

NICTA NEWS

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NICTA awake and ready for ICT action as new decade dawns

Hello and welcome to the December edition of NICTA News. It is incredible that we are at the end of 2009 already!

It is with great satisfaction that I look back over the last twelve months and observe how much NICTA has matured over that time and see how vigorously it has responded to – and weathered – the global economic downturn. We hosted an incredibly successful TechFest in August, received certainty of funding all the way to 2015 in the May Budget and celebrated the graduation of our 100th NICTA-supported PhD student in June.

We now head into 2010 with an exciting research portfolio, plenty of confidence and ambitious plans to kick off the second decade of the 21st century with a real bang.

In Sydney, many of NICTA's staff will start the year at our state-of-the-art Australian Technology Park (ATP) Laboratory and Corporate Head Office, officially opened earlier this month by Senator Stephen Conroy, the Federal Minister for Broadband, Communications and the Digital Economy and the Deputy Director of the NSW Government's Industry and Investment NSW, Mr Barry Buffier.

At an event we hosted to celebrate the opening of these fabulous new premises, Senator Conroy paid tribute to NICTA's contribution to the digital economy and Mr Buffier acknowledged the high calibre of NICTA's researchers. It was a real privilege to show some of our latest research to the Federal and NSW State Governments and to share with them our plans for the future.

This future depends on our ability to deliver

ICT innovation that is of significant benefit to Australia and the world. NICTA has worked hard to forge vital international collaborations with major industry players and leading ICT research institutes, so that we can intensify the impact we have on the world stage.

These efforts are paying off in many ways: through our successful participation in European Commission Framework programs; our involvement in the US National Science Foundation's Global Environment for Network Innovations (GENI) initiative, and regular attendance at international ICT trade expos like CommunicAsia and CeBIT. In March 2010, for the first time, NICTA will have its own presence at CeBIT Hannover, the largest ICT trade fair in the world. I look forward to sharing many more international success stories with you in future editions of NICTA News.

As the year draws to an end, I'd also like to highlight the strength of NICTA's terrific education commitment. So far, we've supported more than 140 PhD students through to their graduation and I am sure that in the years ahead Australia will feel the full force of their positive contribution to the nation. Congratulations to the successful graduates and to the NICTA researchers that shared the supervision of their PhD theses. I'd also like to extend my best wishes to the 270-odd students who are currently working toward their PhDs in NICTA labs.

As Australia moves forward with the roll-out of the NBN, and as Governments and businesses learn how to better protect our environment and deliver services more efficiently, these young scholars and

entrepreneurs will become more and more important. Their talents, imagination and hard work are the renewable energy source that will fuel our future.

In the following pages, you will read about some other recent achievements from NICTA people, including NICTA's second research engagement with Singapore's I²R to build ephemeral wireless mesh networks, the InterfereX team's splendour win at the Canberra division of the Australian Engineering Excellence Awards and the Automap team's success at the inaugural Australian Computer Society Awards in Canberra. Congratulations to Bionic Vision Australia, which has just been awarded \$42 million in Federal Government funding to develop a bionic eye. Read more about this terrific news, and NICTA's role in the consortium, on page three. Congratulations also to NICTA's Victoria Research Laboratory, which has just celebrated its fifth anniversary. Well done, everyone.

Finally, I can't let the year end without acknowledging the extraordinary support given to NICTA by all of our members and partners. Thank you. To all of our readers, have a safe and happy holiday season.

Dr David Skellern
Chief Executive Officer



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InterfereX wins Australian Engineering Excellence Award in Canberra

Congratulations to NICTA's InterfereX team on winning the Canberra Division of the Australian Engineering Excellence Awards in September. The team, led by NICTA's Dr Mark Reed, won the award for an interference-cancelling modem that reduces the amount of radio interference in 3G networks with femtocells.

A femtocell is a small wireless base station that connects to the telephone network via a home or office broadband connection. Targeted at people using 3G mobile connections indoors, where they may encounter mobile coverage 'black spots', a femtocell provides significant improvements in coverage and capacity.

Last month, the InterfereX team went on to successfully demonstrate the technology in a real-time proof-of-concept test in Canberra which showed the NICTA femtocell connecting to multiple 3G devices.

NICTA InterfereX Project Leader, Dr Mark Reed, said the design was the result of many years of research and development effort. "Our unique design approach was based on discussions with industry on the need for a low-cost design capable of minimising the impact on legacy wireless infrastructure by using advanced interference cancellation techniques. Our innovative architecture and design methodology has allowed us to deliver this."



The InterfereX Team

NICTA awarded \$1.01m for advanced surveillance demonstrator

NICTA recently secured just over one million dollars in Commonwealth Government funding to develop an advanced video surveillance demonstrator for the Port of Brisbane.

The funding was awarded under the Department of the Prime Minister and Cabinet's Research Support for National Security Program. "This new funding will help us build an advanced video surveillance system at the Port of Brisbane which could then be replicated in other settings where the protection and safety of people and critical infrastructure is

important," said Professor Brian Lovell, NICTA's Advanced Surveillance Project Leader.

The new system, being developed at NICTA's Queensland Research Laboratory, will combine NICTA technologies with commercially available, off-the-shelf surveillance tools.

NICTA's contribution will include software that recognises individual faces from live video feeds and then matches them to a database, along with technology that improves the clarity of video footage taken in poor conditions, where images may be obscured by rain, dust or fog. The demonstrator will be further enhanced by NICTA's sensor network research

which will link all of these capabilities, creating a robust, superior system.

"I would like to thank the Department of the Prime Minister and Cabinet for supporting our development of this adaptable, integrated security and operations management technology," said Professor Terry Caelli, Director of NICTA's Queensland Research Laboratory, "We plan to use the funding to develop a world-leading blueprint that will help ports, combat agencies and commercial security companies to secure their personnel and assets."

ATP Lab and HQ unwrapped for Christmas

The NICTA ATP Laboratory and Corporate Head Office is officially open! Earlier this month, Senator the Hon. Stephen Conroy, Minister for Broadband, Communications and the Digital Economy, and Mr Barry Buffier, Deputy Director General of Industry and Investment NSW, spent a morning at the new facility as guests of honour at an exciting and successful launch event.

"The NSW Government built this landmark research facility to stimulate innovation and excellence in ICT research for the benefit of the state," said NICTA CEO Dr David Skellern. "At NICTA, we are playing an important role in bringing that goal to fruition, so it gives me great pleasure to welcome Senator Conroy and Mr Buffier to these wonderful premises today."

"It is a privilege to be here to celebrate NICTA's move to these stunning new facilities," said Senator Conroy. "NICTA is a world-class innovation player and helps demonstrate the great capacity for Australia to lead the world in the digital economy. This new facility will strengthen NICTA's ability to foster ICT innovation and skills, driving the development

and commercialisation of Australian technology."

Mr Buffier expressed the NSW Government's support for the growth of the state's \$360 billion economy and NICTA's role in attracting global companies to invest in the state.

"With the best scientists here at NICTA working on real world problems – Sydney's reputation as the place to come when you need to work with the best in the world will be secured," said Mr Buffier.

The new NICTA laboratory houses around 134 researchers, corporate staff and 63 PhD students in state-of-the-art, energy-efficient premises. The building was designed to support collaboration, with an open internal staircase linking three floors of offices and laboratories. NICTA was previously located in temporary space at the Locomotive Workshop in the ATP.



Left: Dr David Skellern, Mr Neville Stevens, AO (NICTA Chairman) Senator Stephen Conroy and Mr Barry Buffier.

Joint Bionic Eye project funded

NICTA has welcomed the Federal Government's announcement of \$42 million in funding for Bionic Vision Australia (BVA) to develop a bionic eye.

The BVA research group includes NICTA; the Universities of Melbourne, New South Wales, Western Sydney and The Australian National University; the Bionic Ear Institute and the Centre for Eye Research Australia.

"NICTA is proud to be a member of the Bionic Vision Australia partnership and to be making a valuable contribution to the development of a leading retinal prosthesis," said NICTA CEO Dr David Skellern.

NICTA will lead the development of the technology to deliver increased resolution of

visual acuity, which will enable the recipient to recognise faces, small objects and to read large print. The device will embody new materials and new circuit designs, will be powered and receive images wirelessly, and contain over 1,000 electrodes that will interface with tissue in the retina.

"The Australian Government's investment will help us to give and restore sight to thousands of people around the world," Minister for Innovation, Industry, Science and Research, Senator Kim Carr said.

The research is led by NICTA's Professor Stan Skafidas, Australia's leading Radio Frequency Integrated Circuit design engineer.

NICTA will also make a contribution to the consortium through its expertise in computer vision and navigation in the development of a

visual processor, which will provide benefits to patients who receive a retinal implant.

The funding was awarded under the Australian Research Council's Research in Bionic Vision Science and Technology Initiative, which was developed in response to the April 2008 Australia 2020 Summit.



Communications - NICTA's impact zone

Staging big events like Techfest, making sure NICTA has a strong professional presence at important national and international exhibitions, developing and updating the NICTA website, managing internal communications, liaising with the media – these jobs are all done by NICTA's Communications team.



The Communications team

Communications is responsible for building and communicating the NICTA brand to the outside world and for sending important messages about NICTA to the people who work here.

If NICTA is being represented at a major exhibition like CeBIT, the Communications team looks after it. If there is a research outcome or commercialisation success that NICTA wants to communicate through the

media, the Communications team will write a press release and manage the public relations effort required to promote the announcement.

Another important role played by Communications is to keep NICTA informed of information relevant to the organisation.

Communications staff put together a monthly CEO message video that is delivered to all NICTA people over the Intranet and produce a weekly internal news bulletin and quarterly 'CEO Roadshow' where

NICTA CEO Dr David Skellern visits each of NICTA's five laboratories and presents to all employees.

Dan Smith is the Manager of Branding and Communications. "Every organisation needs a strong brand, consistent messaging and good relationships between the people in each of its various work areas," says Dan. "At NICTA, this is especially important, as we

have two distinct professional streams – research and corporate. It is important that we all understand each other and are pulling together toward common objectives. In Communications, we work hard to facilitate this."

In all of its activities, Communications makes sure that NICTA's core values of collaboration, pursuit of excellence, openness, entrepreneurship, respect and inspiration are the guiding principles. "We have successfully reflected these values throughout 2009," says Dan. "We co-ordinated NICTA's presence at CommunicAsia in Singapore, made some real strides with our internal communications area, ramped up our Web presence and have made a major impact at many external events."

Dan is now busy planning next year's activities. "We've had a brilliant year in 2009 and I'm really looking forward to pushing forward even further in 2010," he says.

"I am privileged to be working with an absolutely sensational team. Vanda, Kelly, Clare, Veena, Dorothy, Alison and Marijana all do an amazing job and together I'm sure we can help make next year NICTA's best ever."

IT industry cluster expands

NICTA-sponsored industry cluster Embedded Systems Australia (ESA) has spread its wings over the last few months, adding divisions in Queensland and Victoria to its New South Wales base.

ESA is a project-based national industry cluster whose members are interested in developing embedded systems technologies and marketing smart products to global supply chains. The activities span the complete product life cycle of embedded systems development and deployment. The mission of the cluster is to facilitate the

development of a sustainable Australian Embedded Systems industry.

ESA's latest event was an ESA Showcase which took place at NICTA's Australian Technology Park Laboratory in early December. The event featured showcase tables from some ESA sponsors and members: Fluffy Spider Technologies, Sage Consulting, Advantech, BCS Innovations and DirectTV. In the coming year, ESA will continue to expand its membership and sponsor base with a view to becoming a self-sufficient, national industry-based cluster benefiting Australia.

During 2009, ESA also staged interesting and successful events aimed at high school students, including the inaugural Embedded Systems stream inside the National Computer Science School.

ESA projects, including an exciting collaboration between the NSW Roads and Traffic Authority (RTA), NICTA and several other ESA members, are gaining momentum. In 2010 ESA wants to progress these projects and bring some to completion.



Dr Fang Chen lights up call centre

NICTA has a history of producing innovative research results by encouraging researchers from different disciplines to collaborate. NICTA spin-out Monitoring Division arrived at their research outcome through the unlikely pairing of a pattern recognition researcher and an optical networks and communications researcher.

Project Leader of NICTA's Decision Support for Incident Management (DSIM) Project and Human Performance Improvement (HPI) cognitive package, Dr Fang Chen, believes her area of research will benefit from the same sort of collaboration.

"Researchers from computer science, signal processing, cognitive science and neuroscience will work more closely in exploring the human brain's cognitive functions," Chen says.

"Computational, cognitive and social elements of research will enable and facilitate the design of systems that enhance productivity in many aspects of our daily work and life. This will lead to a revolution in workplace performance and quality management as well as a skill training scheme."

NICTA's DSIM Project aims to increase the effectiveness and efficiency of control centres, such as call centres and road/air traffic control centres, by developing techniques that can detect the cognitive load of the operators and take remedial action.

The research focuses on measuring the cognitive load experienced by human operators of large volumes and complex information systems. Cognitive load is the amount of mental effort required to perform a task. The memory system in the human brain consists of long-term and working (short-term) memory. Working memory has a very limited capacity which gets shared by the various perception and production functions. When reading complicated material, or attending to tasks requiring complex mental planning, humans experience high cognitive load.

More familiar tasks would typically generate a lower cognitive load.

Over the past four years, DSIM has been collaborating with the NSW Roads and Traffic Authority's Transport Management Centre (RTA TMC) in Sydney, which manages most of the road network in NSW.

The Project is also engaged with the Australian Bushfire Co-operative Research Centre for experiments targeting bushfire response in the control room. The Project has started collaborative research and deployment in real-life applications with companies such as CAE and Fortune 500 company Synnex.

For more than a year, the Project team has been improving elite sports coaching through collaboration with the Australian Institute of Sport (AIS) in Canberra, in partnership with the HPI Project.

The Project has also established relationships with a few important call centre technology developers, integrators and end-users, in Australia and overseas.

My work provides opportunities to understand people's cognitive behaviour through observations of the way humans react on tasks

"We have made major advances in creating new knowledge and a new research field in measuring cognitive load through multimodal behaviour as well as an innovative approach in decision support, skill training/education and workplace workload assessment and management," says Chen.

Chen joined NICTA in January 2004 and has been able to focus on her research area of specialty – speech processing, cognitive load modelling and multimodal human-machine interfaces – during her time at NICTA: "My main interest in this area is to design better systems which can help people perform their tasks more effectively," Chen says.



Dr Fang Chen

Chen holds a PhD in Communication and Electronic Systems and an MBA. She has more than 100 referred publications and 25 patents in Australia, US, Europe, China, Japan, Korea and Mexico.

Her previous positions include a stint at the Beijing Jiaotong University in China from 1995-1999, where she was Associate Professor of the Faculty of Electronic and Information Engineering in 1995, the Deputy Director of the Institute of Information Science in 1996 and then Dean of the Faculty of Electronic and Information Engineering in 1997.

Chen began her career in industry in 1999 as a senior researcher and team leader in Intel's China Research Centre. She joined Motorola in 2000 as a Principal Researcher and was the founding researcher manager of the Speech and Language Generation Research Lab of Motorola China Research Centre.

Chen then moved to Australia in 2002 to work for Motorola's Australian Research Centre where she chaired the Patent and Publication Committee.

"My work provides opportunities to understand people's cognitive behaviour through observations of the way humans react on tasks, such as the way they are talking and gesturing," Chen explains.

"It will have a profound impact in many relevant research areas and has a wide range of potential in applications such as human-machine interfaces, decision support, workplace performance management, education and training, medical assessment, and device systems and process evaluation."

Biosecurity focus for spectral imaging research

NICTA's Spectral Imaging and Source Mapping (SISM) Project will provide pervasive sensing technologies that may change the way we document and understand life on Earth, project leader Dr Antonio Robles-Kelly says.

The SISM Project is developing ways to identify potential threats to biosecurity and plant health using cameras that see at wavelengths invisible to the human eye.

Currently it is cumbersome and, in some cases, impossible to detect the early signs of plant disease or pest infestations in crops with the naked eye. But there are cameras available that can capture images from beyond the visible spectrum.

NICTA is finding ways to combine these technologies with other known imaging methods to build systems that can protect our ecosystems and valuable agricultural industries.

"Biosecurity, and the broader issue of food security, is a National Innovation Priority and, thus, the Project provides a path to impact with a strong national benefit," Robles-Kelly says. "It is interdisciplinary in nature and permits collaboration with a large number of stakeholders in Australia and overseas. The Project provides a use inspired research environment together with a real-world problem relevant to the Australian well-being and prosperity."

NICTA is working with the Co-operative Research Centre for National Plant Biosecurity on the \$1 million collaborative effort to enhance Australia's plant surveillance systems.

The five-year SISM Project is one of the first of its kind in the world to combine imaging technologies such as hyperspectral imaging, thermal imaging and near-infrared imaging.

Hyperspectral imaging is an information-rich representation of an object under study in which each pixel or sample is comprised by a number of wavelength-indexed measurements. Hyperspectral sensing is particularly well suited for non-intrusive material identification and recognition tasks.

The Project has produced internationally competitive research aimed at providing more automated and informative processes to plant health assessment with a particular focus on issues related to crop and environmental monitoring systems.

These efforts will enable electronic field guides, environmental-specific multimedia databases and may allow the automation of the surveillance grid for key pests such as fruit flies.

Robles-Kelly says the next stage of the Project will further develop novel camera designs, new interactive field guides and novel forms of multimedia databases to allow for in situ identification and open-up new opportunities for devices that can be used by the public,



experts and officials for advanced data logging, identification and interpretation of fauna and flora.

"Developed on mobile platforms, these devices would be welcomed to millions of potential users," Robles-Kelly says.

"These platforms will create a revolution in plant health assessment, insect control and food quality assurance. They will also significantly improve the efficiency of public agencies whose mandate is to document and manage our environment and will provide the public with a ready source for understanding our flora and fauna."

NICTA meshes with I²R

Under a new two-year agreement, NICTA will collaborate with Singapore's A*STAR Institute for Infocomm Research (I²R) to develop and demonstrate fast, low-cost, temporary mobile wireless communications networks.

In this research Project, I²R and NICTA's focus is to design a new system that will let people connect with each other in real-time using their mobile phones or smart phones, without the need for expensive communications infrastructure.

Unlike traditional wireless networks with fixed access points, the connective 'tissue' of the proposed temporary network will vanish once the communication is complete.

"With this Project, we are exploring opportunities in the mobile services area which involve collaborative communications," said NICTA Project Leader Dr Roksana Boreli. "This research is seeking a way to share content across a temporary mobile network using existing wireless links like WiFi or Bluetooth."

The Project will also propose a trust mechanism to secure these new, 'ad-hoc' communications. "It is important that the connections are trusted by users and are also cost-effective," Dr Boreli noted.

"What is exciting is that we are exploring ways to encourage mobile phone users to let their phones help others in the vicinity, and recognising and rewarding the trustworthy helpers," added I²R Project Leader Associate Professor Chen-Khong Tham.

NICTA Lab news

Australian Technology Park Laboratory

The Big Picture Seminar series which has been operating successfully in Victoria for some time and recently launched in Queensland, has taken off in New South Wales. The first of the Big Picture Seminar Series for NICTA's ATP and Neville Roach Laboratories in Sydney took place last month. In an impressive launch, Dr Matthias Kaiserswerth of IBM Research Lab, Zurich talked about Innovating to Create a Smarter Planet.

A field trial is taking place in the Philippines to test a NICTA cognitive load measurement technology. An objective of this field trial is to validate the business benefits and cost savings that the technology may provide in areas such as performance management, workforce management and recruitment of call centre operators. The technology was also demonstrated at the ATP Lab opening earlier this month.

Ross Jeffery, who leads NICTA's Business Adaptation and Interoperation Research Project, recently attended the annual meeting of the International Software Engineering Research Network, ISERN. Ross was a member of the team conducting an empirical software engineering doctoral consortium. Ross was also involved in establishing a new research activity with the University of Maryland Baltimore County, Fraunhofer Centre Maryland and Fraunhofer Institute for Experimental Software Engineering.

Queensland Research Laboratory

The University of Queensland Student Chapter of the US-based Human Factors and Ergonomics Society (HFES-UQ) has been recognised for outstanding achievements in 2009 at the HFES Annual Meeting in San Antonio, Texas. HFES-UQ is principally funded by NICTA's Queensland Research Laboratory and promotes the exchange of student research and ideas between NICTA, UQ and industry. In her address, student chapter coordinator Prof Sandra Garrett singled out HFES-UQ as being "outstandingly successful" in its first year.

NICTA Queensland Research Laboratory currently has the pleasure of hosting three visiting researchers. They are Ilse Gayl, CEO, co-founder and principal partner of OneRain;

Prof. Dr Horst Bunke, a member of the Scientific Advisory Board of the German Research Centre for Artificial Intelligence (DFKI) and author of over 600 publications, and Roger Mohr, Professor Emeritus from Grenoble INP.

Victoria Research Laboratory

It has been an exciting three months for NICTA's Victoria Research Laboratory, with plenty of highlights. Not least of these was the Lab's fifth anniversary dinner on 19 November, 2009 at the Melbourne Law School's Woodward Conference Centre.

Guest of honour for the event was the Victorian Treasurer and Minister for Information and Communications Technology and Financial Services, John Lenders, MLC. Professor Glyn Davis, Vice-Chancellor of the University of Melbourne, NICTA Chairman Mr Neville Stevens (AO) and NICTA VRL Director Professor Rob Evans also delivered addresses during the evening.

Research That Matters: NICTA Victoria Research Laboratory 2004-2009, a beautifully presented document reflecting the research being undertaken at NICTA VRL, was also launched at the dinner.

"Since its establishment in 2004, the NICTA Victoria Research Laboratory (VRL) continues



Mr John Lenders, MLC

to be a key driver of Victorian innovation in health, sustainability and productivity," Mr Lenders said. "This report demonstrates VRL's outstanding success over its first five years with the lab having grown to more than 70 researchers and 100 PhD students." Earlier in the day, NICTA VRL held an open day at the University of Melbourne's ICT Building.

Neville Roach Laboratory

Professor Gernot Heiser, Leader of NICTA's Trustworthy Embedded Systems Research Project and Chief Technology Officer of Open Kernel Labs, has been awarded a grant from Google for device-driver synthesis. He has also been appointed program committee chair of the 6th ACM SIGOPS EuroSys conference scheduled for April 2011 in Salzburg.



Follow NICTA on

twitter

NICTA has embraced the popular social media tool Twitter - we now have our own Twitter channel <http://twitter.com/NICTA>.

Why not follow NICTA to see all of our latest news and developments as they happen? Or start a conversation with us? We'd love to hear from you!

STOP PRESS

- NICTA's Automap team won the top gong at the inaugural Australian Computer Society Awards held in Canberra last month. The Automap team accepted the Innovation Award in front of Senator Kate Lundy and 120 ICT professionals. The award recognised the development of a product or service that breaks new ground but is yet to be commercialised.
- From January 2010 to November 2010, NICTA's Scientific Director, Prof. Bob Williamson, will take a sabbatical, visiting Microsoft Research (MSR) Cambridge at Cambridge University. While there, he will work on his long-term research plan into re-conceiving machine learning. Prof. Toby Walsh will take over as Acting Scientific Director of NICTA during this time.
- The NICTA sel4 team won Best Paper for "sel4: Formal Verification of a Microkernel," at the 22nd Symposium on

Operating Systems Principles (SOSP). A great effort by all the team at a very competitive conference.

- Novi Quadrianto (NICTA PhD student at CRL) won a prestigious Microsoft Research Fellowship and will now spend three to six months at Microsoft Research Asia.
- NICTA's TEMPO team, along with Rutgers University, has demonstrated the virtualisation of WiMax base stations using OMF (omf.mytestbed.net). They successfully demonstrated that parallel experiments do not interfere with each other even under very different channel conditions.
- Subhasis Thakur, Graduate Researcher from NICTA QRL, has been awarded a ten-week internship at IBM Research in Bangalore, commencing on 28 December 2009.

- The Distributed Game Platform team made the shortlist for Telstra's External R&D program with a proposal on their massively multiplayer online (MMO) peer to peer (P2P) network engine, Badumna. Jenny Liu and members of the BAI team also made the Telstra shortlist, with Jenny's proposal on a business services adaptation engine.
- A second patent has been granted to NICTA. Congratulations to the inventors Trevor Anderson, Sarah Dods, Adam Kowalczyk, Justin Bedo and Ken Clarke whose patent application "Method and Apparatus for Automated Identification of Signal Characteristics" was successfully granted in Australia.
- Dr Gerwin Klein, Leader of NICTA's L4.Verified Research Project, has been awarded a grant from the Asian Research Office of the US Air Force.

EVENTS

2-6 March, 2010

CeBIT 2010 at the Hannover Exhibition Centre

17 March, 2010

Dr J Craig Venter delivers the Graeme Clark Oration at 6pm at the Melbourne Convention Centre. This event is organised by the ICT for Life Sciences Forum (www.ict4lifesciences.org.au).

Short Courses

| DATE | TITLE | PRESENTER | LOCATION |
|--------------|--|---|----------|
| 8 Feb | Introduction to TDLs: The Operator's Perspective | Graham Priestnall, SyntheSys UK | Sydney |
| 9-10 Feb | Tactical Data Information Links (TADILs) | Howard Harvey, Haoi Technologies | Sydney |
| 15-16 Feb | Wireless Vehicle Communications | Chris Skinner, DISplay and Dr David Haley, Cohda Wireless | Adelaide |
| 18-19 Feb | Digital Receiver Techniques: From Theory to Practice | Prof Bill Cowley, ITR UniSA | Adelaide |
| 22-23 March | Combat Net Radio Bearer (MIL-STD-188-220) | Tony Castle, SyntheSys UK | Adelaide |
| 24-25 March | Introduction to VMF | Tony Castle, SyntheSys UK | Canberra |
| 29 Mar-1 Apr | Link 16 Network Design and Management | Tony Castle, SyntheSys UK | Canberra |

To register for any of the above short courses please go to: http://www.nicta.com.au/short_courses or contact: **NICTA SHORT COURSES** - Tel: (08) 8343 8710 Fax: (08) 8343 8711 Email: industryeducation@nicta.com.au

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