

STOP PRESS

- NICTA-enhanced PhDs Herman Gunawan, Shang Haichuan and Tuan Thi from NRL and Ilana Lichtenstein from ATP have been successful in securing highly sought-after internships at the National Institute of Informatics (NII) in Tokyo. The total number of internships awarded to NICTA PhDs by NII is now 14.
- Congratulations Peter Chubb and Gernot Heiser for winning the Best Paper Award at the 13th IEEE Asia-Pacific Computer Systems Architecture Conference for "Pre-virtualization: soft layering for virtual machines". For more information visit <http://www.ertos.nicta.com.au/publications/#ertos>
- Please join us in congratulating Xiaonan Ji, James Bailey & Rao Kotagiri on receiving the Best Paper Award at the 3rd IAPR International Conference on

BiInformatics (PRIB 2008). The paper "g-MARS:Protein Classification using Gapped Markov Chains and Support Vector Machines" was awarded the prize out of 121 submissions. Xiaonan has recently been awarded his PhD and was one of NICTA's earliest students, joining the organisation in January 2005.

- Congratulations to Dr Phil Robertson, Chief Operating Officer, for receiving an Australian Academy of Technological Sciences and Engineering (ATSE) Fellowship 2008. ATSE is an independent, non-government organisation dedicated to applying scientific and engineering knowledge to practical purposes. Fellows of the Academy are elected on the basis of their achievement in the application of science, technology and engineering to Australian life.
- Congratulations to CRL staff David Smith, Leif Hanlen, Dino Miniutti, Jian Zhang, David Rodda, Ben Gilbert for the winning the Best Paper Award – Communications Related topic at the 1st International Symposium on Applied Sciences in Biomedical and Communication

Technologies (ISABEL2008) for "Statistical Characterization of the Dynamic Narrowband Body Area Channel."

- Congratulations also to VRL staff Subhash Challa and Rajib Chakravorty on receiving the Best Paper Award at the recent Mosharaka International Conference on Communications, Computers and Applications (MICCCA 2008) held in Jordan in August. The paper, on "Auto Calibration in Drift Aware Wireless Sensor Networks using The Interacting Multiple Model Algorithm" was co-authored with UTS collaborator, Maen Takruri.
- The October nominations for the NICTA Impact Awards for operational excellence were Prashanthi Jayawardene, Joanne Nied and Alpana Lal. Congratulations all.
- ATP staff Markus Rittenbruch and Ronnie Taib grew moustaches in Mo-vement. Charlotte Brain also participated as a M-ovista. M-ovement proceeds are used to tackle men's health issues with proceeds going to Beyondblue and the Prostate Cancer Foundation of Australia.

Short Courses

Date	Title	Presenter(s)	Location
9 – 10 Feb	Modern Digital Receiver Techniques: From Theory to Practice	Prof. Bill Cowley ITR, UniSA	Kuala Lumpur
12 – 13 Feb	Modern Digital Receiver Techniques: From Theory to Practice	Prof. Bill Cowley ITR, UniSA	Singapore
16 Feb	Introduction to Tactical Data Links (TDLs). The Operator's Perspective	Mr Graham Priestnall, SyntheSys	Canberra
17 – 18 Feb	Tactical Data Information Links (TADILs)	Mr Howard Harvey, Haoi Technologies	Canberra
23 Feb	Introduction to DSP with FPGAs	Dr Abbas Bigdeli, NICTA	Adelaide
24 – 25 Feb	Systems Engineering Management	Mr Hervé Rochecouste, EC&S System	Adelaide
4 – 5 Mar	Introduction to Sonar Signal Processing	Mr Graham Mountford	Fremantle
19 – 20 Mar	Fundamentals of RF System Design and Simulation	Dr Rowan Gilmore, Univ. of Queensland	Adelaide
24 Mar	Managing Performance Risks in Service Oriented Architectures (SOA): Technology Overview	Mr Paul Brebner, NICTA Dr Liam O'Brien, NICTA	Canberra
25 – 26 Mar	Managing Performance Risks in Service Oriented Architectures (SOA) Practical Class	Mr Paul Brebner, NICTA Dr Liam O'Brien, NICTA	Canberra

If you would like to comment on anything in this edition of NICTA News or change your contact details, please email us at website@nicta.com.au. If you would like to receive NICTA News online, please register at: <http://www.nicta.com.au/subscription>



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NICTA strengthens international collaboration

It is with great pleasure that I look back on 2008 as a year full of wonderful achievements for NICTA and look ahead to an even brighter 2009. I would particularly like to highlight some of the exciting research collaborations NICTA entered during the past year as they promise to make valuable contributions to Australia's ICT innovation environment in the future.

In November, along with several other representatives from NICTA, I travelled to Singapore where NICTA has entered a new, six-month research collaboration with Singapore's A*STAR Institute for Infocomm Research (I²R). Like NICTA, it is a young organisation, established in 2002, performing R&D in information, communications and media technologies.

In this collaboration, NICTA is contributing its "go-anywhere" mobile router technology to give satellite connectivity to an innovative WiMax maritime mesh network being developed by I²R.

Singapore Harbour is the world's busiest container port, a great location for a project that aims to deliver a long-range ship-to-ship and ship-to-shore wireless mesh communication system to connect port authorities, container terminals and other ships.

In previous editions of NICTA News, I have talked about our progress in Europe as we are now part of several projects in the European Union's Seventh Framework program. I would like to deepen NICTA's involvement here and have spoken openly about my support for Australia to seek inclusion in the Eighth Framework, which is expected to start in 2013. I believe that increased and long-term support by the

Australian Government for international ICT R&D will boost Australia's innovation system significantly.

On the home front, NICTA recently announced the formation of an ICT for Life Sciences Forum, an initiative to support ICT and life sciences research communities in Victoria. This ongoing forum is sponsored by NICTA and seven other institutions interested in promoting cross-disciplinary ICT research. The first initiative was the inaugural Professor Graeme Clark oration and dinner, held in Melbourne in October.

Professor Clark delivered an inspirational address that described each stage of the development of the Cochlear ear implant. The path Professor Clark took, which connected medical and engineering expertise, demonstrated very clearly the importance of collaboration in the creation of truly innovative technologies.

Earlier the same day, NICTA's most recent technology spinout company, Monitoring Division (mdi) received \$2m in its second tranche of Series-A funding. It also shipped its first Optical Signal-to-Noise Ratio Monitor unit to a US manufacturer and opened its corporate operations centre in Melbourne. The Minister for Broadband, Communications and the Digital Economy, Senator Stephen Conroy, attended the event and praised NICTA's role as a champion of digital innovation and commercialisation.

NICTA's spirit of entrepreneurship, displayed in commercial successes like mdi, along with our willingness to foster meaningful ICT research collaborations around the world, are two of the reasons I feel so optimistic about the year ahead, despite difficult economic times.

NICTA's committed and dynamic team of researchers, students and corporate staff understand that the digital economy is not a distant vision but a living reality.

Quite simply, the digital economy *is* the economy; entrepreneurship, openness and collaboration underpin its health. I have been particularly proud of NICTA's expression of these qualities during 2008, from the launch of the "GiFi" chip in February, to last month's I²R announcement.

In this edition of NICTA News, you will also read about the latest news from NICTA's Peer to Peer project and meet Professor Penny Sanderson, who leads the Cognitive and Organisational Systems Engineering Project from our Queensland Laboratory.

There is also a story about NICTA engaging with some Year 10 students on a work experience program and the latest in our "NICTA@" series of engagements. This time, NICTA took some of its exciting research to Canon Information Systems Research Australia's offices in North Ryde. Earlier in 2008, NICTA demonstrated to Google.

I would like to take this opportunity to wish you all a happy and peaceful new year. Thanks once more for your continued support and interest in NICTA and its role in shaping the future of ICT innovation in Australia.

Dr David Skellern
Chief Executive Officer

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Dr David Skellern,
Professor Emeritus Graeme Clark
and Professor Rob Evans

Cochlear pioneer throws switch on life sciences collaboration

In October, NICTA unveiled a new cross-disciplinary initiative, the ICT for Life Sciences Forum. The Forum was established to support ICT and life sciences research communities in Victoria and is sponsored by NICTA and seven other institutions interested in promoting the connection between ICT and the life sciences.

“The ICT for Life Sciences Forum is a wonderful opportunity for NICTA to help foster ICT research collaborations in the life sciences space,” said NICTA’s Victorian Research Laboratory Director Professor Rob Evans, “The application of engineering and computing knowledge to the life sciences will help build the innovative medical systems and services of the future.”

Gavin Jennings, Victoria’s Acting Minister for Information and Communications Technology, congratulated NICTA at the launch of the event. “Life Sciences researchers increasingly rely on ICT to assist them to design, analyse and share their research. The ICT for Life Sciences Forum will promote new relationships and synergies between the two disciplines,” he said.

NICTA CEO Dr David Skellern also welcomed the Forum. “NICTA is pleased to take part in this exciting opportunity to celebrate and promote the link between ICT and the life sciences,” he said, “We anticipate achieving some real research

breakthroughs and delivering significant national benefit from current and emerging collaborations between life science and ICT researchers.”

The first Forum event was a wonderful address delivered by Cochlear implant pioneer Professor Emeritus Graeme Clark at the University of Melbourne. The event was sponsored by NICTA, the Victorian Department of Innovation, Industry and Regional Development, the University of Melbourne and the Cochlear Foundation and is the first of what will be a series of annual Graeme Clark orations.

The Forum’s foundation sponsors are: NICTA; the University of Melbourne’s School of Engineering and commercialisation company Melbourne Ventures Pty Ltd; the Bionic Ear Institute; Florey Neurosciences Institutes; Phillips Ormonde & Fitzpatrick; Austin Life Sciences and the Victorian Partnership for Advanced Computing. The Forum will hold regular seminars and presentations.

The first Forum event was an inspiring address delivered by Cochlear implant pioneer Professor Emeritus Graeme Clark



mdi opens Melbourne office & welcomes \$2m in funding

At the end of October, NICTA spinout Monitoring Division (mdi) opened a corporate operations centre in Melbourne and celebrated the receipt of \$2 million in its second tranche of Series-A funding.

The Federal Minister for Broadband, Communications and the Digital Economy, Senator Stephen Conroy, came along to the well-attended function at NICTA's Victorian Research Lab.

"NICTA has been a champion of digital innovation and commercialisation and Monitoring Division is a fine example of the achievements being made," said Senator Conroy. "The rapid progress of Monitoring Division is a positive signal for the digital economy in Australia," he added.

Monitoring Division is NICTA's most recent spinout and a pioneer in the live network health management field, recently securing its first customer and



Senator Stephen Conroy and mdi CEO David Wright

meeting aggressive hiring targets. "These key milestones are further evidence of our capacity, as a freestanding and powerful new startup, to meet critical deliverables on time and on target," said Monitoring Division's Chief Operating Officer Sarah Dods. "We're proud of our rock-solid progress in product development and our engagement with top-industry customers," added the company's Chief Executive Officer, David Wright.

Australian venture capital firm Starfish Ventures contributed \$1.75 million to Monitoring Division's \$2 million second tranche funding. Monitoring Division was officially spun out of NICTA in March 2008. It arose from the Managing and Monitoring the Internet (MAMI) Project at NICTA's Victoria Research Laboratory.

NICTA steams into Singapore

In November, a group of NICTA executives including Chief Executive Officer Dr David Skellern visited Singapore's A*STAR Institute for Infocomm Research (I²R), met with senior researchers and attended I²R's TechFest.

At the same time, NICTA announced a new research collaboration with I²R that aims to demonstrate a prototype wireless mesh network for maritime traffic.

Under a new six-month agreement, NICTA will use its "go-anywhere" router technology to supply satellite connectivity for the I²R network, which provides data and voice communications between a collection of mobile nodes on ships and land-based networks.

The network is designed to provide communications to port authorities,

container terminals and other ships using WiMax inter-ship connectivity. However, if bad weather or distance makes the connectivity unavailable, an affordable satellite capability is needed. This is where NICTA's technology has a role.

"When shore mesh nodes cannot be reached, traffic will be directed to the mesh node on a ship which has a satellite connection," explained NICTA Project Leader Dr Roksana Boreli. As standard Voice-over-Internet Protocol (VoIP) and data transport techniques don't work well with satellite communications, the mesh system will use NICTA's mobile routers to handle satellite connectivity in these cases.

This allows the traffic to reach its destination by going through the mesh either directly to shore or via the router and the satellite system.

I²R's maritime mesh technology project aims to deliver a 6 Mbps long-range (20km) ship-to-ship and ship-to-shore mesh communication system capable of ad hoc multi-hop communication with other vessels and shore command stations. It will seek to develop this system to serve multiple applications such as general voice and data communications, messaging, surveillance and navigational safety.

Human Resources irons fabric of organisation

NICTA's Human Resources (HR) department focuses on the development of NICTA staff as it partners with research programs and corporate business units to deliver outstanding research and business results. The key approach of the department is to ensure the best possible alignment between HR policies and programs and NICTA's values – the pursuit of excellence, inspiration, collaboration, openness, entrepreneurship and respect.

“Our role in NICTA is important because we are responsible for bringing together world-class researchers and professional staff and enhancing their skills to become the best in their respective fields,” says NICTA's HR Manager Joy Hsu. “We also play a role in building NICTA's culture of entrepreneurship and achievement in use-inspired basic research that will help build Australia's ICT capacity.”

During 2008, HR delivered NICTA's new performance management process. This incorporated values, core responsibilities, key performance indicators and learning and development requirements into one central system.

Various training programs were conducted for students and staff to maximise the impact of use-inspired research. NICTA launched its first Impact Awards during

Techfest in April. These awards recognise and reward employees and students who are making an outstanding contribution to NICTA's vision and values. The Awards program comprises two sections - research and operational excellence.

HR also analysed and revised the NICTA 'succession map.' Successor candidates, both internal and external, are now actively managed by the current position holder to build their skills with the support of Human Resources.

NICTA's HR department has seven staff and is headed by the Director of Human Resources, Carl Middlehurst. Each person in the team has a significant role in ensuring NICTA delivers on strategies leading to the organisation becoming an enduring world-class ICT research institute.

Joy Hsu is HR Manager, responsible for developing and managing the implementation of the HR strategy. Clarissa Endean, Senior HR Advisor handles remuneration and diversity. Natalie Cooney, HR Advisor, is responsible for HR Business Process Improvement and other HR projects. Milky Xia, HR Advisor, is responsible for recruitment and selection and OH&S. Michelle Morgan manages all aspects of payroll, timesheets, superannuation, salary packaging and leave management. Charlotte Brain is responsible for the HR team's administrative needs.



Joy Hsu,
Human Resources
Manager

“We also play a role in building a culture of entrepreneurship and achievement in use-inspired research”



Professor Penelope Sanderson: from Fortran to fame

Professor Penelope Sanderson is Project Leader for one of NICTA's newest projects, called Cognitive and Organisational Systems Engineering (COSE). She is also the Queensland Research Laboratory's Group Manager for NICTA's Making Sense of Data theme.

An internationally recognised expert in the area of cognitive systems engineering, Professor Sanderson's main focus is on the development of theories and methods to help deliver better support for people's cognitive work in complex, dynamic environments such as healthcare, process control and air traffic control.

"My field is cognitive systems engineering," explains Professor Sanderson. "I contribute to the development of theories, methods and tools that help us understand how best to design complex sociotechnical systems so that people reach their goals safely, effectively and productively."

Professor Sanderson has worked on human-system integration in air defence, nuclear power plants, radiological emergency assessment centres, hydropower schemes, air traffic control centres, intensive care units, and operating theatres. She has worked in the field of cognitive systems engineering since starting her PhD with Neville Moray at the University of Toronto in 1981.

"The Three-Mile Island accident had happened just two years before that," Professor Sanderson recalls.

"An international and highly multi-disciplinary community of researchers was reformulating the basis for understanding human-system integration in safety-critical systems, and Neville was part of that community. The area known as cognitive systems engineering emerged from their effort."

Professor Sanderson first became interested in scientific research in 1978, when she was a third-year honours student at the University of Western Australia.

"My introduction to ICT was having to program a PDP-11 so that it would rapidly generate - and present on an oscilloscope - a series of visual stimuli. My honours supervisor gave me a 10-line program in Fortran to get me started. It was up to me to learn the rest."

Recently, at The University of Queensland, Professor Sanderson led a group of researchers developing and evaluating advanced auditory and visual displays for anaesthetists. "In collaboration with Royal Adelaide Hospital, we have successfully run very logistically and technically complex controlled evaluations of advanced displays in patient simulators and in the real operating theatre," says Professor Sanderson.

Other achievements include the development of a well-known software tool called MacSHAPA, which grew from the exploration and development of a particular way of thinking about the analysis of video-based observational data. Professor Sanderson also had a major part in the introduction of an analytic technique called cognitive work analysis to the Defence Science and Technology Organisation (DSTO).

Professor Sanderson is Director of the ARC Key Centre for Human Factors at The University of Queensland where she also leads the Cognitive Engineering Research Group. She is a Fellow of the Academy of the Social Sciences in Australia and in 2004 was awarded the US-based Human Factors and Ergonomics Society's (HFES) Distinguished International Colleague Award.

Professor Sanderson received her BA (Hons I) from University of Western Australia in 1979 with the Australian Psychological Society and H.L. Fowler Prizes, her MA from the University of Toronto in 1981, and her PhD from the University of Toronto in 1985. She worked for 11 years as a tenure-track and then tenured faculty member at the University of Illinois at Urbana-Champaign before returning to Australia in 1997.

P2P plots big game plan

NICTA's Peer to Peer (P2P) research project is investigating decentralised techniques to manage networks and data so that complex applications such as massively multiplayer online (MMO) games can be delivered over the Internet quickly and cheaply.

Service providers normally use a client-server approach to provide online applications such as webcasting, video-on-demand and network gaming, often to millions of Internet users. Such rich media content can strain the network capacity and central servers are a single point of failure requiring constant maintenance.

Recently, the market for MMO games has declined. According to P2P Project Leader Santosh Kulkarni, this is partly due to the lack of maturity of client server technology. "We are focusing on a decentralised platform for MMO games," says Kulkarni. "We hope to bridge the technology gap and make virtual worlds mainstream."

The aim of the P2P project is to explore the peer-to-peer paradigm as an alternative technique for network management and content delivery. It will attempt to solve the problems of the client-server approach so that service providers can offer online services efficiently and economically.

So far, the P2P team has developed the network engine for MMO applications. Called Badmuna, the platform allows developers to host virtual worlds. In the year ahead, Kulkarni and his team hope to make the technology more robust, scalable and secure.

"We have to be able to provide the same level of robustness and security that is available in client-server format," says Kulkarni, adding, "I think the results we're getting look very positive."

The team is running commercial trials of the technology along with its industry partner, VastPark. You can follow the progress of the trials by visiting VastPark's blog posts at: www.vastpark.com/weblog/



Dr Chris Nicol and Jim Metcalfe

NICTA polishes research showcase

As part of its commitment to excellence in ICT research, NICTA has commenced showcasing some of its projects to multinational corporation R&D laboratories in Australia.

Through this outreach, NICTA hopes to foster the exchange of ideas between multinational R&D labs and NICTA researchers and to demonstrate the high calibre of NICTA researchers and students to significant centres of R&D.

We call these visits NICTA@ events and the latest was a visit to Canon Information Systems Research Australia (CiSRA) Laboratories at North Ryde in Sydney.

NICTA researchers Nick Barnes and Lars Petersson demonstrated their projects, following an introduction from NICTA Chief Technology Officer, Embedded Systems, Dr Chris Nicol. The event was hosted by CiSRA Director Jim Metcalfe. Several CiSRA researchers also presented some of their research in video processing.

NICTA Lab news

Neville Roach Laboratory

In October, NICTA and the University of Sydney jointly hosted an IEEE International Workshop on Multimedia Signal Processing in Cairns, attended by over 180 delegates.

The workshop program featured a new theme in bio-inspired multimedia signal processing as well as pattern discovery in multimedia for online video, video analysis and coding, networked multimedia security, multimedia system design and applications, data mining and depositary, etc.

Perspectives on these areas were presented in four keynote speeches delivered by Prof. H.K Huang, University of Southern California, USA; Prof. Nadia Magnenat-Thalmann, University of

Geneva, Switzerland; Dr. HongJiang Zhang, Microsoft Research Asia, and Prof. Chang Wen Chen, University of Buffalo, the State University of New York, USA.

This workshop was the tenth in a series of workshops on Multimedia Signal Processing sponsored by the IEEE Signal Processing Society. Its paper prizes are sponsored by NICTA, Microsoft Research Asia and Canon Information Systems Research Australia (CiSRA). The workshop home page is at <http://www.mmsp08.org/>

Victoria Research Laboratory

NICTA PhD student Rachel Gu has taken out the best conference paper award at the 2008 International Journal of Arts and Sciences conference.

Rachel's paper, about a new research area inside the Managing Complexity Theme, concerned the methodology for modelling and managing buildings and cities in a highly sustainable and environmentally responsible manner. It described a new mathematical modelling approach to such problems.

Year 10 students play Braccetto

During November, NICTA hosted two year ten work experience students from Marist College North Shore for a week. They spent their time working inside the Braccetto project with project leader Markus Rittenbruch.

Braccetto, meaning 'arm in arm' in Italian, is researching the principles underlying effective remote collaboration. The results of this investigation may provide new ways of supporting geographically dispersed teams involved in creative activities such as collaborative design, planning, analysis and decision making.

Markus says students Alvan Lee and Josh Caley were kept busy learning about touch-based interfaces to control real-time strategy games (RTS). One of the questions they considered was how people might play RTS games without using a keyboard.

Josh and Alvan were also introduced to the basic principles of interaction design such as prototyping and mockups. The students went on to create a mockup of a multiplayer co-located RTS game interface and ran through basic interactions using paper mockups.



Alvan Lee and Josh Caley