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UNIVERSITY
OF WOLLONGONG
AUSTRALIA

Research & Innovation

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INSIDE

Executive approach

Highly credentialled health and medical academics join UOW

Battery world

Research-industry project funded to help develop a renewable future

Flip side

PhD student examining cultural change in sporting organisations

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

QS World University Rankings 2016/2016,
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Rankings 2015/2016

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Professor Kristine French is partnering with the Australian Plague Locust Commission

UOW receives \$2.1M injection of funds for ARC Linkage projects

The Linkage projects scheme promotes national and international research partnerships between researchers and business, industry and community organisations

Assessing the broader impact of pesticides used to control locust plagues that threaten vital agricultural industries, designing more efficient batteries and building safe and durable roads and railways for faster and heavier traffic are among the projects that have been funded in the latest round of Australian Research Council (ARC) Linkage grants.

Minister for Education and Training Simon Birmingham recently announced that six UOW-led projects connecting researchers with industry partners have been awarded \$2.1 million in grant funding.

The ARC funding, which demonstrates UOW's experience and capability in engineering, electrochemistry, information communication technology and environmental sciences, is augmented by cash contributions of \$3.5 million from partner organisations in Australia and overseas.

Senator Birmingham said the industry cash and in-kind support across the suite of projects funded in 2016 represented \$2.01 for every dollar from the Commonwealth and highlighted the value of research done at Australian universities and labs.

Deputy Vice-Chancellor (Research and Innovation) Professor Judy Raper congratulated the successful researchers and acknowledged that the university performed particularly well in materials science, information sciences, engineering and biological sciences.

"More than ever it is vital for industries to innovate and thrive in increasingly competitive markets. We can do this by connecting our researchers with businesses that will collectively support new and emergent industries and future jobs," said Prof. Raper.

The UOW Linkage projects funded are:

'Enhancing the longevity of roads and rail tracks for freight'

Distinguished Professor Buddhima Indraratna, Associate Professor Cholachat Rujikiatkamjorn and Dr Ana Heitor

ARC funding: \$590,000 - This project will use compacted industrial waste materials such as coal wash and fly ash for use in road and rail construction. This will help create sustainable and more resilient transport infrastructure to deal with increasing demand for safe and durable roads and railways that support faster and heavier traffic.

Partner Organisations: Douglas Partners Pty Ltd; Infra Tech Pty Ltd; Roads And Maritime Services; South32 Limited; Stabilco NSW Pty Ltd.

'Assessing the impact of pesticides to control locusts'

Professor Kristine French

ARC funding: \$410,000 - This project aims to understand how a range of native animals are affected by pesticides used to control locust plagues. It will develop a model for aerial pesticide spraying that improves our understanding of how mammals, lizards and invertebrates are affected by pesticides in order to improve environmental outcomes in pest management.

Partner Organisation: Australian Plague Locust Commission

'A new seating system for heavy vehicles to increase safety'

Associate Professor Haiping Du and Professor Weihua Li

ARC funding: \$365,000 - The project will develop a comfortable and ergonomic seating system for use in agriculture, transportation, mining and construction vehicles that reduces

exposure to vibrations from uneven road surfaces, vibrating tools, and vibrating machinery. Long-term effects of poor seating design can lead to increased fatigue and reduced safety, as well as cause neck and shoulder pain, lower back injuries, and spinal injuries.

Partner Organisations: Changzhou Wan-An Automotive Component Technology Ltd; Applied Measurement (Australia) Pty Ltd.; Futuris Pty Ltd

A next-generation battery storage system'

Distinguished Professor Shi Xue Dou, Dr Wenping Sun, Dr Khay See, and Mr Jianzhong Wang

ARC funding: \$360,000 - The project aims to significantly improve the energy density, safety and robust storage performance of lithium batteries with reduced cost. Intelligent features will make the whole energy network a next-generation battery storage system, with mechanisms to protect the battery from hazardous and inefficient operating conditions.

Partner Organisation: Tianjin Benefo Machinery Equipment Group Central Research Institute

'Develop a lithium-free sulphur battery system'

A/Professor Jiazhao Wang, Distinguished Professor Hua Liu, Professor Zai Guo, Dr Konstantin Konstantinov and Dr Shulei Chou

ARC funding: \$210,152 - This project aims to replace lithium metal with other anode materials to improve the safety of the system and drive Australia's competitive advantage in the field of energy storage. Commercialisation of the technology will also drive overseas demand for Australian raw materials for manufacturing lithium-ion batteries.

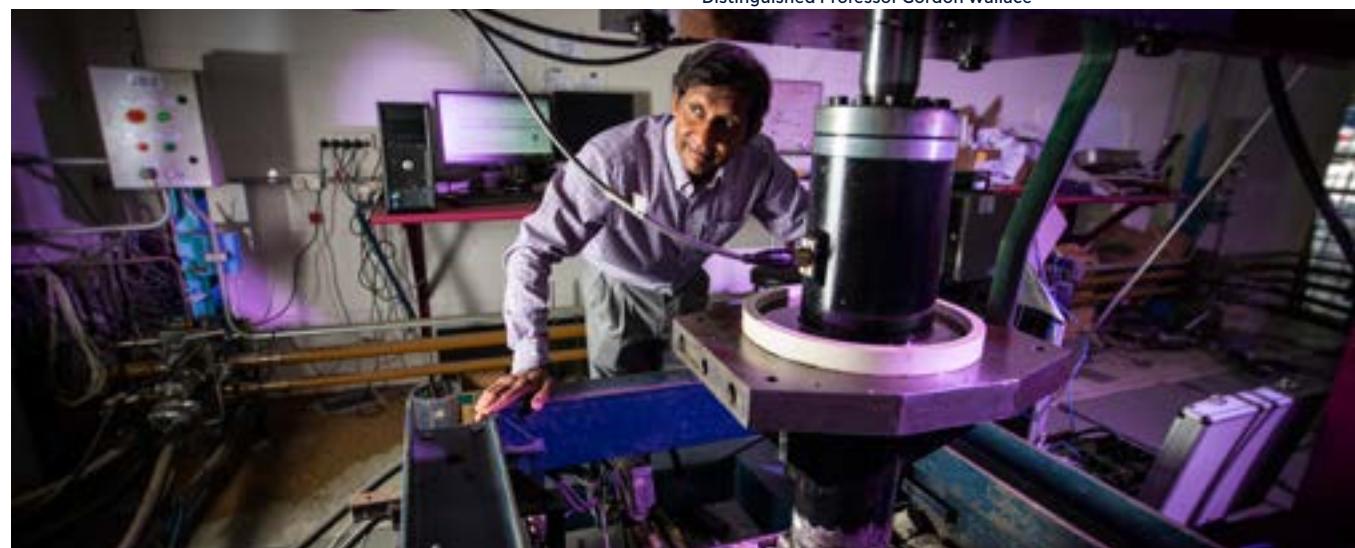
Partner Organisation: Nipress TBK, PT

'Improving voice communication in video conference technology for distance-based learning'

A/Professor Christian Ritz and Professor Farzad Safaei

ARC funding: \$197,048 - This project aims to reduce audio echo and improve stability for video conferencing technology, which are barriers to wider use of the application in education. A key benefit will be a significantly enhanced product that provides a commercial advantage as well as a solution to remote learning for Australian students and educators.

Partner Organisation: Isee Vc Pty Ltd



Distinguished Professor Buddhima Indraratna and his team will be working with a number of partners to enhance the longevity of roads and rail tracks for freight

INDUSTRIAL TRANSFORMATION TRAINING CENTRE IN ADDITIVE BIOMANUFACTURING

UOW is also a partner in a new training centre that will position Australia as a world-leader in 3D bioprinting for medical applications.

Federal Government funding of \$3.7M has been awarded to establish the ARC Training Centre in Additive Biomanufacturing – a collaboration between universities, companies and clinicians, under the Industrial Transformation Centres scheme.

Distinguished Professor Gordon Wallace and Dr Stephen Beirne from UOW's ARC Centre of Excellence for Electromaterials Science are co-investigators of the training centre which is being led by Professor Dietmar Hutmacher at the Queensland University of Technology.

The training centre aims to bring together leading researchers and industry to develop and translate key technology platforms for personalised treatments of challenging medical conditions. The centre expects its research will lead to synergistic and innovative technologies needed for personalised therapies including: modular additive biomanufacturing platforms; advanced bio-inks for regenerative medicine; and additive manufactured tools for surgical planning and education. Anticipated impacts are that Australia will be a world-leader in additive biomanufacturing, and that the research will change the fields of science, health and biotechnology.



ARC Training Centre in Additive Biomanufacturing: Dr Stephen Beirne and Distinguished Professor Gordon Wallace



Dr Shulei Chou (foreground), with Jonathan Knott, Distinguished Professor Hua Kun Liu, and Distinguished Professor Shi Xue Dou

Research and industry combine to develop renewable energy storage

A University of Wollongong-led project will develop ‘game-changing’ sodium-ion battery technology to help drive increased use of renewable energy

UOW is leading a project consortium that has received \$2.7 million from the Australian Renewable Energy Agency (ARENA) and \$1.8 million from partners to develop low-cost, high-density battery storage to integrate renewable energy sources, such as solar power, into the grid.

This will directly impact on the uptake of renewables. A single, integrated solution for renewable energy generation, storage and management will make it cheaper and simpler for consumers.

The Australian Government has set a target of sourcing 20 per cent of power generation from renewables by 2020. Yet, the intermittent nature of solar, wind, wave and other renewable sources, coupled with the high cost of large-scale battery storage, imposes a barrier on wider uptake.

Over the course of the four-year project, three UOW research groups will combine their expertise in battery technology, power reliability and building integration to develop sodium-ion battery materials technology in a modular and expandable battery packaging platform.

Current lithium-ion battery technology is expensive and uses relatively rare materials, while lead-acid technology is mature and cheap but has relatively poor energy density, which is a problem for use in large-scale storage systems.

As electric vehicles become more popular, demand for lithium-ion batteries will stretch an already limited supply of raw materials, pushing up the price of the technology.

Sodium however, is abundant, cheap and the element lends itself to being a ready replacement for lithium. The challenge for sodium-based batteries is to increase their charge and discharge rate and reduce the overall size of the batteries.

UOW's **Institute for Superconducting and Electronic Materials** (ISEM), which has a well-established world reputation on energy storage materials research, will develop a pilot-scale sodium materials production facility to prototype and develop the modular and expandable battery packs.

The battery packs will be tested in a residential and industrial setting. A small pack will be installed at the Illawarra Flame house, a sustainability demonstration site at UOW's Innovation Campus.

A larger battery pack will be installed at Sydney Water's Bondi Sewage Pumping Station, located just behind the iconic Bondi Beach. This pack will be integrated into a state-of-the art energy management system that is also being developed as part of the project. The energy management system will monitor and control renewable energy generation, storage and consumption to ensure the overall system operates at maximum efficiency.

UOW project leader and ISEM Director Distinguished Professor Shi Xue Dou said a single, cheap and integrated solution for renewable energy generation, storage and management would significantly improve uptake of renewable power.

“This technology will be a game-changer in providing cheap, energy-dense storage in the context of an energy management



A researcher holds a container of sodium to be used as a storage system for renewable energy

system," he said. "It will provide a path for Australia to reduce demand on the grid and the cost of infrastructure upgrades for utilities - particularly in remote regions."

The UOW research groups involved in the project alongside ISEM are the Australian Power Quality and Reliability Centre and the Sustainable Buildings Research Centre.

Their expertise will help design and model the energy management system and perform detailed energy-use studies to maximise the efficient use of the renewables generation, energy storage and grid connection.

Key manufacturing partners – McNair Technology, Hebei ANZ, Hong Cheng Electric Power, and Nano-Nouvelle – will develop the manufacturing processes, techniques and capacity to mass-produce the required sodium-ion cells for this project, and to meet the anticipated demand for this technology in the future.

As an end user, project partner Sydney Water will provide a platform for evaluation of the sodium storage pack at its pumping station and demonstrate its commercial viability.

Sydney Water Energy Manager Philip Woods said this technology would be of great benefit to Sydney Water's operations, with the potential to significantly reduce the cost of energy storage.

"We are pleased to support this project and look forward to testing this ground-breaking technology at one of our pumping stations in Bondi. The ability to store solar energy will increase the resilience of our plants, lower our operating costs and fits well with our commitment to cost-effectively generate and source electricity from renewable sources."

The project will start in mid-2016 and is expected to be completed in early 2020.

“UOW’s Institute for Superconducting and Electronic Materials will develop a pilot-scale sodium materials production facility to prototype and develop the modular and expandable battery packs. The battery packs will be tested in a residential and industrial setting.”

Distinguished Professor Shi Xue Dou
Director of Institute for Superconducting and Electronic Materials

ABOUT ARENA

ARENA was established by the Australian Government to make renewable energy technologies more affordable and increase the supply of renewable energy in Australia.

Through the provision of funding coupled with deep commercial and technical expertise, ARENA provides the support needed to accelerate the development of promising new solutions towards commercialisation.

ARENA invests in renewable energy projects across the innovation chain and is committed to sharing knowledge and lessons learned from its portfolio of projects and information about renewable energy.

ARENA always looks for at least matched funding from the projects it supports and to date has committed \$1.1 billion in funding to more than 250 projects.

For more information, visit www.arena.gov.au.

SYMPOSIUM ON NEXT-GENERATION BATTERIES

The 2016 International Symposium on Next-Generation Batteries will be held the University of Wollongong's Innovation Campus in August, bringing together more than 200 international scholars.

A first for Wollongong, the symposium will create a stage for exchanging the latest research results and sharing the advanced research methods for both young and senior scientists all over the world.

The symposium is soliciting state-of-the-art research papers in the following topics: Lithium and sodium based batteries; Metal air batteries; Electrochemical supercapacitors; Novel carbon based materials; Fuel cells and electrochemical catalysts; and Solar cells.

Symposium chair, Dr Shulei Chou, from the Institute of Superconducting Electronic Materials, invites all academics involved in these research areas to attend.

For further information: shulei@uow.edu.au



Examples of the sodium battery packs

Innovative thinker joins R&I Forum and launches UOW Scholars



“ UOW must keep trying to grow its research targets despite the national budgetary constraints. Things have never been more political and you have to lobby hard to show how your objectives meet current political objectives.

Dr Thomas Barlow
R&D strategist

A/Prof. Peter Innis (left) with Dr Thomas Barlow at the Research & Innovation Forum

Independent research strategist Dr Thomas Barlow presented at the recent UOW Research and Innovation Forum, which also saw the official launch of UOW Scholars.

Dr Barlow is the author of the Barlow Report ‘The State of Research in Australian Universities’, which has been published since 2007, and remains a key resource to inform strategic decision-making about research in Australian universities.

He spoke to the audience about how, over the last decade, UOW has doubled its scale of research activity.

“This is a significant period of sustained growth and yet UOW remains a friendly and welcoming environment.

“The data shows that UOW is one of the most effective educational institutions in terms of turning its R&D investment dollars (1.8% of national total in 2012) into outputs (2.7% of all universities), and that is impressive.”

In terms of finding other sources of funding in an environment of constrained external resources, Dr Barlow said, “You must become more research intensive, which means increasing investment of your own resources into research, including from consolidated revenues.”

The Research and Innovation Forum was hosted by Deputy Vice-Chancellor (Research and Innovation), Professor Judy Raper. She presented on recent and upcoming research initiatives, including the launch of **UOW Scholars** – an online platform for academic profiles.

“Scholars is a powerful tool for our academics and will be critical in helping them build their profiles and provide data for reporting, among other things.

“All profiles in UOW Scholars are drawn from the University’s enterprise information systems. The profiles contain pre-populated data that has been carefully curated by the Research Services Office, the University Library and the Information Management Unit within IMTS,” Professor Raper said.

UOW Scholars automatically integrates research publication, grant and HDR supervision data, as well as providing online details on research interests, external networks, teaching experience, outreach activities and a career biography.



An academic’s profile within UOW Scholars provides a summary of activities which can be viewed at any time by anyone. The intuitive interface allows academics to maintain a public web profile and provides a series of powerful visualisations into authorship, outcomes and collaboration activity.

Academic researchers will benefit by being able to showcase their research and expertise, highlight their partnerships and collaborations, raise the visibility of their work through social media platforms, and attract potential HDR students.

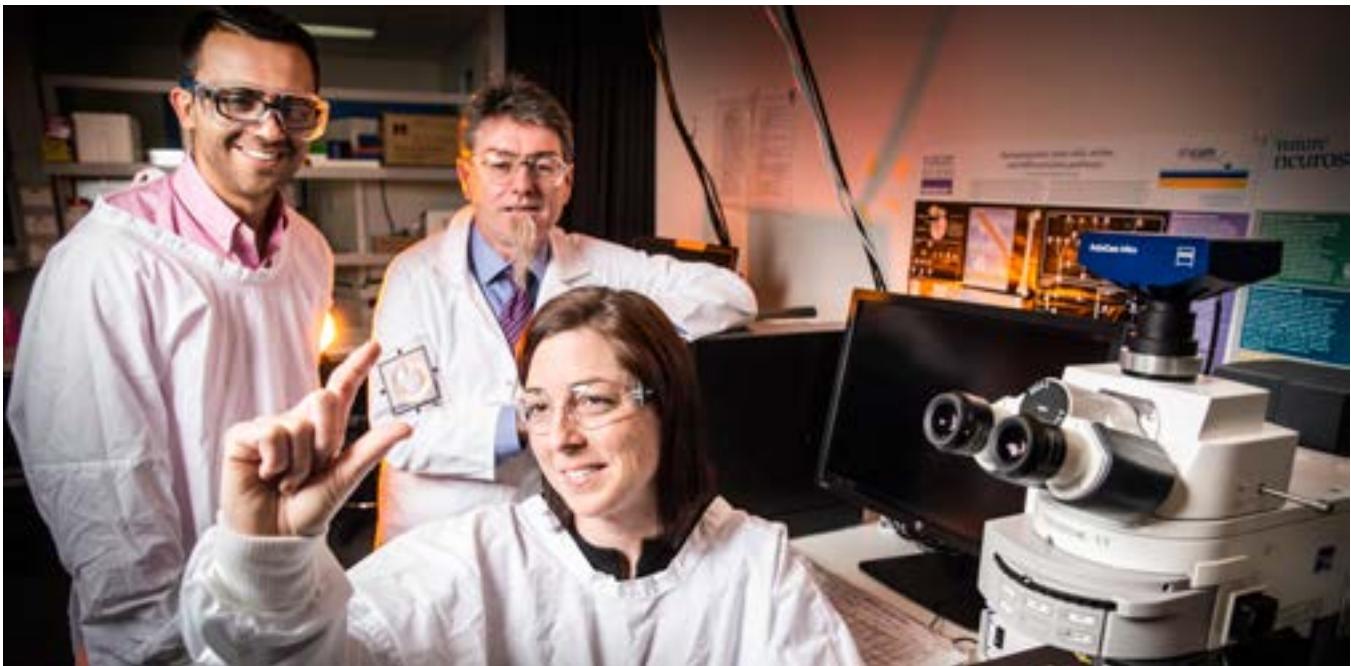
Associate Professor Peter Innis from the Intelligent Polymer Research Institute presented his UOW Scholars profile at the forum to show the type of information he chose to include and highlight.

“UOW Scholars provides a uniform way to publicise my research profile. The ability to seamlessly pull together publications, funded research grants and other research based activities with minimal effort is highly attractive.

“Significantly, the ability to see how my research activities relates to co-authors and collaborators in the form of a visual network is a compelling feature. This unique capability helps to identify other avenues for potential collaboration that otherwise may be overlooked,” Associate Professor Innis said.

Professor Raper encourages all academic staff to take advantage of the new system at <https://scholars.uow.edu.au/>

“This will also be an excellent resource for the media to find our experts in particular fields of research,” Professor Raper said.



Some of the UOW authors of the award winning publication: Mr Rodrigo Lozano, Distinguished Professor Gordon Wallace and Dr Elise Stewart. Fellow authors are: Leo Stevens, Dr Brianna Thompson, Dr Kerry Gilmore, Dr Robert Gorkin III, Professor Marc in het Panhuis and Prof Mario Romero-Ortega (University of Texas Dallas)

Brain on a bench

Studying the human brain using 3D printing technology: *Biomaterials* publication awarded Elsevier Atlas award

Our brains are amazing: they control our movements, thoughts and memories, regulate our body temperature and influence our emotions. But they're also the source of neurological disorders, cognitive disabilities and psychological problems.

Understanding the brain is helping scientists build a clearer picture of neurodegenerative diseases like Alzheimer's disease, but that picture has been in two dimensions – until now.

Researchers at the University of Wollongong in Australia and the University of Texas at Dallas in the US have figured out how to make more accurate models of the brain using 3D printing. Their Elsevier Atlas award-winning article was published recently in *Biomaterials*.

At two percent of our body weight, and made up of 100 billion nerve cells, the brain is a hugely complex organ. Scientists can study the brain using animal models, but in recent years much work has gone into seeking alternatives, with the support of organizations like the National Centre for the Replacement, Refinement & Reduction of Animals in Research.

One such alternative is creating models of brains in the lab ('Brain on a bench') - growing brain cells in a structural material that lets scientists observe what happens in the tissue. Until now, it has only been possible to do this in two dimensions, producing sheets of cells.

Distinguished Professor Gordon Wallace (Executive Research Director for the **ARC Centre for Excellence for Electromaterials Science**) and his colleagues have come up with a way of creating layered 3D structures that mimic the brain more closely, using 3D printing.

The team used gellan gum to create the structures. Gellan gum is

a substance made by the bacterium *Sphingomonas elodea*, which is often used as a gelling agent in microbiology labs. They created a bio-ink using the gellan gum, which they combined with brain cells. They found that the gellan gum helped the brain cells grow well and function as a network – much like in a real brain.

Having a 3D model will help give scientists a much more accurate image of what's really going on in our brains, and Professor Wallace believes this will help propel research into diseases like Alzheimer's and Parkinson's disease.

"I think the ability to study biological systems in three dimensions reveals new knowledge every day," he said.

"The brain is enormously complex and so are neurodegenerative diseases. Looking at what's going on in 3D – in a similar structure to the real human brain – will give us a much better idea of the biology behind these diseases, and help researchers working on ways to treat them."

"The new model has potentially huge benefits, and the collaboration that went into the research has made it even more useful."

"It's really important to build collaborative, interdisciplinary teams to address challenges like this. This paper wouldn't have been possible without the input of clinicians, biologists, materials scientists and chemists. Bringing those sorts of teams together is critical to address these clinical challenges," Professor Wallace concluded.

The **recently published work** explaining the 'brain on a bench' research also received the Elsevier Atlas Featured Paper Award for February 2016. This award recognises research which could significantly impact people's lives around the world.

Environmental conditions influence fish aggression



The intensity of aggressive interactions between one of the nation's most popular angling fish, Australian bass, and the invasive eastern mosquito fish, are dependent on the interplay between water temperature and salinity, a study by UOW PhD student Laura Lopez has revealed.

Her findings provide valuable new insights towards efforts to preserve estuarine ecology, and the enjoyment of recreational anglers, through stocking of Australian bass (*Maccullochella novemaculeata*) in coastal rivers and estuaries along the nation's east coast.

Natural numbers of Australian bass – a predatory native fish – have declined since the damming of rivers in key habitat areas. Juvenile bass of between 2.5 and 3 centimetres long from

hatcheries are therefore routinely restocked into traditional habitats.

How these young bass interact with the aggressive behaviours of the pest eastern mosquito fish (*Gambusia holbrooki*), endemic to the same environments, is not well understood.

Both fish are aggressive in nature, with the mosquito fish reputed for physical interactions including nipping other fish. As well, mosquito fish compete with bass, among other species, for access to food and habitat.

Laura's main finding was that temperature and salinity did regulate the intensity of aggressive behaviours between the two species. "We found that at a higher water temperature the two fish were more aggressive towards each other, but that higher salinity could mediate that effect and reduce aggression," Laura said.

"If aggression is reduced, it's more likely that the juvenile bass will survive to grow and mature, which is important both ecologically, as they are a predatory fish, and commercially."

Her investigations of how fish density may affect the number and intensity of interactions between the two species showed that when there is a higher density of mosquito fish, the bass are at the receiving end of more aggression.

However, mosquito fish didn't reduce the growth or survival of bass fingerlings in the field, though this is likely to change with water temperature. "The really interesting finding from the density studies was that we actually saw the bass returning the mosquito fish aggression. The bass seem to be able to adapt quickly to the aggression they're receiving."

Visiting international scholars announced



Research projects to generate energy from sewage, advance artificial muscle technology and investigate the impact of omega-3s in pregnancy are among the topics to be explored by visiting international scholars at UOW in 2016.

Ten talented international researchers will visit Wollongong this year as part of the Vice-Chancellor's International Scholar Awards (VISA) scheme. While here, they will collaborate with UOW academics on research projects at the cutting edge of discovery.

This is the second round of VISA scholarships to be awarded, with the scheme set to provide funding for up to 40 scholars over the next four years. It aims to boost UOW's global collaborations, linkages and connections with international research institutions in line with its research strengths.

2016 VISA RECIPIENTS

Professor Moeness Amin (Villanova University, USA): Distributed computations and classifications in urban and in-home networks.

Professor Jian-Fei Chen (Queen's University, Belfast, UK): FRP strengthening of bridges for improved resilience under extreme loading.

Dr Abigail Fisher (University College London, UK): Active Schools: Examining associations between the indoor build environment, pedagogy and classroom activity levels.

Dr Dilys Freeman (University of Glasgow, UK): Docosahexaenoic acid metabolism in healthy pregnancy & preeclampsia.

Dr Tom Froese (National Autonomous University of Mexico, Mexico): New approaches to the cognitive archaeology of the symbolic mind.

Dr Harriet Hawkins (University of London, UK): Creative Earth Futures: 'Making' other environmental futures possible.

Professor Tao He (Shanghai Advanced Research Institute, Chinese Academy of Science, China): Novel forward osmosis and membrane distillation materials for sewer mining.

A/Professor Edwin Jager (Linkoping University, Sweden): Printed Artificial Muscles.

Professor Weijia Wen (Hong Kong University of Science & Technology, Hong Kong): Development of an innovative microfluidic platform for biological applications.

Professor Hua Zhang (Nanyang Technological University, Singapore): Volume production of high-quality pristine graphene, ultrathin 2D metal oxide nanosheets, and 2D metal dischalcogenides.



Professor Zaiping Guo (pictured, left) and Professor Zenobia Jacobs are two of three researchers awarded a 2015 ARC Future Fellowship at UOW

ARC funds Future Fellows

Investigating questions of our origins and solving challenges of our future.

The nation's largest Australian Research Council (ARC) Future Fellowship for 2015 has been awarded to University of Wollongong geochronologist, Professor Zenobia Jacobs, from the Centre for Archaeological Sciences.

Professor Jacobs, who is also Head of the School of Earth and Environmental Sciences, was awarded \$946,000 when the 2015 Future Fellowships were awarded in December to continue her research into the evolution of early humans.

Using state-of-the-art optical dating, Professor Jacobs will address the critical question of when *Homo sapiens*, Neanderthals and Denisovans occupied the Altai region of Russia, the only place on Earth where these three groups of humans are known to have existed at the same time.

She said when the recovery of ancient DNA from the fossilised finger bone of an unknown lineage of ancient species (dubbed the 'Denisovans' after the cave in which they were found) was recovered from Siberia in 2010, the story of human evolution and world prehistory "took an unexpected turn".

The mystery of the Denisovans deepened when it was discovered that, of all humans alive today, Aboriginal Australians and Melanesians contain by far the greatest amount of Denisovan DNA in their genomes – up to five per cent – surprisingly linking these enigmatic hominins found in Siberia with the first Australians.

Under her Future Fellowship, Professor Jacobs will construct an accurate timescale for the archaeological and human fossil assemblages found in the Altai region of Russia over the past 800,000 years in the hope of answering some key questions about human evolution.

"This project will yield new insights into human evolution and how *Homo sapiens* came to be. It will also place Australia's cultural heritage within the broader framework of global human history, and enrich our understanding and appreciation of Aboriginal culture," she said.

Professor Zaiping Guo, from the School of Mechanical, Materials, and Mechatronic Engineering and the Institute for Superconducting and Electronic Materials – part of the Australian Institute for Innovative Materials (ISEM) – received \$899,000 under the Future Fellowship scheme to explore new materials for ultra-efficient, long-life sodium-ion batteries.

Professor Guo and her team have been working to create sodium ion batteries and will now focus on developing new nanoscale electrode materials to use in the batteries.

"Sodium-ion batteries are the most promising choice for large-scale electrical energy storage, in particular for renewable energy sources and smart electric grids, owing to their low cost and the natural abundance of sodium."

"The success of this project will advance fundamental understanding of sodium-ion batteries, and provide techniques for the development of a promising low-cost system for renewable energy storage, which is urgently needed in smart electricity grids."

UOW's third Future Fellowship awarded in the 2015 round went to Professor Yusuke Yamauchi, from Japan's National Institute of Materials Science. Professor Yamauchi received \$784,000 to work on creating novel high-performance, low-cost, and long-life electrode catalysts, which is important for improving energy conversion technology. It is hoped the insights gained from this project can be utilised to advance fuel cells and advance other green energy technologies under development at ISEM.

Deputy Vice-Chancellor (Research and Innovation) Professor Judy Raper said the Future Fellowship outcomes highlighted UOW's strengths in materials engineering and archaeology, both of which were rated 'well above world standard' in the ARC's 2015 Excellence in Research for Australia report.

"This is an outstanding result and a testament to the quality of research at UOW. I congratulate our three Future Fellowship recipients."



Professor Alexandre Kalache was recently in Wollongong as a guest of Global Challenges

Ageing in leaps and bounds

'A Conversation With' Professor Alexandre Kalache: an expert in ageing and gerontology

Professor Alexandre Kalache grew up in the bustling Brazilian city of Rio de Janeiro, at a time when the average life expectancy for the nation's citizens was just 43.

More than five decades on that number has almost doubled to 75, a trend that is reflected in developing nations around the world.

However, the rapid pace of ageing, while astonishing in the course of just one generation, poses the greatest challenge to modern society, Professor Kalache says.

An expert in the fields of ageing and gerontology, Professor Kalache says his childhood in Brazil, spent in a busy household of multiple generations, informed his attitude towards older people.

"My grandmother had 13 brothers and sisters, and my grandfather had 17 siblings, so I had very close contact with older relatives," says Professor Kalache, the president of the International Longevity Centre in Brazil, and HelpAge International in London.

Professor Kalache believes the move away from extended families living under the same roof is leading to a lack of empathy from younger generations towards their elders.

"Each of my grandparents came from Portugal, Italy, Greece, and Lebanon, and we didn't have a television, so I listened to lots of fascinating stories growing up."

Professor Kalache was recently in Wollongong as a guest of Global Challenges. A member of the Living Well, Longer Advisory Board, he also took part in 'A Conversation With', a series in which a renowned academic takes part in an informal chat about their career.

Professor Kalache, a trained doctor, has devoted his work to understanding ageing, and what it will mean for society as we move further into the 21st century.

As Director of the World Health Organisation, a position he held from 1994 to 2008, he pioneered the concept of active ageing and launched the Global Movement on Age Friendly Cities.

"I've never looked back," he says of his decades spent researching geriatrics. "When I moved to the United Kingdom in 1975, no one spoke about ageing. I saw an opportunity. No one could have predicted the speed of ageing that has occurred."

The world, he says, is struggling to both understand and support its ageing population. And this older generation is not going in to their twilight years quietly. Rather, Baby Boomers, who have changed societal definitions of each stage of life they pass, are again disrupting what it means to age.

"Baby Boomers have a very different idea of retirement and ageing," Professor Kalache says. "Just as they were the original disrupters in the 1960s and 1970s, they are disrupting the wisdom of what ageing means."

He explains that Baby Boomers have created a new stage in life – a concept he terms "gerontolescence", a older version of that definitive stage of transformation, adolescence – in which they are embracing ageing and viewing life post-retirement as exciting, rather than exhausting.

Professor Kalache argues for greater understanding of and strategies for older generations, to ensure they receive the support they deserve and are able to continue contributing to society. Otherwise, he says the experience and wisdom of our older members of society will be lost. Initiatives such as Global Challenges' Living Well, Longer enable society to view ageing in a more positive light and recognise the importance of embracing every life stage, even if it brings greying hair and a few wrinkles.

Professor Kalache's passion for the subject, which sees him work with organisations throughout the world on the importance of active ageing and creating age-friendly cities, is infectious and it is clear that his own retirement is not in sight.

"When I was born, life was a 100 metre sprint. Now it is a marathon," says Professor Kalache, who entertained the 'A Conversation With' crowd with his anecdotes of life in Brazil, where he still lives.

An executive approach

The Illawarra Health and Medical Research Institute, and the Faculty of Social Sciences, have both recently had a change in leadership. Here, we profile new IHMRI Executive Director, neurophysiologist Professor David Adams, and new Faculty of Social Sciences Executive Dean, health economist Professor Glenn Salkeld.



Professor David Adams, Executive Director, Illawarra Health and Medical Research Institute

Professor David Adams

EXECUTIVE DIRECTOR, ILLAWARRA HEALTH AND MEDICAL RESEARCH INSTITUTE (IHMRI)

"I studied science at the University of New South Wales, but to be honest I didn't really know what I wanted to do. Things started to turn around in my third year when I attended lectures on membrane physiology with Professor Peter Gage, an inspirational lecturer and researcher who was at the forefront of ion channel research.

I did Honours in his lab in 1973 and was then conscripted to fight in Vietnam. I was able to defer this by undertaking a PhD with a Commonwealth Postgraduate Scholarship. Under Professor Gage's supervision, I had my first paper published in *Science* in 1976 and the output of my PhD also included two papers in *Nature* and four in the *Journal of Physiology*. I am indebted to him for the opportunity to have a career in medical research.

When I first went overseas in 1978, I soon realised that the work I had been doing in Professor Gage's lab was at the cutting-edge. I was able to attract a Muscular Dystrophy of America Postdoctoral Fellowship at the University of Washington (1978-80), then a Grass Fellowship in Neurophysiology at the Marine Biological Laboratory, Woods Hole Massachusetts (1980), followed by a Beit Memorial Fellowship for Medical Research at University College London (1981-84).

In 1984, I was recruited by the University of Miami School of Medicine as an Assistant Professor in the Department of Molecular and Cellular Pharmacology. While there, I helped to establish, and was Associate Director of, the National Institutes of Environmental and Health Sciences Center for Marine Biomedical Research.

I returned to Australia in late 1995 to take up the Chair of Physiology at the University of Queensland (UQ). It was an interesting time. Peter Beattie was elected Premier and UQ was also changing under the leadership of Vice-Chancellor John Hay. The Pro Vice-Chancellor (Biological Sciences) at the time was Professor Alan Pettigrew, who is now IHMRI's Chair.

I became the Head of the School of Biomedical Sciences in 2000 and in that role was keen to build on the strength of neuroscience research at UQ. I approached Professor Hay with regard to a neuroscience initiative. Donations from Atlantic Philanthropies, coupled with University and State Government funding, saw the Queensland Brain Institute (QBI) founded in 2003.

I left UQ in 2009 to become Director of the Health Innovations Research Institute (HIRI) at RMIT University, Melbourne. There, I focused on identifying research-active and externally-funded researchers in the biomedical sciences, establishing four programs based on critical mass: Biophysics and Bioengineering, Metabolism, Exercise and Disease, Traditional and Complementary Medicine, and Ion Channels and Transporters as Therapeutic Targets. The Institute has been instrumental in building the research culture and infrastructure at RMIT's Bundoora campus.

I acted as Deputy Vice-Chancellor (Research and Innovation) at RMIT between May 2013 and February 2014. This was a great experience, giving me insights into university-wide challenges and initiatives.

My interest in the role at IHMRI was really sparked by talking to Professor Pettigrew. I realised the opportunity at IHMRI was unique in that it is a partnership between UOW and the Illawarra Shoalhaven Local Health District.

That's one of the real advantages of IHMRI - not every institute is fortunate enough to have that founding partnership between the local area health district and the University. I am passionate about research translation and so far, I've only had strong commitment from IHMRI's partners to build on that. The opportunity of working with clinicians, and the broader Illawarra community, is great. It is a model that provides real opportunities for research impact.

In science now, in research now, the biggest change I've seen since from when I started is that if you want to be competitive, it's about the research team. You can't do it yourself. Of course you need an area of focus – if you want someone who can work in ion channels, I can do it – but that's only part of the story if I want to actually develop and deliver to market a drug to treat chronic pain.

So the role I see for this Institute is to develop an environment and culture where people feel supported in research, and feel they can have successful careers. For me, I need to help develop a culture of engagement and connection. Part of this will mean attracting some outside talent, and building depth: of expertise, of research profile, of people.

There is some fantastic work underway here, and plenty of potential, that is what's exciting. This includes for me personally, as IHMRI offers some new opportunities for my research.

My research involves the use of state of-the-art electrophysiological and fluorescence imaging techniques to investigate the targets and mechanisms of action of analgesic peptides on membrane receptors and ion channels expressed in the sensory neurons of pain pathways.

At the moment, we are pursuing investigation of a peptide derived from the venom of marine cone snails as a novel candidate for treating visceral pain. There's always been a lot of emphasis on understanding and treating neuropathic pain, in actual fact visceral pain is as predominant, if not more, in terms of population health. For example, one in five people in Australia – the majority of whom are women – suffer from the symptoms of Irritable Bowel Syndrome and there's just no good treatment. We're optimistic about the potential of the peptide we have characterised for IBS.

I've also more recently become involved in investigating opportunities of utilising peptides for targeted drug delivery, for example in getting anti-cancer drugs to tumours. What we find in say, lung cancer, is an overexpression of a certain receptor by the cancerous cells. If we have a peptide that is very selective for that receptor and no other for that receptor, then that peptide is an opportunity to be a highly specific vehicle for drug delivery. It's early days, but I'm aware of some fantastic research already underway at UOW and by our researchers in drug delivery, and I'm looking forward discussing the opportunities and linkages."

>> Joel Castro, Andrea M Harrington, Sonia Garcia-Caraballo, Jessica Maddern, Luke Grundy, Jingming Zhang, Guy Page, Paul E Miller, David J Craik, David J Adams, Stuart M Brierley: α -Conotoxin Vc1.1 inhibits human dorsal root ganglion neuroexcitability and mouse colonic nociception via GABAB receptors, *Gut*, doi:10.1136/gutjnl-2015-310971

With thanks to IHMRI's Research Matters for permission to republish parts of this profile.

An executive approach

Professor Glenn Salkeld

EXECUTIVE DEAN, FACULTY OF SOCIAL SCIENCES

"I was the first person to be awarded a National Health and Medical Research Council (NHMRC) fellowship in health economics – that was in 1987 – and the topic I examined was the cost effectiveness of breast cancer screening. This feels like ancient history now, because now breast cancer screening is such an integrated part of the healthcare scene.

That was undertaken in the Department of Community Medicine at Westmead Hospital, headed by Stephen Leeder, now Emeritus Professor of Public Health at the University of Sydney. In 1992, I got a lectureship in health economics there and spent my career - up until this point - at the University of Sydney.

In the 1990s, there weren't that many health economists around. So I found myself making connections in all of these different disciplines – epidemiology, statistics, anthropology, health promotion.

We were all interested in many ways in the same health questions and topics but of course had a different disciplinary perspective on it. It was brilliant training because the culture was one in which you would never pose a research question in isolation of other points of view or disciplines.

So for me, this environment manifested itself in our first NHMRC program grant, in 2001, on which we had a multidisciplinary team working on a project called the Screening Test Evaluation Program (STEP). We were funded to be an independent critical voice of issues surrounding population based screening.

There's lots of screening – there's bowel cancer screening, breast cancer screening, osteoporosis screening, screening babies for certain conditions at birth. But actually, not all screening is beneficial.

“ To me, what brings the Faculty of Social Sciences together is our common interest in social change and social impact

Part of STEP's role, over the 15 years it has been running, has been to evaluate proposals for population health screening. For example, we evaluated the HPV immunisation program, as well as investigated the potential for prostate cancer screening – but on prostate cancer the evidence is not there.

The major paradigm shifts that our group has been responsible for is – and it sounds really simple, but it's powerful – is that you really need to systematically consider the benefits and the harms of screening at a population basis, and also to promote the idea of informed choice – that you can't just take a paternalistic view that all screening is good.

A lot of the work I led on the STEP grant was the development of online decision aids which capture the evidence base for screening

and/or treatment; capturing that important part of patient preference.

When you take the quantitative estimates of the benefits and harms, and match it with patients' general preferences about life and their health using an expected value equation you can come up with a recommendation or opinion.

One of the top cited papers to come from this project is on informed choice, published in the *BMJ* which is on the vanguard internationally of saying we really need to think critically about this.

STEP has been funded for 15 years, coming to a close at the end of June this year. I've been extremely fortunate to be a part of such an influential research group, and now I'm looking forward to what's ahead here at Wollongong.

To me, what brings the Faculty of Social Sciences together is our common interest in social change and social impact. All of the things that influence people's choices in daily life, whether as an individual, as part of a household, or part of a community and how people are given opportunities to fulfil their potential in life.

So from a social sciences point of view if we're about social change and impact, how do we measure that? I'm personally committed to finding effective ways of measuring impact, because professionally it's been a really important part of everything I've done, but also now because consideration and measurement of impact is demanded by funding agencies.

What impresses me so far – and I had heard of this long before I came to Wollongong – is the high level of collegiality amongst staff here.

Also I've noticed that there are processes are in place to empower PhD students to have confidence take charge of their ideas and that a PhD is not viewed just as a transaction, not just a piece of work, it's actually relational. Maybe that's no different to what most universities have, but I've seen it here and I'm impressed by that.

I'm a strong believer in doing a few things well so part of the challenge is to really focus – build reputation, build impact, and of course part of that must always be journal articles, publication citations and of course the thing that all universities want – and Wollongong is better positioned to have it – is engagement with community.

Early Start is one of the great opportunities for community connection here. Yet we can't lose sight of how it can create broader prospects for our research as well. We've seen people coming to Wollongong because it offers an opportunity that other universities cannot, attracting leading academics from the UK for example. It's essentially 'turbocharging' our research, building our capacity for postdoctoral positions, as well as extending for our national and global networks."

Professor Glenn Salkeld, Executive Dean, Faculty of Social Sciences



University of Wollongong

\$740,000 NHMRC funding to maintain fight against diabetes

UOW researchers Associate Professor Thomas Astell-Burt and Dr Xiaoqi Feng, members of the Western Sydney Diabetes Prevention and Management Initiative, have been awarded an National Health and Medical Research Council grant of \$740,000 to continue one of the world's largest studies into environmental factors that may contribute to successful management of the disease.

With 280 Australians developing diabetes every day, or one person every five minutes, the spotlight is on western Sydney where incidence is among the highest.

According to Dr Astell-Burt, director of Public Health Sciences at Western Sydney University, the prevalence of diabetes in Sydney's west is between 6 to 8 per cent of the population compared with only 2 per cent in more affluent areas in the eastern suburbs and north shore.

"We have researched this since 2012, with incredible support from Western Sydney Local Health District (WSLHD) and WentWest Primary Health Network, and found we have this wide inequity within our city which we think may be driven by the environments we live in," Dr Astell-Burt said.

"In western suburbs like Blacktown and Mount Druitt, between 10 and 20 per cent of residents live within a kilometre of a takeaway, but do not have a supermarket or green grocer within the same distance.

"This circumstance is likely to influence decision making in terms of what people eat and, therefore, the success of diabetes prevention and management efforts."

Dr Feng, a senior lecturer in epidemiology at the University of Wollongong, who also received a postdoctoral fellowship from the National Heart Foundation of Australia to conduct related research on diabetes prevention with WSLHD, says the NHMRC and Heart Foundation-funded projects are focused on exploring environmental relationships.

"We are looking at the relationship between the characteristics of where people with diabetes live, such as green spaces, walkability, public transport availability and provision of food environment, and how these factors modify the success of diabetes management for preventing avoidable hospitalisations and emergency department presentations," Dr Feng said.

The project aims to bolster collaborations with health policymakers and urban planners to improve the quality of neighbourhoods.

"That will, in turn, support longer, healthier and happier lives for everyone living with diabetes in western Sydney and across Australia," Dr Astell-Burt says.



Twitter Day of action on Indigenous health : #IHMAY16

The third annual 'Twitter Day of Action for Indigenous Health' (May Day Twitter festival) focusing on Indigenous youth and families, and suicide prevention was co-hosted by UOW on Thursday 12 May.

"This day of action is incredibly important and especially given the focus on youth and families and suicide prevention," said Associate Professor Bronwyn Carlson, lecturer at the Indigenous Studies Unit in the Faculty of Law, Humanities and the Arts.

"Some Aboriginal communities experience rates of suicide and self-harm which are up to 40 percent higher than the general population, making them among the highest in the world.

"Reducing suicide and suicidal behaviour among Aboriginal peoples is now a public health priority for all Australian governments," Associate Professor Carlson said.

Workshops at UOW prior to the Twitter Day of Action provided practical advice about using social media for advocacy and

activism as well as learning from Indigenous people who have extensive experience and expertise in using social media platforms.

The facilitators shared social media tips and the strategies they use to ensure Indigenous perspectives and voices are heard.

Hosting #IHMayDay16 at UOW builds on Associate Professor Carlson's Australian Research Council (ARC) funded work on Indigenous social media use and suicide prevention and Dr Tanja Dreher's ARC Future Fellowship grant on the politics of listening, as well as a LHA Faculty Challenge Grant.

It also builds on the very successful FIRE Symposium on Indigenous Social Media Activism held in November last year.

[View tweets with #IHMAY16](#)



iAccelerate Centre officially opens

The iAccelerate Centre, the region's first purpose-built business incubator, providing a permanent home for over 280 startup companies is close to completion at the UOW's Innovation Campus

The \$18 million Centre is due to be open for business in June 2016 with applications currently being accepted for the next intake.

iAccelerate's suite of programs, designed around a robust educational framework, formalised business acceleration monitoring and one-to-one mentoring, is aimed to assist businesses grow and scale their companies in the Illawarra and into the national and international markets.

"iAccelerate provides opportunity for early stage ideas, existing large scale businesses wanting to spinout an innovative idea or new business, or businesses looking for a soft landing in the Illawarra region. Where else can you get this level of office space from \$70 per desk per week?" said Melissa Ryan, UOW's Innovation Development Senior Manager.

iAccelerate offers a practical and engaging program to help build businesses fast, with a no fuss leasing process, offering two main business acceleration programs: iAccelerate Start and iAccelerate Advanced.

In 2015, six iAccelerate resident companies expanded their international presence and to date nine companies have had new product launches. Since the iAccelerate program launched in 2012

iAccelerate has assisted a total of 57 companies and helped create 119 startup jobs.

The 3-storey, 4,000 square metre iAccelerate Centre will feature 'plug and go' expandable space, with 30 offices, 12 meeting rooms, 6 breakout spaces, 2 co-working spaces and a rooftop terrace with a container bar.

The funding for the iAccelerate Centre was part of the Restart Illawarra Infrastructure Fund, which provided \$100 million in State Government funding for 12 projects in the region.

IACCELERATE APPLICATIONS NOW OPEN

Applications are currently being accepted for the iAccelerate Centre. If you would like to know more about reserving your place in the new building contact iAccelerate on info@iaccelerate.com.au or apply to the iAccelerate program. iAccelerate also holds many community engagement events open to the public including the Entrepreneur Club meetings and a women's breakfast series.

Learn more: www.iaccelerate.com.au



Southern Manufacturing Innovation Group

UOW brings together innovative manufacturers in the region with university researchers to form a Southern Manufacturing Innovation Group

Just on one year ago UOW initiated bringing together innovative manufacturers in the region with university researchers to form the Southern Manufacturing Innovation Group (SMIG).

The Group was officially launched by the Deputy Vice-Chancellor (Research and Innovation), Professor Judy Raper, at UOW's Innovation Campus on in May, 2015.

Since then, a series of themed networking events have been organised to provide a forum for manufacturers in the region to create an exchange of ideas and specific collaborative opportunities facilitating a strong connection with researchers from UOW.

"The idea was to open up dialogue and encourage companies to discuss their own experiences, challenges or opportunities," Manufacturing and Innovation Leader of Global Challenges at UOW, Professor Geoff Spinks, said.

"UOW has a long history of industry engagement. We are part of a region that was founded on manufacturing and is now facing transformation. UOW is deeply committed to the future and vitality of this sector. Establishing a forum for collaboration is just one way we aim to support ongoing development," he said.

Discussion topics have been established by an initial survey of SMIG companies and in response workshops have been organised around new materials, 3D printing and sensors and data analytics. Researchers from a range of disciplines at UOW have been invited to present their research in those areas and SMIG members have also contributed their experiences and expertise.

Recent government reports (like the Australian Innovation Systems Report) have highlighted how poorly Australian businesses collaborate with one another and with universities in comparison with other businesses in other OECD countries.

"The SMIG events shows that there is definitely a willingness of manufacturing businesses in our region to explore collaborative opportunities and learn more about what's going on and how to propel things further," Professor Spinks said.

Equally important is the involvement of key researchers representing many of the multiple, widely disparate disciplines that are relevant to manufacturing: technical, business, social.

The concept for SMIG was originally discussed in 2013. Throughout 2013 and 2014 Professor Spinks and Bruce Thomson, Business Development Manager at ICR visited businesses in the Illawarra,

Southern Highlands and Shoalhaven which were known to be innovative but did not have any formal research interaction with the University to gauge their level of interest in working with UOW.

Many of the businesses were doing very innovative work and connections with other like-minded business and with UOW seemed an empowering way to drive further innovation.

The selection of companies for SMIG was enabled by the combined intelligence of quite a few different organisations and people. Particularly important were AusIndustry (especially Innovation Facilitator, Leanne Taylor and Regional Manager, Peter Masterson), AiGroup (Regional Manager, Leanne Grogan) and NSW Dept of Industry (Tony Green and Megan Cleary).

"We are fortunate in our region to have a strong support 'eco-system' with an attitude to help out and work together. It would be very difficult to get a group like SMIG started without such a well-connected network of contacts," Mr Thomson said.

At the time of launch, 14 companies had agreed to participate in SMIG. Two more companies have joined since and it is expected that more will join by the end of 2016. In March, an event was held at a factory - Fibre Optic Design and Construct in Bulli - for the first time.

"The great thing about SMIG is that it provides an opportunity for three-way information exchange: business-to-business, business-to-university and university-to-business," Mr Thomson said. "Not only are researchers and businesses talking about how to work together, but we are already seeing the roots of new business to business collaborations."

For further information, contact brucet@uow.edu.au.



Professor Judy Raper, Professor Geoff Spinks and Mr Bruce Thomson

Improving mobility aids

Most of us imagine our twilight years as a time of exploration and relaxation; a time to throw off the demands of work and children and enjoy all the world has to offer.

But for those with physical health concerns, the gap between expectation and reality is often widened by a lack of mobility support as they struggle to retain independence and quality of life.

A Global Challenges project is aiming to address this issue by designing new and improved mobility aids, while, at the same time, providing a much-needed boost to the region's manufacturing industry.

Enabilise is working with the aged care industry and local manufacturers to identify, and solve, the problems presented by existing mobility aids and develop new prototypes based on engagement with the people who will actually be using the equipment.

It does not sound like a novel approach, but it is. Until now, mobility aids have largely been developed in response to changing technology, rather than the needs of the community.

Senior research assistant, Dr Eliza de Vet, says the aim of Enabilise is to ensure those with mobility issues are able to access services and maintain their independence and involvement in the community as they age.

"Australia has a big ageing population – a quarter of the population are 55 plus – and aged care services are already stretched so it's important we start looking at having systems and equipment in place to allow older people to have an improved quality of life," Dr de Vet says.

In the first stage of the project, the Enabilise team held focus groups to identify current mobility issues and the daily problems experienced by those who use mobility aids.

Enabilise is now in its second stage, in which members of the community are invited to complete a survey that will help the researchers pinpoint the issues with existing aids. The findings will inform the third and final stage of the project – designing, developing and potentially manufacturing new mobility equipment in collaboration with local manufacturers.

The project is truly interdisciplinary and enables the region's businesses and manufacturers to provide solutions that meet the real-world needs of those aged over 55 who experience mobility issues.

Enabilise brings together different disciplines from across the university and engages with AusIndustry, Aged and Community Services NSW/ACT, and the Illawarra Forum.

You can have your say by participating in the [online survey](#) or by phoning (02) 4221 4261.

“Until now, mobility aids have largely been developed in response to changing technology, rather than the needs of the community.

Dr Eliza De Vet
Senior Research Assistant





Indonesia must seize role in drafting rules for high seas

By Zaki Mubarok Busro and Genevieve Quirk
PhD students in ocean law and policy at the Australian National Centre for Ocean Resources and Security

Negotiations to create an international legally binding instrument for governing marine resources beyond national borders took place recently at the UN headquarters.

More than 50 percent of the world's oceans are in these areas beyond national jurisdiction. These first negotiations from March 28 to April 9 in New York related to the 1982 UN Convention on the Law of the Sea (UNCLOS) on the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction. The underlying principles are mainly that the marine resources and biodiversity are a common heritage, apart from freedom of navigation.

Indonesia, a maritime and archipelagic state, was closely involved with the drafting of UNCLOS and together with the G77 group of developing nations, now comprising 134 members, supports these talks to improve governance of the seas.

The negotiations are historic; the UN agreed only last year to tackle the challenge of coordinated governance of biodiversity beyond national borders through a legally binding instrument. Marine areas beyond national jurisdiction are vital to sustainable development, food security and poverty alleviation. This is because of the trans-boundary nature and interconnectedness of ecosystems in the high seas and on the seabed beyond our borders to the coastal regions within those borders.

Industrial activity has expanded to include seabed mining, ocean energy generation, distant industrial fishing and bio-prospecting for marine genetic resources. Today technological advances are a double-edged sword aiding more intense exploitation, but with the benefit of overcoming the high costs of monitoring and enforcement outside national jurisdictions. Reformed governance of ocean activities beyond our borders is crucial to minimize risks to the health and productivity of marine ecosystems.

Negotiators face complex issues and challenges. Additional challenges arise in negotiations over an institutional structure that does not undermine the mandates of existing organizations. The other challenges are about an appropriate dispute settlement

mechanism, unresolved issues over continental shelves and a mechanism for coordination and oversight for regulation of activities.

For biodiversity beyond national borders, fishing poses the greatest threat. For Indonesia, illegal, unreported and unregulated (IUU) fishing beyond our borders threatens the environment and livelihoods. Indonesia has taken a strong stance on IUU fishing nationally and in international forums.

The UN negotiations — to continue next year before an intergovernmental conference — offer a key opportunity to prevent, deter and eliminate IUU fishing in areas beyond national jurisdictions. Through these negotiations Indonesia can be part of combating these illicit activities in the high seas as a responsible member of the international community.

For Indonesia and its friends in the G77, careful attention is needed in the following issues:

First, the legal framework on areas beyond national jurisdiction should not undermine any current legal arrangements on global conservation by fishing vessels on the high seas.

Second, Indonesia must be among the developing states to benefit from marine genetic resources in the high seas.

Third, the institutional framework for the international legally binding instruments should also be considered as cautiously as compliance and cooperation with regional fisheries management organizations. Fourth, Indonesia should ensure that capacity building and transfer of technology will be on equal footing for developed and developing states.

Of particular importance to these negotiations is the link between IUU fishing and transnational organized crime beyond national waters. Crimes such as over-exploitation of fisheries and human trafficking are key examples of illicit activities within and beyond Indonesia's oceans. Eradicating the problem requires global cooperation and it is important for Indonesia to continue to cooperate with the global community in this unprecedented opportunity to stamp out illegal and criminal activities at sea.

*Originally published April 18th 2016 in the Jakarta Post.
Read the Full article.*



Laws don't silence street music

Contrary to the assumption that buskers resent being subjected to rules and regulations, researchers from the University of Wollongong's Legal Intersections Research Centre (LIRC) have found most street performers are not opposed to a bit of law in their lives.

Associate Professor Julia Quilter (pictured below right) and Professor Luke McNamara, UNSW Law and LIRC Visiting Professor, recently completed Australia's first ever study of the operation of local council laws governing street music and other forms of busking.

Building on previous collaborative research on the criminalisation and regulation of behaviour in public places (as well as a shared love of music), Associate Professor Quilter and Professor McNamara set out to determine how successful councils have been in the tricky business of simultaneously encouraging and 'containing' busking.

In fieldwork conducted in Sydney and Melbourne, the researchers were surprised to find that most buskers were happy with the rules and regulations.

"While some buskers remain philosophically opposed to any sort of restrictions, most of the buskers recognised that the laws were required and were fair enough.

"Some went so far as to say that they liked the rules – because they gave street performers certainty and legitimacy as a user of public space," Associate Professor Quilter said.

She said the findings demonstrate the importance of empirical socio-legal research to inform decisions about the regulation of public places and their uses. If the study had simply examined the law 'on the books' it would have found that local council laws that govern busking are draconian and over the top.

"Certainly, on paper, they look that way – permit requirements, time limits, and big fines if you break the rules.

"However, by speaking directly to those affected by, and involved in enforcing, street performance rules, we found the magic ingredients of a successful regulatory model – a combination of self-regulation and gentle, education-focused enforcement – were working well.

"In talking to council officers and rangers, and buskers themselves, about how things work in practice, we found buskers generally reported feeling that their unique contributions to the urban streetscape were appreciated and supported by the rules," Associate Professor Quilter said.

This study has implications for street music across Australia and around the world as "it shows that it is possible to introduce a permit system without stifling the capacity of street musicians and other performers to do their thing – including enlivening urban streets and malls and making a living."

The findings have been published in the latest issues of the *Melbourne University Law Review* and the *Journal of Musicological Research*.

Read the original **Conversation Article**.





Pictured from left to right: Dr Bailian Li (NCSU) Prof. Joe Chicharo (UOW), Prof. Michael Kearney (University of Surrey), Prof. Judy Raper (UOW), Prof. Mauricio Baptista (University of São Paulo), Prof. Vincent Emery (University of Surrey), Prof. Paul Wellings (Vice-Chancellor, UOW) and Prof. Max Lu (Vice-Chancellor, University of Surrey)

UOW now a Global Partner

To ensure the University of Wollongong continues to grow as an international educational institution and increase its global impact, it has recently partnered with other like-minded leading universities within the University Global Partnership Network (UGPN).

Established in 2011, the UGPN is an international consortium of selected research-intensive universities focussed on turning ideas into action by developing sustainable world-class research, education and knowledge transfer.

UOW joined the Network in November 2015, alongside founding partners North Carolina State University in USA, the University of São Paulo in Brazil and the University of Surrey in the UK.

As the newest member, UOW hosted the UGPN annual meeting (29th Feb-3rd March 2016) which brought together senior researchers and academics to collaborate on issues of global importance, explore ways to improve teaching methods, share research resources and create new opportunities for international student and staff exchanges.

"The consensus is it's been the best conference we've ever had," University of Surrey Pro-Vice Chancellor International and Acting Deputy Vice Chancellor (Research and Innovation) Professor Vincent Emery said.

"Everyone has been very interactive, exploring the opportunities for the whole network to move forward and I think the University of Wollongong is a key player in that future," Professor Emery said.

The conference included presentations, workshops, tours and networking events and established a solid foundation for UOW's participation in the network.

UOW Deputy Vice Chancellor (Research and Innovation) Professor Judy Raper said the conference lived up to expectations, revealing synergies and collaboration opportunities with current research projects.

"The University of Surrey has been undertaking research into the life cycle of shipping, but hadn't considered the environmental impact of sea anchors - an area UOW has been researching.

"We saw a great deal of interest in our research in the field of wearable sensors.

"Australians are now using 4G mobile communications technology,

but the University of Surrey has a 5G test bed. We're looking at using this facility to test the compatibility of our sensors with the next generation of mobile communications technology.

"There was also considerable interest in research into the effect of climate change on Australia's mangrove forests and the role of the 'blue carbon economy'. We're now exploring how we can extend that work internationally."

Another research area attracting attention was Early Start - UOW's revolutionary initiative that combines research, teaching and community engagement to deliver better outcomes for children.

USP Director of International Cooperation, Professor Maricio S. Baptista, said he was impressed by Early Start's interdisciplinary approach and the community outreach activities.

"If we work with our kids we are assuring the future of ourselves and of our country. For Brazil this is perhaps the weakest part of our society and an area where as a country we have to improve," he said.

As well as research collaboration, the conference gave partners insight into the experience on offer for international exchange students, a particular area of interest for North Carolina State University Vice Provost for International Affairs, Bailian Li.

"The facilities at UOW are excellent, especially your Innovation Campus which is very similar to North Carolina State's Science Park.

"Your main campus is a lovely campus; almost like a little mini city. All this is a big plus because campus life is so important for our students when choosing an international exchange destination. We currently have a waiting list of students wanting to come to Wollongong and I've already spoken to UOW about expanding our exchange program," he said.

The conference also marked the opening of the call for submissions for the next round of the UGPN Research Collaboration Fund, which has provided seed funding for 27 projects over the last three years resulting in a total research investment in excess of \$US3.1 million.

The next annual meeting of the UGPN network will be hosted by USP in Brazil in February/March 2017.

Further information is available on the [UGPN site](#).

PhD student profile: Amy Carrad

School of Health and Society, Faculty of Social Sciences

My PhD research is investigating the feasibility of using organisational development and capacity building strategies to facilitate culture change in sports organisations, specifically gymnastics. The ultimate goal of this culture change is to shift sports settings to be supportive of holistic wellbeing by stepping away from the historically strong focus on athlete skill development and competition. The health areas for the current phase of my research are mental health and nutrition.

WHY DOES THIS INTEREST YOU?

Health promotion through sports interests me because of the links between prevention of chronic diseases, settings-based approaches to health promotion, the large number of Australians participating in sport, and the potential to utilise the existing structures of sports organisations to deliver on health promotion.

Sport is often assumed to be inherently healthy because of its physical activity component, however there are other exposures within the sports context that are not health promoting. Some examples are sponsorship by alcohol and fast food companies, sun protection in outdoor sports, unhealthy foods in canteens and fundraising, and mental health issues including body image disorders. I believe that sports clubs are able to alter their physical and social environments in order to address these other health areas that extend beyond exercise alone.

WHY IS IT IMPORTANT?

Non-communicable diseases are the leading causes of death and disability in Australia, accounting for approximately 85% of the burden of disease and 90% of total deaths. Generally, risk factors for these diseases originate early in life through unhealthy behaviours such as poor diet, smoking, and physical inactivity. However, the behaviours of individuals do not result merely from individual choice but also from socioeconomic, societal, political and environmental determinants. This means that in order to address the high level of preventable disease in Australia, we need to focus on these broader determinants of health.

The greatest impact on reducing the physical, social and financial burden of preventable disease is achieved by making smaller improvements amongst many people, rather than large changes to individuals. This is where the setting-based approach to health promotion comes in, with interest increasing in the role sports clubs can play as a health promoting settings.

DESCRIBE HOW YOU GOT HERE?

The inspiration and passion for this area came from my personal experiences coaching gymnastics. The club I coach at has a holiday program for children to attend, during which the lunches we used to serve them would have actually been classified as junk food. I conducted a personal project to improve the nutritional quality of the meals we served by providing the children with vegetables they liked. Over almost three weeks, 252 children underwent my “experiment” or taste-testing to give feedback on these meals.

Their responses were encouraging and demonstrated that it was feasible to provide healthier, tasty dishes whilst remaining within budget. However, for my PhD, I didn’t want the field to be as narrow as nutrition alone because there are a lot of other health areas that sports clubs could address.



WHO HAS INFLUENCED YOU IN YOUR RESEARCH CAREER?

I’m not sure there is any one specific person. It would more likely be anyone in the field who is striving to make inroads on the huge public health issues we are faced with. There is very little commitment from government to invest in preventive health, so trying to conduct and sustain projects that seek to benefit the health of our community is a difficult thing and requires a great deal of tenacity.

WHAT HAS BEEN THE MOST EXCITING PROJECT SO FAR?

I think the most exciting part so far would actually have to be the fieldwork - going out to interview people at their clubs. These people are so invested in their club and it was a beautiful thing to feel their passion for the sport and visit what is for most of them their home away from home.

WHAT DO YOU HOPE TO ACHIEVE?

I would love to re-write what sport is. At present, it is predominantly about competition, and developing motor skills and physical fitness. I aspire to be part of the movement to seeing sports organisations changing their mandate to include holistic health because at the end of the day, individuals who are holistically healthy are also going to be better athletes.



Boron advance for energy storage

Chemical formulas that provide the ‘recipe’ for key ingredients in advanced energy storage, developed and enhanced at UOW, are being commercialised through an industry partnership.

Institute for Superconducting and Electronic Materials (ISEM) researcher Dr Zhenguo Huang (pictured above) has developed compounds containing boron, one of the critical chemical elements that make up the planet. He has also reformulated existing methods for synthesising compounds used in energy storage to make them more efficient.

Dr Huang, an Australian Research Council Discovery Early Career Research Award (DECRA) recipient (2012-2015), has licensed the formulas via UOW to Melbourne-based specialist chemical manufacturer, Boron Molecular, which was spun out from CSIRO in 2001.

Boron Molecular focuses on producing specialised chemicals used in the manufacture of pharmaceuticals and high-end electronics.

The 10-year agreement between UOW and Boron Molecular will see commercial expansion of the processes developed by Dr Huang for application in hydrogen energy storage solutions and rechargeable batteries, a market valued into the billions of dollars.

In research conducted under his ARC DECRA, Dr Huang synthesised compounds critical to the development of effective hydrogen storage using cheap and common starting materials and featuring high purity and better yields than previously reported methods.

“In the fundamental research we conducted under the DECRA funding, we reported the first B₃H₈ ionic liquid related to hydrogen

storage, and settled a 90-year argument over the existence of a key compound in the field of borane chemistry,” Dr Huang said.

The commercialisation arrangements demonstrate how fundamental investigations can influence innovation and drive disruption in the commercial sector, Dr Huang said.

“It takes hard work to convert research into actual products, so this partnership with Boron Molecular is evidence of effectiveness in research commercialisation that is helping Australian industries become more innovative,” Dr Huang said.

“Improving energy storage is a critical area if we, as a society, are to make progress in improving energy efficiency, and exploit more environment friendly energy solutions.

“There is much research underway in this area and it is exciting to see that our research investigations have led to a promising commercial opportunity, particularly given the national focus on driving innovation.”

Dr Huang’s research has also lead to the commercial-scale production of a new boron-based electrolyte salt for sodium-ion batteries, which could enable wide deployment of cheap sodium-ion batteries for use in large-scale renewable energy storage.

The UOW-Boron Molecular partnership will also help the broader research community in enabling access to high quality hydrogen storage compounds.

Research at UOW

Research Strengths

- Advanced Manufacturing Technologies
- Australian Centre for Cultural Environmental Research
- Australian National Centre for Ocean Resources and Security
- Centre for Archaeological Sciences
- Centre for Health Initiatives
- Centre for Medical and Molecular Bioscience
- Centre for Medical Radiation Physics
- Early Start Research Institute
- Engineering Materials
- GeoQuEST
- National Institute for Applied Statistical Research Australia

Externally Funded Centres

- ARC Centre of Excellence for Electromaterials Science (ACES)
- ARC Centre of Excellence in Geotechnical Science and Engineering (GSE)
- Australian Power Quality and Reliability Centre (APQRC)
- ARC Research Hub for Australian Steel Manufacturing
- Centre for Geomechanics and Railway Engineering
- Centre for Human and Applied Physiology
- Defence Materials Technology Centre (DMTC)

Major Research Entities

- Australian Institute for Innovative Materials
- Early Start
- Illawarra Health and Medical Research Institute
- SMART Infrastructure Facility
- Sustainable Buildings Research Centre

Cooperative Research Centres

- Automotive CRC
- Bushfire CRC
- Capital Markets CRC
- Energy Pipelines CRC
- CRC for Polymers

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