CONNECT: RESEARCH & INNOVATION NEWS

MAY - JULY 2013 ISSUE

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UOW researchers aim to build a dementia friendly city in response to the growth of its aging population

CALL FOR BET-FREE SPORTS TELEVISION
Public Health Sociologist speaks out against the barrage of gambling marketing in sport and its affect on our children

A STEP CLOSER TO PRINTING HUMAN ORGANS
Hospital-based biofabrication unit marks milestone for 3D printing at ARC Centre of Excellence for Electromaterials Science

UNIVERSITY OF WOLLONGONG

The University of Wollongong ranks in the top 2% of research universities worldwide

Source: QS World University Rankings 2012/2013

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Coral reef fish research buoyed by Hermon Slade grant

Not all fish are friendly and a $47,000 grant from the Hermon Slade Foundation is backing research that will investigate why. Dr Marian Wong and Professor Mark Dowton from UOW's School of Biological Sciences have been awarded the grant to investigate the evolution of sociality – using fish. Making comparisons of fish from the coral reefs surrounding Lizard Island in Queensland, the project will investigate the long-standing scientific question of why sociality has arisen.

"While some species are social, others remain stubbornly asocial, and this contrasting variation often seen between closely related species has long puzzled evolutionary biologists," Dr Wong said.

"To solve this mystery, we will employ a combination of broad phylogenetic comparisons and rigorous experimental manipulations to test key hypotheses for the evolution of sociality."

"In so doing, we will provide a taxonomically broad overview as well as a demonstration of the roles of key ecological, environmental and life history variables," she said.

Coral fishes are of particular interest to scientists due to the unique relationship they share with their ecosystem.

"These fishes spend their entire lives living within the branches of corals or anemones, and display remarkable variation in sociality, with some species forming complex dominance hierarchies and others leading asocial existences," Dr Wong said.

The research is part of a wider assessment of fish sociality that has formed the basis of Dr Wong's academic work. Her most recent article, outlining the key concepts in evolutionary ecology by observing fish, was published in the June edition of high-impact journal *BioScience*.

> "In order to understand how societies as a whole function, we need to first understand their mating systems"

Co-authored with Boston University's Professor Peter Buston, the paper offers insight into the reasons for female reproductive suppression, group living and bidirectional sex change – a phenomenon which allows many marine fish species to change sex when needed. As a matter of evolutionary biology, the authors suggest that in order to understand how individuals and societies as a whole function, we need to first understand mating systems.

"Despite their ecological quirkiness, our review demonstrates that they have been instrumental in testing the generality and robustness of key concepts that are widely applicable to other taxonomic groups," Dr Wong said.

"Habitat specialist reef fishes have taught us many things about the evolutionary ecology of mating, social and sexual systems."

"Mating system research is of critical importance – since natural selection shapes all aspects of an individual's behaviour to maximise its genetic contribution to the next generation," she said.

"The type of mating system plays an important role in the expression of other behaviours, particularly the decision whether to form groups, and in what direction to change sex."

Field work for the Hermon Slade project is to be conducted at the Lizard Island Research Station, while all lab-based work will occur at the University of Wollongong. The Foundation aims to advance the progress of harmony between mankind and the Earth through the study and application of Natural Sciences.

>Potential PhD students interested in assisting with the three year research project are encouraged to contact Dr Wong.

UOW moves into top 1% for research quality

UOW's goal to secure a place in the top 1 per cent of universities worldwide is off to a good start with one of the four major world rankings (Leiden Ranking) showing UOW has topped NSW in the field of "Research Quality" – securing the University a top 1 per cent spot, out of about 20,000 universities worldwide.

UOW was ranked 186th in the world overall in the 2013 Leiden Ranking, moving up from 233rd last year. Overall, UOW was rated fifth in Australasia (and number one in NSW) for research quality.

A standout for UOW was the quality of its Engineering disciplines which, according to the Leiden Ranking, has now seen Natural Sciences and Engineering move into 81st spot in the world.

The 2013 Leiden Ranking from Leiden University's CWTS (Centre for Science and Technology Studies) is a measure of performance of major universities.

"The Leiden rankings showcase the quality of the Australian higher education sector. UOW is one of 12 Australian universities to be rated in both the overall top 500 ranking and in all five of the field of research rankings. The highlight is being rated 81st in the world and third in Australia for Natural Science and Engineering," the Vice-Chancellor Professor Paul Wellings said.

"The improvement is encouraging and suggests that the research from UOW is being actively used by colleagues around the world."

>See the Leiden website for further information about these rankings.

Processing the potential of 'big data'

What to do with the glut of growing data – or 'big data'– generated by a rising number of global tech-users is the theme of the June issue of industry magazine *Computer*. UOW's Associate Professor Katina Michael from the School of Information Systems and Technology has guest-edited the special edition of the peer-reviewed publication supported by the Institute of Electrical and Electronics Engineers (IEEE).

"Since 2008, there has been much published on the promise of big data, and the exponential growth of electronic transactions via cloud computing, social networking, and mobile applications," A/Prof. Michael said.

"As companies attempt to leverage rich customer data through business intelligence applications, there are unanswered questions that need to be addressed. Where is this data being stored? Who can access it? What can it tell us about customer patterns today and into the future? What is it costing organisations to keep this data? Are their proven economic advantages to the big data proposition?"

According to A/Prof. Michael, the magazine presents a balanced view on the challenges and opportunities of a data-rich future.

"We've tried to come to an agreement about some of the frameworks applicable in this new big data environment," she said

>The new edition of Computer is now available online.

Academics announced Ambassador and Future Leader

Pictured left: Prof. Gordon Wallace with The Honourable Andrew Stoner and BESydney CEO Lyne Lewis-Smith. Pictured above: Dr Pia Winberg.

The Business Events Sydney Ambassador Program is a strategic initiative that taps into the strong networks and insights of global industry leaders spanning the fields of medical research, technology, arts and culture, engineering, business and science.
In May 2012 NSW Deputy Premier The Honourable Andrew Stoner, became the program's inaugural Patron, and at this year's annual Ambassador Dinner in May he formally announced 20 new Ambassadors and four new Future Leaders. Among the new inductees were UOW's Professor Gordon Wallace (Ambassador) and Dr Pia Winberg (Future Leader).
The program now includes over 60 Ambassadors based in Australia and throughout the world. The new group of Ambassadors include leaders who represent the NSW Government's priority sectors, an initiative that forms part of the recently released NSW Economic Development Framework.
Overlooking Darling Harbour, Ambassadors, Future Leaders and invited guests were able to network, discuss new ideas and enjoy a panel of discussion entitled: 'Australia...land of opportunity?'- hosted by SBS Insight presenter Jennie Brockie.
The panel comprised leading business people David Hutton (Lend Lease), Greg Hywood (Fairfax Media Limited) and Alex Malley (CPA Australia). They shared a few home truths about opportunity in Australia – Do we take it for granted? Is it a blessing or a curse? - and shared some candid thoughts about Australia's current economic, social and political climate.

iAccelerate's 'CriticalArc' wins pitch competition

CriticalArc, a resident of the University of Wollongong's iAccelerate StartPad business incubator, has won the prestigious StartUp Trophy at Australia's largest startup conference SydStart 2013.
Selected as one of 12 finalists from a field of 100 applicants, CriticalArc outshone the competition and was declared winner by the judging panel.
Pitching criteria included:

- the team's liklihood of winning globally,
- the addressable market,
- points of difference,
- traction to date, and
- why the startup would stay ahead of the pack

Founded by Glenn Farrant, a UOW graduate and former Australian Navy weapons engineer, CriticalArc's first product is SafeZone, a mobile alert safety solution for tertiary education campuses. The SafeZone mobile app enables students and staff to communicate with campus security teams using location-based incident alerts and helps security teams coordinate a rapid response.
According to Glenn, the SydStart win has already attracted interest from investors.
"Winning the SydStart StartUp Trophy has enabled us to set up meetings with a number of potential investors," Glenn said.
"This is terrific for us as we are currently raising capital for our international expansion."
Commenting on the role of iAccelerate StartPad in the development of CriticalArc, Glenn said "Being part of iAccelerate StartPad has given us the credibility that comes from being selected as one of the incubator's residents through a competitive process, and mentoring from business people who have advised on the steps we need to take and what pitfalls to avoid as our business grows."
Focused on technology-enabled start-ups, iAccelerate StartPad's mission is to help Wollongong entrepreneurs - including UOW's almost 1000 ICT graduates each year - turn their ideas into viable businesses.

>For further information on iAccelerate StartPad, its residents and alumni, visit startpad.com.au

You need to think like bacteria to defeat bacteria

A new approach to treating antibiotic-resistant infections has been developed by University of Wollongong and University of New South Wales researchers who have patented the new technology and entered into commercialisation discussions with two French pharmaceutical companies.
Antibiotics have saved countless lives and alleviated human suffering for more than seven decades but, as widely reported, their continued use has led to the emergence of antibiotic-resistant bacteria or 'superbugs' which pose a major threat to humankind.
In ground-breaking work funded by the Australian National Health and Medical Research Council (NHMRC), researchers focused on the pathogens which are able to resist antibiotic treatments through the formation of biofilms.
"Biofilms occur when bacteria grow together as communities, usually on surfaces, encased within a protective polymeric blanket," explained Illawarra Health and Medical Research Institute researcher, Dr Mike Kelso, from UOW's School of Chemistry and Centre for Medicinal Chemistry.
"These bacterial 'fortresses' are the root cause of most chronic infections, including those occurring on medical in-dwelling devices such as urinary, venous and arterial catheters, orthopaedic prostheses, pacemakers and heart valves, as well as chronic urinary tract and diabetic wound infections and incurable lung infections in cystic fibrosis sufferers.

> "These bacterial fortresses are the root cause of most chronic infections"

"Sadly, there are no effective drugs for treating biofilm-based chronic infections," he added.
In collaboration with researchers from UNSW's School of Biotechnology and Biomolecular Sciences, Dr Kelso rationally engineered a new technology known as 'Trojan Horse' drugs.
"These drugs [cephalosporins] are recognised by biofilm bacteria as dangerous and, to defend themselves, they produce an enzyme [beta-lactamase] which would normally degrade the molecules leading to their inactivation."
"However, when the bacteria degrade the Trojan Horse molecules, a second molecule called nitric oxide, previously hidden within the molecular structure, is released into the biofilm milieu," he said.
"The nitric oxide then acts as a signal that tricks bacteria into dispersing from their easy-going biofilm lifestyle in pursuit of alternative lodging, convinced that their digs are no longer so cosy.
"Convincing bacteria to disperse from biofilms exposes their Achilles' heel, since they are much more susceptible to traditional antibiotics and immune defences in the dispersed state."
"To put it another way, you need to think like bacteria to defeat bacteria," Dr Kelso concluded.

All bets on academic scrutiny of sport ads

Centre of Health Initiatives researcher Associate Professor Samantha Thomas has played an expert role in the policy debate on sports betting advertising, advocating that gambling marketing be removed from televised sport during children's viewing hours.
Her contribution to the latest Parliamentary Inquiry is but one of a string of expert recommendations made to government on the subject in recent years, having appeared before the Prevention and Treatment of Problem Gambling and Interactive Gambling Inquiries, as well as the Joint Select Committee on Gambling Reform.
"I'm interested in the complex factors that lead to risk behaviours," A/Prof.Thomas said.
"Often risky behaviour is sold as an issue of personal responsibility, but I am interested in the range of factors – including marketing from industry – that may contribute to people consuming products in potentially harmful ways."

Featured on ABC's Four Corners program 'The Big Gamble', A/Prof. Thomas has spoken to the issue of embedded marketing in sport and its contribution to the rise and rise of betting culture in Australia.
"A lot of young men spoke about the fact if they didn't gamble they felt isolated form their peer groups. Those sorts of new cultural norms that are associating gambling with sport are really starting to make us concerned," she said.
"There are multiple ways gambling is promoted during matches. We found that there were episodes of marketing before the game, during quarter time breaks, that there was advertising on the hoardings on the ground that constantly rotated, logos on team jerseys, and people popping up on the screens.
"While the gambling industry argues that it doesn't deliberately target children, they are being exposed and, our research shows, are clearly picking up the messages contained in these ads," A/Prof. Thomas said.

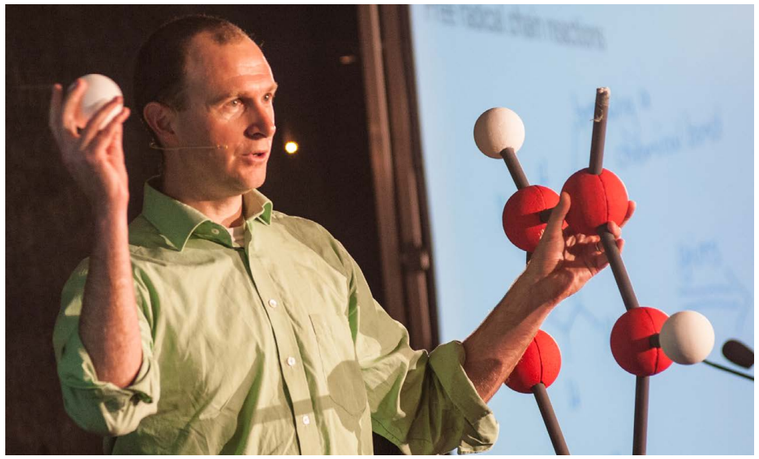
Before her move to Wollongong, A/Prof. Thomas worked at the World Health Organisation's Geneva-based Mental Health and Human Rights Unit, and then later at the Indigenous Peoples Health Unit. She gained her PhD in Community Health from the University of Auckland and has worked as an academic at Monash University and London's King College.

>Watch the FourCorners episode 'The Big Gamble'

UNI IN THE BREWERY

A/Prof. Thomas will be presenting at the next instalment of Uni in the Brewery, discussing her research on gambling.
DATE: Wednesday 14th August
RSVP: http://bit.ly/11u8wVi

First Big Ideas Festival continues tradition of innovation



On Wednesday 8th May a brilliant mix of local community members, business leaders and researchers descended on the University of Wollongong for the inaugural Big Ideas Festival.

The Big Ideas Festival featured presentations by 12 of the University's recently-appointed professors, talking about the "big ideas" of their work, while some of UOW's key research centres also had interactive research booths at the Festival hosted at the Innovation Campus.

Presentation topics included the development of better batteries to power electric cars of the future; the implications on sea level rise to national borders; unlocking the mysteries of quantum computing; helping police better manage psychiatric crisis incidents; and the prevention of obesity and physical issues thorugh early intervention programs in pre-schools.

UOW Vice-Chancellor Professor Paul Wellings said the Big Ideas Festival was a "rare opportunity to hear from some of the brightest and best in Australia".

"The 12 speakers have all taken up their professorial role in the past two years," Prof. Wellings said. "Their presentations are intended to be a glimpse behind the veil into a huge diversity of academic schools of thought and projects".

He pointed out that UOW's research was highly ranked on a variety of national and international measures, including the recent Leiden ranking of research quality, placing UOW in the top one percent of the world's universities and fifth in Australia.

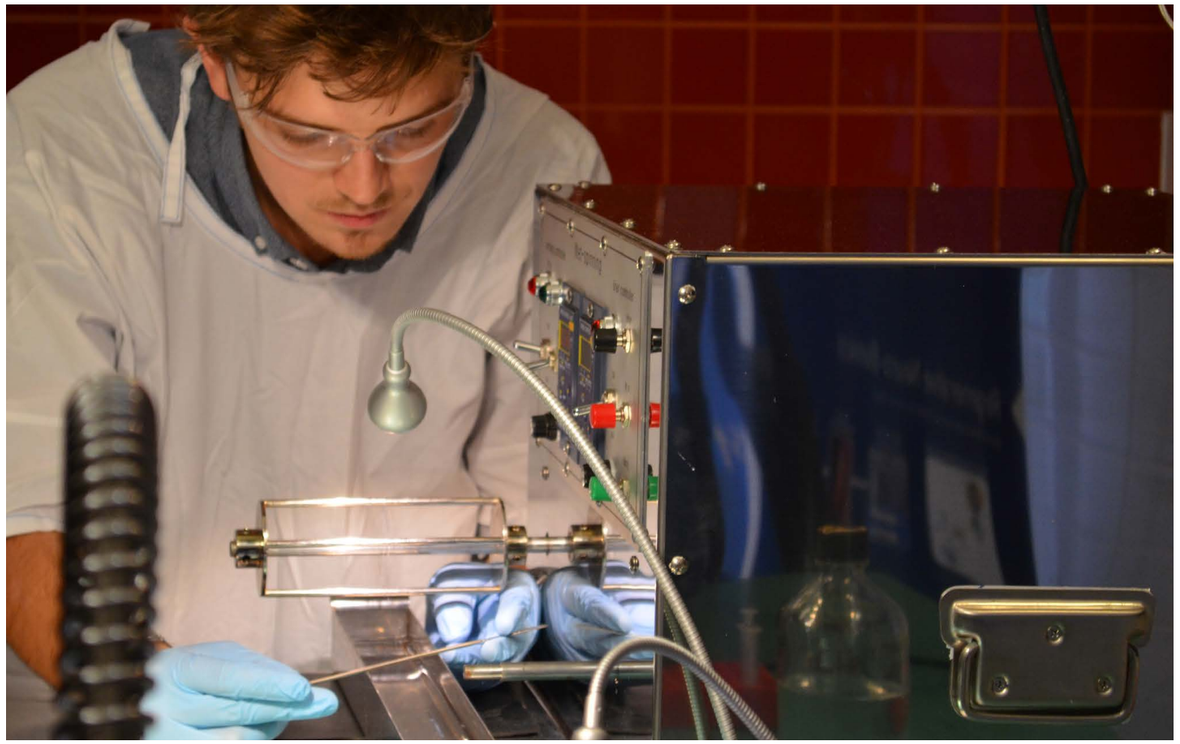
>Watch videos of the presentations
>View the photo gallery

Pictured left: Prof. Stephen Blanksby. Pictured below: The Big Ideas audience hear from Professor Chris Gibson.

Looking at lipids in disease with high-tech laser and mass spectrometry

The University of Wollongong has received state-of-the-art instrumentation that combines laser and mass spectrometry-technology that will allow researchers to take a closer look at how different types of molecules are distributed throughout a sample. Professor Stephen Blanksby says one key research area the technology could assist is lipid characterization.
"The distribution of lipids (fat molecules) within the human occular lens is being mapped using this technology, which is providing new clues as to how the chemistry of the lens changes as we age, as well as providing new understanding of processes leading to presbyopia and cataract," Prof. Blanksby said.
The commissioning of an AB Sciex QTRAP5500 mass spectrometer within the Mass Spectrometry User Resource and Research Facility (at UOW), was officially launched in April.
This instrument has been provided by AB Sciex as a part of a research partnership with UOW through an ARC Linkage grant entitled 'Development of Ozone-Induced Dissociation for Lipidomics Workflows'.
The collaboration between Prof. Stephen Blanksby and Dr Todd Mitchell involves working with scientists from AB Sciex's research laboratories in Toronto, Canada.
Lipidomics is an emerging field of research focussed on understanding the role of lipids (fat molecules) in health and disease and is significantly advancing our understanding of molecular-level processes involved in lipid-related disorders such as type-2 diabetes and heart disease.
Dr Larry Campbell, an AB Sciex research scientist spent two weeks working within the mass spectrometry labs at UOW to help incorporate OzID-technology (invented and patented by UOW) on the new mass spectrometer. The project has also been supported by AB Sciex Australia with Mr Tony Brewster (Senior Manager, Australia & New Zealand).
OzID is an exciting new analytical tool that uses ozone to identify the position of double bonds within the lipid structure. Identifying the structure of a molecule is the first step to understanding its biological importance.

Human organ printing one step closer for researchers



The idea that researchers from the UOW-based Australian Research Council Centre of Excellence for Electromaterials Science (ACES) could print human organs had humble beginnings.

Researchers bought a collection of inkjet printers from Officeworks and began experimenting with printing new ink formulations. This included inks containing organic conductors that were subsequently used to support and stimulate nerve cell growth.

Over subsequent years UOW researchers worked in-house and with collaborators to build customised equipment that could print living cells. Over a 10-year period the researchers also built collaborative links with like-minded clinicians that was to prove crucial to targeting near, medium and longer term applications and developing a translational pipeline that would accelerate progress.

Fast forward to 2013 and researchers are now dispatching the knowledge, skills, formulations and machinery developed in the laboratory into the clinical environment through the ACES Bionics node at St Vincent's hospital in Melbourne.

A significant milestone in the development of 3D bioprinting was realised in May this year when a satellite additive biofabrication unit was opened at St Vincent's, expanding on the capabilities developed at UOW's Intelligent Polymer Research Institute (IPRI).That facility will be the first of its kind in Australia to be located in a hospital.

"This is an exciting development involving the establishment of a customised facility at St Vincent's, Melbourne, that will put our scientists and engineers in direct contact with clinicians on a daily basis," ACES Director Professor Gordon Wallace said.

"It's expected to fast-track the realisation of practical medical devices and the reproduction of organs," he said.

The initial projects targeted by the facility involve wet spinning of long lengths of micron dimensional fibres containing living cells to aid muscle regeneration.

In addition, researchers will be electro spinning nanostructured mats containing drugs to implants into the brain for epilepsy treatment as well as fabricating scaffolds for bone and cartilage regeneration.

"It is already possible to print 3D biocompatible plastics and metals to manufacture patient-specific implants," Prof. Wallace said.

"Within a few years, we believe it will be possible to manufacture structures that facilitate the regeneration of nerve, muscle, skin, cartilage, and eventually produce structures that replicate the functions of human organs by spatial distribution of biofunctional components (biopolymers, proteins and cells) in 3D.

"Using a patient's own cells to create this tissue avoids issues of immune rejection."

Prof. Wallace exlplains that 3D printing, or additive fabrication, uses machines to build 3D objects layer-by-layer from digital data.

"While 3D printing is already being used in some medical applications, by bringing together the materials and scientists at ACES and the clinicians and researchers at SVHM, we have been able to accelerate our progress so that we are now on the verge of a new wave of technology leveraging 3D printing/additive fabrication techniques to deliver solutions to a number of medical challenges.

"These include bionic devices, the regeneration of nerve, muscle and bone, as well as epilepsy detection and control," he said.

The St Vincent's research facility is located in the Daly Wing on the hospital's 5th floor.

Cambridge recruits academic for Economic History of Australia

UOW Professor Simon Ville has been invited to spearhead the editorial team for the inaugral volume of '*Cambridge Economic History of Australia*' alongside ANU Professor Glenn Withers.

Due to be published in early 2015, it will be the first major study of Australia's economy in 30 years.

According to Prof. Ville, the book will blend themes and chronology, addressing Aboriginal legacy, convict economy, colonial expansion to federation, globalisation and economic reform.

"There's a growing interest in the impact of European settlement on Aboriginal economic activity and what this knowledge tells us about the current condition of the indigenous population," Prof. Ville said.

"In the book Dr Boyd Hunter (ANU) offers an analysis of the Aboriginal legacy to modern Australia and dispels myths regarding a lack of indigenous resource management, capital investment or task specialisation.

"He concludes that their knowledge and understanding of local ecology will have enormous value in handling the effects of climate change – hotter days and more droughts into the future," Prof. Ville said.

Three leading scholars from ANU's Centre for Aboriginal Economic Policy Research are working on the volume, part of a contributing team that draws from a multidisciplinary pool of economists, historians, management scholars and senior figures from local and domestic business and government.

Prof. Ville has previously been involved in two other Cambridge projects – the *History of Australia* and the *Economic History of Britain*.

Prof. Withers has just finished his term as Universities Australia Chief Executive and returned to a chair in public policy at ANU.

Transforming the lives of people with disabilities through IT

UOW Information Technology expert Dr William Tibben has won the prestigious 2013 Christopher Newell Prize for his research into how governments around the world can utilise technology to increase equity for people with disabilities.

Dr Tibben won the prize in conjunction with Gunela Astbrink from GSA InfoComm for their paper in the *Telecommunications Journal of Australia: The role of public procurement in improving accessibility to ICT*.

"Forty-five per cent of Australians with a disability live on or near the poverty line compared with the OECD average of 22 per cent due, in part, to high unemployment rates," Dr Tibben said.

In order to enable higher participation rates in the workplace for people with disabilities, Dr Tibben believes the Australian government should lead the way by purchasing accessible office equipment such as phones and computer systems for government employees with disabilities.

"This could have flow-on effects for greater availability of affordable and accessible [technologies] in the broader community," he said.

The Federal Government's National Disability Insurance Scheme (NDIS) provides an ideal opportunity for creating real and lasting change.

"Accessible [technologies are] a positive step in removing barriers that prevent people with disabilities from participating equitably in society and thus increasing digital inclusion," he said.

Dr Tibben said Australia has a history of early adoption for all things digital, but when it comes to adopting accessible technologies, we are lagging behind.

"While information and communications technologies continue to improve, advances in technologies that are usable and accessible by people with disabilities struggle to keep up," he said.

The research was funded by a competitive grant from the Australian Communications Consumers Action Network (ACCAN).

How pesticides impact arid ecosystems

Across two million square kilometres of Australian arid and semi-arid grasslands, pesticides are used on an annual basis for the control of locust pests.

Professor Kris French from UOW's Institute of Conservation Biology and Environmental Management is heading up a team of researchers working to manage locust populations by assessing the ecological impacts of two very different pesticides used by the Australian Plague Locust Commission (APLC).

While ongoing control is essential to minimise the devastating effects of locust plagues on agricultural production, questions have been raised over the environmental costs associated with the use of insecticides and whether biocontrol is a preferred alternative as a reduced impact on ecosystems.

The environmental effects of pesticide application for locust control however has been largely ignored in this country and so the potential environmental benefits resulting from a change in the pesticide used or the method of application remain unquantified.

Prof. French is collaborating with expert herpetologist Professor Michael Bull (Flinders University), ecotoxicologist Dr. Grant Hose (Macquarie University) and Paul Story (APLC) in an Australian Research Council Linkage funded project.

The project aims to monitor the effects of fipronil, a phenyl pyrazole pesticide, and a fungal biopesticide, Metarhizium anisopliae var. acridium (Green Guard) on non-target terrestrial invertebrates, termites, reptiles and soil processes including litter decomposition rates and microbial function.

It is predicted that the impact will be greater and the ecosystem will be slower to recover when fipronil is used as it is less specific in targeting locusts.

Because fiprinol takes longer to degrade, recolonisation of organisms from adjacent areas may also be delayed. The speed with which the ecosystem bounces back from either treatment is likely to determine the best strategy for the APLC.

Core to their approach is a large field-based experiment with replicated spraying treatments. The nine replicate 70 ha sites approximate the scale of locust control operations. No other study in the world has taken such a comprehensive approach.

The use of a manipulative experiment at realistic, field-relevant scales should lead to significant knowledge about 'whole ecosystem effects'.

Large scale monitoring across a range of trophic levels and ecosystem functions also represents an exciting globally-relevant approach that will allow more informed decisions on locust control both in Australia and elsewhere.

Dr Kim Maute at the University of Wollongong is undertaking the organisation and collection of this information. Since February 2012, over 4000 invertebrate samples and 366 soil samples have been collected, 2500 termite baits monitored, 1700 litter decomposition bags have been placed on site and 270 lizard monitoring sites surveyed.

Pesticides were successfully applied to treatment sites in February 2013, and a year of post-spray monitoring is planned.

The field site, based at Fowlers Gap Arid Zone Research Station, near Broken Hill, NSW is visited nearly every three months, tracking changes in focal animal populations and ecosystem processes.

Such a large scale project involves the help and coordination of many staff and volunteers.

Over 30 domestic and overseas university students have already experienced the joys of volunteer field work.

In the coming year, the collaborators hope to attract more keen volunteers for this important work.

If you would like information on volunteering for field work on this project please contact Prof. French at kfrench@uow.edu.au or Dr Maute at kmaute@uow.edu.au

Are we ready to live in an uberveillance society?

When Google Glass hits stores later this year, not only will it transform sunglasses from fashion accessory to wearable technology, it will cause a social revolution, according to IEEE Technology & Society Magazine editor in chief, Associate Professor Katina Michael.

The Sci-Fi-looking, internet-connected eyewear will do everything a mobile phone can do (and more) by simple voice command.

Beyond the obvious functions – snapping photos, recording video, sending text messages and browsing the internet – some of its most exciting uses will include a biofeedback (heart rate monitor for your morning run), instruction (stream step-by-step video tutorials) and navigation (map out a route to the other side of the city or out of IKEA).

A/Prof. Michael is warning that with these capabilities we are fast approaching an "Uberveillance" society. She predicts the next wave of innovations may even be implantable cameras – that are always on.

"Wearable devices like Google Glass allow users to record events and share them with members of their social network in near-real time. The possible applications are endless," A/Prof. Michael said.

Alexander Hayes, who is currently completing a PhD under Michael's supervision, says his preliminary research shows that wearable devices, like Google Glass, will replace current handheld technologies like the smartphone in as little as five years' time.

"Wearable technologies will increasingly become part of many activities across society, in essence becoming the norm rather than the exception," Alexander said.

Alexander has just returned from Finland's Aalto University where he contributed to a high-profile, European emerging technologies research project.

Alexander's research focuses on the impacts of wearable technologies on education, training and occupations.

He says that while these devices have many educational benefits, such as enhancing mobile and distance education, he is worried that lawmakers are failing to keep up with their rapid uptake, which is already exploding in the extreme sports, military and medical sectors.

"The user needs to know boundaries as to when and where it's appropriate, or indeed permissible, for these technologies to be used," he said.

Through his research, Alexander hopes to one day recommend on the responsible formation of policies around the use of wearable technologies in work and in educational environments.

UOW 'Bright Sparks' showcase talent

University of Wollongong PhD students displayed their hidden creative talents by attempting to convince a panel of judges in 150 seconds why their work should get $5,000 funding from AMP.

PhD students Joseph Giorgio, Damian Kirchmajer and Raymond Laine represented UOW as finalists in this year's Bright Sparks competition (Tuesday 4 June).

The rapid-fire pitch contest 'Bright Sparks' combines real science and sound research with creativity, theatre and a touch of comedy as part of AMP's Amplify Festival.

Part of the contestant's brief was not only to convince the judges, but also try and win the hearts and minds of the Bright Sparks audience - brimming with seed-funders and collaborators.

Damian from UOW's Intelligent Polymer Research Institute (IPRI) and the ARC Centre of Excellence for Electromaterials Science (ACES), has been working on hydrogels for tissue engineering with potential applications in organ printing.

"It's not only important to perform great science, but to communicate it well," Damian said.

"Using the media is an effective means of doing this but it takes time to learn to do effectively," he said.

"The best way to learn is to practise, and it's prudent to start practising early – as a student."

Damian said there was no better way to build public engagement skills than by getting out in the community.

>Check out the AMP blog for more information about Bright Sparks

Can Wollongong become a dementia friendly city?

UOW's Professor Richard Fleming, Director of the NSW/ACT Dementia Training Study Centre, is working towards a significant change in design and practice in dementia care facilities.

The number of Australian people living with dementia is estimated to triple by 2050: that is an increase from 320,000 Australians to 900,000.
President of Alzheimer's Australia (AA), Ita Buttrose recently opened the 15th national conference in Hobart (last May 2013) , and warned that Australia was already lagging behind other countries like the UK for example, which has thrown $46M into research to help manage the dementia crisis.

"Dementia is already the third largest cost to the health and welfare system. If we don't spend more money on research the outcome will be horrendous" she said.

One of the AA reports she launched at the conference, "Dementia Friendly Societies: The Way Forward", encourages society to be more inclusive of people with dementia by developing dementia friendly communities in Australia.

Initiatives which promote social engagement and awareness of dementia, and reduce the isolation, discrimination and stigma of patients and their families were highlighted in the report and include: Dementia Awareness Week, Dementia Choir, Side by Side Program (SA), Memory Lane Cafes (Vic), Memory Books Project (NSW), and the Dementia Training Study Centre (NSW/ACT) at the University of Wollongong.

Professor Richard Fleming, who is the Director of the NSW/ACT Dementia Training Study Centre, has already been hosting workshops with planners, architects, managers, architectural schools and care staff around the country, to share his insights into creating 'friendlier' spaces for people with Dementia.

His aim is to help create dementia-friendly cities, and improve the lives of people with dementia by eliminating some of the confusion, anxiety and suffering by addressing key areas such as:
1) Retrofitting existing dementia care facilities to improve design;
2) Building new and more compact dementia care facilities that facilitate less confusion for patients;
3) Removing unnecessary stimulation, while encouraging positive engagement;
4) Training of staff to recognise that most behavioural problems are an expression of unmet needs and will be reduced when the needs are recognised and met;
5) Introducing volunteer dementia programs to create a friendlier neighbourhood.

RETROFITTING AND BUILDING NEW CARE FACILITIES

Complicated building designs which cause confusion, by preventing patients from finding their way, can cause disorientation and stress. Retrofitting existing facilities can be difficult but there are some simple changes which can be applied.
Providing well-defined pathways supports movement and engagement and helps prevent stumbles and falls. Good visual access provides opportunities for engagement and gives a patient confidence to explore.
As you age, colour contrast becomes more difficult, so the use of strongly contrasting colours on doors and door frames can help patients locate rooms.
"It's a simple idea really – and you can even extend that to the dinner plates by making sure they contrast with the table cloth. Ideally the food should contrast with the plate - it is hard to see mashed potato on a white plate" says Prof. Fleming.
The size of the care facility can also make a big impact on the level of confusion and affect the behaviour of a person with dementia. If the facility is large there will inevitably be long corridors of resident rooms, with some located quite a distance away from the central lounge and dining area. Being able to see these shared spaces is important for residents.
The number of people that the person with dementia encounters is also intimidating and can cause agitation. This is difficult to address in an existing facility but must be considered when planning and building new and smaller care facilities.

REDUCE UNHELPFUL STIMULATION

As dementia reduces the ability to filter stimulation a person may become quite stressed by prolonged exposure to large amounts of stimulation. For example, placing someone in a lounge chair in front of a television in a busy room can overstimulate them and make them agitated. According to Professor Fleming the environment should be designed to minimise unhelpful stimuli and be balanced by highlighting stimuli that are important to the residents.
He suggests positioning the lounge chair towards a window which could look out into a garden or an outside visiting area, or bird aviary. If these outlooks are not possible, a display of personal memorabilia and photos could be beneficial. The familiarity of the personal objects to the resident is comforting.

IS HIGH SECURITY NECESSARY ?

Many dementia facilities are high security which essentially means residents are locked in. Carers will choose this type of facility because they are concerned their loved ones will escape or wander off. In the early stages of the disease patients often try to leave the facility to return to their home. This can cause anxiety and sometimes violent behaviour as their need to escape is quite strong.
Prof. Fleming has visited many dementia facilities overseas where there are no tall fences, and no locked doors. In Norway it is illegal to lock people up because of dementia. The person's security is protected by providing sufficient staff numbers.
"If a resident wants to leave, the door is open and they can choose to walk out. The difference is the response by staff. Staff can recognise that the patient would like to leave the care facility, so they accompany them for a walk. Usually it only takes a few minutes for them to feel satisfied that they have gone some where and they are happy to go back. So it's a staffing issue and training of staff to deal with these types of behaviours" says Prof. Fleming.

NEIGHBOURHOOD VOLUNTEERS

Neighbourhoods have a capacity to support people with dementia in ways we are only starting to understand here in Australia.
A volunteer program for the immediate neighbourhood of a facility (and in general) can play a significant role in creating a dementia friendly city.
"These volunteer programs are common in Finland and Japan." Says Prof. Fleming. "People are taught to identify a dementia patient who may have wandered from their home or facility. They can engage with them, show support and friendship. The patient may be confused, lost or simply lonely. A million volunteers in Japan have been trained to recognise a person with Dementia and to provide assistance".

ACUTE CARE FUNDING FOR DEMENTIA-FRIENDLY HOSPITALS

The NSW/ACT Dementia Training Study Centre has recently received a $200,000 boost to its budget from the Federal Department of Health and Ageing (DoHA) for improvements in acute hospital services for people with dementia.
Professor Fleming said the funding will support two-day workshops on designing dementia-friendly hospitals in every state and consultancy on at least 25 hospital-based projects across Australia, by the end of this year.
Professor Fleming's original funding application to DoHA was to provide education and consultancy on the design of dementia-friendly environments to architects, hospital planners and managers working on the plans for new or refurbished hospital facilities in NSW. However, DoHA advised Professor Fleming to resubmit his application as an Australia-wide project, which has now been approved.
"It is very encouraging to see the importance of the built environment being recognised," Professor Fleming said.
"There has been good quality research carried out on designing residential care environments for people with dementia, but the hospital environment has been largely neglected. This project will enable us to apply the knowledge that we have and, hopefully, set the stage for future research into designing for the special needs of people with dementia undergoing the stresses of hospital admission." VW

Interested in making a difference and helping Professor Fleming and his team achieve a dementia friendly city? There are a few things you can do:

1) Donate to Dementia Research at UOW
http://www.youruowcommunity.edu.au/donate-to-dementia-research

2) Attend a workshop or event run by the Dementia Training Study Centre
http://dementia.uow.edu.au/index.html

3) Read more - Subscribe to the 'Australian Journal of Dementia Care'
http://journalofdementiacare.com/

4) Volunteer at a local Care Facility.

Geographers map uncertain landscapes in land of the free

From the University of California, Berkeley to Joshua Tree National Park, UOW Social Geographers Dr Christine Eriksen and Associate Professor Michael Adams encountered uncertainties that wove through many aspects of their month-long field trip in the USA.

Entering Palm Springs from the surrounding desert is a surreal experience – bright green irrigated lawns, expensive cars, up-market resort and spa accommodation, and thousands of palm trees in a flat landscape surrounded by arid mountains. This is the traditional country of the Cahuilla Indians. Like Native American tribes across the USA, the Agua Caliente Band of the Cahuilla Indians has faced wide-ranging environmental, social and economic uncertainty.

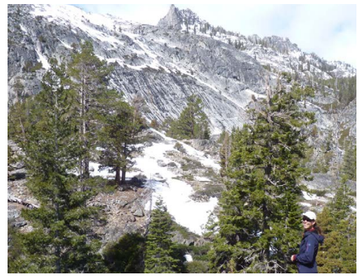
At Palm Springs, however, a long history of resistance and skilled negotiation by Cahuilla leaders meant that most of the chequerboard of Native American-allocated lands was retained. As Palm Springs eventually developed into an expensive resort destination, the Agua Caliente Band became the single largest landholder with billion-dollar real estate enterprises based on leasing what became downtown lots.

We were in the USA with several aims: to negotiate new international student exchanges as part of a UOW International Links Grant co-funded by the Faculty of Science; to participate with a group of AUSCCER researchers at the Association of American Geographers conference; to explore contemporary conservation initiatives and challenges, including Indigenous involvement and NGO conservation initiatives; and to continue research on wildfire and hunting.

While pursuing all these interests, we were repeatedly struck by dimensions of uncertainty in American life, some of which might be particularly acute in California.

We drove 2,000 miles, sometimes funnelled along at 75mph on Los Angeles' fearsome and crowded 12 lane freeways, and sometimes on remote back roads, across the San Andreas fault – one of the many fault lines that crisscross earthquake-prone California. Tsunami warning signs greeted us on Los Angeles' Venice Beach. Many times along Highways 395 and 10 we encountered the thousands of miles of aqueducts that flow through dust-billowing deserts, once the rich agricultural hubs of places like the Owens Valley and Mono Lake. Wildfire scars were evident across thousands of hectares of forest. These were all constant reminders that these really are landscapes of uncertainty.

Michael spent a day on the Tejon Ranch, which at 250,000 acres is the largest continuous landholding in California. After a century of ranching, mining and development



operations, Tejon has established a complex new environmental dimension in the form of the Tejon Conservancy.

The Conservancy was negotiated between Tejon's owners and five major US and California environmental groups. In return for certainty for some development activities (particularly a billion dollar real estate project) the newly created Conservancy will manage conservation values across a landscape which links four major ecological regions.

Christine guest lectured at California State University, Chico in one of the few pyro-geography courses taught at university undergraduate level worldwide. Like many parts of Australia, wildfire is an annual occurrence in California. In both countries, the ability of people to coexist with fire at the wildland-urban interface causes much debate and consternation. Christine presented on the challenges of preparing, responding and recovering from wildfire amongst contemporary landholders in California and New South Wales – a key theme in her forthcoming book.

In California water and fire are closely interlinked ecological and social systems. When one is out of balance, the other often is too. On April 20th the front and back pages of the Los Angeles Times reported on the "girding of fire fighters for battle" as Southern California headed for its fourth-driest year since 1877.

On the one hand the general manager of the Metropolitan Water District of Southern California expressed a lack of concern for water supply due to stored water from stronger rain years. On the other, a worried farmer spoke about the increasingly parched regions that supplied most of the water to the Los Angeles metropolis display tough everyday realities: "When you're a farmer in Central California, you absolutely watch the water as much as you watch your kids," he said.

Three weeks after our arrival, the United States Senate failed to reform the country's gun laws and two bombs exploded at the Boston Marathon. With 270 Americans shot in the USA every day, for many people uncertainty is part of the daily social fabric.

>This blogpost was originally published at http://uowblogs.com/ausscer/

AUSCCER is a Strategic Research Initiative of the University of Wollongong

Niche markets can breathe new life into manufacturing

Photo: Mark Newsham

According to Professors Chris Gibson and Geoff Spinks, Ford's latest announcement does not herald the death of Australian manufacturing.

The public debate overlooks the diversity of Australian manufacturing. What happens to the automotive industry is not necessarily indicative of other sectors. The assumption that manufacturing is dying overlooks innovation, diversity, specialisation, and human skills. It also ignores the fact thatAustralian manufacturing output has quadrupled since the 1950s.

The truth is that the face of Australian manufacturing is changing. Overall employment numbers are in steady decline, but the proportion of high-skill workers is actually increasing and many sectors are expanding. Manufacturing competitiveness is not just a high dollar problem. We need to look inside industries and regions to identify opportunities. New research that cuts across technology, economics and the social sciences will be crucial.

Indeed, there are opportunities to grow Australian manufacturing in new and diverse ways. But we will need to move beyond glib headlines about the death of manufacturing, and appreciate that manufacturing is no longer simply about production lines, low-cost labour and cheap, throwaway products.

The question is not whether Australia should have a car industry or a manufacturing sector, but what kinds of high quality, lasting things Australia should make, and where are the opportunities. After all, a deep part of regional and even national pride comes from the things we make.

OPPORTUNITIES ABOUND BUT THE RACE IS ON

There are huge opportunities at the high-tech end of the spectrum. Australian manufacturers are mostly small companies working within specific niches. And yet they are world leaders in a wide range of products, from compost bins to the cochlear implant, musical instruments to polymer bank notes and from 4-wheel drive accessories to wi-fi. Manufacturing is also about specialist services, product design, prototyping and testing – not just assembly lines.

The research sector is vital to future innovation. There is no shortage of great ideas emerging from university and government research labs across Australia. The University of Wollongong's own research efforts span high strength alloys, better battery materials, bionic implants and nanomaterials. Researchers are also developing innovative machinery like high productivity welding systems, 3D-printers, metal forming systems and autonomous robots. These are just a snapshot of the strength of Australia's manufacturing-related research. Those countries that are able to best harness their research capacity and convert ideas into industries will gain the advantage. It's another reason the federal government should continue to grow the higher education sector, rather than cut its funding.

INNOVATION BY DESIGN

Manufacturing innovation is not just about technical advances. Other kinds of manufacturing will rely on making the most of human skills. The key will be to harness existing abilities to craft things by hand, integrating high quality and design, and to better promote and value the human input into how things are made.

The surfboard industry is a great example. The traditional method relies on hand-shaping boards, customised to individual surfers and local waves. It happens in small workshops who maintain strong connections with local surfing communities. That strong local connection and customisation means that designs can evolve constantly as surfers and boardmakers experiment with more radical designs to get a thrilling wave ride. Upon this basis, Australia has become the world leader in new surfboard design.

However, cheap imported boards, made using computer design and cutting technology, are undercutting the lower end of the market, where retail competition is most fierce. When Australian surfboard makers have sought to compete on price, they have failed. Where they survive is based on quality, innovation, hand-crafting, and a personal connection with the customer. So the strategy will need to be very different for this industry than for cars or health products.

TRANSFORMING LIVES AND REGIONS

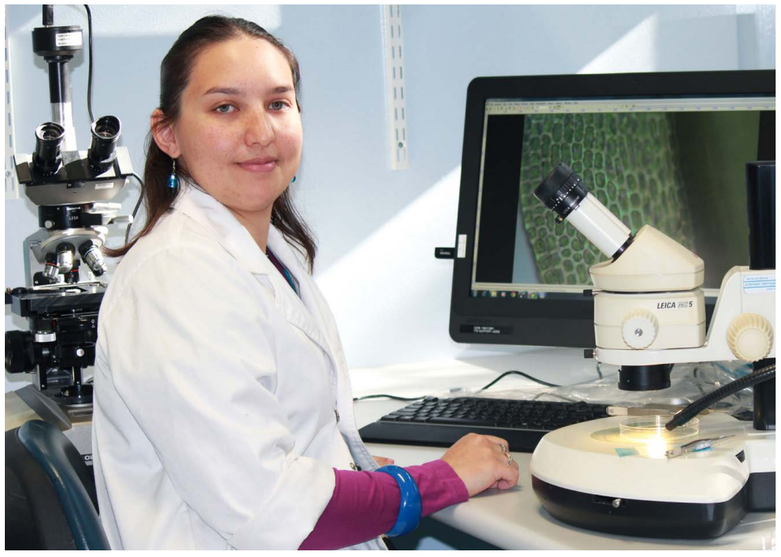
The debate must also appreciate the regional basis of manufacturing. The downstream effects of Ford's closure will be region-specific and intense. Attempts to alleviate regional impacts of manufacturing contraction – such as in the Illawarra after 2011 cutbacks at BlueScope Steel – have had very limited success. Governments have thrown money at the problem too quickly, without a good evidence base for what might work. Retraining and job

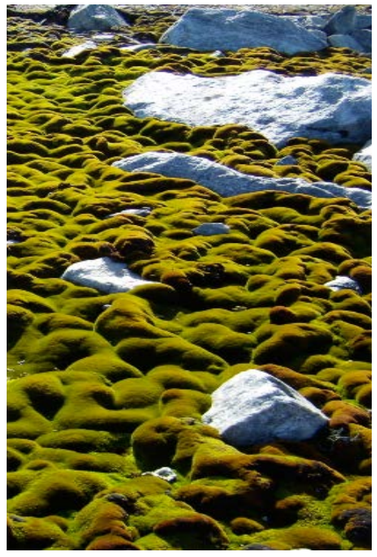
placement schemes have operated without broader strategic regional development, infrastructure and industry support. No amount of retraining or job subsidy will work if the jobs, infrastructure and planning aren't there.

This is why we need qualitative social science research – as well as high-tech science — on the aspirations and capacities of manufacturing workers within regions. Social scientists can help us explain what those workers ultimately aspire to be. Surely, in light of Ford's recent announcement, that is among the highest priorities of all.

>By Professors Chris Gibson and Geoff Spinks. Originally published on The Conversation.

Diana King





What are you studying?
PhD in Conservation Biology and Environmental Management in Antarctica.

What does your research focus on?
My research involves analysing change in vegetation communities on the Antarctic continent over the past 10 years and determining what climatic factors are responsible for these changes.

I am creating a system of automated image analysis, to reduce the amount of time that our research team has to be out in the freezing cold in Antarctica.

To do this, our research team take photos of the vegetation in Antarctica and then bring them back to Wollongong where I use computer software to classify the vegetation in the photograph, so that we can get estimates of vegetation percent cover and how this changes over time.

How did you come to study at UOW?
As a student with a physical disability+, it was important for me to choose an accessible university that was close to home. I also love the fact that our campus has so much vegetation so that was also a big reason for choosing UOW rather than one of the Canberra or Sydney universities. I started my undergrad Bachelor of Environmental Science (Honours) here in 2004, and upon completion of that I began my PhD in 2010.

What's been the highlight of your career so far?
I think the best thing so far has been the opportunity to travel to conferences. I have been to a number of conferences so far, including local ones in Hobart and Melbourne and also bigger, international conferences in America. It's great to be able to meet some of the top researchers in your field, and to listen to talks on a huge range of topics. It is exciting to see what research is currently being investigated around the world.

My research has been able to show that Antarctic vegetation communities can change faster than we previously thought. These communities are like mini rainforests, except instead of trees we have mosses, and we can get up to 500 moss shoots in 1cm^2 of moss turf. We are noticing a dramatic increase in one of our moss species, and think that this could be linked to changing water availability on the continent. I have presented these findings at two international conferences in America, and will also be presenting at the upcoming Antarctic conference in Hobart in June.

What do you plan on doing after the completion of your study?
I'm hoping to be able to do more research once I've finished my PhD, but perhaps working on something a bit different, as Antarctic vegetation is quite a niche area to work in. I should be able to apply my computer-based analyses to a variety of different fields, but I would like to remain in ecological research as ecology is my main area of interest. I don't like to have too many set ideas for the future, as I have learned that if you are more open to opportunities, you have more chance of finding the path that is right for you.

What do you hope to achieve in your research/field in the future?
I am developing a technique to automatically classify Antarctic vegetation in photographs, and have already been approached by New Zealand Antarctic researchers to collaborate with them to develop similar techniques. I will publish a number of papers from my research, and I also hope to travel overseas to collaborate further with international colleagues.

+*Diana has a chronic connective tissue disorder known as Ehler-Danlos syndrome.*

David Kirby is a Senior Research Fellow at UOW's Australian National Centre for Ocean Resources & Security (ANCORS). He has a background in marine science, having gained an honours degree in Ocean Sciences (1994) and a Masters in Applied Oceanography (1996) from the University of Wales, Bangor, UK, followed by a PhD in Fisheries Oceanography and Behavioural Ecology (2001) from the University of Leicester, UK. David was also President of the University of Wales, Bangor, Students Union (1994-5) at a time of significant reform in UK higher education. Prior to joining ANCORS David was Senior Scientist (International Fisheries, Data and Assessments) with the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), a research division of the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF). Before coming to Australia in 2009 David spent 7 years as Senior Fisheries Scientist at the Secretariat of the Pacific Community's Oceanic Fisheries Programme (SPC-OFP). His work focussed on Ecological Risk Assessments (ERAs) for fisheries bycatch, analyses of the effectiveness of bycatch conservation and management measures, and provision of fisheries management advice at national and international levels. David contributes to several of ANCORS' professional and masters courses and pursues research interests in the effectiveness of institutions and other initiatives for the conservation and management of marine resources and the marine environment, in the quality of the 'best available science' presented to such institutions, and in the extent to which policy making and resource management is evidence-based and/or agenda-driven. David is the project manager and lead researcher for a new AusAID-funded project on 'Fishing for Security in the Gulf of Guinea'.

Dhanya Ganesalingam joined UOW's Centre of Geomechanics and Railways Engineering in April, as an Associate Research Fellow.
After completing her B.Sc degree in Civil Engineering at University of Moratuwa, Sri Lanka, Dhayna joined James Cook University in Australia in November 2009 to pursue a PhD in Geotechnical Engineering. She was working with Associate Professor Dr. Nagaratnam Sivakugan and the project was funded by the Australian research council together with the Port of Brisbane and Coeffey Geotechnics. Dhayna's research interests were mainly on the consolidation and compressibility properties of recent dredged mud sediment, which application is widely appreciated in the land reclamation projects.
Dhayna is currently working on modelling the role of natural vegetation in stabilising the transport corridors and sloping ground. The successful completion of the project will be a leap towards the sustainable engineering concept. Together, with an excellent panel of geotechnical professionals at UOW to work with, she is aiming to learn the in-depths of geotechnical engineering and establish her career in research.

Cathy Duncan joined the Australian Health Services Research Institute (AHSRI) in April. Prior to joining the Institute, Cathy worked for the Australian Government Department of Health and Ageing (DoHA) in both Canberra and Tasmania in a range of program management and policy positions in aged care, primary care and rural health. Cathy has academic qualifications in Social Work and worked for 13 years as a Social Worker in both Sydney and on the South Coast of NSW in various settings, including acute care, rehabilitation and aged care. Cathy is a member of the Australian Association of Social Workers. Her interests include aged care assessment, rural and remote health, community capacity building and the interface between acute care, primary care and aged care.
Cathy is currently working on a DoHA funded project to develop and trial a new Commonwealth Assessment Framework and Tool for Aged Care.
Cathy is looking forward to working on a range of health and aged care related research projects with the team at AHSRI.

Research in three minutes

THREE MINUTE THESIS

Tuesday 2 July | 5pm
McKinnon Building (67), UOW
INFO & RSVP: uow.edu.au/research/rsc
FREE AND OPEN TO THE PUBLIC

Join us for the UOW final of the Trans-Tasman Three Minute Thesis competition, where research students have three minutes to explain their thesis.
UOW's Dean of Research Tim Marchant believes that the Three Minute Thesis Competition supports the development of research students' capacity to communicate ideas effectively to a range of non-specialist audiences and the wider community.
"It is an exercise in developing academic and research communication skills. Selected HDR students have three minutes to present a compelling oration on their thesis topic and its significance, in language appropriate to an intelligent but non-specialist audience," he said.
Waving the banner for the Education faculty in the UOW finals will be PhD candidate Elise Thurtell, whose research focuses on the mathematical knowledge for teaching of primary preservice teachers.
"Anyone who knows me knows I would find it difficult to talk for less than three minutes!" Elise quipped. "And it's also ridiculously hard to summarise three years' worth of work into such a short presentation."
Working under the supervision of Dr Tricia Forrester and Associate Professor Gary Hoban, the PhD student relishes the opportunity to fully explore an in-depth topic that may one day contribute to her disciplinary field.
"I love the idea that I could be supporting the mathematical knowledge of the next generation of teachers that will in turn influence the mathematical knowledge of our next generation of primary students," Elise said.
In a mere 180 second presentation Elise suggests representations can be used as a way to develop the mathematical knowledge of educators.
"I also present a challenge in my PowerPoint slide to see if the audience is able to discern which diagrams appropriately represent a maths problem," Elise said.
"But you'll have to come along to the presentation night to test yourself."

For an insight into the next crop of brilliant young researchers, don't miss the 2013 UOW final of the Three Minute Thesis.
>Register to attend.

Bill Wheeler Symposium: Fundraising for the future of bionics

Thursday 15 August | 12.30pm–1.30pm
Leon Kane-Maguire Theatre, AIIM Facility, Innovation Campus
INFO & RSVP: http://bit.ly/19oqXDI
FREE AND OPEN TO THE PUBLIC

Future leaders of bionics research are to be recognised at the upcoming annual Bill Wheeler Symposium, hosted at the University of Wollongong's Intelligent Polymer Research Institute (IPRI) on 15 August.

Featuring presentations by leading bionics researchers and medical industry professionals, one talented PhD student will also receive the 2013 Bill Wheeler award. The award offers $2,000 of community raised funds to a UOW student engaged in a Medical Bionics project of significance to the larger community.

UOW Pitch

The UOW PITCH competition is designed to build on the success of iAccelerate to promote student and staff involvement in entrepreneurialism and commercialisation by progressing ideas, inventions and research outcomes at UOW. UOW PITCH is open to our staff and student community from all research disciplines, whether they relate to businesses, products, services or technologies.

Shortlisted entrants will receive Pitch Training and will be required to present a 5 minute pitch to a panel of experts with the winners sharing in over $30,000 of prize money.

Applications open from 15 July 2013 to 20 August.

>Join our mailing list to receive updates and further information about UOW PITCH.

SAF FUNDED UOW

VISIONARY/PASSIONATE/DYNAMIC CONNECT: SUMMER SCHOLARSHIPS

Set your research career on the right track this summer

ACES 2013 Summer Scholars Program

Undergraduate students with an interest in science research are invited to apply for a 10-week summer program at the Intelligent Polymer Research Institute (IPRI) in Wollongong (9 December 2013 – 21 February 2014).

The ARC Centre of Excellence for Electromaterials Science (ACES) and its industry partners are this year offering $6,000 summer scholarships to 10 students.

Interested candidates must be third or fourth year students enrolled in a Australian university in 2014.

To apply for the a 2013-14 Summer Scholarship:

Go to www.electromaterials.edu.au and click 'Apply Now'.

Applications close Friday, 30 August, 2013.

Successful applicants for the 2013-14 Summer program will be announced on 14 September.

Professor Wallace will be available to meet with prospective students on the folllowing dates:

- Adelaide 3,4 June
- Hobart 10-12 June
- Melbourne / Geelong 13, 14 June
- Brisbane 7, 8 July

To book an appointment email Phil Smugreski.

ARC Centre of Excellence for Electromaterials Science

UNIVERSITY OF WOLLONGONG

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