

Department of Computer Science

Research Report 2015

Head of Department: Associate Professor Sonia Berman

Departmental Profile

The Computer Science Department has two main research themes: Information and Communication Technology for Development (ICT4D) and High Performance Computing (HPC). ICT4D is a multi-disciplinary field that looks at the design and creation of computer systems for the developing world. These systems could cover any sub-discipline of computing, such as the Internet of Things, virtual environments, security, interaction design, artificial intelligence, and information retrieval. However, they differ in that design constraints for the developing world are different: power is limited, networks scarce, users may be illiterate, etc. ICT4D deals with the creation of ICT solutions that address defined developmental and social challenges like education, medical care, identity, and human dignity. High Performance Computing is an enabling technology that seeks to improve the performance of computationally intensive discipline-specific computing applications. For example, the time required to perform a molecular simulation of drug interaction might be reduced from years to months, or the production of digital 3D content may occur in real time rather than requiring minutes to generate. A major theme of HPC research is a focus on computationally intensive grand-challenge problems that would otherwise require infeasibly long times to compute a solution.

The Department hosts several research centres. The UCT Centre in ICT for Development seeks to design, create, and evaluate technologies that address the needs of the developing world, and to study the impacts of existing technology. As ICT is an enabling technology, and thus highly cross-disciplinary, this centre also includes staff from diverse UCT departments, such as Information Systems and Film and Media. The Hasso-Plattner Institute (Germany) funds African PhD students working in Computer Science as part of the Hasso-Plattner Research School in Computer Science for Africa (CS4A). The Centre of Excellence in Broadband Networks and their Applications, funded by Telkom and its affiliates, includes UCT's Communications Research Group in Electrical Engineering and the Departments of Computer Science at UCT and at Stellenbosch University. The department has also recently signed a collaboration agreement with the CSIR regarding the establishment of a node of the Centre for Artificial Intelligence Research (CAIR) at UCT. CAIR conducts research in foundational and applied aspects of Artificial Intelligence. It is based at the CSIR with nodes at a number of South African universities. The UCT node of CAIR hosts the UCT-CSIR Chair in Artificial Intelligence.

In addition, the department has several smaller research laboratories. The Collaborative Visual Computing Laboratory works in five main areas: procedural modelling, geometric compression, graphical simulation, virtual environments and computer games. The Digital Libraries Laboratory covers information storage and retrieval, including multilingual retrieval and cultural heritage preservation. The High Performance Computing Laboratory applies parallel computing technologies (especially General Purpose GPU approaches) and visualization methods to generate efficient solutions for computational problems in the areas of graphics and computational science (particularly radio astronomy and computational chemistry). The Network and Information Security Laboratory focusses on algorithms and systems for safe and secure information access.

Departmental Statistics

Permanent and long-term Contract Staff

| | |
|----------------------------------|-----------|
| Professors | 3 |
| Associate Professors | 5 |
| Senior Lecturers | 5 |
| Lecturer | 1 |
| Scientific and Technical Staff | 3 |
| Administrative and Support Staff | 4 |
| Total | 21 |

Adjunct and Honorary staff

| | |
|--------------------------|----------|
| Adjunct Professors | 1 |
| Adjunct Senior Lecturers | 1 |
| Honorary Professors | 2 |
| Total | 4 |

Students and Postdoctoral Fellows

| | |
|----------------------|-------------|
| Postdoctoral Fellows | 2 |
| Doctoral | 32 |
| Master's | 95 |
| Honours | 50 |
| Undergraduate | 1224 |
| Total | 1403 |

Research Fields and Staff

Permanent Staff

Associate Professor Sonia Berman
Head of Department; Data management

Professor Edwin Blake

ICT for Development; Human-Computer Interaction; User Experience in Games and Virtual Environments

Dr Melissa Densmore
ICTD, HCI, Health Informatics, Mobile Health

Dr Brian DeRenzi
ICT4D, ict4chw, Mobile Health, Supervisory systems, Behaviour change, Data quality, Community empowerment

Associate Professor James Gain
Computer graphics, virtual reality

Dr Mmaki Jantjies
Educational technology

Dr Anne Kayem
Information Security

Dr Maria Keet
Logic-based knowledge representation, ontology development, biological data characteristics and granularity

Associate Professor Michelle Kuttel
Computational Science; Parallel Processing; Scientific Visualisation and Design

Associate Professor Patrick Marais
Computer Graphics; Image Processing, GPU Computing

Professor Thomas Meyer
Artificial Intelligence, Knowledge Representation and Reasoning, Logic based Ontologies

Dr Geoff Nitschke
Artificial Intelligence; Co-evolution; Robotics

Professor Rob Simmonds
Parallel and distributed Computing

Associate Professor Hussein Suleman
Digital Libraries; Information Retrieval; Internet technology; Educational Technology

Scientific and Technical Officers

Mr Stephan Jamieson
Senior Scientific Officer

Mr Craig Balfour
Computer Systems Administrator

Mr Samuel Chetty
Computer Systems Administrator

Administrative and Support Staff

Ms Salegga Valley
Administrative Officer

Ms Eve Gill
Administrative Assistant

Ms Thelma Jenneker
Senior Secretary

Ms Bernie Sam
Departmental Assistant

Postdoctoral Fellows

Dr Simon Perkins
High Performance Computing for Radio Astronomy

Dr Hendranus Vermeulen
Serious Games and Gamification

Adjunct and Honorary Professors

Honorary Professor Judith Bishop
Software Engineering; Programming Languages; Distributed Systems

Honorary Professor Matt Jones
Human-Computer Interaction, Information Retrieval, World Wide Web

Adjunct Professor Andrew Hutchison
Information Security

Adjunct Senior Lecturers

Dr David Johnson
Networks, Communications

Contact Details

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