and 4 March by a Technology Demonstration Forum at a Coniston site recently acquired by the University.

The forum was part of the OzWeld Technology Support Centres Network Project, launched 12 months ago by the Welding Technology Institute of Australia, as a means of increasing industry access to appropriate welding technologies. The aim is to strengthen Australia's manufacturing, fabrication, construction and repair industries.

The forum provided industry members the opportunity to see demonstrations of the latest pipeline welding techniques — mechanised, semi-automatic and manual including hybrid processes — from overseas and Australian companies.

Professor Norrish took the opportunity at the forum to highlight the latest research being carried out by his centre including a \$600,000 program over the next two years.



• Professor John Norrish . . . forum at Coniston provided industry the opportunity to see the latest pipeline welding techniques.

UOW and Metal Manufactures win energy award

• From Page 1

Professor Tim Beales of Metal Manufactures Ltd, who is also Visiting Professor at the ISEM, will lead the project.

Professor Beales said although the generic HTS coils fabricated in the program could form components in a range of electrical power equipment (including transformers, fault current limiters and motors) the program would concentrate on fabricating two initial prototypes.

The first will be a 100 kVA HTS transformer coil, which will have the same power rating as that currently in use in the NSW distribution system transformers. The project will allow Metal Manufactures the opportunity to develop HTS coils with low current losses and to design new transformer cores using the laminated iron strip currently used in Australia.

A second prototype to be developed is an HTS superconducting magnetic energy storage device.

Professor Beales said this would serve as an example of how to facilitate the use of renewable energy-generating technology by allowing the continuous supply of power from discontinuous renewable sources (such as photovoltaics and wind) and to improve the quality and energy efficiency of the electricity supply by smoothing out short-term power fluctuations.

Metal Manufactures Ltd is commercialising its HTS products using the marketing network and capabilities of its Kembla Wire and Rod division based at Port Kembla in NSW. As a world-class producer of copper and aluminium rod and wire products, Kembla Wire and Rod view the commercialisation of HTS products as a key component of their strategy to maintain and improve its business position.

Metal Manufactures' General Manager Operational Services, Mr Bill Ferrier, said his company was proud to receive the award.

"It demonstrates the national leadership of Metal Manufactures Ltd in this area and further cements the alliance with our strategic partners at the University of Wollongong.

"The successful outcomes of the project will help maintain Metal Manufactures' significant position in the race to commercialise HTS products," Mr Ferrier said.

The University of Wollongong is at the forefront of HTS research among Australian universities. It possesses world-class HTS research and development facilities at the Institute of Superconducting and Electronic Materials under Professor Shi Xue Dou.

The Institute is equipped with over \$2 million worth of specialist equipment including advanced metallurgical processing machinery and state-of-the-art electro-magnetic characterisation equipment.

UOW's Power Quality Centre, led by Professor Chris Cook, has received considerable long-term funding from Integral Energy to carry out research and standards development work in power quality.

It also has several major contracts with electricity distributors, generators and users around Australia. It has built up substantial large-scale test equipment which can supply and monitor most aspects of the performance of power engineering equipment up to 200 kW capacity.

Key Aboriginal scholars participate in international conference

About 120 international and national delegates converged on the University of Wollongong on 10 February, including key Aboriginal scholars, for a conference entitled *Compr(om)ising Post/colonialisms*.

The conference began with a traditional Aboriginal Smoking Ceremony (usually only performed at sacred initiations) followed by welcoming addresses from Barbara Nicholson of the Wodi Wodi Tharawal people; the Vice-Chancellor, Professor Gerard Sutton and the Dean of Arts, Professor Anne Pauwels.

Convened by Dr Gerry Turcotte of the Centre for Research into Textual and Cultural Studies, the conference broached the politically sensitive issues of colonisation and scientific racism.

Aboriginal scholar, writer, educationalist and inventor, Dr Eric Willmot, presented the first keynote address. Other keynote talks were given by Professor Diana Brydon, of Guelph University and Professor Helen Tiffin, of the University of Queensland.

The first general session featured award-winning author and historian Dr Ruby Langford Ginibi. A Bundjalung Elder and Aboriginal



activist, Dr Ginibi is the recipient of a Human Rights Commission Award in Literature.

Internationally acclaimed screenwriter and playwright, Louis Nowra, and the director of the award winning film, *Radiance*, Rachel Perkins, introduced and discussed their film at a special screening.

Days two and three of the conference also included a permanent multi-media display in the

foyer of the McKinnon Building and other activities involved a fibre art demonstrations in basket, net and mat work and an exhibition opening at the Wollongong City Gallery convened by the Lord Mayor of Wollongong, Councillor David Campbell.

The South Coast's world-renowned Doonooch dancers perform at the opening of the conference.

New Shoalhaven Campus on target

The University of Wollongong is on target for its first intake of about 200 students by 2000 at the new Shoalhaven Campus as well as the new Access Centres at Batemans Bay and Bega.

Construction work is now under way at Nowra for the \$14 million joint venture between the University, the Illawarra Institute of Technology and local councils.

Students will be enrolling at the start of the academic year in 2000 at Nowra and at Batemans Bay and Bega, according to the Vice-Chancellor, Professor Gerard Sutton.

A Kiama company, M.C. Harold & Associates, were the successful tenderers for the project at Mundamia, near Flat Rock Dam, about 3km to the west of Nowra off the Yalwal Road. The Nowra Local Aboriginal Land Council in the Shoalhaven has lifted a State Land Claim over much of the site after discussions with the University and Shoalhaven City Council about the proposed plans for its use. This action opened the way for the NSW Minister for Education to then acquire this 67 hectare site.

Shoalhaven City Council will contribute about \$3m to site infrastructure costs, with TAFE and the University contributing to building costs. The University has received a Commonwealth Capital Development Grant for this project.

The first step in the campus development has been the formation of the South Coast Educational Network (SCEN) which aims to deliver quality higher education services to the South Coast right down to the Victorian border. SCEN is a genuine partnership between the University of Wollongong, the Illawarra Institute of Technology, the New South Wales Department of Education and Training (DET) and the three Local Government Areas on the South Coast — Bega Valley, Eurobodalla and Shoalhaven. All parties are making significant contributions to the establishment of the network.

The University will offer a full Bachelor of Business and Bachelor of Arts, as well as selected first year subjects in other degrees.

Surgical probe for cancer patients

• From Page 1

Professor Rosenfeld and the Managing Director of Gammasonics, Dr Carl Munoz-Ferrada have been invited to Italy, Lebanon, Malaysia, New Zealand and the Philippines to lecture and demonstrate the probe and promote the new Master of Medical Physics at the University of Wollongong.

A recently submitted National Health and Medical Research Council (NH&MRC) grant application involving Gammasonics is directed to support further development of medical radiation detection instrumentation based on scintillators and fibre optics.



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