



**THE AUSTRALIAN NATIONAL UNIVERSITY**

**FACULTY OF ENGINEERING AND  
INFORMATION TECHNOLOGY**

**ANNUAL REPORT 2002**

## HIGHLIGHTS

2002 was an outstanding year for the Faculty in a number of areas. In international enrolments, the Faculty achieved a 64% increase, and income from external funding increased to a total of \$3.487m (or 39% of the total Faculty income). Our students continued to excel with three graduating students achieving a University Medal.

There were a number of key staff appointments including the appointments of Professor Mick Cardew-Hall as Head, Department of Engineering, and Mr Paul Melloy as Manager, Student Services.

Mr Robert Gresham was awarded the University Medal for General Staff Excellence, and Dr Alistair Rendell was appointed as Sun Lecturer by Sun Microsystems.

7 academics were promoted, including 2 to level B and 3 to level C. Andres Cuevas and Matt James were promoted to Level E.

Professor Andrew Blakers delivered the prestigious National Institute Lecture at the National Museum.

Major developments in the teaching programs included revisions to the Bachelor of Engineering Program, thus significantly increasing its flexibility. The Masters of Engineering was approved for introduction in 2003 and attracted 6 enrolments. Combined degrees in Arts/It and IT/Law were approved for introduction in 2003. The first cohort of students graduated from the Bachelor of Software Engineering program.

## STATEMENTS OF ACHIEVEMENT AGAINST STRATEGIC DIRECTIONS IMPLEMENTATION PLAN

1. *To create a stimulating and challenging educational experience for all our students*

Both Departments held extensive planning sessions resulting in major changes to the BE program and changes to the first year program in BIT and BSE.

2. *To be recognized as a leading research Faculty both Nationally and Internationally*

Outstanding research success - \$3.487 m in external income (39% of total income), 12 new ARC grants won to commence in 2003, 34% of ANU linkage grants

3. *To create a supportive environment to develop all staff to their full potential*

Maintained support for a wide range of academic and general staff activities including conference attendance, general training courses in information literacy programs and specialized training courses in the university's student and financial management systems.

4. *To seek appropriate partnerships and alliances both academic and business*

Developed concept of Industry Alliance and actively pursued a range of linkages with major universities overseas.

5. *To diversify our funding base*

External income now forms 39% of total.

6. *To maintain our outreach activities to ensure that the Faculty is widely known and favorably perceived*

Members of the Faculty visited every regional college between Armidale and

Albury and every ACT school more than once. The Student Services group conducted a very successful Careers Night, Robocup competition, and Open Days.

7. *To ensure that all of our administrative processes are efficient and effective*

The Faculty actively participated in the Review of Administration and continues to strive to improve its student administration processes.

#### **BUDGET PERFORMANCE**

The Faculty finished 2002 with a modest operating surplus. This, together with the cash carried forward from 2001, allows the Faculty to enter 2003 in a good financial position.

#### **GENDER EQUITY PERFORMANCE**

The Faculty continues its efforts to recruit female academics to its staff and the percentage of female academics has now risen to 15%. The numbers are higher for general staff, with 34% of general staff positions occupied by women.

In relation to students, the proportion of female students in single and combined degrees in 2002 was 19.5%. The Faculty has a number of initiatives to encourage the participation of female students. For example, it operates a multifaceted "Women in Engineering and Information Technology Network" program. Externally the program aims to disseminate information to female students in high schools and colleges highlighting the disciplines of engineering and information technology as viable career options, and to encourage female students to continue to achieve in the areas of mathematics and physics. Internally the program's objectives are to strengthen ties with industry with a focus on women in engineering and information technology disciplines, to maintain communication with alumni and their employers and to ensure a learning environment that encourages women to reach their full potential exists within the Faculty

The Women in FEIT Network coordinates a series of programs for current students. The lunchtime seminar program invites alumni to present a short talk on their achievements in industry. Speakers in 2002 included Tamsin Tapley, a BIT graduate from ANU, now a consultant with SMS Consulting, and Ayesha Razzaq, an ANU BE graduate now at ACTEW AGL working as an Energy Market Consultant.

A scholarship and financial support program is offered through the network. Julia McDonald and Jennifer Simon were recipients of the Women in First Year scholarships. Gyanam Sadananda, a final year BE student, was sponsored to represent the Faculty at a "Women in Technology" conference held in Canberra in October.

#### **SIGNIFICANT ACHIEVEMENTS IN RESEARCH AND TEACHING**

##### **DEPARTMENT OF COMPUTER SCIENCE**

##### **Research**

Research on algorithms by Brendan McKay and Weifa Liang has produced several publications of the highest quality for many years. This area has recently achieved a large external grant from the Australian Research Council (\$520,000 over 5 years) and another ARC grant of \$50,000. The group is expanding to include three research students and a research fellow, enabling Professor McKay to devote himself full-time to research as an ARC Professorial Fellow.

The areas of computational science, high performance computing and parallel systems also have a long history in the department. Regrettably a long running research relationship with Fujitsu Laboratories of over more than 11 years came to an end in 2002. However, the research group has continued and expanded its interests to encompass parallel computing architecture, systems, computational applications, systems, and data mining. Its activities are supported through funding from ARC industrial linkage grants with Sun Microsystems and Gaussian, and with the NSW Department of

Health. The award of two ARC postgraduate research scholarships and an ARC research fellowship for 2003 will further strengthen research in these areas.

The arrival of Steve Blackburn in May 2002 as a Research Fellow in high performance programming language systems is expected to lead to the development of a research group in this important and highly productive area.

The Department contributes fractions of two research programmers to the ANU Internet Futures infrastructure and research group, which is giving researchers access to the Grangenet high speed research network backbone through access grid nodes, one of which is in the CSIT building. The Department is also a major participant in the Smart Internet Technology CRC jointly with RSISE Computer Sciences Laboratory.

### **Teaching**

The first cohort of the 4-year Software Engineering program graduated in 2002. The program was introduced in 1999 to meet the software industry's need for better-educated software creators and managers. The degree was accredited by the Institution of Engineers, Australia in 2001. The program had an initial cohort of more than 40 students, most of whom will graduate in early 2003, and achieved the planned intake level of over 50 students in 2002. The program includes an introduction to fundamentals of computer science and software in courses that are in common to the 3-year Information Technology programs, going on to the most recent technologies and practices in the advanced years, and includes a major component of industry-related project work.

After seven years of extremely rapid and stressful growth the Department's first year student numbers fell slightly for the first time in 2001, and again in 2002 (back to the 1999 level, but still some 40% above the 1994 level). The very public dot.com crash in the world's sharemarkets, and the visible drop in employment in the IT industry have had similar,

and worse, effects across all Australian universities and many overseas universities. Despite this, the number of international students entering our programs actually increased, thanks to the Faculty's own recruiting efforts. In addition, to meet students' wishes to combine their IT qualification with other university studies, combined degree programs in Arts/IT and IT/Law have been approved and publicised to start in 2003.

The Graduate Diploma and Masters programs in IT(eScience), supported for 3 years by the DEST Science Lectureships Initiative, had 27 students enrolled in 2002 and is now generating significant student income, sufficient for the programs to become self-supporting. The number and quality of applications for 2003 indicates further growth. The quality of the program is high and its graduates are nicely placed to meet both industry and research needs.

## **DEPARTMENT OF ENGINEERING**

### **Research**

The Department continues to perform well in terms of research output and grant success. 33 journal articles and 22 conference papers were published during 2002. In addition there were 11 ongoing ARC research grants and 8 successful applications for Discovery, Linkage and LEIF grants to start in 2003. The department continues to work closely with industry, particularly Ford Motor Company, Origin Energy, Solahart, BP Solar, Specialty Group and Aerosond on a range of funded projects. Total research funding for 2002 exceeded ~\$2.67M. The Department, in collaboration with Deakin University, also contributed to the successful \$6M bid for the establishment of the Victorian Centre for Advanced Material Manufacturing (VCAMM).

Significant milestones for the Centre for Sustainable Energy Systems were:

- ▶ the announcement of the "Sliver" solar cell, which was developed over the past 2 years. The cell is being commercialised by Origin Energy;

- › the commencement of a program to construct a 300m<sup>2</sup> Combined Heat and Power Solar (CHAPS) system project for the Bruce Hall extension in collaboration with Rheem/Solahart and with funding from the Australian Greenhouse Office (due for completion in 2004); and
- › the recommissioning of the “Solar Big Dish”.

Another milestone for the Advanced Manufacturing and Production Systems Group (AMPS) was the implementation of the Simpress knowledge capture system at the Ford Motor Company’s Geelong Stamping Plant. This was developed out of research activities in the Department under the ongoing STAMP research collaboration. The implemented system enabled lessons learnt during the launch of the new Ford Falcon to be captured and intelligently searched in a quest for shorter production lead times.

### Teaching

Major revisions to the undergraduate BE program were approved for commencement in 2003. These revisions give students a high degree of flexibility within the program and have allowed the introduction of majors. Combined with the existing combined degrees, the Department now has a consistent and attractive undergraduate offering.

A new degree program, a Master of Engineering, was approved during the year. This one year program will commence in 2003 and planning is well underway for its delivery.

The undergraduate engineering students continue to form a cohesive group on campus. The Engineering Students Association organised many social events culminating in the successful Engineering Ball. This social interaction is an important aspect of life within the Department.

December saw the Department’s Formula SAE team compete at Carrum Downs against an international field of 19 teams. This year the car was a completely new and radical composite monocoque design which the team built from scratch and achieved an overall result of 6<sup>th</sup>.

This was a great outcome for the team in its second year. A team also represented the University at the SAE Aero West Air Plane Design and Build Competition in California USA. They came 15 out of an international field of over 40 University teams.

### STUDENT NUMBERS

In 2002 the Faculty had a total of 1099 students enrolled in its undergraduate and postgraduate programs, including combined degrees. This included 182 international students. There was a total of 1048 undergraduate students and 51 postgraduate students. The total load taught by the Faculty was 619 EFTSU. There was a growth in total students of 10% over 2001. International students grew by 64%.

**Table 1: New enrolments in single and combined course programs as at 31 March 2002**

|                  | Engineering |           | Computer Science |            | Total      |
|------------------|-------------|-----------|------------------|------------|------------|
|                  | F           | M         | F                | M          |            |
| <b>Postgrad</b>  | 1           | 7         | 1                | 8          | 17         |
| <b>Grad Dip</b>  |             |           | 2                | 6          | 8          |
| <b>Undergrad</b> | 21          | 68        | 43               | 133        | 265        |
| <b>Total</b>     | <b>22</b>   | <b>75</b> | <b>46</b>        | <b>147</b> | <b>290</b> |

### MAJOR PRIZES, HONOURS, AWARDS (STAFF AND STUDENTS)

#### STAFF

#### Council Medal for General Staff Excellence

Gresham, Robert

#### STUDENTS

#### University Medallists

Doshi, Sachin  
 Radlinski, Filip  
 Williams, Michael

#### National Undergraduate Scholarship

Hahn, Katrina  
 Trench, Monica  
 Wilson-Brown, Timothy

**ANU Honours Scholarship**

Cheung, Adrian  
Fletcher, Andrew  
Pounds, Paul  
Price, David  
Rowlands, Thomas  
Vedi, Jetta  
Weatherhead, Peter  
Williams, Michael

**ANUTECH Lisa Brodribb Scholarship for Women in Engineering**

Webster, Anne

**ANUTECH Scholarship for First Year Engineering**

Tan, Hong Keong Kevin

**ANUTECH Scholarship for Second Year Engineering**

Webster, Lyndelle

**ANUTECH Scholarship for Third Year Engineering**

Anderson, Michael

**ANUTECH John Morphett Scholarship for Fourth Year Engineering**

Styles, Millicent

**Boeing Australia Scholarship for Third Year Engineering**

Chan, Michael

**Boeing Australia Scholarship for Fourth Year Engineering**

Sainsbery, Ian

**Centre for Science and Engineering of Materials Prize**

Doshi, Sachin

**Dean's Prize**

Carter, Michael  
Cheung, Adrian  
Doshi, Sachin  
Gretton, Charles  
Heaney, Warwick  
Nguyen, Mimi  
Radlinski, Filip  
Styles, Millicent  
Williams, Michael

**Dean's Scholarship in Engineering for Second Year**

Mills, David

**Dean's Scholarship in Engineering for Fourth Year**

Doshi, Sachin

**FEIT First Year International Scholarship**

Goy, David  
Tan, Yeou Jian  
Yap, Huei Ee

**FEIT First Year Women's Scholarship**

McDonald, Julia  
Simon, Jennifer

**Glenn Dickins Engineering Scholarship**

Engel, Nicholas

**Institution of Electrical and Electronics Engineers Prize**

Williams, Michael

**Institution of Mechanical Engineers Frederic Barnes Waldron Best Student Prize**

Williams, Michael

**Institution of Mechanical Engineers Project Prize**

Brambley, Galan

**Institution of Radio and Electronics Engineers (Canberra Division)**

Williams, Michael

**International Student Engineering Scholarship**

Teh, Yee Harn

**Mastech Asia Pacific IT Equity and Merit Scholarship**

Elliott, Crystal

**Paul Thistlewaite Memorial Scholarship**

Walker, Emma

**Telstra Enterprise Solutions Scholarship**

Carter, Michael  
Gretton, Charles

## GRANTS AWARDED IN 2002

- 2002 *Abstract Machines for Parallel Functional Programming Languages*, (**C. Baker-Finch**), FRGS, \$7.6K
- 2002 *Combined Solar Systems Domestic Trial*, (**A. Blakers**), SEDA, \$117.5K
- 2002-2006 *Commercial Solar Concentrator Systems (for Electricity and Hot Water)*, (**A. Blakers**), RECP, \$1M
- 2002 *Investigating the Use of Active Shape Models (ASM), to Analyse and Quantify Manufacturing Forming Force-Displacement Signatures for Process and Quality Control* (**Cardew-Hall**), FRGS, \$19K
- 2002 *Parallel Techniques for High-Performance Record Linkage*, (**P. Christen**), ANU Industry Collaboration Scheme Seeding Grant, \$20K
- 2002-2003 *Lifetime Studies of Metallic Impurities and Precipitates in Multicrystalline Silicon Solar Cells*, (**A. Cuevas**), AGJRCs, \$18K
- 2002-2004 *Advanced Physics and Characterisation of Silicon Materials and Devices*, (**A. Cuevas**), ARC Discovery Grant, \$247K
- 2002 *Solar Thermal Power* (**K. Lovegrove**), ACRE, \$5K
- 2002 *Construction of X4-Flyer and Hover Control using Visual Data*, (**R. Mahony**), FRGS, \$14.6K
- 2002-2006 *Practical and Theoretical Aspects of Structure Enumeration* (**B. McKay**), ARC Discovery Grant, \$516K
- 2002 *Bunyip II: Developing a Cost-Effective Node Architecture for Cluster Computers*, (**P. Strazdins**), FRGS, \$18.2K

## FUTURE DIRECTIONS

The recruitment of 4 new academic members of staff in Engineering will bring it up to its full complement, last seen in 1998. This will further enhance its research and teaching capability.

The new undergraduate course structure in Engineering will provide a flexible and rewarding program for students. The new ME program promises to provide an avenue for growth and expansion of activities. As new staff join, a major focus will be recruitment and enhancement of PhD programs to provide a balanced portfolio of Departmental activities. Overall, the outlook for Engineering is bright.

In contrast, anticipated weak employment prospects in the IT industry over the next two years is expected to translate into continuing weakness in student demand and a reduction in new student enrolments. This downturn can be addressed through marketing efforts highlighting the viability of IT as a career choice, despite occasional fluctuations in marketplace demand. To counter the drop in enrolments, more aggressive recruitment of local and international students, with more flexible first year entry (allowing mid-year entry to more programs, for example), is planned. It is also planned to make more combined degrees available.

Conversely, there are indications that the same industry weakness will lead to an increased interest in graduate programs as a means of enhancing skills and strengthening employment prospects. As a result, strong enrolments in the Master of IT(eScience) and in the projected new Master of Software Engineering program are anticipated.

In research Computer Science is moving to further improve the level of participation, with a very much improved intake of PhD students in 2003; seeking of research grants, particularly with industrial linkages, will be more aggressively pursued and collaborative project work with the SmartInternet Technology CRC will be consolidated and participation increased.