
Department of Computer Science
University of Cape Town



Annual Review 2002

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CONTEXT

Mission

As its primary mission, the Department of Computer Science endeavours to develop and impart knowledge and skills in the field of computer science.

Vision

The Department of Computer Science strives to be a department of the first rank in both an international and an African context, sustaining

- ❖ high respect for its research and post-graduate education;
- ❖ excellence in teaching in order to produce graduates who possess the skills that are needed wherever decision making or creative thinking takes place; and
- ❖ an influential role in industry and the Information Technology community.

Role

The Department of Computer Science has a multi-faceted role with responsibility to

- ❖ produce graduates with knowledge and skills relevant to both the International and the South African Information Technology community;
- ❖ carry out innovative research which adds to basic understanding;
- ❖ produce service courses and provide research assistance in the fields of science and engineering;
- ❖ provide services to Industry through technology transfer and applied research;
- ❖ take an active part in the academic and governance affairs of the University;
- ❖ provide opportunities and support for students from disadvantaged backgrounds to realise their potential; and
- ❖ promote, support and advise schools in the teaching of Computer Science Technology.

HIGHLIGHTS

Inaugural Postgraduate Mini-Conference

The department launched a new initiative to afford all post-graduate students the opportunity to present their ongoing research to peers in a conference environment. The mini-conference adopted typical conference procedures, with a rigorous peer review process to give students the experience of participating at all levels. The inaugural conference was held at the CITI Bandwidth Barn and was well attended by students and staff, as well as representatives from industry partners and government.

Staffing

In mid-2002, the existing vacant position was filled by Ms A. Potgieter, whose research interests include artificial intelligence, complex adaptive systems and agent and component technologies.

In accordance with the new staff allocation scheme approved by the Science Faculty in 2001, the department embarked on a recruitment campaign for 2 new staff members to begin work in 2003. The Science Faculty also extended a merit-based appointment to Ms M. Kuttel, an existing Ph.D. student in the faculty, who chose to join the computer science department beginning in 2003.

Innovation Fund

The Department is involved in two prestigious Innovation Fund research projects. The Innovation Fund was established by the Department of Arts Culture Science and Technology to provide significant funding for applied research. The two projects are LODOX, which is developing a low-dosage x-ray system, and CAVES, which aims to develop authoring tools for Virtual Reality Systems.

STAFF AND THEIR ACTIVITIES

Staff of the Department

The staff complement in 2002 was as follows:

Professor and Head of Department:

K.J. MacGregor, BSc Strathclyde MSc Glasgow

Professors:

E.H. Blake, BSc (Hons) Wits PhD London

P.S. Kritzinger, MSc (Eng) Wits PhD Waterloo

Associate Professors:

S. Berman, BSc Rhodes, MSc PhD Cape Town

G. Marsden, BSc(Hons) PhD Stirling

Senior Lecturers:

J. Gain, MSc Rhodes PhD Cantab

M. Linck, MSc PhD Cape Town

P. Marais, MSc Cape Town DPhil Oxon

Lecturers:

D. Cook, BSc (Hons) Cape Town

A. Potgieter, MSc Pretoria

K. Malan, BSc (Hons) Cape Town

Part-Time Lecturers:

N. Jones, BSc Cape Town

Industry Advisor:

T. Papenfus, BSc (Eng) Wits

Computer Systems Managers:

S. Chetty, MCP

M. West

Administrative Assistant:

M.L. Wood

Senior Secretary:

S. Solomons

Laboratory Assistant:

B. Sam

Part-time Research Assistant:

E. Gill

Hosted Visitors

The department was pleased to host the following visitors during the course of the year:

- A/Prof. Shaun Bangay, a computer graphics researcher from Rhodes University.

- Prof. Stan Budkowski, of the Institut National des Télécommunications in France.
- David Cairns, an AI researcher from the University of Stirling in Scotland.
- Susan Dray and David Segel, editors of the ACM SIGCHI Interactions journal.
- Joe Konstan, editor of SIGCHI bulletin and HCI professor at University of Minneapolis.
- Gary Olson, the Fitts Professor of Human-Computer Interaction at University of Michigan.

Collaboration and Dissemination

Local Conferences

- Prof. Berman presented a paper at the WWW 2002 conference held at the University of Stellenbosch.

International Conferences

- Prof. Blake attended the SIGCHI Development consortium in Minneapolis in April and presented a paper on the Cybertracker system.
- Prof. Blake presented a paper at the Virtual Story telling conference in September in Bonn.
- Prof. Kritzinger attended the TOOLS 2002 conference.
- Prof. Kritzinger participated in the 22nd IFIP WG 7.3 International Symposium on Computer Modeling, Measurement and Evaluation.
- Dr Marais attended the SIGGRAPH '02 conference in San Antonio, where he presented a talk to promote the Afrigraph organisation and conference.
- Prof. Marsden attended a South African SIGCHI development consortium at the CHI conference in Minneapolis in April, funded by the ACM.

Other Visits Abroad

- Prof. Kritzinger visited London and Imperial College, for discussions with collaborators and colleagues, including Dr W. Knottenbelt (DNA collaborator), Prof. Peter King (co-member of IFIP WG 7.3 and ex-colleague), Prof. Murray Woodside (Carlton University), Prof. H. Beilner (University of Dortmund), Prof. R. Puigjaner (Spain) and Dr Adrian Conway.
- Prof. Marsden was funded by Microsoft to attend a course in embedded technologies at MSR Cambridge and was given a small development grant from them.

Professional Activities

The Department's staff have the following affiliations and professional associations:

- Prof. Berman served as external examiner to the Computer Science Department at the University of the Western Cape and as an evaluator for the National Research Foundation.

- Prof. Blake was a member of: ACM; Computer Society of the IEEE; CSSA; Eurographics Association; and SAICSIT. He served as external examiner for Rhode's Computer Science Department. Also, he contributed to the ISET SETA in drawing up of a curriculum for Software Engineering (mainly for DCOM's IT training institute in Grabouw).
- Mr Cook was Chair of the South African Computer Olympiad and Coach of the South African Olympiad team.
- Dr. Gain was a member of the ACM and the Computer Society of the IEEE. He was appointed co-chair of the forthcoming Afrigraph conference. Afrigraph (International Conference on Computer Graphics, Virtual Reality and Visualisation in Africa) is an international conference sponsored by ACM and the Eurographics Association.
- Prof. Kritzinger continued to act as an evaluator for the National Research Foundation. He retained his membership of IFIP Working Groups 6.1, 6.3 and 7.3 and continued to be Associate Editor responsible for Computer and Software Engineering of the SAIEEE Transactions.
- Prof. MacGregor retained his membership of IFIP Working Group 2.4.
- Dr Marais was appointed treasurer of the Afrigraph organisation, a capacity in which he played in active role in ongoing organising of the conference series.

UCT and Departmental Activities

- Prof. Berman served on the UCT Quality Assurance Working Group, which had as its brief the formulation of a quality assurance system. Prof. Berman also served on the Science Faculty's Postgraduate Students Committee, Employment Equity Committee, Library Committee, IT Working Group and Programme Committee for Mathematical, Physical and Statistical Sciences; as well as chairing the Information Technology Programme Committee and serving on the Dean's Advisory Committee.
- Prof. Blake served on the Science Faculty's Accreditation Committee, the IT Programme Committee and the IT Working Group.
- Mr Cook was an IT Programme Student Advisor in the Science Faculty and served on the Physical Planning Committee, IT Programme Committee, was chair of the SCILAB Committee and served on the Faculty IT committee.
- Dr Gain served on the IT Programme Committee as well as CUES (Committee for Undergraduate Education in Science).
- Dr Linck was an IT Programme Student Advisor in the Science Faculty and served on the following Committees: the Science Faculty Advertising and Marketing Committee and the Engineering Faculty Academic Administration Committee. Dr Linck was also the Computer Science representative to the Engineering Faculty.
- Prof. MacGregor served on the Promotions and Merit Awards Committee, the IT Programme Committee, the Faculty Examinations Committee and the Dean's Advisory Committee
- Ms Malan continued work on CUES (Committee for Undergraduate Education in Science) where she chaired a sub-committee on the Evaluation of Teaching. She was also a member of the IT Programme Committee, the Programme Management

Committee, a member of the board of CHED (Centre for Higher Education Development) and a member of the GIS Research Unit.

- Dr Marais was on the IT Programme Committee and CUES (Committee for Undergraduate Education in Science).
- Prof. Marsden served on the university ICT Users Group (ICTUG) and the faculty IT committee.

RESEARCH

Research Funding

Research funding of R625 000 was granted to the Department by the NRF for 2002. These awards were part of various NRF programmes and funded research in multiple core areas within the department. The Telkom/Siemens Centre of Excellence (COE) was jointly funded by industry and the THRIP programme, each contributing R277 824 towards the venture. Further funding was secured from Microsoft Corporation (R196 700) and SANPAD (R189 900). The combined funding for research within the department amounted to R1 629 248, representing a greater than 50% increase from the previous year. In addition, the CAVES innovation fund project is worth R10M over a period of three years.

Departmental Projects

Collaborative Visual Computing Laboratory

The CVC laboratory is involved in many diverse research areas, with projects in virtual environments, usability, computer graphics and image processing. Joint work was done with two local firms. Regional academic cooperation is continuing: with UWC.

During 2002, the group graduated 4 MSc students (Jinsong Feng, Cathryn Johns, Richard Southern and John Williams). The lab continues to grow, with 20 postgraduates in 2002.

The lab has moved from expensive SGI graphics solutions to more cost effective and efficient PC systems. This move is in keeping with an emerging trend at other institutions and has had a positive impact on research activities.

Centre of Excellence

The Centre of Excellence (CoE) in Asynchronous Transfer Mode & Broadband Networks and their Applications was established in 1997. It is supported by Telkom, Siemens and the Department of Trade and Industry (through the THRIP programme). The objective of the CoE is to promote research and development in broadband technologies and their applications; to train postgraduate students and professionals in the expertise required in this field of telecommunications; and to promote the empowerment of previously disadvantaged communities, striving to increase the numbers of South African black and female students.

The CoE makes a significant contribution to our ability to build up infrastructure for teaching postgraduates and for research. In this it fills a gap other funding bodies and UCT cannot address due to lack of funds.

Data Communications

The DNA Group consists of Professor Pieter Kritzinger, Neco Ventura in Electrical Engineering at UCT and Dr Andrew Hutchison, a previous graduate of the group and now working for industry, as team members. The DNA Laboratory specialises in the security, correctness analysis, performance analysis, design, specification and modelling of stochastic concurrent communicating systems (SCCS) in general, and telecommunication systems in particular.

Persistent Object Systems

Dr Berman was principal grant-holder in an Object Database Technology initiative, which is concerned with enhancing programmer productivity and system reliability in long-lived applications. This project was funded by the NRF, under their Competitive Industries theme.

CAMA

Over the past 6 years, the Contemporary African Music & Arts Archive (CAMA) has been based within the department. CAMA's underlying long-term goal remains the acknowledgement of creativity in the African cultural sphere. CAMA's multi-media research projects include the exploration, digital documentation and the dissemination of high quality multimedia materials on African music, art and ethnography.

Within the department a number of students are engaged in visualisation, graphics and database projects based on or related to the CAMA model.

MSc and PhD Students

The following is a list of graduates and their thesis topics (the supervisor's name is given in parentheses).

MSc graduates

1. Feng, Jinsong. *Visualization of ATM Virtual Path Connection*. (Edwin Blake)
2. Johns, C. *The spatial learning method: facilitation of learning through the use of cognitive mapping in virtual reality*. (Edwin Blake)
3. Schulz, M. *Garbage Collection of the Java Object Store*. (Sonia Berman)
4. Southern, R. *Quality Control Tools for Interactive Rendering of 3D Triangle Meshes*. (Edwin Blake and Patrick Marais)
5. Williams, J. G. (coursework and dissertation) *Extraction of Surface Texture Data from Low Quality Photographs to Aid the Construction of Virtual Reality Models of Archaeological Sites*. (Edwin Blake) **Distinction**
6. Yang, S. *Using Programming Tools in Virtual Environments*. (Gary Marsden)

A list of the remaining post-graduate students, with their thesis topics and supervisors, follows.

PhD students

1. Hallot, M-L. *To Design, Aid in the implementation of, and Demonstrate an effective User Interface applying Non-Traditional Ideas of Storyboarding for interacting with Virtual Reality* (Edwin Blake)
2. Malan, K. *Simultaneous Visual Querying of Certain and Uncertain Data* (Gary Marsden)
3. Nirenstein, S. *Visibility Pre-processing for Interactive Virtual Environment* (Edwin Blake)
4. Semwayo, D. *A Conceptual Model for Environmental Data Integration* (Sonia Berman)
5. Tucker, W. *Social Amelioration of Bridged Communication Delay* (Edwin Blake)

6. Welz, M. *Host-Based Intrusion Detection* (Andrew Hutchison and Pieter Kritzinger)
7. Winnemoeller, H. *Visual Shortcuts: Exploiting Visual Perceptual Phenomena to Improve Rendering Quality and Performance* (Edwin Blake)

MSc students

1. Burford, D. *Real-Time Facial Animation for Avatars in Collaborative Virtual Environments* (Edwin Blake)
2. Chibesakunda, M. *A Methodology for Analyzing Power Consumption in Wireless Communication Systems* (Pieter Kritzinger)
3. George, B. *Secure Wireless Communication* (Ken MacGregor)
4. Hamza, S. *Virtual Stories of AIDS: The Use of Narrative in Virtual Reality as an Intervention in a Virtual AIDS Support Group* (Edwin Blake)
5. Hendricks, Z. *Authoring Tool Generation for Collaborative Virtual Environments* (Edwin Blake)
6. Lesoana, M. *Interactive Storytelling* (Edwin Blake)
7. Lewis, J. *Multimodal Media Bridging using Instant Messaging* (Edwin Blake)
8. Lifson, F. (Pieter Kritzinger)
9. Lyness, C. *Perceptual Depth Cues, in Support of Limited Angle CT Data Diagnosis* (Edwin Blake)
10. Maclay, D. *An Optic Flow Approach to Painterly Rendering of Dynamic Environments* (Edwin Blake)
11. Marte, O. *Model-based Segmentation and the Detection of Bone Fractures* (Patrick Marais)
12. Neeser, R. *The Use of Spatial Deformation for Correcting Taphonomic Distortions in Fossilized Hominid Crania* (James Gain)
13. Perkins, S. *Shape Reconstruction from X-ray Data* (Patrick Marais)
14. Steyn, B. *Topology Alteration Of Meshes Using Directly Manipulated Free-Form Deformations* (James Gain)
15. Tangkuampien, J. *Intuitive User Interfaces for Non-professional Virtual Environment Authors* (Gary Marsden and Edwin Blake)
16. Walters, L. *Traffic Modeling for Mobile Communication Networks* (Pieter Kritzinger)
17. Wong, B. *Using Access Information in the Dynamic Visualisation of Websites* (Gary Marsden)
18. Yang, S. *Using Programming Tools in Virtual Environments* (Gary Marsden)

MPhil students

1. Nunez, D. *A Connectionist Explanation of Presence in Virtual Environments* (Edwin Blake)

Honours Projects

As usual, the Honours projects produced some excellent work. The following projects were tackled:

1. A visual query tool for wineries (Stanford Mogotsi, Vaughn Vadachalam)
2. Accelerating ray shooting through aggressive visibility pre-processing (Adrian Sharpe, Matthew Hampton)
3. African Music Query System (Gavin Bennette, Liesl Radloff)
4. An investigation of the effects of meditation in a story telling virtual environment (Cara Winterbottom, Ilda Ladeira, Sarah Brown)
5. Attack Modelling, Code Generation and Performance Analysis in a Multi-dimensional Security Protocol Engineering Environment (Chris Veldman, Simon Lukell)
6. Chatterbox: Case study in Engineering concurrent communicating systems (Marshini Chetty, Jesse Landman, Michael Marconi, Oksana Ryndina)
7. Customizing Digital Libraries for small screen devices (Dyna Patel, Nessen Ramsamy)
8. Data weaver: Web-Authoring tool for relational database driven websites (Wayne Hanslo, Craig Lotter)
9. Dynamically Linked Accounts (Pitso Tsibolane, Dane Bezuidenhout, Graham Withey)
10. Efficient storage and querying of XML (Milesh Bhana, Sylvia Khabele, Malesela Tlhotse, Greeshma Gulab)
11. Tool-based approach to virtual sculpting (Ilan Angel, Alvin Chang)
12. Using a PDA to control virtual environments (Marc Bosma, Andrew Cousins, Richard Schroder)
13. Weblife: Learning, Collaboration and Pseudo-Anonymity in an Online Isometric Environment (Riko Eksteen, Adi Eyal)
14. Wireless Application Middleware (Bonnie Lam, Nadim Yazdani, Nico de Wet)

Publications

Journals

1. Marsden, G. and Jones, M. (2002). "Ubiquitous Computing and Cellular Handsets— are menus the best way forward?", in South African Computer Journal, Vol. 28, pp. 67-74 (Re-publication of SAICSIT 2001 paper).
2. Marsden, G., Gillary, P., Thimbleby, H. and Jones, M. (2002). "The Use of Algorithms in Interface Design", in International Journal of Personal and Ubiquitous Technologies, Vol. 6(2), pp. 132-140.
3. Bause, F. and Kritzinger, P. (2002). Introduction to Stochastic Petri Net Theory. [2nd edition], Vieweg Verlag, Germany, in the series Advanced Studies in Computer Science, ISBN 3-528-05535-9.

4. Kritzinger, P. and Yavwa, Y. (2001). "Investigating cost effective communication systems alternatives in developing regions", in *The Electronic Journal on Information Systems in Developing Countries (EJISDC)*, Vol. 6, December 2001, ISSN 1681-4835.
5. Nirenstein, S. Blake, E., Winberg, S. and A.~Mason. (2002) "Hierarchical level of detail optimisation for constant framerate rendering of radiosity scenes", in *South African Computer Journal*, Vol 29, pp. 32--40, December 2002. ISSN 1015-7999.
6. Marte, O. and Marais, P. (2002). "Model-based Segmentation of CT Images", in *South African Computer Journal*, Vol. 28, pp. 54-59, ISSN 1015-7999.

Conference Proceedings: International

1. Buchanan, G., Jones, M. and Marsden, G. (2002). "Exploring Small Screen Digital Library Access with the Greenstone Digital Library" *Proceedings of the 6th European Conference on Research and Advanced Technology for Digital Libraries, Rome, Italy, September 2002, LNCS 2458, pp. 583-596, Springer.*
2. Marsden, G., Cherry, R. and Haefele, A. (2002). "Small Screen Access to Digital Libraries of African Art," Short Paper presentation, *Extended Abstracts ACM CHI 2002, pp. 786-787.*
3. Kritzinger, P. , Davies, I. and Knottenbelt, W. (2002). "Symbolic Methods for State Space Exploration of GSPN Models", in *Proceedings of the Conference on Modelling Techniques and Tools for Performance Evaluation, T. Field et al., London, Springer-Verlag, pp. 188-199, ISBN 3-540-43539.*
4. Nirenstein, S., Blake, E. and Gain, J. (2002). "Exact From-Region Visibility Culling", *Rendering Techniques 2002: 13th Eurographics Workshop on Rendering, 26-28 June 2002, Pisa, ed. P. Debevec & S. Gibson, ACM Press, pp. 191-202. ISBN 1-58113-534-3.*

Conference Abstracts

1. Bhana, M., Gulab, G. Khabele, S., Tlhotse, M. and Berman, S. (2002). "Querying XML Documents on the Web", *WWW2002 – 4th Annual Conference on the World Wide Web, 4-6 September 2002, Cape Town.*
2. Bhunu, S., Ruther, H. and Gain, J. (2002). "Three-dimensional Virtual Reality in Urban Management", *ISPRS Commission VI Workshop: Developments and Technology Transfer in Geomatics for Enviromental and Resource Management, 25-28 March 2002, pp. 201-204.*
3. Hanslo, W., Lotter, C. and Berman, S. (2002). "Website Generation from Relational Databases", *WWW2002 – 4th Annual Conference on the World Wide Web, 4-6 September 2002, Cape Town.*
4. Lewis, J. A., Tucker, W. D. and Blake, E. (2002). "Softbridge: An architecture for building is based bridges over the digital divide", in *Proceedings of South African Telecommunications and Networking Application Conference (SATNAC 2002), Champagne Sports Resort, Kwazulu-Natal, 1-4 September 2002, p. 18.*
5. Marsden, G., Malan, K., Hendricks, Z. and Tangkuampien, J. (2002). "Using Digital Technology to Access and Store African Art", *Development Consortium Presentation and Poster ACM CHI 2002 Extended Abstracts, pp 528-529.*

6. Walton, M., Marsden, G. and Vukovic1 V. (2002). "Visual Literacy as Challenge to the Internationalization of Interfaces: A study of South African student web users", Development Consortium Presentation & Poster ACM CHI 2002 Extended Abstracts, pp 530-531.

Technical Reports and Other Publications

1. Hugo, J., Marsden, G. & Walton, M. (2002) "CHI 2002 Development Consortium: A South African Perspective", SIGCHI Bulletin (September/October), pp. 4 & 10.
2. Marsden, G. (2002) "Subverting Technology: Meeting User Needs in a Developing Economy", SIGCHI Bulletin (March/April), p. 8.

Invited Colloquia

Several colloquia were held during the year. These were attended by staff and senior students from several departments at UCT, as well as interested people from the computer industry.

- Simulating an acoustical environment with binaural technology - investigations of binaural recording and synthesis
Pauli Minnaar (Aalborg University, Denmark)
- Modern Techniques in 3D Game Design
Neil Mason-Jones (Independant Games Consultant)
- Data Integration for Software Engineering Tools
Timothy Lethbridge (University of Ottawa, Canada)
- The Engineering of Emergence in Complex Adaptive Systems
Anet Potgieter (University of Pretoria)
- Measuring Quality of Interaction within Bridged Communications Systems
Bill Tucker (University of the Western Cape)
- Collaboratories to Support Distributed Science: The Example of International HIV/AIDS Research
Gary Olson (University of Michigan, U.S.A.)
- Computer Graphics in the Entertainment Industry
Martin Reiser (Frauenhoffergesellschaft, Bonn, Germany)
- E-learning, Illustration and Metacognition
David Kirsh (Department of Cognitive Science, University of California - San Diego)
- The Wits Firewall Project
Scott Hazelhurst (School of Computer Science, University of the Witwatersrand)
- From Interoperability to Componentization: The OAI and ODL Approaches to Building Digital Libraries
Hussein Suleman (Virginia Tech)

DEPARTMENTAL EQUIPMENT AND FACILITIES

Existing Equipment

The Department maintains a network of UNIX and Windows based systems which are available for use by senior and graduate students. First year computing facilities are provided by the Science Faculty. The value of the current senior/graduate equipment base exceeds R2M. The available equipment includes:

Servers

17 Machines running a variety of operating systems (FreeBSD, OpenBSD, WindowsNT, Windows2000, Windows2003) that provide Web, email, domain, file, print, research and other services to the department as a whole.

Workstations

200 Workstations comprising of Unix and Windows operating systems, including Network Computers with simultaneous Unix and Windows operating systems on the desktop, notebook computers and high-end Intel XEON and AMD based systems.

Printers/Scanners/cameras/projectors

6 network laser printers, 2 high-resolution scanners and a range of digital cameras.

Science First Year Laboratory

The Department is the major user of 150 Windows PCs in this laboratory.

The current undergraduate student-to-machine ratio is about 4.5:1, which needs to be improved.

New Equipment

A number of existing machines received component upgrades.

The following new systems were purchased using a combination of Departmental and research funds:

- ❖ 16 Intel Pentium 4 based systems for the Honours lab,
- ❖ 2 Ultra high-end Intel Pentium 4 based systems for the Honours lab,
- ❖ 2 Intel Pentium 4 based systems for the Masters Lab,
- ❖ 5 Cisco wireless Access Points were installed within the department and the lecture theatres for 11 megabit wireless access,
- ❖ 18 3Com 100baseT network switches were installed to create a switched network for optimal access to network resources, and
- ❖ 1 3Com Gigabit switch was installed to connect all central servers to the switched network.

Programs

The Department of Computer Science is a paid-up subscriber to the Microsoft Developer Network Academic Alliance program. The program allows the department and registered Computer Science students easy access to software from Microsoft.

Free and Open Source Software

The Department makes extensive use of open source software, which is available at no cost, primarily under the GPL and BSD licenses. The software is provided by the FreeBSD Project, the OpenBSD Project and a multitude of private individuals and other vendors. The types of software employed range from operating systems, to network infrastructure services, to word processing and typesetting suites.

INDUSTRY INVOLVEMENT AND DEPARTMENT PROFILE

Advisory Board

The Advisory Board is being reconstituted to better represent those parts of the ICT industry that are most closely aligned to the degree programmes in computer science. This process began in 2001, but the scope of the process has been expanded by discussions centred on structural changes in the university, such as the possibility of a closer relationship between Computer Science and Information Systems.

While such discussions continue, Tom Papenfus continues in his role as the Department's industrial advisor.

Industrial Projects and Collaboration

Staff were involved in the following industry related activities:

- Dr Marsden was involved with CITI (Cape IT Initiative) and also collaborated with AVG on e-commerce design issues.

Companies with whom joint research projects or collaborative work was undertaken or continued include:

- Cellular Dynamics
- De Beers
- NetConnect
- Siemens
- Telkom
- Visual Information Systems
- Video Labs

Equipment/Software Donations

Grisoft (<http://www.grisoft.com>) donated 315 licences of their AVG Anti-Virus version 7 product, under the AVG Anti-Virus Donation program - valid for one year.

Telelogic (<http://www.telelogic.com>) donated 8 licences of their Tau/Developer software - valid for one year.

Marketing and Advertising

The Department is pro-active in attracting students to join the IT Programme at UCT. To improve its profile and exposure to outside organisations and prospective students, the Department:

- participated in the Science Faculty Marketing and Advertising Committee. Dr Linck was the Departmental representative on this committee.

- was actively involved in the University Open Day, where its exhibit in 2002 drew a large number of prospective students; and the Schools Open Day where prospective students spent time in the computing labs and were given a series of talks on the Department and the IT Programme.
- is actively recruiting school students. Dr Linck and Mr Cook attended a number of school careers evenings during which they discussed the benefits of a career in computer science at UCT.
- maintains a Web presence which offers a window onto the activities of the staff and students. For many local and international students and companies, this is the first contact they have with the Department.

STUDENTS AND TEACHING

Student Enrollment

In previous years, enrolment in the department had steadily risen but, in 2002, student numbers in most undergraduate courses dropped, albeit marginally. Table 1 indicates enrolment figures for the past 3 years to illustrate this. In contrast, there was a significant boost in post-graduate student numbers because of the larger Honours class, indicative of a growing interest among students in specialised and advanced research-led topics in computer science.

Table 1. Final Registration Figures for 2002, 2001 and 2000

<i>Course</i>	<i>Enrollment in 2002</i>	<i>Enrollment in 2001</i>	<i>Enrollment in 2000</i>
115F	329	290	169
116S	227	210	162
110H	112	161	167
111H	63	83	38
201F	178	203	147
202S	154	185	135
302F	102	112	73
303S	108	110	64
304S	22	35	24
UGRAD TOTAL	1295	1389	1196
400/3W	37	20	19
500/1/2W	27	28	26
600W	6	6	4
GRAD TOTAL	70	54	49
TOTAL	1365	1443	1115

During the course of the year, Computer Science undertook a curriculum review to keep the syllabus aligned with the new international ACM/IEEE curriculum guidelines published early in 2002.

Results for 2002

The pass rates in the vast majority of courses have shown substantial improvement in 2002 over the previous year. The increase in first year pass rates was most noticeable compared to senior years.

A total of 110 students passed the third year major course in Computer Science, while 29 students graduated with Honours in Computer Science. No Computer Science PhD students graduated in 2002 but 6 students obtained their MSc degree. The results for all undergraduate courses are summarised in the accompanying table.

Table 2. 2002 Student Pass Rates (2001 pass rates are indicated in brackets)

Course	Wrote	Passed	Percentage Passed
115F	302	263	87 % (77%)
116S	196	183	93 % (78%)
110H	98	79	81 % (65%)
111H	57	47	82 % (68%)
117F	82	76	93 % (75%)
201F	164	150	97 % (83%)
202S	149	136	91 % (90%)
302F	103	101	98 % (95%)
303S	110	110	100 % (99%)
304S	21	18	86 % (94%)
400/3W	29	29	100 % (100%)

Academic Development

The Department continues to run an Academic Development Programme (ADP/GEPS), designed to assist talented, but under-prepared, historically-disadvantaged students who do not meet the standard admissions criteria of the University.

The students on the AD programme enrol for a four-year BSc, which includes 2 years of ADP courses, followed by the regular CS2 and CS3 courses.

A significant improvement in pass rates was noted in 2002. In general, statistics show that 20-30% of students admitted to the AD programme finally pass CS3. Given the disadvantage, on entry to UCT, of ADP students, we view this as a high rate of success.

The Programme in Information Technology

Summary

The IT programme is the largest in Science, and includes 48% of historically-disadvantaged undergraduates in the Faculty (GEPS and SCIB03 excluded). There were 57 IT graduates in

2002; among them were 7 who entered through GEPS in 1999. Progress of senior students is good; on the other hand many 1st years attracted to the programme prove unable to cope, and move to other programmes or are excluded.

Coherence of Programme

The programme has not deviated from its original design objectives of 1998; the only change in 2002 was the adaptation of the Scientific Computing stream to accommodate a 4-course Psychology major. Cross-faculty specialisation fields continued to grow in popularity.

Student Numbers in Programme

In 2002 there were 440 students registered in the IT programme (198 in 1st year, 169 in 2nd year and 73 in 3rd year). The number of 2nd years in particular was very high; surprisingly, the 3rd year IT students constituted only about 75% of the Computer Science 303S course. Gender ratio remained poor (F:M = 1:4). Equity percentages were A:C:I:W¹ = 41:14:9:36. The proportion of African students has been continually growing since programme inception (and the percent of White students decreasing). Compared to other non-GEPS Science programmes, IT remained the most attractive to African students (48% of the non-GEPS African BSc students were in the IT programme).

New Intake

There were 162 new students in 2002, compared with 123 and 114 in the previous two years. The percentages by population group A:C:I:W = 30:13:9:48. 12% of entrants were transferring in from other HE institutions; this is a relatively high proportion, as has been the case in previous years. There was also a fairly large proportion of foreign students – viz. 16% of the new IT intake. In addition, 47% of students who completed their GEPS year in 2002 transferred to the IT Programme.

Of those new IT students whose notional matric aggregate can be calculated, 21% scored an “A” (43+ points), 41% a “B” (37-42 points), 33% a “C”(31-36 points) and the remaining 5% a “D” (25-30 points). While many IT students are good at English, it is disconcerting to note that as many as 22.5% of the new intake scored a D or E in matric English. In the numeracy testing of new students, the IT programme fared better than all but the MPSS programme (SCIB14); however as many as 33.6% of the new intake obtained a “D” or “E” for Higher Grade Maths in matric, and a further 7.6% of the intake had only Standard Grade Maths.

Graduation

There were 57 IT Programme graduates in 2002, compared with 48 in 2001. Their distribution across specialisation fields was CEN:CBU:CSC:SCI² = 9:13:17:17. Of the cohort that joined the IT programme in 2000, 21% obtained their degree in 3 years (7 females, 15 males, A:C:I:W = 4:0:2:16), 23% were still registered for IT in 2003, 28% transferred to other programmes, 13% dropped out of UCT in good academic standing, and 15% were excluded. This represents deterioration over the previous cohort (i.e., 1999 intake) where 28% graduated in 3 years (with 23% graduating in 2002, in their 4th year). It is also interesting to note that the proportion of females graduating in IT is substantially higher than

¹ To enable an analysis of race group equity, the following designations are used for historical divisions: A=African, I=Indian, C=Coloured, W=White

² CEN = Computer Engineering, CBU = Business Computing, CSC = Computer Science, SCI = Scientific Computing

the proportion of females entering it (e.g., 32% of each cohort that graduated in 3 years was female).

Excellence

There were 46 IT students on the Dean's Merit List in 2002. The top 1st year student in the Faculty was in the IT Programme. Among the IT graduates, there were 7 subject distinctions and 4 students awarded the degree with distinction. Based on 2002 results, Faculty scholarships for 2003 were awarded to 33 IT Programme students, 4 of them female. Broken down by population group, these 33 are A:C:I:W = 6:3:2:22. Overall, the number of excellent results was less than in previous years, which is cause for concern.

Equity Issues

The ADP route through the IT programme is working well. In 2002, the first GEPS students graduated with an IT degree – in the minimum time of 4 years. These were 7 African students, 4 of them female. A further 12 of that GEPS-entry cohort are still in the IT programme; 4 have transferred to other programmes and 2 left UCT in good academic standing. The remaining 11 were excluded. Some of the GEPS IT graduates enrolled for Honours in 2003.