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CIVIL AND ENVIRONMENTAL ENGINEERING

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ANNUAL REPORT 2018

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Environmental Engineering

UNSW SYDNEY 2052

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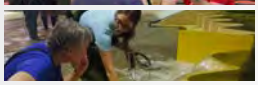

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7 THINGS you should know about UNSW Civil & Environmental Engineering

No 1
Ranked No 1 in Australia and in the world's Top 10*

1

Experienced
70 years of innovative and in-depth teaching - a Foundation School of UNSW

2

Expansive
Over 2200 undergraduates enrolled in 12 different degree programs, over 1400 masters students in 12 specialisations and 200 PhDs

3

Excellence in Research
5 out of 5 ERA ranking - awarded 160 Australian Research Council Grants

4

Investigative
6 research hubs working across the full range of civil, environmental and geospatial engineering

5

Connected
Each year we work with over 100 organisations on specific industry related projects

6

Influential
Consistently one of the highest contributors to Engineers Australia's Top 100 Engineers lists

7

Civil and Environmental Engineering
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* 2018 Academic Ranking of World Universities (ARWU) published by ShanghaiRanking's Global Ranking of Academic Subjects

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Welcome from the Head Of School

"The School has always been at the forefront of innovative 'blue sky' and applied research across the many facets of our very broad engineering field"

I am delighted to introduce the School of Civil & Environmental Engineering's 2018 Annual Report.

Our School has long been internationally ranked as the premier School of its kind in Australia, and in 2018 we were pleased to see our global ranking move even higher when Shanghai Ranking placed us in the world's top ten for civil engineering.

The School maintains strong breadth and depth of knowledge in all core areas of civil and environmental engineering as well as surveying and geospatial engineering. The quality and diversity of our academic staff, and our intensive engagement with industry, allows us to bring an unmatched level of expertise to our research and teaching.

We offer numerous undergraduate single and dual degree programs, and a wide variety of very popular postgraduate coursework specialisations. Not surprisingly our School is large by both national and international norms, with over 3,800 students enrolled in our programs in 2018.

The School has always been at the forefront of innovative 'blue sky' and applied research across the many facets of our very broad engineering field. Our researchers continue to receive industry and government funding, including 146 highly sought after Australian Research Council (ARC) grants and fellowships.

We are excited by the social impact we have as teachers and guides of the next generation of innovative professionals, as well as our critical mass contribution to the global research sphere. But we aim also to have a positive impact and use for the broader community, beyond any campuses, as we transfer our knowledge to industry and government through our many external partnerships.

In 2018 the School began the year with an industry research futures forum at UNSW's CBD campus in O'Connell St. Representatives from 44 industry and government bodies attended the forum, which was themed as 'meeting the challenges together'. During the course of the year that followed, our staff worked

with over one hundred industry and government organisations on specific research projects to face current challenges and provide sustainable solutions.

We live in challenging times, which demand and will continue to demand a lot from all of us. I am confident that the resources of this large, hard working, highly motivated, skilled and passionate School will also continue to contribute greatly to the common and the global good.

Professor Nasser Khalili
Acting Head of School

About Us

...ranked as the premier School of its kind in Australia...

UNSW Civil & Environmental Engineering is internationally ranked as the premier School of its kind in Australia and in the world's top 15 (QS ranks us as #12 and AWRU as #10). From our foundation in 1949, the School has pursued excellence and innovation in education and research. We now offer 14 undergraduate degree programs, with one third of our undergraduate students enrolled in dual degrees.

Our academic staff are recognised world leaders in their fields of expertise, while our alumni are to be found as innovators and decision makers in industry, government and the community. We are embedded in the real world. Each year we work with over 100 industry and government organisations on specific industry and community related research projects.

Snapshot Stats 2018

School academic staff: 50

School and centres research staff: 75

School professional and technical staff: 30

2018 Enrolment

HDR: 173 Students - EFTSL 137

Postgraduate coursework: 1416 Students - EFTSL 937

Undergraduates; 2235 students - EFTSL 1477

2018 Research

ARC funding awarded in 2018: $6.3M

Total research funding: $13.8M

Refereed research publications: 474

2018 Finances

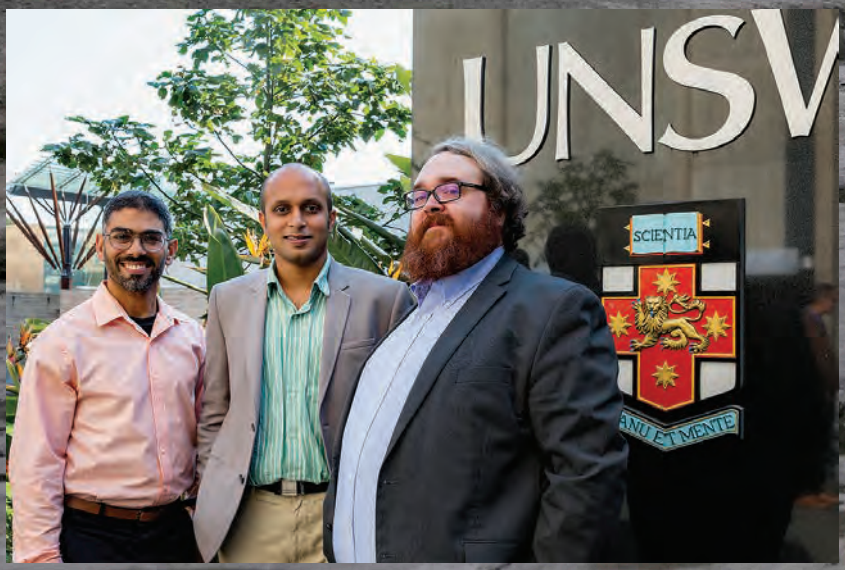
2018 generated teaching & research income: $90.7M

2018 allocation to the School: $23.2M

2018 operating budget: $20.7M

Below: HoS Prof Nasser Khalili and Prof Denis O'Carroll, Director Water Research Centre – recipients of ARC Special Research Initiative Grants in 2018 – their work will address environmental contamination caused by per- and poly-fluoroalkyl substances (PFAS), chemicals used in everyday commercial products including firefighting foams and pesticides.

Bumper Crop in 2018 – 13 ARC Grants for the School



Above: Smart Parkers: rCITI champions : A/Prof Taha Rashidi, Prof Vinayak Dixit, Director of rCITI & Prof Travis Waller, UNSW Engineering Deputy Dean – Research.

Seven Discovery Projects, four Linkage, two Special Research Initiative Grants. A total of $6.3M:

the largest amount of ARC funding ever received by what was already a high achieving School, which can now claim 160 ARC grants under its belt. As Head of School Nasser Khalili declared, "This is a phenomenal outcome and one that is reflective of the quality of work done by all our staff. Congratulations to all involved."

Research topics covered a range of engineering challenges, involving deep explorations and innovations in geotechnical engineering, urban sustainability, revolutionary miniaturised satellites, traffic networks & transport planning, as well as water quality, reuse and remediation technologies. Many of the projects involve academic colleagues from other UNSW disciplines and other universities, as well as industry partners, as the School continues to connect extensively with the wider world.

For the third year running, UNSW received more Discovery Project grants than any other institution in the country, receiving 88 in the 2018 announcement- worth $34.9m

UNSW Deputy Vice-Chancellor for Research Professor Nicholas Fisk congratulated UNSW researchers. "Our researchers have again been recognised as being at the very top of their game" he said, "and for their exceptional contribution to tackling some of society's biggest challenges to achieve relevant outcomes for Australia and the world."

CVEN staff involved in the ARC grants include Emeritus Professor Ian Gilbert, Professor Nasser Khalili, Dr Arman Khoshghalb, Dr Matthew Lee, Dr Jinxing Ma, Professor Michael Manefield, Associate Professor Denis O'Carroll, Dr David Rey, Emeritus Professor Chris Rizos, Associate Professor Adrian Russell, Dr Kristen Splinter, Professor Chuying Tang, Professor Ian Turner, Scientia Professor David Waite, Professor S. Travis Waller, and Associate Professor Tommy Wiedmann.

In addition to the ARC funding, in 2018 School transport researchers also won $800K from the Australian Government's Smart Cities & Suburbs Program, for work on an Integrated Smart Parking System. Staff involved in the Department of Infrastructure, Regional Development and Cities' grant are Sylvia Brohl, Professor Vinayak Dixit, Dr Milad Ghasri, Maria Lee, Dr Wei Liu, Associate Professor Taha Rashidi (Chief Investigator), Dr David Rey, Dr Meead Saberi, Professor S. Travis Waller and Dr Kasun Wijayaratna.

For full list of ARC grant projects awarded in 2018 see Research Section pp40-42.

Lucy Marshall – our inaugural Associate Dean for Equity and Diversity.

In June 2018 CVEN academic Associate Professor Lucy Marshall was appointed Associate Dean for Equity and Diversity for the Faculty of Engineering at UNSW Sydney, the first position of its kind created by any UNSW faculty.

A/ Professor Marshall will work closely with Professor Eileen Baldry who holds the corresponding role for UNSW. Together they will develop strategic plans and evaluate practices and policies to provide an inclusive, equitable and respectful environment for all staff and students across the Faculty. A/Professor Marshall will also chair the Faculty's Equity, Diversity and Inclusion Committee.

"This role is really important for the Faculty – and it's well aligned with the university's 2025 strategy, which is excellent," A/Professor Marshall says. "My focus will be on creating equal opportunity for our community at all levels – this includes both staff and students," she added.

In 2018's intake, 27 per cent of UNSW undergraduate engineering students were female, versus the Australian average of 17 per cent. Gender equity is high on A/ Professor Marshall's agenda. To fulfil the target of 40 per cent of senior positions in the Faculty to be held by women by 2025, attitudes and perceptions need to be changed.

"I think there's a perception that the number of women who come through engineering education or the engineering industry is quite small and that this is the reason why the proportion is small at academic levels as well," she says."But that's not correct, if we have a look at our PhD students; we have 40 per cent women for example in my School, so transforming the culture in the university is something that I'd really like to tackle."

The new role will enable A/Professor Marshall to implement a program that she says will not only promote more diverse representation, but also improve the quality of research and education.

"Put really simply, with diversity we achieve our best results," A/Professor Marshall says."When we have diverse viewpoints and groups that come together to solve a problem or address a particular issue, we ensure that we come up with the most effective solutions, the most efficient solutions and the most innovative ones. I think with this aim of developing a workplace at UNSW that is more diverse, that is more inclusive, we want to make sure that we are identifying the best talent that's out there and make sure that we're retaining that talent."

As an active member of Women in Science and Technology communities, A/Professor Marshall is an expert in equity issues. She was also awarded the prestigious MODSIM Mid-Career Research Excellence prize in 2017.

But it's not just gender equity that will be part of Marshall's focus.

"Socioeconomic diversity is something that I think is particularly important. We've also looked at cultural diversity and we have some plans to make sure that our PhD population is representative of the full cultural diversity," Marshall says.

Meeting the challenges together

– CVEN Industry Futures Research Forum

Over 120 people including 60 industry representatives from 44 organisations attended the School's biennial industry research forum held in Feb 2018 at UNSW's CBD campus in O'Connell St. With the major theme as 'meeting the challenges together' it was a day at which the cutting edge research of the School was showcased, not just with research outcomes, but more pertinently with results of our successful and ongoing collaborations with industry and government.

MC for the day was the School's Industry Advisory Committee IAC Chair Ian McIntyre, who declared that 'Today's event is intended to be a conversation starter, not just a series of presentations.'

Professor Stephen Foster, Head of School affirmed that 'This forum is a two way conversation to help the School assess its future direction in research.'

Industry and universities have extensive opportunities to work together in the coming years, particularly as new technologies change existing engineering and manufacturing practices.

Advisian Professor of Transport Innovation Travis Waller spoke of the Australian Government's report "Australia 2030, Prosperity through Innovation", and how the School was contributing towards this with solution-driven approaches to design, construction and management of the built environment using leading edge techniques.

"There's a need to embrace new opportunities for industry and academic innovation, but to do it successfully", said Dr Robert Care, AM, "there needs also to be an emphasis on building strong relationships. Ones that respect the different drivers that industry and academic bring into collaborative relationships."

Warwick Dawson, Director of UNSW's Knowledge Exchange (KE), informed the audience that his department can help with bridging this gap.

Parallel sessions provided more opportunities for knowledge sharing, industry networking, and collective exploring of challenging issues. CVEN presentations and industry discussions were grouped under four topical themes:

Smart cities: managing our complex 21st century societies

Resilient communities: engineering for adaptation and safety

Disruptive technologies - engineering a transformed global landscape

Sustainable, strong and socially just – engineers make the world a better place.

The overall message of the forum was the need for holistic and long term thinking in policy and research, full sharing of information and data, and for industry, government and academia to seek deep and lasting ways of working together.

As industry participant Sid French, Principal Structural Engineer at Advisian, remarked, "The key to our evolution to the new paradigms lies in co-operative partnerships with organisations like UNSW who are generating the smarts to make the future happen."

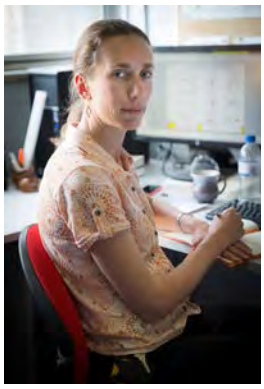
Staff Awards and Achievements

Congratulations to our wonderful Civil & Environmental Engineering staff on all their many achievements and awards gained during 2018 including the following:

Professor Stephen Foster was awarded **Honorary Life Membership of the International Federation for Structural Concrete (fib).** Prof Foster is a member of the fib Presidium and Head of the fib Australian National Delegation He was one of the key organisers of the 5th fib International Congress in Melbourne. Stephen has been a member of the fib journal *Structural Concrete* Editorial Board since 2017 and Deputy Chair of the fib Technical Council since 2015. He was the former fib Commission 4 "Modelling of Structural Behaviour and design" Chairman. He is a member of numerous fib working groups, and co-authored fib Bulletins 45, 55, 56, 57, 65, 66, 79, 85 and the Model Code 2010.

Associate Professor Will Glamore and his team at CVEN's Water Research Laboratory (WRL) were awarded an International *Working with Nature* Certificate of Recognition from PIANC International, the world association for waterborne infrastructure. This was a joint award with Newcastle Coal Infrastructure Group on their restoration of 24 ha of habitat for migratory shorebirds - and the first time this certificate was given to any project in Australia. In 2018 Will was also appointed to three expert panels including the NSW Coastal Council, the Marine Estate Expert Knowledge Panel and the NSW Expert Panel on PFAS, and was elected Chairman of the Board for PIANC Australia-New Zealand, only the second Chair in the past 20+ years.

Dr Mitchell Harley, Senior Research Associate at WRL was awarded a prestigious **UNSW Scientia Fellowship** in 2018. Mitch is a leading researcher in the field of continental shelf dynamics, wave climates, coastal modelling and real-time early warning systems for coastal hazards. In the QS 2018 World University Subject Rankings UNSW was ranked 16th in 'Marine and Ocean Engineering'.



Senior lecturer **Dr Fiona Johnson** won the **Early Career Research Excellence Prize** from **MSSANZ** (The Modelling and Simulation Society of Australia and New Zealand) in December 2017, and in 2018 was awarded a prestigious **UNSW Scientia Fellowship,** as UNSW also recognised her outstanding research track record. Fiona's research is in the area of hydro-climatology, and her teaching is in water resources and humanitarian engineering.

A team of researchers at **Research Centre for Integrated Transport Innovation** (rCITI) won the **Pyke Johnson Award** from the **US Transportation Research Board** (a division of the US National Academies of Sciences, Engineering and Medicine) for the most outstanding paper submitted on transportation planning

and the environment. The paper - which was co-authored by **Ali Najma, Dr Melissa Duell, Dr Milad Ghasri, Dr Taha Rashidi and Prof S Travis Waller** - looked at demand forecasting and system/supply modelling. It was selected from a field of 650.

In recognition of his distinguished contributions to engineering, **UNSW Scientia Professor T David Waite** was elected a **Foreign Member of the United States National Academy of Engineering (NAE),** one of only 16 foreign members - and the only member from an Australian university – to be given this honour in 2018**.** Membership of the NAE is considered one of the highest professional honours accorded to any engineer, and recipients are recognised for their outstanding contributions to research, practice or education or the pioneering of new and developing fields of technology. Waite, a former Head of School, is internationally recognised for his work in the field of environmental chemistry. His principal research area is the investigation of physico-chemical processes in natural and engineered systems, in particular the behaviour of elements such as iron, manganese, copper, silver and uranium. The impact of his work is multifaceted, ranging from improved technologies for water treatment, to better approaches to land management, to mineral extraction from tailings deposits and the management of radioactive wastes. In 2018 David was appointed Executive Director of the UNSW Centre for Transformational Environmental Technologies (CTET) in Yixing (Jiangsu Province). He is an Associate Editor of the journal *Environmental Science & Technology*.

Postdoctoral Fellow at the Water Research Centre Dr Conrad Wasko was awarded **The Lorenz G. Straub prize** for the best PhD in Water Engineering globally. This competitive international prize is awarded for the most meritorious thesis in hydraulic engineering, hydrology, ecohydraulics, or related fields. In the past 52 years, only four scholars from Australian universities have received this honour. Conrad's work on simulation of rainfall in a warmer climate is already making a significant impact on engineering design under a changing climate. He is the latest in a long list of overachieving PhDs in the Hydrology and Water Resources group at the School, which is ranked 6th internationally in QS discipline specific rankings - on the basis of research outcomes.

A/Prof Tommy Wiedmann was identified by *Clarivate Analytics* as one of the world's most *Highly Cited Researcher* in their 2018 list (for the fourth time since 2015). Tommy's publications rank in the top 1% in his field as measured by citations. He has long-standing expertise in integrated sustainability assessment and environmental footprint analysis. His main research question is how to achieve human wellbeing without increasing environmental impacts. He develops and applies environmental input-output analysis as part of a holistic concept to life cycle assessment, industrial ecology and sustainable consumption and production research.

Senior Appointments in 2018

Congratulations to our staff who have taken up UNSW Engineering leadership positions outside the School.

In 2018 **Associate Professor Lucy Marshall**, Deputy Director of the Water Research Centre, was appointed Inaugural Associate Dean for Equity & Diversity at UNSW Engineering, the first position of its kind in an Australian university – see p8 of this report for fuller story.

Professor Travis Waller was appointed to the position of Deputy Dean, Research UNSW Engineering. In his new role, Waller, who was the founding director of the phenomenally successful rCITI, will provide strategic advice to the Faculty on research activity, and work to raise our profile amongst industry.

In recognition of his expertise and leadership in the sustainable concrete field, in 2018 **Associate Professor Arnaud Castel** was appointed Chair of a new international Technical Committee convened by the global body, the International Union of Laboratories and Experts in Construction Materials, Systems and Structures (RIMEL). The establishment of the RIMEL Technical Committee is a significant milestone in the global cause of low carbon concrete.

Promotions:

The great work of our academic staff continued to be recognised at UNSW and in 2018 the following staff received well deserved promotions which will come into effect on 1 January 2019.

Promotions to Professor

Vinayak Dixit, Director of UNSW Research Centre for Integrated Transport innovation (rCITI) and Director of TRACSLab@UNSW - the world's first networked driving simulator laboratory.

Linlin Ge, an expert in remote sensing and earth observation techniques, and a foundation member of the Surveying and Spatial Sciences institute.

Denis O'Carroll, ARC Future Fellow whose research is currently focused on the environmental fate and ecotoxicity of engineering nanoparticles released from commercial products.

Promotions to Associate Professor

Congratulations to **Ehab Hamed** – CIES researcher.

Taha Rashidi, rCITI researcher, and ARC DECRA.

Our Research Centres

Our success is based upon the detailed, rigorous, collaborative and visionary work of our research centres and discipline groups.

The School is a research powerhouse – with seventy five professional researchers and 173 PhD candidates led by our expert world-renowned academic staff. Not surprisingly we received a five out of five ranking from the Australian Government's ERA (Excellence in Research in Australia) for 2018. Our success is based upon the detailed, rigorous, collaborative and visionary work of our research centres and discipline groups.

CWI Connected Waters Institute Research Centre

www.connectedwaters.unsw.edu.au

Our mission is to undertake the fundamental and applied multidisciplinary research needed to improve our understanding of groundwater systems both nationally and internationally.

Director: A/Professor Martin Andersen

CIES Centre for Infrastructure Engineering & Safety

www.cies.unsw.edu.au

An internationally recognised centre focused on high-level research for safe and sustainable civil engineering infrastructure - expert in structural engineering, geotechnical engineering, engineering materials, construction & project management, and computational mechanics.

Director: Professor Chongmin Song

rCITI Research Centre for Integrated Transport Innovation

www.rciti.unsw.edu.au

rCITI is a world-leading organisation in integrated interdisciplinary transport research and development with a range of research initiatives investigating sustainable approaches to transport infrastructure and operations, with extensive liaison with industry and government.

Director: Professor Vinayak Dixit

SAGE Surveying and Geospatial Engineering Research

www.sage.unsw.edu.au

The SAGE Research group conducts world-class research in the sub disciplines of geodesy, photogrammetry, positioning measurement and remote sensing.

Academic Leader: Professor Linlin Ge

WRC Water Research Centre

www.wrc.unsw.edu.au

Australia's water management needs innovative and integrated solutions in terms of environmental, energy and social considerations. WRC conducts pure and applied research in surface and groundwater hydrology, public health and water treatment, and water quality. We also undertake commercial activity in collaboration with industry.

Director: Professor Denis O'Carroll

WRL Water Research Laboratory

www.wrl.unsw.edu.au

The Water Research Laboratory (WRL) is a world-leading research and consulting laboratory on a four hectare site at Manly Vale that tackles the most challenging and pressing water engineering problems faced by the world today. Our areas of expertise include coastal, ocean, estuarine and wetland management; riverflow and floodplain management; civil engineering hydraulics; and climate change adaptation.

Director: Professor Ian Turner

Aboriginal Australians prize the environment more than any engineering project.

We acknowledge that the land we walk on is Gadigal land. We pay our respects to elders past, present and emerging.

The School of Civil & Environmental Engineering would like to loudly applaud the astounding achievements of our first indigenous female engineer.

Rachel McVittie is a Martu woman who first walked the hallways of CVEN six years ago. After completing a Tertiary Preparation Certificate at TAFE, she was admitted to Engineering on her ATAR score. She freely admits that, prior to her TAFE enrolment, she could hardly read or write.

To walk these hallways was particularly daunting: entering a world where no indigenous woman had gone before. Looking back, the people she will miss most are the CVEN professional staff. Rachel lost her dear mother whilst studying, and so it has been both a sad and a triumphant time to graduate. The professional staff handled her journey through grief gently, in a culturally sensitive and re-assuring manner.

The other team of people Rachel loves is from Nura Gili, the UNSW Indigenous Programs Unit, who gave Rachel a home in an intimidating world. She is now a Nura Gili ambassador herself, helping younger Aboriginal students feel empowered.

Rachel found herself attracted to construction. It is on work sites she has found not only the means to utilise theory, but life lessons in sustainability, egalitarianism and the clarity to define an indigenous perspective on land and water use.

One of Rachel's core beliefs is egalitarianism. "I come from a community where we were all poor, so we were all equal," she says. "At universities we could let go of the idea that if we restrict access, entry is more prestigious. Let's share the knowledge."

This belief in equal access and equal worth guides her behaviour.

"On site I get on with the labourers best," she says. "Many engineers might not ask a labourer for help or information, but if you want to estimate how much concrete is needed, how much to order, then ask the guy who pours the concrete. It saves time and money and reduces waste. Often engineers don't touch the materials and estimate from a distance."

Another firmly held belief is diversity. "Lack of diversity is traditional," Rachel says. "Women and indigenous kids want to do engineering but are put off by a belief that you have to be a maths genius. You don't. I'm proof of that. Indigenous kids struggle with self-belief, as I did. They confuse disadvantage and trauma with lack of intelligence. Even when I got into uni, I constantly felt I had to prove that I was worthy of my place.

"Diversity makes business sense. If you have 10 people, all the same gender, age and cultural background, all looking at a problem, you get 10 similar answers. If you have 10 people from diverse backgrounds you get a variety of answers, from which you can choose the best solution."

It has become part of Rachel's mission to teach young disadvantaged people that the road to success is not about inherent brilliance, but hard work. She tells the students she mentors: "Put the phone away. Treat study like a nine-to-five job. Do the readings, do the work. Listen."

Rachel has been accepted into a two-year engineering graduate program and she is delighted. Whatever her future employment looks like it will need to provide the flexibility for outreach, because she intends to be active about the lack of indigenous and female voices in engineering.

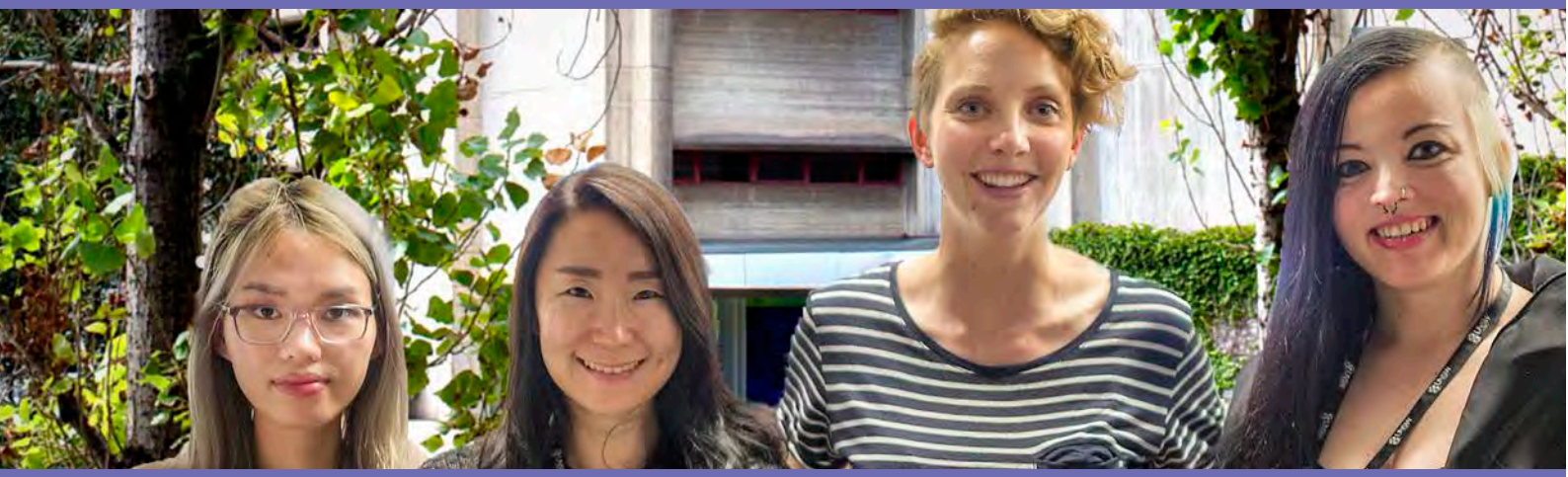
She not only wants to help solve ongoing tensions in indigenous communities, but also articulating what an indigenous perspective could bring to engineering and the broader society.

Engineering is an intellectually rigorous activity, "but it can be very black and white. It needs to be. I don't want an engineer designing a bridge on how they feel, but this can mean we don't debate enough, we don't discuss other thought processes. Skills like empathy and negotiation are under-valued," Rachel says.

"We cannot solve indigenous issues until indigenous people are working on them together. There is a way to hold on to our past if we are the ones building our future.

"Aboriginal Australians prize the environment more than any engineering project. In this dollar driven world there are Aboriginal communities that could teach the rest of us so much about sustainability."

OUR PEOPLE



Academic Staff

Alvarez Gaitan, Juan Pablo
Lecturer, BEng, MBA Carabobo, PhD UNSW

Research Interests: Improving the environmental performance of products and processes using Life Cycle Assessment (LCA)

Andersen, Martin
Associate Professor and Director CWI
MSc in Engineering, PhD DTU, Denmark

Research Interests: Investigations of physical & geochemical processes at the surface water groundwater interface; groundwater dynamics in the coastal zone; reactive flow & transport modelling; developing methodologies for using heat as a tracer of groundwater flow; karst hydrology.

Attard, Mario
Associate Professor
Associate Head – Academic
BE PhD MHEd UNSW, MIEAust, CPEng

Research Interests: Finite Strain Isotropic & Anisotropic Hyperelastic Modelling; Anisotropic Hyperelastic Modelling of Biological Material; Plasticity Formulation for Confined Concrete Columns; Cover Spalling in High Strength Reinforced Concrete Columns; Lateral Buckling of Thin-Walled Beams.

Bradford, Mark
UNSW Scientia Professor
BSc BE PhD USyd, DSc UNSW, CPEng, CEng, MASCE, FIEAust, MIStructE

Research Interests: High-strength steel structures, steel-concrete composite structures, steel-timber hybrid structures, concrete structures, arches, geometric non-linearity, pavement thermo-upheaval buckling, railway thermo-lateral buckling, design for deconstructability, low-emissions structural paradigms, forensic engineering..

Carmichael, D G
Professor
BE MEngSc USyd, PhD Cant, CPEng, FIEAust, MASC

Research Interests: Management, systems applications of optimisation, synthesis: Identification & analysis: Contracts & disputes: Project delivery: Construction operations: Project management & management functional areas including risk, economics, finances, people resources & scope: Construction management: Problem solving & decision making.

Castel, Arnaud
Associate Professor
BE, MEngSc, PhD Toulouse

Research Interests: Durability of construction materials, low carbon concrete technology, alternative SCMs, Geopolymer concrete, Performance based & service life design, Steel reinforcement corrosion in concrete, serviceability, time-dependent effects, restrained shrinkage induced early age cracking.

Cox, Ron
Associate Professor
Convenor, ACCARNSI
BE PhD UNSW, FIEAust

Research Interests: Climate change adaptation for settlements & infrastructure: Coastal engineering & coastal zone management: Stability, design & safety of coastal structures: Application of sand filled geo-containers in coastal protection: Environmental monitoring & modelling: Desalination plant brine disposal: Hydraulics of water & wastewater treatment plants: Flood hydraulics & floodplain management: Life safety, emergency warning & evacuation.

Dackermann, Ulrike
Lecturer
Dipl.-Ing. Univ., Technical University of Munich (TUM), PhD UTS

Research interests: Structural Health Monitoring, Non-Destructive Testing, Damage Detection, Structural Dynamics, Artificial Intelligence, Timber Engineering

Davis, Steven
Senior Lecturer
Chair, Teaching & Learning Committee
BE PhD UNSW

Research Interests: Online Assessment, Virtual Reality, Project Scheduling, Safety, Construction Defects and Rework.

Dixit, Vinayak
Associate Professor
Director, rCITI
MT Institute of Technology, Delhi, PhD University of Central Florida

Research Interests: Behaviour under Risk & Uncertainty in Transportation Systems: Transportation Modelling & Simulation: Traffic Flow Theory: Traffic Safety: Workzone Management Strategies: Experimental Economics.

Douglas, Kurt
Pells Sullivan Meynink Senior Lecturer of Rock Mechanics,
Chair External Relations
BE (Hons1)USyd, PhD UNSW

My interests lie in the field of rock mechanics and dam engineering. Predicting field properties of rock masses continues to be a major challenge for us to address. My dams research focusses on spillway erosion and backward erosion of dams.

Felder, Stefan
Senior Lecturer
Dipl.-Ing. RWTH Aachen, PhD UQ

Stefan is an expert in hydraulic engineering and applied fluid mechanics. He uses his expertise in physical modelling to improve hydraulic designs, flow performances and ecological outcomes of water infrastructure including flow conveyance, urban stormwater, wastewater and irrigation systems.

Foster, Stephen
Professor and Acting Head, School of Minerals & Energy Resources Engineering (MERE)
BE NSWIT, MEngSc PhD UNSW, MIEAust, FIEAust

I research the behaviour of structural systems (buildings and bridges) constructed of reinforced and prestressed concrete. I'm particularly interested in bringing new and advanced materials technologies to the engineering of structures. My interests are in the use of high and ultra-high performance concretes, fibre-reinforced concretes and geopolymer concretes and in use of carbon fibre technologies for strengthening and repair of structures and structural systems. I develop physical-mechanical models for use in advanced computational and numerical tools such as FEM and for their use in the study of behaviour of concrete structures that are subjected to extreme events.

Gao, Wei
Professor
BE HDU, ME PhD Xidian, MIIAV, MAAS

Research Interests: Uncertain modelling & uncertain methods: Vehicle-bridge interaction dynamics: Wind and/or seismic induced random vibration: Train-rail-sleeper-foundation-tunnel/bridge system: Stochastic nonlinear system: Vehicle dynamics & vehicle rollover: Structural optimization & control: Smart structures: Stability & reliability analysis.

Gardner, Lauren
Senior Lecturer
BS ArchE, MSE, PhD U Texas at Austin

Research Interests: Network modelling for multi-domain integrated systems: congestion pricing models accounting for uncertainty, the role of real-time information & adaptive pricing: Sustainability models integrating transportation & electricity systems: developing network-based optimization models to predict the role of global transport systems in the spread of contagious disease.

Ge, Linlin
Associate Professor,
BE, MSc Wuhan, PhD UNSW

Research Interests: I combine remote sensing with GPS & GIS to produce cost-effective & highly reliable maps. Integrating radar & optical remote sensing with GPS & GIS, we measure the subtle change on the surface of the Earth with minimum latency using data collected from satellite, airborne & UAV platforms.

Ghasrikhouzani, Milad
Associate Lecturer

Research Interests: Data Analysis, Big Data, Econometrics Analysis, Integrated Land-Use and Transport Modelling, Behavioural Travel Modelling, Social-Media Sentiment Analysis, Transport and Life Satisfaction

Glamore, William
Associate Professor
Principal Research Fellow, WRL
BE UI Boulder Colorado USA, PhD UoW

Associate Professor William Glamore leads a large award-winning research team examining various aspects of landscape restoration, emerging contaminants, estuary dynamics and climate change. William highlights his real-world experiences during his teaching on water principles, groundwater resources and estuaries/rivers.

Hamed, Ehab
Senior Lecturer
BSc MSc PhD Technion

Research Interests: Viscoelastic behaviour of materials and structures, strengthening of structures with FRP composite materials, sandwich panels.

Harvey, Bruce
Senior Lecturer
BSurv (Hons 1), GradDip Higher Ed, PhD UNSW

Research Interests: Least Squares analysis of surveying measurements is my main interest. I also investigate alternative analysis methods and the latest measurement technologies. Are there better ways to analyse surveying measurements? Can we improve Least Squares, L1 and grid search methods?

Holdom, Robert
Senior Lecturer

Research Interests: construction management.

Johnson, Fiona
Senior Lecturer
BE, PhD UNSW

Research Interests: statistical hydrology and climate change impact assessment for water resources systems; bias correction and post-processing methods to improve forecasts and climate projections; methods for sustainable and resilient water and flood management in the developing countries and marginalised communities.

Khalili, Nasser
Professor and Acting Head of School CVEN
BSc Teh, MSc Birm, PhD UNSW

Research Interests: Mechanics of unsaturated soils: Flow & deformation in double porosity media: Numerical methods applied to geotechnical engineering: Pavement engineering.

Khan, Stuart
Professor
BSc (Hons 1) USyd, PhD UNSW, MIEAust.

Research Interests: Advanced Water & Wastewater Treatment & Analysis: Trace Chemical Contaminants in Water: Chemical Risk Assessment: Probabilistic Chemical Exposure Assessment: Water Recycling & Seawater Desalination: Sustainability Assessment & Risk Assessment: Environmental Fate Modelling: Water Quality Impacts of Extreme Weather Conditions.

Khoshghalb, Arman
Senior Lecturer
BEng, MEng, Sharif University of Technology, Tehran, PhD UNSW

Research Interests: Mechanics of unsaturated soils, coupled analysis of porous media, advanced numerical methods in geomechanics, modelling discontinuities in porous media, large deformation analysis in geomechanics, stabilisation techniques in computational geomechanics, constitutive modelling of geomaterials, dynamic properties of geomaterials.

Kim, Taehwan
Lecturer
BSc, MSc KAIST, Seoul, PhD Purdue USA

Research Interests: Advanced and sustainable infrastructure materials: Thermodynamics in cementitious materials and the modelling of their chemical process: Advanced materials characterization techniques: fundamental understanding of chemo-physical reactions in cementitious materials: Microstructure evolution of cementitious materials: Utilizing natural and waste materials to develop low carbon foot-print materials.

Lim, Samsung
Associate Professor
BA, MA (Mathematics) Seoul, PhD U Texas at Austin

Research Interests: I apply geospatial and remote sensing technologies to spatio-temporal information extraction, image classification, digital elevation modelling, feature extraction, building edge detection and change detection from lidar (known as light detection & ranging) data and aerial/satellite images.

Liu, Wei
Lecturer (CVEN/Comp Sci & Eng)

Wei's research interests are in the field of smart transport and smart cities. Current research includes transport system modelling and optimisation, large-scale traffic modelling, simulation and computing, transport economics, and urban big data analytics. He teaches in numerical methods and transport systems.

Manefield, Michael
Professor (CVEN/Chem Eng)
PhD UNSW

Research Interests: I have developed research portfolios in biological remediation of contaminated environments, biogas production from organic feedstocks and biofilm formation and control. My teaching encompasses the full breadth of microbiology from food fermentation to wastewater treatment with hands on laboratory and field work.

Regan, Michael
Professor

Michael (Mike) Regan is Professor-Human Factors with rCITI. He is a psychologist and transportation safety researcher with specialist expertise in driver distraction and inattention, interaction with vehicle automation, driver and pilot selection and training, human error, user-centred design of vehicles and roadways and driver licensing.

Rey, David
Senior Lecturer
BSc, MSc EE & IT Montpellier; MSc Maths PUC-Rio, Brazil; PhD IFSTTAR Lyon. Grenoble, France

Research Interests: Research Interests: Optimisation and Control, Operations Research, Transportation and Logistics, Network Design, Collision Avoidance, Shared Mobility, Contagion Modeling, Vehicle Routing.

Roberts, Craig
Senior Lecturer
BSurv, University of South Australia, PhD UNSW

Research Interests: As an education focussed academic I am interested in the implications of datum modernisation on the geospatial community, leveraging multi-GNSS CORS infrastructure for practical application to surveying and geospatial engineering and applications of UAVs for high precision mapping

Russell, Adrian
Associate Professor
BE, PhD UNSW, PGCert Bristol

Research Interests: Applied unsaturated soil mechanics; Liquefaction of variably saturated soils and tailings; Fundamental modelling of soils linking microstructure to large scale behaviour; Fundamental rock mechanics: Fibre reinforced soils.

Saberi, Meead
Senior Lecturer

Dr. Saberi is leading the CityX lab as part of the Research Centre for Integrated Transport Innovation (rCITI) which focuses on scientific understanding of smart cities through modelling, simulation, data analytics, and visualisation. His research interests and experience cover a range of transportation areas including traffic flow theory & characteristics, large-scale transport network modelling, complex networks, pedestrian crowd dynamics and simulation, and urban data analytics & visualisation.

Sharma, Ashish
Professor
ARC Future Fellow
BE Roorkee, MTech IIT Delhi, PhD Utah State

Research Interests: Stochastic hydrology: Synthetic generation of seasonal streamflow; Medium to long-term probabilistic forecasting: Stochastic downscaling of hydrologic variables under climate change scenarios: Radar rainfall estimation: Rainfall runoff model & parameter uncertainty assessment in a Bayesian framework: Water Resources Management: new developments in statistics to solve water problems.

Shen, Johnson Xuesong
Senior Lecturer
BEng, MSc Nanjing, PhD Hong Kong Polytechnic University

Research interests: Digital Twins, Artificial Intelligence, Smart Sensing, Autonomous Systems, Internet of Things, Mixed Reality, and their applications in the construction, operation, and maintenance of civil infrastructure and built environment.

Song, Chongmin
Professor and Director CIES
Chair, Computing, IT & Ed Tech Ctte BE ME Tsinghua, DEng Tokyo

Research Interests: Scaled Boundary Finite-Element Method, Mesh Generation, Dynamic Soil-Structure Interaction, Structural Dynamics & Earthquake Engineering, Fracture Mechanics, Elasto-Plastic-Damage Constitutive Modelling.

Splinter, Kristen
Senior Lecturer
BSc (Eng), Queen's University, Kingston, Canada; MSc, Florida, PhD Oregon State, USA

Research Interests: I study how our coastline (namely the beaches) erode and recover from changes in the size of waves, sediment supply, and water levels. I develop simple numerical models based on broad-scale observations that can predict how beaches change due to changes in wave height and wave period.

Stuetz, Richard
Professor
Co- Chair Teaching & Learning
BSc, PhD UNSW

Research Interests: Research Interests: Water & wastewater quality monitoring: Fate of chemical contaminants in natural and engineering systems: Assessment and treatment of volatile emissions and odours.

Tamburic, Bojan
Melbourne Water Lecturer on the Nuisance and Harmful Algae Science-Practice Partnership

Project Manager on the Nuisance and Harmful Algae Science-Practice Partnership. My research focuses on algae – microscopic photosynthetic plants that live in our waterbodies. Algal blooms need to be managed because they can produce harmful toxins and other nuisance compounds. Algal biomass is a resource for the production of sustainable fuels and green chemicals. I am passionate about teaching engineers the biological processes that impact water quality and water treatment.

Tang, Chuyang
Professor (CVEN/Chem Eng)

Professor Chuyang Tang's main teaching and research interests include environmental engineering, membrane technology, desalination, water chemistry, and physical/chemical treatment methods. He has published approximately 200 refereed journal papers, with a total citation of > 11,000 and an H-index of 60 (Scopus).

Turner, Ian
Professor,
Director, Water Research Laboratory
BSc (Hons) USyd, MEnvEngSc UNSW,
PhD USyd

Research Interests: Coastal Engineering & Coastal Management; Innovative coastal measurement & monitoring techniques; Sediment transport at the beachface; Modelling of coastline variability & change spanning storm, seasonal, annual & decadal time-scales; Assessment of coastline adjustment to a changing climate.

Vali Pour Goudarzi, Hamid Reza
Associate Professor
BE, MEngSc, PhD UNSW

Research Interests: Structural mechanics; Development of innovative hybrid steel-timber-concrete structures with emphasis on sustainability and improved structural performance; Behaviour of structures subjected to extreme loads such as earthquake, impact, blast and explosion: Computational mechanics and non-linear finite element modelling of structures: Constitutive modelling of materials.

Waite, T David
Scientia Professor,
BSc Tas, GradDip RMIT, MAppSc
Monash, PhD MIT, FRACI

Research Interests: Redox and photochemical processes in natural and engineered systems; Electrochemical technologies for water & wastewater treatment and resource recovery; Separation processes involving colloids & particles in water & wastewater treatment; Biogeochemistry; Computational & experimental studies on the transformation, fate & effects of chemical pollutants; interactions between trace elements & microbiota in aquatic systems.

Waller, S Travis
Professor and Deputy Dean (Research)
BSc Ohio State, MSc, PhD
Northwestern

Research Interests: Transportation network modelling, particularly systems characterized by dynamics, uncertainty & information; large-scale integrated transport optimization & planning. Specific applications or problem domains include Dynamic Traffic Assignment (DTA), routing algorithm development, network equilibrium, stochastic optimization, integrated demand/supply modelling, network design, adaptive equilibrium, system analysis of public-private partnerships, & bi-level optimization of transport networks.

Wang, Jinling
Associate Professor
BSc, MSc Wuhan, PhD Curtin

Research Interests: Global Navigation Satellite Systems - GNSS (GPS, Glonass, Galileo, BeiDou System-BDS) & their Integration: Multi-Sensor Integration for Positioning, Mapping & Navigation: Statistical Theory & its Applications in Positioning, Mapping & Navigation.

Wiedmann, Thomas
Associate Professor
MSc, PhD Ulm

My main research question is how to achieve human wellbeing without increasing environmental impacts. My expertise is in integrated sustainability assessment & environmental footprint analysis. I develop & apply environmental input-output analysis as part of a holistic concept to life cycle assessment, industrial ecology & sustainable consumption & production research.

Farewell

In 2018 the School farewelled the following academic staff – we wish them all the very best in their future careers - especially the retiring ones!

Dr Ali Amin, now a Lecturer at University of Sydney;

Dr Ali Akbarnezhad, now Associate Professor at University of Sydney;

Associate Professor Ron Cox (see p66);

Stephen Moore - our waste management guru and inspirer of environmental engineering students for three decades;

and Dr Gabriel Rau, now Assistant Professor of Engineering Geology at Karlsruhe Institute of Technology (KIT), Germany.

ARC Future Fellows

Collins, Richard
Senior Lecturer and Scientia Fellow
UNSW Water Research Centre

Research Interests: Environmental Molecular Geochemistry of trace elements (metals, metalloids and actinides) in both natural and engineered systems. Research covers aspects related to metal(loid) bioavailability and speciation, redox chemistry and biogeochemical transformations assessed through field/laboratory studies, computational approaches (e.g. DFT) and X-ray Absorption Spectroscopy.

Marshall, Lucy
Associate Professor and Associate Dean (Equity and Diversity)
BE, MEngSc, PhD UNSW

Lucy's research expertise is in hydrologic modelling, model optimization, and quantification of uncertainty in water resources analysis. She is an expert on the assessment of uncertainty in water resource models, and more specifically in the application of formal Bayesian methods for model optimization and diagnostics.

O'Carroll, Denis
Associate Professor and Director WRC
B.A.Sc. Civil Engineering Ottawa, M.S., Clarkson, PhD.,
U Michigan

Research Interests: Development of novel water remediation technologies, including technologies to effectively degrade PFAS contaminated water. Transport of nanoparticles in the environment – in particular evaluating the fate of engineered nanoparticles that have leached out of commercial products (e.g., release from sunscreens, tennis racquets) and their ecotoxicity.

Rashidi, Taha Hossein
Senior Lecturer
Discovery Early Career Researcher Award (DECRA)
BSc MSc Sharif UT Tehran; PhD UI Chicago

Research Interests: Travel Behaviour Analysis: Transportation Planning: Activity-Based Travel Demand Modelling: Housing Search & Land Use Modelling: Integrated Land-Use & Transportation Models: Goods Movement Modelling: Microsimulation Modeling Methods for Urban Activities

Professor of Practice

Care, Robert
Professor of Practice

My interests include the development of management and leadership in engineering and in business with a strong engineering focus, in major infrastructure projects and in the development of sustainable cities. Specific interests include road and rail transport systems, procurement methods, collaborative and relationship contracting, the development of humanitarian engineering and sustainable communities and climate change adaptation.

Emeritus Professors

Black, John

Trinder, John

Fell, Robin

Valliappan, Somasundaram

Gilbert, Ian

Rizos, Chris

Tin Loi, Francis

VC Postdoc Fellows

Jinxing, Ma		WRC

Visiting/Adjunct Academics 2018

Ajami, Hoori	Visiting Fellow	WRC
Aldred, James	Adjunct Associate Professor	CIES
Barczak, Radoslaw	Visiting Fellow	WRC
Bellie, Sivakumar	Adjunct Associate Professor	WRC
Blenkinsopp, Christopher	Adjunct Lecturer	WRL
Byrne, Joshua	Adjunct Associate Professor	WRC
Cathers, Bruce	Visiting Senior Lecturer	WRL
Cordery, Ian	Honorary Associate Professor	WRC
Cox, Ron	Honorary Associate Professor	WRL
Doust, Kenneth	Adjunct Senior Lecturer	rCITI
Duell, Melissa	Adjunct Senior Lecturer	rCITI
Geha, Shane	Adjunct Professor	CIES
Gong, Weijia	Visiting Senior Lecturer	CIES
Guan, Jing	Adjunct Associate Professor	WRC
Hadjikakou, Michalis	Visiting Fellow	WRC
He, Jie	Visiting Fellow	WRC
Kayvani, Kourosh	Professorial Visiting Fellow	CIES
Kearsley, Arthur William	Visiting Professor	SAGE
Koenke, Carsten	Visiting Professor	CIES
Lundie, Sven	Adjunct Associate Professor	WRC
Moylan, Emily	Visiting Fellow	rCITI
Payne, Timothy	Adjunct Associate Professor	WRC
Peirson, William Leslie	Adjunct Professor	WRL
Peters, Gregory	Adjunct Associate Professor	WRC
Pi, Yong Lin	Adjunct Professor	CIES
Rau, Gabriel	Visiting Fellow	WRL
Schofield, Nicholas	Visiting Professor	WRC
Swarbrick, Gareth Edward	Visiting Fellow	CIES
Vandebona, Upali	Honorary Senior Lecturer	rCITI
Wang, Yuan	Conjoint Senior Lecturer	WRC
Wei, Minghai	Visiting Fellow	CIES
Xie, Wen	Visiting Fellow	CIES
Zamyadi, Arahs	Visiting Fellow	WRC

Welcome

Dr Bojan Tamburic has recently joined the School of Civil and Environmental Engineering as the Melbourne Water Lecturer on the Nuisance and Harmful Algae Science-Practice Partnership (NHASP), UNSW Water Research Centre.

Bojan completed his PhD in Biochemical Engineering at Imperial College London on the topic of biohydrogen production from algae. He then moved to Sydney and won the Chancellor's Postdoctoral Research Fellowship at UTS, where he led the Algal Biosystems Group, and developed algal solutions for the bioremediation of wastewater and for the production of biofuels, animal feed and food additives.

Bojan has a strong analytical background and 10 years of experience in applied algal research. He has designed algal bioreactors, which have been used to simulate algal blooms in the laboratory. Bojan has developed computational models that predict algal growth under different environmental conditions, and he has investigated the removal of algae from suspension by flocculation and flotation. Bojan also has in-depth knowledge of algal surveillance techniques, including spectroscopy, fluorometry, biochemistry and various omics tools.

As well as delivering teaching, Bojan will conduct independent research in the area of water engineering and management in collaboration with the NHASP with Melbourne Water and other partners.

Welcome

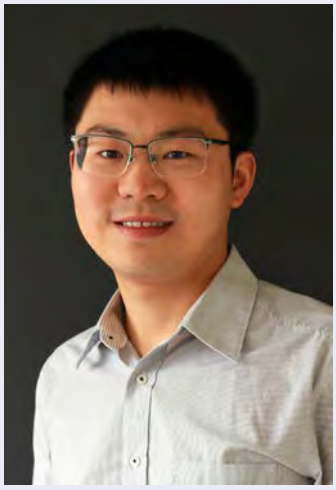
Professor Michael (Mike) Regan joined the School as Professor – Human Factors in August 2018 and is based within rCITI. Human Factors (also known as Ergonomics) is the scientific discipline that creates and applies information about human behaviour, abilities, limitations and other characteristics to the design of machines, tasks, jobs, environments and systems in order to optimise human well-being and overall system performance.

Mike is a well-known and distinguished member of the international Human Factors and transport safety research communities. Prior to his current appointment, he was Chief Scientist-Human Factors for the Australian Road Research Board; and before that a Professor in the Transport and Road Safety Research Group (TARS) in the UNSW School of Aviation. He held earlier appointments with the Liberty Mutual Research Institute for Safety in Boston, IFSTTAR in France, The Monash University Accident Research Centre, VicRoads, and the Defence Science and Technology Organisation.

Mike is the author/co-author of around 250 published documents, including three books, and has designed and led around 200 research projects in transportation Human Factors and safety, spanning aircraft, motorcycles, cars, trucks, buses, and trains. Mike's vision for CVEN is to create research and teaching programs that inform and promote human-centred engineering.

Dr Meead Saberi Kalaee, Senior Lecturer

Prior to joining UNSW, Dr Meead Saberi was a lecturer at Monash University, Melbourne from 2014 to 2018. He holds a PhD degree in transportation systems analysis and planning from Northwestern University, USA. He also has a Masters and a Bachelor degree in Civil Engineering. He is leading the CityX research lab as part of the Research Centre for Integrated Transport Innovation (rCITI). The CityX Lab focuses on improving scientific understanding of smart cities through development and application of data-model driven methods to better plan, manage and operate urban transport systems. Meead's research interests and experience cover a wide range of transportation areas including traffic flow theory & characteristics, large-scale transportation network modelling, complex networks, pedestrian crowd dynamics and simulation, and urban data analytics & visualisation.



Dr Wei Liu, Lecturer (joint appointment with Computer Science & Eng)

Prior to his position at UNSW, Wei was a Lecturer at University of Glasgow, UK, and was a postdoctoral researcher at Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland, and was a visiting scholar at University of Florida, US. Wei's research interests are in the field of smart transport and smart cities. His current research includes transport system modelling and optimisation, large-scale traffic modelling, simulation and computing, transport economics, and urban big data analytics. He teaches in numerical methods and transport systems.

Centre Research Staff

CIES

Abdolreza Ataei	Research Associate
Masuzyo Chilwesa	Research Associate
Amirhossein Hassanieh	Research Associate
Lei Liu	Postdoctoral Fellow
Mehrisadat Makki Alamdari	Postdoctoral Research Fellow
Saeed Masoumi	Research Associate
Md Ahsan Parvez	Postdoctoral Fellow
Albert Saputra	Postdoctoral Fellow
Babak Shahbodaghkhan	Senior Research Associate
Mohammad Vahab	Research Associate
Thanh Liem Vo	Research Associate
Di Wu	Research Associate
Yuguo Yu	Research Associate

CWI

Helen Rutlidge	Postdoctoral Research Fellow

rCITI

Mahmood Akhtar	Senior Research Associate
Sai Chakka	Research Associate
Hanna Grzybowska	Senior Research Associate
Divya Jayakumar Nair	Research Associate
Sisi Jian	Research Associate
Prasannah Prabhakharan	Research Fellow
Edward Robson	Research Associate
Neeraj Saxena	Research Associate
Kasun Wijayaratna	Research Associate
Xiang Zhang	Research Associate

Survey & Geospatial

Amir Khodabandeh	Research Associate

WRC

Ademir Abdala Prata Junior	Research Associate
Mark Bligh	Research Associate
Amos Branch	Research Associate
Jun Chen	Postdoctoral Research Fellow
Xiaojun Chen	Research Associate
Ruth Fisher	Research Associate
Shikha Garg	Senior Research Associate
James Hayes	Research Associate
Adele Jones	Research Associate
Seokhyeon Kim	Research Associate
Andrew Kinsela	Research Associate
Matthew Lee	Research Fellow
Xiaomin Li	Senior Research Associate
Jinxing Ma	Postdoctoral Fellow
James McDonald	Research Fellow
Rajeshwar Mehrotra	Senior Research Fellow
Christopher Miller	Senior Research Associate
An Ninh Pham	Senior Research Associate
Veljko Prodanovic	Research Associate
David Roser	Senior Research Associate
Yingying Sun	Research Associate
Yating Tang	Research Associate
Soo Huey Teh	Research Associate
Guowei Xing	Research Associate
Kefeng Zhang	Research Fellow

WRL

Chris Chen	Research Associate
Mitchell Harley	Senior Research Associate
Valentin Heimhuber	Research Associate
Mahmood Sadat-Noori	Research Associate
Joshua Simmons	Research Associate
Douglas Anderson	Principal Engineer
James Carley	Principal Engineer
Francois Flocard	Principal Engineer
Brett Miller	Principal Engineer
Benjamin Modra	Principal Engineer
Ian Ross Coghlan	Engineer
Mathieu Deiber	Engineer
Christopher Drummond	Engineer
Alice Harrison	Engineer
Daniel Howe	Engineer
Gabriela Lumiatti	Engineer
Priom Faria Rahman	Engineer
Duncan Rayner	Engineer
James Simpson	Engineer
Toby Tucker	Engineer

Professional Staff (Administratrive)

School Office

Anthony Dever
School Manager

Warassamon Kate Brown
Web Coordinator

Denise Lee
Facilities Officer (Faculty embedded)

Laarni Caludugan
Health, Safety & Environment Advisor (OH&S embedded)

Xiaobo Ni
Web Designer (IT embedded)

Patrick Vuong
Computer Systems Officer (IT embedded)

Jiaqi Yang
Administrator (Faculty embedded)

Paula Ploysarak
Administrator (Faculty embedded)

Student Centre

Lena Comino
Student Services Manager

Natalie Sufong
Student Services Manager

Patricia McLaughlin
Higher Degree Research (HDR) Support Officer (Faculty embedded)

Chelsea Pham
Student Services Officer

Sunhee Lim
Student Services Officer

Ellie Williams
Student Services Officer

Liam Orchard
Administrative Officer (Timetable)

Ozair Turabi
Administrative Officer

HoS Office

Lucia Wong
Executive Assistant

External Relations

Mary O'Connell
External Relations Manager

Patricia Tesoriero
External Relations Project P/T

Farewell

In 2018 the School farewelled our brilliant External Relations Manager and dogged/devotional School historian Dr Mary O'Connell. She wrote the only UNSW engineering history which began with a poem – Rilke's 'To Work with Things.' (For the god wants to know himself in you.) Mary says she aims to devote more time to creative writing, community gardening, choir singing, family, friendship, swimming in the ocean, and lying on the grass to look up at the sky. Yeah, right! We will miss her yellow poems and office flowers, and we wish her the best. She was a good friend to the School.

Professional Staff & Technical Staff (incl. Research Centres)

Technical Services (Water)

Gautam Chatto-padhyay
Professional Officer

Kelvin Ong
Technical Officer

Artur Ziolkowski
Technical Officer

Technical Services (Kensington)

Paul Gwynne
Laboratory Manager

Anthony MacKen
Senior Technical Officer

William Terry
Senior Technical Officer

Luiz Pettersen
Technical Officer

Timothy Weston
Technical Officer

Technical & Professional (SAGE/Transport)

Julius Raditya Secadiningra
Technical Officer (Transport)

Zhitao Xiong
Technical Officer (SAGE/Transport)

Yincai Zhou
Professional Officer (SAGE)

Technical Services (Heavy Structure Laboratory Randwick)

Zhen-Tian Chang
Laboratory Manager

Ronald Moncay
Technical Officer

Benjamin Pauley
Technical Officer

Rudino Salleh
Technical Officer

Greg Worthing
Technical Officer

Research Centre Management

Andreia Heslin
Administrative Officer CIES/WRC

Maria Lee
Administrative Officer rCITIT

Sylvia Brohl
Project Officer rCITI

Robert Steel
Manager WRC

Grantley Smith
Manager WRL

Gracie Carlino
Administrative Assistant WRL

Coral Johnson
Administrative Assistant WRL

Ross Mathews
Administrative Assistant WRL

Technical Services (WRL)

Robert Byron Jenkins
Technical Officer WRL

Larry Paice
Technical Officer WRL

Dr Kristina Palmer
Technical Officer WRL

Robert Thompson
Technical Officer WRL

School Management Committees

School Executive Group (SEG)

Prof Nasser Khalili	HoS & Chair
A/Prof Mario Attard	Associate Head (Academic)
Prof David Carmichael	CIES
Anthony Dever	School Manager
A/Prof Lucy Marshall	WRC
Prof Chongmin Song	Director, CIES
Prof Richard Stuetz	WRC & TLC
Prof Ian Turner	Director, WRL
Prof Travis Waller	RMC & rCITI

School Management Group (SMC)

Prof Nasser Khalili	HoS & Chair
A/Prof Martin Andersen	Director, CWI
A/Prof Mario Attard	Associate Head (Academic)
Prof David Carmichael	CIES
Dr Steven Davis	Co Chair, Teaching & Learning
Anthony Dever	School Manager
A/Prof Vinayak Dixit	Director, rCITI
Dr Kurt Douglas	Chair, External Relations
A/Prof Linlin Ge	Chair, Computing, IT & Ed Tech
Paul Gwynne	Manager, Laboratories & Chair, OH&S
A/Prof Denis O'Carroll	Director, WRC
Dr Craig Roberts	SAGE
Prof Chongmin Song	Director, CIES
Ms Natalie Sufong	Student Services Manager
Prof Ian Turner	Director, WRL
Prof Travis Waller	RMC & rCITI
Ms Lucia Wong	EA to HoS

VALE

OAM 2006: For service to surveying and mapping, particularly as an educator and a specialist in the field of celestial navigation and positional astronomy....

George Gordon Bennett: December 21, 1926 - November 21, 2018.

From ten-pound Pom to surveyor on the Snowy Mountain hydro scheme, Woomera rocket range, celestial navigator and Head of the UNSW School of Surveying, George Gordon Bennett OAM has left a lasting legacy at UNSW.

George was born in Croydon, London, on December 21, 1926 He was educated at Selhurst Grammar School in Croydon and, following demobilisation from the British Army in 1948, he and his parents George and Winifred, and his sister Joan, settled in Australia as "ten-pound Poms".

In 1954, Bennett was in the second graduating class, with First Class Honours, from the Department of Surveying, University of Melbourne. He was a surveyor on the Snowy Mountains Hydro-Electric Scheme for the next five years and played a major role in setting out the tunnels and dams of the Snowy scheme.

In the International Geophysical Year 1957 Bennett was seconded to National Mapping to assist in Australia's fledging space program by making astronomical observations in South Australia to assist in laying out the Woomera rocket range. After working on the Snowy he became a lecturer at UNSW in 1959 and obtained his PhD in 1970, finishing his UNSW career as Head of the School of Surveying in 1986.

His work in astronomy resulted in research with the Nautical Almanac Office of the Royal Greenwich Observatory. He also undertook astronomical and survey research work in Canada, Germany and Antarctica. Bennett was also active in professional matters. He was a Fellow of the Institution of Surveyors and the Institute of Navigation, a member of the Board of Surveyors (NSW) for 15 years and served a term as the President of the Institution of Surveyors (NSW).

His interest in navigation and nautical astronomy led him into yachting, where he served as navigator on many Sydney to Hobart yacht races. In 1998 Bennett wrote The Complete On-Board Celestial Navigator, a revolutionary text allowing yacht navigators to carry a simple, waterproof, comprehensive compendium of navigational almanac data in one small book as a backup if electronic navigation failed.

The design of the millennial sundial in the UNSW Quadrangle in 2000 is just one of his many lasting achievements along with his many students.

Bennett was recognised with an OAM in January 2006. His citation read: "For service to surveying and mapping, particularly as an educator and a specialist in the field of celestial navigation and positional astronomy".

OUR RESEARCH

Research Management Committee Report 2018

The School's Research Management Committee (RMC) manages and supports research activities within the School. In 2018, the RMC met every month to oversee and progress all research related aspects of the School's operation. The RMC liaises with and contributes directly to the Faculty's Research Management Committee.

RMC Committee Membership 2017

A/Prof Denis O'Carroll	Chair, RMC
A/Prof Adrian Russell	HDR Admissions Coordinator
A/Prof Hamid ValiPour	HDR Coordinator
Prof Chongmin Song	CIES Acting Director
Prof Mark Bradford	CIES Research Director
A/Prof Martin Andersen	CWI Director
A/Prof Taha Rashidi	RCITI Representative
Dr Wei Gao	Taste of Research Coordinator
Ms Maria Lee	HDR Student Administrator
Prof Nasser Khalili	Head of School
A/Prof Will Glamore	
Prof Wei Gao	
Dr Jinxing Ma	
Dr Mehri Makki Alamdari	
Dr Johnson Shen	
A/Prof Jinling Wang	

Postgraduate Research Student Management

In 2018, the School had 173 Higher Degree Research candidates.

An important aspect of the Committee's work involves the management of the School's postgraduate research student program. This involves the assessment of applications to undertake higher degrees within the School, the formulation of specific research plans for each student accepted into the program, the nomination of suitable supervisors, reviewing the progress of students at regular intervals, making recommendations on progress to the Faculty's Higher Degree Committee, and finally, nominating examiners when the thesis is completed and, where necessary, following up on the examination process.

Review committees:

Each candidate is assigned a review committee of three academic staff chaired by a member of the RMC. The review committee meets to interview the student and supervisor(s) at 6 or 12 monthly intervals, depending on the student's progress, and, at these reviews, the student is invited to present a brief seminar outlining progress since the last review. Most academic staff and several research only staff participated in the student review panels in 2018. Much of the heavy administrative work load in this area is carried by the School's HDR Coordinator Associate Professor Hamid ValiPour and the HDR Student Administrator Ms Pattie McLaughlin.

Graduation:

2018 saw 39 of our PHD researchers and 3 MEs successfully graduate. Their achievements and those of their research supervisors create a scholarly critical mass – certainly the School now provides one of the largest regular, consistent and scholarly contributions towards civil, environmental and geospatial engineering knowledge across Australasia and the world.

ARC Research Grants – a record breaking year

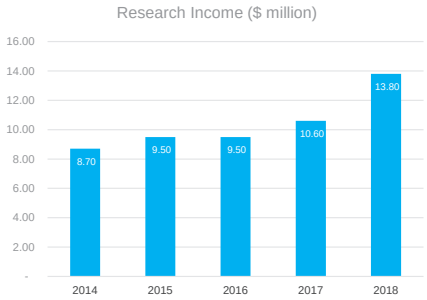
The RMC also provides input to the preparation and coordination of research grant applications. This includes ranking the School's applications for internal grants and UNSW Major Research Equipment and Infrastructure Initiative (MREIIs) and reviewing applications for competitive external grants such as the Australian Research Council (ARC) Grants and from industry.

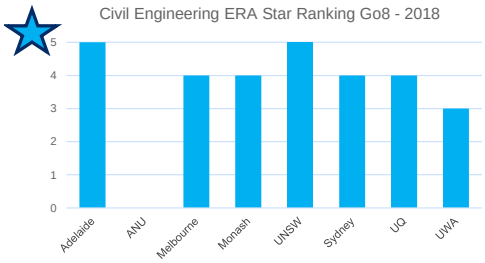
In 2018, and for the third year running, UNSW won the largest number of ARC Discovery grants (88) in the country, to a total value of $34.9M.

2018 saw the School continue its own ARC success story – winning 13 highly sought-after ARC Grants – 7 Discovery, 4 Linkage and 2 ARC Special Research Initiative Grants– for a School research record-breaking value of $6.3M. Full details see overleaf.

Alice Harrison in wave basin

Research





30% growth research income 2018

No. 1
AUSTRALIA
No. 10/12
WORLD

AWRU/QS 2018/9

Achievements:

1. 7 ARC DPs, 4 ARC LPs, 2 ARC SRIs awarded in 2018, totaling $6.3 million
2. More than 10 % of UNSW ARC Grants
3. Lead DP grants amongst G8 Schools of Civil and Environmental Engineering
4. More than $5 million in applied research income 2018
5. $13.9 million in research income representing a growth of 30%
6. 1 Book, 16 book chapters, 457 journal articles with more than 86% in Q1 outlets
7. 5 star 2018 ERA Ranking in Civil (0905) and Geomatic (0909)Engineering

Research Centres - 2018 Highlights

Research at the School of Civil & Environmental Engineering is about our people working together, with academic and industry colleagues to address global challenges.

Research at the School of Civil & Environmental Engineering is about our people working together, with academic and industry colleagues to address global challenges. This section provides a snapshot of our current research expertise and highlights research break throughs that we have achieved over the last year. It also profiles our research and industry collaborations that ensure our research has a positive impact beyond campus.

We welcome all enquiries about engagement and partnership opportunities to link our remarkable researchers and facilities with your needs and ambitions. More detailed information can be found on our website here:

https://www.engineering.unsw.edu.au/civil-engineering/research

CIES – Centre for Infrastructure, Engineering & Safety

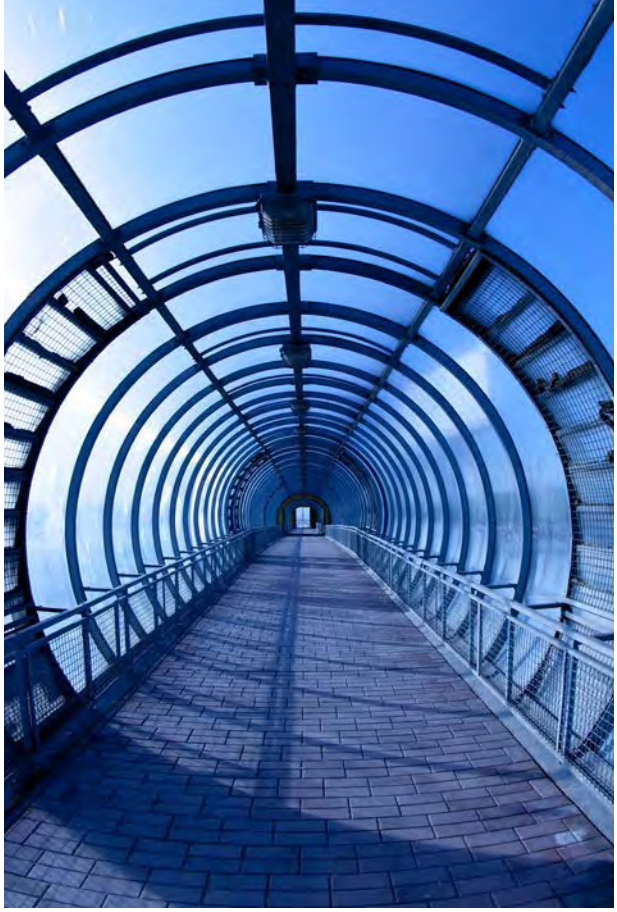
Our expertise and priorities

The Centre for Infrastructure Engineering and Safety is focused on high-level research in structural engineering, geotechnical engineering, engineering materials and computational mechanics. Specifically, we apply our skills to engineering and safety assessments and with the risk management of buildings, bridges, dams, roads and other infrastructure when subjected to both in-service conditions and overload (or limit) conditions, such as may occur in fire, earthquake, cyclone or blast situations, or when structures are exposed to hostile environments. We are making an impact that matters with the following research priorities:

1. Resilient and sustainable infrastructure
2. Innovative low-carbon materials and structural systems
3. Enabling fundamental research for analysis, design and monitoring of infrastructure

Our break throughs this year

1. High density geopolymer concrete and its application in coastal protection
2. Sustainable steel-timber hybrid structures
3. Robotic 3D mapping and spatial modelling



Our collaborations:

Each year our academics and research centres work with businesses, government and community organisations on specific projects, transferring our research into practice. Our most successful collaborations over the last year include:

1. Pells Sullivan Meynink (PSM), Australia
2. Cement Concrete & Aggregates Australia
3. Melbourne Water
4. Murray Darling Basin Authority

Autonomous 3D mapping drone

A game changer in construction industry and beyond. An autonomous 3D mapping drone that slashes surveying times from weeks to hours has the potential to save lives and cut costs in many industries, as well as assist in disaster-recovery efforts.

CIES researchers and Linke & Linke Surveys have partnered to develop the Unmanned Aerial Vehicle (UAV) using spinning Light Detection and Ranging (LiDAR) technology that delivers fast and accurate 3D maps of targeted areas and features. Weighing about 12 kilograms, the small UAV can travel for up to 18 minutes above any terrain to deliver data from 30,000 reference points per second in real time. One of its main surveying uses is in large construction projects, where large costs are derived from measuring stockpile volumes and waiting for accurate data. The UAV could help the coal-mining industry keep its workers safe.

rCITI research Centre for Integrated Transport Innovation

Our expertise and priorities

We pursue world-leading interdisciplinary solutions for transport planning and management that integrate three critical aspects of societal impact: (i) emerging mobility technology, (ii) human behaviour & choice and (iii) institutional/market landscape.

Our break throughs in 2018

Smart Cities and Smart Transport Technology

Mobility as a Service (MaaS) is a concept of considering mobility as a single need of an individual, as opposed to needs that are mapped to the different modes of transport in a disconnected manner.
The Research Center for Integrated Transportation Innovation (rCITI) has been involved in trials in New South Wales with partners like GoGet and Keolis-Downer. Early results have been promising and indicate that it is imperative to understand and incorporate the mobility needs of the customer. This understanding informs how to tailor the infrastructure to deliver efficient mobility services.

Autonomous signal systems are providing significant improvements in efficiency, safety and comfort of travel. rCITI in collaboration with the Government of India and MedullaSoft Technologies has demonstrated significant benefits of Autonomous Systems that have been honed by reliable scientific models but driven by real time

traffic data for adaptive traffic signals. Queue lengths were reduced by almost 30-35%, and furthermore there were sections of the networks where the evening peaks were removed. This has been trialled in other cities and has shown significant promise.

Transport network models form the fundamental scientific models to inform directions for future planning. rCITI has been developing affordable integrated transportation models that carefully account for the convergence of electricity, communication and economic networks. Such integrated models account for real complexities associated to cascading impacts and feedback loops across these networks. This provides a consistent platform to evaluate transportation projects in a comprehensive manner while accounting for the complexity. rCITI has deployed and used these models to inform decisions in Asia, Australia and the U.S.

Human-in-the-loop virtual reality is an important tool to design cities and transport systems to the needs of the citizens. rCITI is the home to one of the world's largest interactive multimodal driving simulator virtual reality laboratories (TRACSLab) that allows planners and engineers to understand behavioural impacts of their interventions. This provides planners an affordable tool for rapid prototyping. Overall the convergence of connectivity, data and models is now making it affordable to build and operate a smart and sustainable transport system. This facility is currently being used by insurers, government agencies and manufacturers to understand driver behaviour, in automated vehicles, as well as developing guidelines for field operational testing of autonomous vehicles.

Smart demand responsive parking systems are currently being developed by rCITI and being explored in UAE and Australia. The system relies on cutting edge communication technology in conjunction with behavioural interventions including pricing to change parking patterns and usage to reduce congestion and improve parking experiences.

Our collaborations

This year has seen a multitude of significant collaborations both domestic and international in areas such as Smart Cities, Human Factors, Traffic and Transport Management with Crowd-sourced Data, Smart Parking, Insurance Research for Autonomous Vehicles and Mobility as a Service (MaaS). Some of our partners include TfNSW (Transport for New South Wales), Google, Vicroads, GoGet, Ozharvest, U.S.DOT (United States Department of Transportation), Government of India, Government of Indonesia, DSTO (Defence Science and Technology Organisation), NTC (National Transport Commission), City of Adelaide, AustRoads, TMR (Department of Transport and Main Roads, Queensland), European Union.

Connected City

Adaptive Connected Traffic Systems (ACTS)

Transport infrastructure provides the back-bone for a connected city, affording citizens to connect for work, entertainment, living and to each other. The emergence of autonomy, communication connectivity and IoT has created an opportunity to sense and manage our transport systems in real time. This has resulted in reduction in congestion, improved safety and travel experience in a cost effective manner. Professor Vinayak Dixit is leading a collaboration with the Government of India, Indonesia and UAE to improve traffic and transport management in key strategic areas by utilizing autonomous systems, pricing and real-time traffic data. The traffic signal systems developed have demonstrated significant benefits with congestion reduction by almost 30-35%. The team led by Prof. Dixit is working to develop cost-effective systems that demonstrate 10% improvement in overall congestion at 10% of current costs by 2020.

WRC Water Research Centre

Our expertise and priorities:

Over the last few years, our School has focused on building expertise in developing techniques to treat water of poor quality. We are making an impact that matters with the following research priorities:

1. Development of next generation membranes to improve water quality
2. Development of advanced oxidation processes to treat emerging contaminants
3. Address the need for technologies to treat PFAS contaminated water and sites

Our break throughs this year:

While some of our research efforts can take years to develop, we have had some key research break throughs over the last year. One highlight is the use of electrokinetics to treat contaminated lands

Our collaborations:

Each year our academics and research centres work with businesses, government and community organisations on specific projects, transferring our research into practice. Our most successful collaborations over the last year include:

1. Property NSW
2. Dow Chemical

Many historical industrial sites are contaminated with a range of contaminants, including chlorinated solvents. Unfortunately, a significant amount of these contaminants are in clay, making them extremely difficult to remove. Over the last couple of years, A/Prof O'Carroll's research team has been developing the use of electrokinetics to get amendments into clay at contaminated sites. These amendments work to degrade contaminants in-situ. His research team has recently trialed this technology at a contaminated site and achieved very promising results. The ability to treat contaminants encapsulated in clay could represent a game changer, helping to save billions of dollars in clean-up costs and cleaning up contaminated waters.

WRL Water Research Laboratory

Our priorities

The UNSW Water Research Laboratory (WRL) is the largest coastal/hydraulics research laboratory in Australia. WRL spans four hectares and is home to state-of-the-art facilities, equipment and personnel comprised of the most experienced and creative problem solvers in their respective areas of research and industry. Due to the space requirements of large-scale laboratory facilities and the need for access to a significant on-site water supply provided by the adjacent Manly Dam, WRL is located at the University's 'Northern Beach Campus' in Manly Vale, which is situated approximately 35 minutes north of the Kensington Campus.

WRL researchers are specialists in solving problems related to water and the environment. The unique blend of fundamental and applied water research that is undertaken by School staff and postgraduate students at the WRL site delivers both academic and industry/government-based research outcomes that are unmatched at any other water research facility in Australia

In addition to its major role within the School's UNSW Water Research Centre (WRC), WRL is a foundation member of the UNSW Global Water Institute (GWI) and also co-hosts the UNSW Connected Water Initiative (CWI) directorship.

Our specific areas of expertise include:

- Coastal, ocean and estuarine engineering and management
- Catchment hydrology
- River flow and floodplain management
- Environmental studies & climate change adaptation
- Groundwater research and management
- Wetland restoration

Civil
engineering
hydraulics

Our breakthroughs this year include:

1. Living Shorelines – design, testing and field installation of oyster bag structures for coastal protection

2. Flood protection and climate change impacts – State government appointment to review and undertake cost-befit of the $30M Hunter Valley Flood Mitigation Scheme

3. PFAS – development of sustainable remediation technologies to clean up contaminated sites

Our collaborations

WRL researchers work extensively with all three tiers of government, as well as many of the leading companies in Australia in engineering management and consulting. This year's international collaborations have included the USA, UK, New Zealand and Netherlands, as well as partners across SE Asia and the Pacific Islands including in the Cook Islands, and Myanmar.

An example: Eco-Engineering: Oyster Reef Restoration Project

WRL has a track record of delivering large scale environmental restoration projects including wetlands, rivers, estuaries and beaches. Recently, WRL researchers have been working with OceanWatch Australia to support their vision of restoring oyster reefs on the Australian coast and in estuaries, including Sydney Harbour. While many great ideas are being trialled in the ecological engineering discipline, our research links practical engineering solutions with innovative performance testing to inform designs.

Prior to European settlement, naturally occurring oyster reefs were widely found around Australia. Indeed, diaries of early Sydney settlers suggest that oyster reefs were so abundant in the Harbour that they were described as a shipping hazard. However, since the 1880s these reefs have largely disappeared due to over-exploitation (for consumption and cement production), pollution, increased estuarine siltation and the introduction of a parasitic mudworm.

With the assistance of WRL researchers, a novel technique has been proposed to encourage oyster reef restoration and reduce intertidal riverbank erosion. This innovation uses seeded oyster shells in coconut fibre bags.

Deliberately utilising only organic materials, the fibres will naturally decay in time with the intention of leaving a new, intact oyster reef structure behind. To support this unique form of eco-engineering, the research focus is on improving the engineering design and function of oyster bags, using WRL's state-of-the-art large-scale laboratory facilities. Two-dimensional physical modelling has been undertaken of oyster bags to better understand their expected behaviour when exposed to wave attack. Test situations were developed based on typical wind and boat waves that the oyster bags may be exposed to. These investigations have now identified threshold wave heights for initiation of oyster bag rocking and displacement. The tests also demonstrated that wave-driven foreshore erosion processes are expected to be attenuated immediately landward of oyster bag structures. The performance in the field is now being tested and evaluated, with the official launch of the first trial installation of oyster bags at Sugarloaf Point in Sydney's Lane Cove National Park.

Examples of oyster bag reef testing in WRL's large-scale 2-D wave fume facilities are shown here: https://youtu.be/f2KHPpf4myA

We welcome all enquiries about engagement and partnership opportunities to link our remarkable researchers and facilities with your needs and ambitions. More detailed information can be found on our website here:

www.wrl.unsw.edu.au/

Offering environmental protection

Scientia Professor David Waite, CEO and Executive Director of CTET; Dr Yuan Wang, Head of UNSW Torch Innovation Precinct and GM of CTET; Professor Nick Fisk, UNSW DVC-Research; Mr Zhongping Zhou, Deputy Party Secretary of Yixing Municipal City; Mr Yidong Hu, Party Secretary of JITRI (Jiangsu Industry Technology Research Institute); Ms Ziling Cheng, Torch High Technology Industry Development Centre, Ministry of Science and Technology; Mr Xufeng Zhu, Director of Yixing ES&TP; Mr Rhett Miller, Trade Commissioner (Education) of Australian Consulate-General Shanghai.

CTET – first UNSW research centre in Jiangsu

Former Head of School, and Scientia Professor David Waite is CEO and Executive Director of UNSW's first overseas research centre in Yixing, China, a facility dedicated to driving research and commercial opportunities in environmental protection, especially water treatment, resource recovery and environmental management and sustainability.

The UNSW Centre for Transformational Environmental Technologies (CTET) operates through the Torch Innovation program in partnership with Yixing Industrial Park for Environmental Science and Technology, the only hi-tech (Torch) zone focused on the development of an environment protection industry in China.

The official inauguration of the UNSW CTET was attended by Deputy Vice-Chancellor (Research) Nicholas Fisk, CTET's Executive Director and CEO, Scientia Professor David Waite, Australian and local Jiangsu dignitaries, industry partners and professors from leading Chinese universities.

The Centre will focus on several core areas including advanced oxidation to destroy non-biodegradable and toxic substances in water, electrochemical technologies for contaminant removal and resource recovery, and development of new generation membranes that help minimise pollutants and energy use.

The Centre has already secured more than $3 million in funding from partners including the Jiangsu Industrial Technology Research Institute (JITRI), Goldwind Environment and Puxin Environment for research activities at UNSW Sydney and in China.

Professor Waite said that the success his team has had in attracting interest from new partners is thanks to UNSW's reputation as a leader in water and environmental research.

"As UNSW's first overseas research centre, the CTET will provide exciting opportunities for our Australian partners to connect with Chinese counterparts. It will also become a base for UNSW undergraduates and graduates to engage with companies in China, through industrial training placements. I hope that by bringing academics, industry, entrepreneurs and investors together, we will improve environmental outcomes here in China, at home in Australia and around the world," Professor Waite said.

ARC Grants

This is a phenomenal outcome and one that is reflective of the quality of work done by all our staff. Congratulations to all involved.

Bumper Crop in 2018 - 13 ARC Grants for the School

Seven Discovery Projects, four Linkage, two Special Research Initiative. $6.3M

As Head of School Nasser Khalili declared, "This is a phenomenal outcome and one that is reflective of the quality of work done by all our staff. Congratulations to all involved."

Research topics covered a range of engineering challenges, involving deep explorations and innovations in geotechnical engineering, urban sustainability, revolutionary miniaturised satellites, traffic networks & transport planning, as well as water quality, reuse and remediation technologies. Many of the projects involve academic colleagues from other disciplines and universities, and industry, as the School continues to connect extensively with the wider world.

CVEN staff involved in the ARC grants include Emeritus Professor Ian Gilbert, Professor Nasser Khalili, Dr Arman Khoshghalb, Dr Matthew Lee, Dr Jinxing Ma, Professor Michael Manefield, Associate Professor Denis O'Carroll, Dr David Rey, Emeritus Professor Chris Rizos, Associate Professor Adrian Russell, Dr Kristen Splinter, Professor Chuying Tang, Professor Ian Turner, Scientia Professor David Waite, Professor S. Travis Waller, and Associate Professor Tommy Wiedmann.

Discovery Projects awarded in 2018 for 2019 commencement

Nasser Khalili; Adrian Russell
Modelling creep and time-dependency in unsaturated soils. $325,000

This project aims to present the most complete and rigorous modelling framework for creep and time-dependent behaviour of unsaturated soils in infrastructure. The project will address previously neglected aspects of soil behaviour, such as gradual changes in physical properties with time and strain-rate dependency. The project is expected to enable better predictions of infrastructure performance, improve confidence in design, and avoid unwarranted over-design and the considerable cost this imposes. The project will provide a fully validated predictive computational modelling tool for quantitative assessment of long-term performance and stability of infrastructure such as dams, embankments, tunnels, slopes, buildings and foundations.

Nasser Khalili; Arman Khoshghalb; Bernhard Schrefler
Non-isothermal dynamic strain localisation in unsaturated porous media. $295,000

This project aims to present a more complete and rigorous treatment of theory of strain localisation in unsaturated porous media geo-structures subject to thermal, inertia and large deformation effects in a three dimensional setting. The project will provide an improved understanding and an added confidence in dealing with geotechnical engineering problems involving failure and instability. The outcome of this research will be a fully validated predictive tool in the form of a computational model for quantitative assessment of structural integrity, safety, failure, and consequence of failure of geo-structures such as dams, embankments, tunnels, slopes, and above and under-ground excavations.

Michael Manefield; David Leys; Martin Elsner
Electron transport catalysis in organohalide pollutant respiration. $524,000

This project aims to understand the link between substrate specificity and gene sequence of dehalogenating enzymes in organohalide respiring bacteria (ORB) and the mechanism by which electrons are transferred to dehalogenating enzymes through protein-protein interactions. Organohalides were present in Earth's early history and now pollute the environment globally. Organohalide respiring bacteria (ORB) can degrade these pollutants by using them as terminal electron acceptors in their respiratory metabolism. This represents one of the most ancient respiratory systems on Earth about which little is known. This project will add to our fundamental knowledge of microbial evolution and metabolic systems, and pave the way for next generation organohalide remediation technologies.

Chuyang Tang; Anthony Fane; Menachem Elimelech
Ultrathin membranes of novel structures for highly efficient water reuse, $390,000

This project aims to develop a new generation of reverse osmosis membranes to enable significantly more efficient water reuse. The project expects to

generate new knowledge in the area of membrane technology and wastewater reclamation using innovative designs of membrane structures and new techniques for membrane synthesis. Expected outcomes of the project include the development of highly permeable and high selective reverse osmosis membranes. This project should provide significant benefits to water reuse by greatly improving product water quality and dramatically reducing its energy consumption by over 50 per cent, which in turn addresses the challenges of water scarcity and water-energy nexus.

David Waite; Christine McKenzie
Biomimetic ligands for catalytic iron-mediated degradation of contaminants. $390,000

This project aims to develop and apply ligands attached to solid supports that bind iron and which, on activation, form high valence state iron species capable of catalytically oxidising contaminants present in waters and wastewaters. Of particular interest in this work are ligands that are simple analogues of biological molecules and which are stable in the presence of the high valent iron species formed following activation. The end result of this project is a water treatment process suited to the effective removal of trace contaminants such as hormones, pharmaceuticals and pesticides from wastewaters such that the treated waters are suitable for discharge to pristine environments or to reuse for potable purposes.

Steven Travis Waller; David Rey; Carolina Osorio
Incentivised strategic traffic assignment: bi-level transport optimisation. $378,000

This project aims to advance the fundamental knowledge base and methodological modelling capacity related to traffic network assignment representing complex incentive structures such as network pricing, behavioural shift inducement, dynamic speed control and information-provision. Expected outcomes include new equilibrium formulations characterising traveller responses to, and interactions with, incentive structures while maintaining complex stochastic adaptive behaviours from previous research, new network routing algorithms, and a novel bi-level optimisation approach for seeking optimal incentive policies. The project will provide a scientific basis for the quantified network evaluation of incentivisation strategies that will support enhanced transport planning thereby improving mobility across society.

Thomas Wiedmann; Manfred Lenzen; Heinz Schandl

Assessing absolute sustainability of global cities $350,030

The project aims to create a quantitative modelling framework for assessing the absolute sustainability of cities by combining global multi-region input-output analysis with the 'safe and just space' concept for human development. The model will allow assessment of the full supply chain environmental and social impacts of urban economic activities against biophysical planetary limits as well as social foundation thresholds defined in the literature. The project will advance sustainability science methodology and will greatly benefit worldwide initiatives for urban sustainability. Case studies on Australian cities will assess where interventions can be most practically, realistically and effectively implemented.

ARC Linkage Projects

Nasser Khalili; Adrian Russell; Mark Jaksa; Garry Mostyn

Experimental investigation and constitutive modelling of reactive soils.

LP180100235 $342,831

Industry Partners: PSM Consult Pty Limited; DPTI

This project aims to develop the fundamental knowledge, a mechanical framework and practical engineering design tools needed to minimise the effects of reactive soils on infrastructure. Reactive soils undergo significant swelling and weakening upon wetting or intrusion by salt-rich groundwater and shrinkage upon drying. This can result in damage to buildings and infrastructure beyond a state of repair. This project will develop tools, models and theories to detect weaknesses in the design of infrastructure and its foundations built on problematic reactive soils, assess the impact and implement effective remedial measures to improve performance. The project is expected to increase efficiency through improved design and reduced damage, and save infrastructure owners, government and private, tens of millions of dollars each year.

Arnaud Castel; Raymond Ian Gilbert; James Iman Mohammadi Rodd; Warren South.

Shrinkage, cracking, self-healing and corrosion in blended cement concrete,

LP170100912, $321,000

Industry Partners: Cement Concrete & Aggregates Australia

This project aims to investigate the effects of binder quantity and composition on early-age cracking in Australian concretes caused by restrained shrinkage, the subsequent self-healing capability of the cracks, and the possibility of detrimental early chloride induced steel reinforcement corrosion, particularly in marine locations. This project will focus on concrete mix designs and the blends of cement, fly-ash and blast furnace slag that are prescribed in the revised version of the concrete bridge standard for the most severe exposure. This project will lead to a significant improvement in the serviceability and durability of concrete structures in severe environments.

David Waite; John Fletcher; Jinxing Ma; Jing Guan; Shane Cox

Ammonia recovery from wastewaters using flow electrode-membrane systems

LP170101180 $498,000

Industry Partners: Beijing Origin Water Technology; Instrument Works Pty Ltd

This project aims to develop an innovative approach to the recovery of ammonia from dilute wastewaters using coupled-flow electrode-membrane technologies that also enable energy recovery. The outcome of the project is expected to minimise damage to, and develop solutions for, restoration and remediation of, soil, fresh and potable water, urban catchments and marine systems, and significantly improve the environmental impacts of ammonia.

Ian Turner; Ryan Lowe; Diana Greenslade; Nathaniel Plant; Jeff Hansen; Kristen Splinter

Development of a new coastal hazard early-warning system capability

LP170100161 $505,000

Industry Partners: The University of Western Australia; Bureau of Meteorology; Office of Environment and Heritage; United States Geological Survey; Northern Beaches Council; City of Mandurah; WA Department of Transport

An Australian storm wave damage and beach erosion early warning system. This project aims to develop a new coastal hazard early-warning system capability for Australia, to alert coastal communities, emergency managers and coastal engineers to impending storm wave damage and coastal erosion. Emergency preparedness informed by early warning is expected to significantly benefit vulnerable communities and infrastructure along Australia's coasts.

ARC Special Research Initiative Grants

UNSW Denis O'Carroll; Michael Manefield; Matthew Lee; Naresh Kumar; with Prof Qingguo Huang (University of Georgia),

Development of electrochemically activated sorbents for PFAS defluorination, $1,103,883

The project aims to develop to develop a new treatment technology to treat water contaminated with Per- and poly-fluoroalkyl substances (PFAS) a technology capable of cost-efficiently treating large quantities of PFAS-contaminated water. Currently, most existing water treatment technologies are unable to remove PFAS to adequate levels, are prohibitively expensive or are only useful for a very limited lifespan.

Robert Niven; Nasser Khalili; Richard Pashley; Mark Taylor; Vladimir Strezov; Scott Wilson; Peter Murphy; Steven Phillips. With Macquarie University; OPEC Systems Pty Ltd.

PFAS source zone remediation by foam fractionation and in situ fluidization $900,000

Professor Nasser Khalili, with colleagues from UNSW Canberra, UNSW Medicine and Aviation, was awarded $900,000 to develop techniques for extracting PFAS from soils as a liquid concentrate through the use of foam. These techniques could enable PFAS removal efficiencies of greater than 90%, providing entirely new methods for the aggressive removal of PFAS from contaminated sites.

These two grants were part of the $8.2 million awarded to nine research projects in the first round of ARC's Special Research Initiative PFAS Remediation Research Program.

Discovery Projects with CVEN researchers – on projects administered by other universities.

Ahmed El-Mowafy (Curtin), Peter Teunissen (Curtin), Chris Rizos (UNSW),

DP109102444 Tracking Formation-Flying of Nanosatellites Using Inter-Satellite Links $390,000

This project aims to realise real-time kinematic precise orbit and attitude determination of nano satellites. Formation flying, based on distributed miniaturised satellites such as Cubesats, is envisioned to revolutionise the way the space-science community conducts autonomous missions. The project will develop a purely kinematic concept exploiting the full capabilities of Global Navigation Satellite Systems (GNSS) carrier-phase measurements for instantaneous precise orbit and attitude determination of the Cubesats. The project will also pioneer the use of the satellite based augmentation systems (SBAS), supporting the future Australian SBAS program, and the development of integrated algorithms for space-based, Precise Point Positioning with fixed ambiguities supported by SBAS.

Research Centre Projects 2018

The total amount for all Research Centres for 2018 was
$13,807,597

CIES Centre for Infrastructure Engineering & Safety

CIES Investigators	Topic	Partners/ Providers	2018 Amount
Bradford, MA	Buckling capacity of high-strength steel flexural members	Australian Research Council / Discovery Project	$130,000.00
Bradford, MA	Composite Structures of High-Strength Steel and Concrete	Australian Research Council / Linkage Project China Construction Steel Structure Corp. Ltd / ARC Linkage Project Industry Partner Contribution	$222,333.00
Bradford, MA | Vali Pour Goudarzi,	Composite steel-timber structural system	Australian Research Council / Discovery Project	$145,000.00
Castel, A	Durability of underground concrete pipes in chloride environment	Concrete Pipe Association of Australasia (CPAA) / Contract Research	$28,400.00
Castel, A	Modelling and testing corroding reinforced concrete structures	Australian Research Council / Discovery Project	$120,000.00
Castel, A | Foster, SJ | Nezhad, AA	A mix design approach to reduce early-age thermal cracking of concrete	Australian Research Council / Linkage Project	$53,000.00
Castel, A | Gilbert, RI	Shrinkage, cracking, self-healing and corrosion in blended cement concrete	Australian Research Council / Linkage Project	$48,000.00
Chang, Z | MacKen, AP | Herath, HMS	Investigation of concrete tensile stress-strain behaviour	Boral Resources (NSW) Pty Ltd / Contract Research	$7,565.00
Chang, Z | Vali Pour Goudarzi,	Investigation of steel-timber joints	Strongbuild Commercial / Contract Research	$21,900.00
Foster, SJ	Characterisation of Shear and Tensile Fracture of UHPFRC	Australian Research Council / Discovery Project	$129,500.00
Foster, SJ	Independent review of High Modulus, High Strength Concrete	Boral Concrete / Contract Research	$10,891.00
Foster, SJ	Steel Fibre Reinforced Concrete Static and Fatigue Round Panel Testing	BOSFA / Contract Research	$13,636.00
Foster, SJ | Castel, A | Shen, X | Cox, R | Modra, BD	RP1020u1: Demonstrating the practical use of geopolymer concrete: high density coastal protection units	CRC For Low Carbon Living Limited / Research Grants	$1,000.00
Gao, W	New generation of sustainable building structures	Beijing Engineering Research Center / International Contract	$80,000.00
Gao, W | Li, G | Zhang, Y	ARC Research Hub for nanoscience based construction material manufacturing (Project 1)	Monash University / ARC Industrial Transformation Research Hub Shared Grant Monash University / ARC Industrial Transformation Research Hubs - Shared Industry Partner Contributions	$22,764.00
Gao, W | Pi, YL	Unified nondeterministic dynamic safety assessment of softening structures	Australian Research Council / Discovery Project	$140,000.00
Gao, W | Tin Loi, FS	Advanced analysis and safety assessment framework for structures under uncertainty	Lindenbaum Pty Ltd / Contract Research	$40,000.00
Gilbert, RI | Castel, A	Shrinkage and cracking of concrete	CEMENT CONCRETE & AGGREGATES AUSTRALIA / Contract Research	$50,000.00
Gilbert, RI | Hamed, E	Time-dependent behaviour of precast concrete sandwich panels	Australian Research Council / Discovery Project	$100,000.00
Hamed, E	Coupled service and ultimate behaviour of high strength composite columns	University of Sydney / ARC Discovery Project Shared Grant	$30,000.00

CIES Investigators	Topic	Partners/ Providers	2018 Amount
Khalili-Naghadeh, N	Unsaturated clays in free-standing railway embankments - monitored field trial	GHD PTY LTD / Contract Research	$9,000.00
Niven, R | Khalili-Naghadeh, N | Pashley, RM	PFAS Source Zone Remediation by Foam Fractionation and In Situ Fluidisation	Australian Research Council / Special Research Initiatives	$100,000.00
Oldfield, PF | Nezhad, AA | Carmichael, DG	Carbon Value Engineering	CRC For Low Carbon Living Limited / Research Grants	$78,765.00
Raval, SA | Shen, X	Improved structural mapping of pit walls using UAV based mobile laser scanning	Australian Coal Research Limited / Australian Coal Association Research Program	$26,419.00
Russell, A	Evaluating potential static liquefaction of tailings to prevent failures	Teck Resources Limited / ARC Linkage Project Industry Partner Contribution Anglo American Services (UK) Limited / ARC Linkage Project Industry Partner Contribution Freeport-McMoRan Inc / ARC Linkage Project Industry Partner Contribution	$84,827.00
Shen, X | Carmichael, DG	Construction Drilling Robot - TechVoucher Project	Smart Welding Solutions / Contract Research	$15,000.00
Shen, X | Carmichael, DG	Evaluating Light Detection and Ranging (LiDAR) Sensors for Construction Mapping	Linke & Linke Surveys / Contract Research	$50,000.00
Song, C	Deterioration of structural integrity of ageing ships and marine platforms	University of Newcastle / ARC Linkage Project Shared Grant University of Newcastle / ARC Linkage Project - DSTG Shared Partner Organisation Contribution University of Newcastle / ARC Linkage Project - Pacific ESI Shared Partner Organisation Contribution	$44,622.00
Song, C	Scaled boundary framework for adaptive and multiscale structural analysis	Australian Research Council / Discovery Project	$130,000.00
Song, C	Seismic analysis of cracking and deformations in concrete gravity dams	Australian Research Council / Linkage Project Melbourne Water Corporation / ARC Linkage Project Industry Partner Contribution Goulburn-Murray Water / ARC Linkage Project Industry Partner Contribution Murray-Darling Basin Authority / ARC Linkage Project Industry Partner Contribution Sunwater Limited / ARC Linkage Project Industry Partner Contribution	$175,230.00
Song, C | Tin Loi, FS	3D contact and fracture analysis for safety assessment of structures	Australian Research Council / Discovery Project	$141,400.00
Vali Pour Goudarzi,	Finite element analysis of high-strength concrete column/wall to normal strength slab	Taylor Thomson Whitting (NSW) Pty Ltd / Contract Research	$8,260.00
Vali Pour Goudarzi, | Chang, Z	Investigation of structural behaviours of timber stud walls with OSB panels	Strongbuild Commercial / Contract Research	$34,890.00
TOTAL CIES 2018			**$2,292,402.00**

CWI Connected Waters Institute Research Centre

CWI Investigators	Topic	Partners/ Providers	2018 Amount
Andersen, MS | Glamore, W | Rau, GC | Johnson, FM	Geological mapping and geophysical surveys of the Thirlmere Lakes area	NSW Office of Environment and Heritage (OEH) / Thirlmere Lakes Research Program	$46,875.00
Andersen, MS | Rau, GC | Glamore, W | Anderson, DJ | Johnson, FM	Surface water-groundwater interactions at Thirlmere Lakes	NSW Office of Environment and Heritage (OEH) / Thirlmere Lakes Research Program	$69,600.00
Baker, AB | Andersen, MS	Research in the study of groundwater organic matter using isotopic and accelerator-based techniques - Scholarship for Liza McDonough	Australian Nuclear Science & Technology Organisation (ANSTO) / Postgraduate Student Scholarship	$3,750.00
Baker, AB | O'Carroll, DM | Andersen, MS	Groundwater organic matter: carbon source or sink?	Australian Research Council / Discovery Project	$93,333.00
Kelly, BF | Andersen, MS | Manefield, M	Baselining Lower Namoi Groundwater and Evaluating Pilliga CSG Developments	Cotton Research & Development Corporation (CRDC) / Open Call Research and Development Projects	$21,268.00
Rau, GC | Andersen, MS | Pek, HT	Groundwater Infrastructure Program	NSW Department of Industry / RAAP - NCRIS	$100,000.00
Total 2018			**$334,826.00**

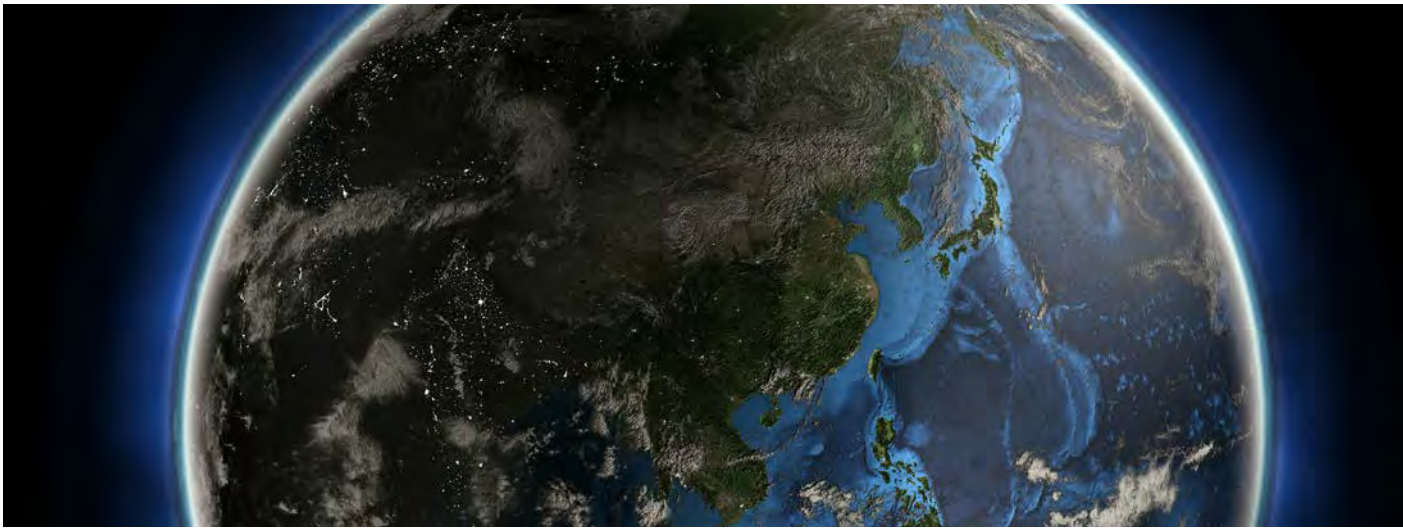
rCITI Research Centre for Integrated Transport Innovation

rCITI Investigators	Topic	Partners/ Providers	2018 Amount
Dixit, V	Driving Behavior and Insurance Contracts	Georgia State University / Contract Research	$33,099.00
Dixit, V	Engagement Of Dr Vinayak Dixit To Network And Asset Intelligence	Roads and Maritime Services / State Government Contract	$163,759.00
Dixit, V	Insurance Research for Autonomous Vehicles	iMOVE CRC Research Project IAG Partner Organisation Contribution iMOVE CRC Research Project for UNSW Contribution	$87,000.00
Dixit, V	Knowledge Centre in mobility, connected and autonomous vehicles	Insurance Australia Limited / Contract Research	$62,500.00
Dixit, V	Managing Traffic and Transport with Crowd-Sourced Data	Thane Municipal Corporation / International Contract	$555,468.00
Dixit, V | Grzybowska, H	Impacts of Connected and Autonomous Vehicles - Phase 2	Transurban Limited / Contract Research	$32,320.00
Dixit, V | Grzybowska, H | Saberi Kalaee, M | Ranaweera Kankanamge	Impacts of Connected and Autonomous Vehicles - Behavioural Study (Phase 3)	Transurban Limited / Contract Research	$57,000.00
Dixit, V | Hossein Rashidi, T	Energy Efficiency Decision Making in the NSW Transport Sector	CRC For Low Carbon Living Limited / Research Grants	$79,999.00
Dixit, V | Hossein Rashidi, T | Waller, ST	Planning and operational models for food rescue and delivery to the poor	Australian Research Council / Linkage Project	$25,406.00
Dixit, V | Jian, S	Non-linear model to estimate regional impressions and reach	Wrappli Pty Ltd / Contract Research	$10,000.00

rCITI Investigators	Topic	Partners/ Providers	2018 Amount
Dixit, V | Jian, S	Project Evaluation (Premier Innovation Initiative)	Roads and Maritime Services / State Government Contract	$45,000.00
Dixit, V | Waller, ST | Most, SB	Understanding Impact of Autonomous Vehicles on Behaviour and Interactions	Australian Research Council / Linkage Project ARC Linkage Project Industry Partner Contribution - ARRB Group /Transport for NSW / Robert Bosch (Australia) Pty Ltd / Roads Corporation (VicRoads) / Transport Accident Commission Victoria.	$160,444.00
Dixit, V | Waller, ST | Prabhakharan, P | Wijayaratna, KP	GHD Projects: Mesoscopic and Hybrid Modelling Guidelines, and Driving Behaviour Parameters	GHD PTY LTD / NSW Roads and Maritime Services Subcontract	$120,000.00
Dixit, V | Wijayaratna, KP	Parking Fees Stated Preference Survey	Transpo Group (UAE) / International Contract	$33,501.00
Gibson, IR | Waller, ST | Saberi Kalaee, M | Jian, S | Dixit, V	Innovation Fund to develop new capabilities for Intelligent Transport enabled IoT and networking technology innovation	CISCO Systems Australia Pty Ltd / Innovation Fund	$108,000.00
Grzybowska, H	Research into freight and supply chain constraints and improvements in the Northern Rivers	Southern Cross University / Regional Development Australia Northern Rivers Subcontract	$6,880.00
Hossein Rashidi, T	Empirical Estimation of Time Use and Disutility of Travel Time in the Context of New Mobility Technologies	UChicago Argonne LLC (Argonne National Laboratory) / International Contract	$120,770.00
Hossein Rashidi, T	Integrating social media with conventional data sources to model land use	Australian Research Council / Discovery Early Career Researcher Award (DECRA)	$117,000.00
Hossein Rashidi, T | Ardeshiri, A | Ghasrikhouzani, M	Freight Data Requirements Study	iMOVE CRC / Research Project	$52,350.00
Hossein Rashidi, T | Dixit, V	An evolutionary model for interactions of land use and travel behaviour	Australian Research Council / Linkage Project	$54,084.00
Maghrebi, M | Waller, ST	Optimizing virtual reality parameters for simulating construction process ubiquitously - NSW TechVoucher Project	Norwest Contracting Australia Pty Ltd / Contract Research	$15,000.00
Regan, MA | Prabhakharan, P	Feasibility of Integrating Advanced Driver Assistance Systems in Driver Education	AUSTROADS LTD / Contract Research	$5,000.00
Rey, D | Hossein Rashidi, T	On Demand Transport Pilots	Australian Transit Enterprises Pty Ltd / Contract Research	$94,610.00
Waller, ST	Independent Representative for SCATS Development Review/ Governance	Roads and Maritime Services / State Government Contract	$28,370.00
Waller, ST | Dixit, V	Investigating travel choice behaviour: a new approach	University of Sydney / ARC Discovery Project Shared Grant	$52,376.00
Waller, ST | Dixit, V | Moylan, EK | Wijayaratna, KP	Travel time reliability model development	Transport for NSW / State Government Contract	$16,000.00
Waller, ST | Hossein Rashidi, T | Dixit, V | Grzybowska, H | Wijayaratna, KP	WestConnex Project	Plenary Organisation / Contract Research	$85,200.00
Waller, ST | Hossein Rashidi, T | Dixit, V | Grzybowska, H | Wijayaratna, KP	WestConnex Project, Sydney, Australia	Cintra Global / International Contract	$127,800.00
Waller, ST | Wijayaratna, KP | Jian, S	Consultancy Services for Review of Traffic Systems and Smart Technology	City of Adelaide / Local Government Contract	$54,950.00
Wijayaratna, KP | Waller, ST | Jian, S | Jayakumar Nair, D	Benchmarking and Place Performance Indicators Development of the NSW Road Planning Framework Stage 1	Transport for NSW / State Government Contract	$63,363.00
Total rCITI 2018			**$2,467,249.00**

SAGE Surveying and Geospatial Engineering Research

SAGE Investigators	Topic	Partners/ Providers	2018 Amount
Ge, L	Auckland Ground Investigation	Auckland Council / International Contract	$60,591.00
Ge, L	Joint Development of Smart Spatial Technologies	Huitian Jiuzhou Technologies Co Ltd / International Contract	$200,000.00
Ge, L	Study on InSAR monitoring of sudden geological disaster of losses induced by underground mining	Taiyuan University of Technology / International Contract	$8,000.00
Ge, L | Zhou, Y | Ghasrikhouzani, M	East Artarmon Street Parking Evaluation	Willoughby City Council / Local Government Contract	$1,818.00
Rizos, C | Saydam, S	Third Generation of Positioning System for Underground Mine Environments	Australian Research Council / Linkage Project	$32,250.00
Rizos, C | Wang, J	Trustworthy Positioning for Next Generation Intelligent Transport Systems	Australian Research Council / Discovery Project	$144,000.00
Total SAGE 2018			**$446,659.00**



WRC Water Research Centre

WRC Investigators	Topic	Partner/Provider	2018 Amount
Branch, AD	LC-OCD investigation of biofouling potential	Water Corporation (WA) / State Government Contract	$3,360.00
Branch, AD | Khan, SJ | Leslie, GL	STP Modelling	BAE Systems Australia Limited (SA) / Contract Research	$15,880.00
Branch, AD | Khan, SJ | Leslie, GL | Le Clech, P | Tng, KH	Analysis of biofouling potential using LC-OCD	Southern Seawater Joint Venture / Contract Research	$8,352.00
Branch, AD | Tng, KH | Leslie, GL | Khan, SJ	Improving Understanding of Pretreatment Process Selection and Operability for Seawater Reverse Osmosis Plants	Water Corporation (WA) / State Government Contract	$13,838.00
Deletic, A | Zhang, K	Advancing water pollution emissions modelling in cities of the future	Australian Research Council / Linkage Project ARC Linkage Project Industry Partner Contribution - Environmental Protection Authority Victoria /Melbourne Water Corporation / Knox City Council /	$185,000.00
Deletic, A | Zhang, K	All-solid-state Z-scheme photocatalysts for water treatment	Monash University / ARC Discovery Project Shared Grant	$26,300.00
Deletic, A | Zhang, K	Sino-Australian Centre on Sponge City	Jiangsu Easthigh Environmental Holdings Co Ltd / International Contract	$220,705.00
Evans, JP | Khan, SJ	Better data-driven decision making under future climate uncertainty	Water Research Australia Limited / Contract Research	$3,075.00
Fisher, RM | Le, MN | Stuetz, R	Analytical Determination of Selected Siloxanes in Biogas	Sydney Water Corporation / State Government Contract	$30,564.00

WRC Investigators	Topic	Partner/Provider	2018 Amount
Henderson, RK | Zamyadi, A | Stuetz, R	Characterisation of cyanobacteria and their metabolites by fluorescence spectroscopy - Postgraduate Scholarship for Sara Imran Khan.	Water Research Australia Limited / WQRA Postgraduate Scholarships	$2,186.00
Johnson, FM | Sharma, A	Assessing future drought risk for water resources system management	Australian Research Council / Linkage Project NSW Department of Primary Industries / ARC Linkage Project Industry Partner Contribution	$60,000.00
Khan, SJ	Can wastewater treatment increase the ecotoxicity of chiral chemicals?	Australian Research Council / Discovery Project	$122,000.00
Khan, SJ	Potable Reuse Update	Water Research Australia Limited / Contract Research	$75,000.00
Khan, SJ	Smart Management of Disinfectant in Chloraminated Water-Supply Systems	Western Sydney University / ARC Linkage Project Shared Grant	$13,000.00
Khan, SJ	Validation and monitoring of advanced oxidation for potable water reuse	Australian Research Council / Future Fellowship	$255,782.00
Leslie, GL | Henderson, RK | Sharma, A	Adapting catchment monitoring and potable water treatment to climate change	Australian Research Council / Linkage Project Sydney Water Corporation / ARC Linkage Project Industry Partner Contribution Water NSW / ARC Linkage Project Industry Partner Contribution	$111,667.00
Li, S | Gooding, J | Waite, TD | Conibeer, GJ	Nanoimprint Systems: Expanding Research Capability of Roll to Roll Printer	Australian Research Council / LIEF University of Sydney / ARC LIEF Subcontract (UNSW Admin) University of Wollongong / ARC LIEF Subcontract (UNSW Admin) University of Technology, Sydney (UTS) / ARC LIEF Subcontract (UNSW Admin) Royal Melbourne Institute of Technology / ARC LIEF Subcontract (UNSW Admin)	$162,118.00
Manefield, M | O'Carroll, DM | Khan, SJ | Lee, M	Biogeochemical remediation approaches for PFAS contaminated environments	Australian Research Council / Linkage Project	$90,000.00
Manefield, M | Rahman, S | Li, X	Hotwiring microbial communities for enhanced unconventional gas production.	Department of Industry, Innovation & Science / Australia-India Strategic Research Fund (AISRF) BIOGAS Energy PTY LTD / DIIS - Australia-India Strategic Research Fund (AISRF) Partner Contribution	$94,064.00
Manefield, M | Yeung, AC	Biodegradation Trial of PFOS and PFOA Compounds	Enretech Australasia Pty Ltd / Innovation Connections Contract	$12,500.00
Manefield, M | Yeung, AC	Development of halophilic surface associated inoculum for the treatment of hypersaline wastewater	Loris H Hassall Trading Pty Ltd / Innovation Connections Contract Department of Industry, Innovation & Science / Innovation Connections Contract	$23,408.00
Marshall, LA	Advancing uncertainty quantification in terrestrial hydrologic systems	Australian Research Council / Discovery Project	$98,912.00
O'Carroll, DM | Manefield, M | Lee, M | Kumar, N	Development of electrochemically activated sorbents for PFAS defluorination	Australian Research Council / Special Research Initiatives ARUP Pty Ltd / ARC Special Research Initiatives Industry Partner Contribution	$212,725.00
Roser, D | Khan, SJ | Fisher, RM	Analysis into Potable Reuse Technical Viability	Sydney Water Corporation / State Government Contract	$99,500.00
Sharma, A	A Fourier approach to address low-frequency variability bias in hydrology	Australian Research Council / Discovery Project	$110,000.00
Sharma, A	The changing risk of very rare to extreme floods in a warming climate	Commonwealth Government Contract - Murray-Darling Basin Authority / State Government Contract - Department of Energy and Water Supply (QLD) /Melbourne Water Corporation / SEQWater / Sunwater Limited / Water NSW /Water Corporation (WA) Contract Research - Hydro Tasmania / Snowy Hydro Limited	$274,000.00

WRC Investigators	Topic	Partner/Provider	2018 Amount
Stuetz, R	Analytics to predict anaerobic codigestion & downstream process performance	University of Wollongong / ARC Linkage Project Shared Grant University of Wollongong / Sydney Water Corporation ARC Linkage Partner Contribution Shared	$32,804.00
Stuetz, R	Energy Benchmarking for Efficient, Low Carbon Water Recycling Operations	CRC For Low Carbon Living Limited / Research Grants	$30,000.00
Stuetz, R	Optimisation of granular sludge for energy efficient wastewater treatment and reuse - Scholarship for Benjamin Thwaites	Water Research Australia Limited / WQRA Postgraduate Scholarships	$10,000.00
Stuetz, R | Henderson, RK | Neilan, BA | Schofield, N | Glamore, W | Johnson, FM | Zamyadi, A	Nuisance & Harmful Algae Science-Practice Partnership	Melbourne Water Corporation / State Government Contract	$142,857.00
Taylor, R | Chen, V | Wang, Y | Leslie, GL	Membrane Distillation Development for Concentrated Solar Thermal Systems	Australian Research Council / Linkage Project Vast Solar Pty Ltd / ARC Linkage Project Industry Partner Contribution Beijing Origin Water Technology Co Ltd / ARC Linkage Project Industry Partner	$33,039.00
Waite, TD	Redox transformations of natural organic matter	Australian Research Council / Discovery Project	$130,000.00
Waite, TD	Relationship between physical and chemical characteristics of coal dust particulates and incidence of coal workers pneumoconiosis (black lung disease)	Australian Coal Research Limited / Australian Coal Association Research Program	$120,000.00
Waite, TD | Collins, RN	Impact of aging on iron speciation in Caenorhabditis elegans	Australian Synchrotron / X-ray Absorption Spectroscopy Beamline Access	$1,018.00
Waite, TD | Collins, RN	Reactive Oxygen Species Production on Oxygenation of Subsurface Sediments	Australian Research Council / Discovery Project	$108,000.00
Waite, TD | Fletcher, J	Optimising CDI Water Treatment for Ion Removal and Energy Recovery	Australian Research Council / Linkage Project Jaycar Pty Ltd / ARC Linkage Project Industry Partner Contribution	$120,000.00
Waite, TD | Fletcher, J | Ma, J	Ammonia recovery from wastewaters using flow electrode-membrane systems	Australian Research Council / Linkage Project	$26,167.00
Waite, TD | Foster, SJ | Castel, A | Arns, C	Development of innovative cement binders with low carbon footprint	Australian Research Council / Linkage Project	$84,375.00
Waite, TD | Kinsela, AS | Anderson, DJ | Bligh, MW	Continuing Support for Research and Remediation tasks at Little Forest Legacy Site	Australian Nuclear Science & Technology Organisation (ANSTO) / Commonwealth Government Contract	$78,000.00
Waite, TD | Leslie, GL | Chen, V | Wang, Y	Overview of options for wastewater treatment and resource recovery (Main Account & Project 1)	Beijing Origin Water Technology Co Ltd / International Contract	$179,195.00
Waite, TD | Liu, X	Development and use of conducting ceramic membranes for fouling prevention, contaminant degradation and ion removal by electrosorption	Jiangsu Industrial Technology Research Institute / International Contract	$29,908.00
Waite, TD | Wang, Y | Ji, C	Development and Optimization of Advanced Treatment Technologies for Shanxi Jiaocheng Economic Development Zone Wastewaters	Puxin Environmental Protection Co. Ltd / International Contract	$102,000.00
Wiedmann, T	Data analysis services	Australian Bureau of Statistics / Commonwealth Government Contract	$9,000.00
Wiedmann, T	Integrated Carbon Metrics Tool Alignment with the National Carbon Offset Standard for Precincts	CRC For Low Carbon Living Limited / Research Grants	$32,200.00
Zamyadi, A | Stuetz, R | Henderson, RK	Release of Intracellular Cyanotoxins during Oxidation of Natural Bloom Samples and Laboratory Cultured Cells	Water Research Australia Limited / Contract Research	$7,455.00
TOTAL WRC 2018			**$3,599,954.00**

WRL Water Research Laboratory

WRL Investigators	Topic	Partners/Providers	2018 Total $
Anderson, DJ | Howe, D	Liverpool Plains Hydrogeological Data Analysis (WRL2017092)	Caroona Coal Action Group / Contract Research	$30,254.00
Blacka, MJ | Cox, R	Hay Point Berth 2 Physical Modelling Advisory Services (WRL2018023)	Aurecon Australasia Pty Ltd / Contract Research	$7,000.00
Blacka, MJ | Flocard, FD | Howe, D	Physical Modelling of Stern Wave Breaker (WRL2017012FF)	MMA Offshore / Contract Research	$60,450.00
Blacka, MJ | Glamore, W | Rayner, D | Ruprecht, JE | Blacka, AC | Harrison, AJ | Smith, G	Review of the Merimbula & Back Lakes Estuary Management Study and Management Plan 1997, Lake Curalo Estuary Management Study and Plan 2002 and Wallaga Lake Estuary Management Plan 2000 (WRL2016067.10)	Bega Valley Shire Council / Local Government Contract	$52,680.00
Blacka, MJ | Miller, BM | Deiber, M | Drummond, C | Rahman, PF	Coastal Hydrodynamic Modelling and Data Collection to Support the Mei Te Vai Ki Te Vai Project (WRL2017063MJB)	Ministry for Finance and Economic Management - Cook Islands / International Contract	$101,614.00
Blacka, MJ | Smith, G	Tweed River Entrance Sand Bypassing Project: Coastal Imaging Surveillance System. Contract No. DTIRIS 12/06	NSW Department of Primary Industries / State Government Contract	$23,956.00
Carley, JT | Anderson, DJ | Flocard, FD	Seawater Intake at Kingscliff NSW - TechVoucher Project (WRL2017075)	Australian Bay Lobster Producers Ltd (ABLP) / Contract Research	$21,155.00
Carley, JT | Coghlan, IR	Fairy Bower Seawall Remediation Project	Manly Council / Local Governments Contract	$19,610.00
Carley, JT | Coghlan, IR | Harrison, AJ	Revision of Coastal Hazard Lines for Roches Beach. Lauderdale Tasmania (WRL2016044)	Clarence City Council / Local Government Contract	$25,000.00
Carley, JT | Coghlan, IR | Harrison, AJ | Miller, BM	Detailed Design of the South Steyne Stormwater Outlet Renewal (WRL2017093)	Northern Beaches Council / Local Government Contract	$87,566.00
Carley, JT | Miller, BM	Ballina Ocean Pool: Coastal Engineering Services	Ballina Shire Council / Local Government Contract	$28,000.00
Carley, JT | Miller, BM | Coghlan, IR | Harrison, AJ	Hallett Cove Sea Pool Feasibility Study	City of Marion / Local Government Contract	$27,000.00
Carley, JT | Modra, BD | Harrison, AJ	Snug Bay and Adventure Bay Dynamic Tailwater Levels (WRL2017050)	Kingborough Council / Local Government Contract	$15,000.00
Coghlan, IR | Carley, JT | Howe, D	Physical Modelling for the Maroochy River Groyne Field Renewal Project (WRL2018020)	Jeremy Benn Pacific / Contract Research	$45,470.00
Coghlan, IR | Glamore, W | Carley, JT | Howe, D	Coastal Engineering Assessment for Trial Oyster Bag Structures	Estuary Care Foundation SA Inc / Contract Research	$5,000.00
Drummond, C | Carley, JT	Ettalong Extended Drone Monitoring and Analysis	Central Coast Council / Local Government Contract	$2,625.00
Drummond, C | Carley, JT | Harrison, AJ	Umina-Ocean Beach Erosion Management Study Revision 1	Haskoning Australia Pty Ltd / Contract Research	$52,715.00
Drummond, C | Coghlan, IR	Terrigal Haven Nearshore Bathymetry and Intertidal Survey (WRL2018071)	ARUP Pty Ltd / Contract Research	$6,040.00
Drummond, C | Harrison, AJ | Carley, JT | Smith, G	Aerial Surveys and Inspections for Central Coast's Coastline (WRL2017088)	Central Coast Council / Local Government Contract	$99,705.00
Drummond, C | Lumiatti, G | Carley, JT	Beach Scraping Assessment for Sandy Beach and Station Beach (WRL2018042)	Northern Beaches Council / Local Government Contract	$24,205.00

WRL Investigators	Topic	Partners/Providers	2018 Total $
Drummond, C | Miller, BM	Outfall Condition Monitoring using Unmanned Aerial Systems (WRL2016081)	Sydney Water Corporation / State Government Contract	$2,088.00
Drummond, C | Tucker, TA | Smith, G | Lumiatti, G	Survey and Analysis of Narrabeen Lagoon Entrance Shoal (WRL2018031)	Northern Beaches Council / Local Government Contract	$9,770.00
Flocard, FD | Anderson, DJ | Rahman, PF | Smith, G	Data Audit for Coal Mine Final Voids in NSW (WRL2018012)	NSW Department of Planning and Environment / State Government Contract	$136,275.00
Flocard, FD | Blacka, MJ | Howe, D | Carley, JT	Physical Modelling for Clump Point Boating Infrastructure Project (WRL2017044FF)	Kellogg Brown & Root (KBR) / Department of Transport and Main Roads Subcontract	$35,383.00
Flocard, FD | Coghlan, IR | Howe, D | Carley, JT	36th America's Cup Wynyard Hobson Project Proposal for Physical Modelling (WRL2018048)	Wynyard Edge Alliance / International Contract	$73,660.00
Flocard, FD | Tucker, TA | Carley, JT | Blacka, AC | Johnson, CR | Smith, G	DPIPWE Okines Beach Lewisham erosion mitigation recommendations (WRL20180386)	SGS Economics and Planning Pty Ltd / Contract Research	$40,300.00
Glamore, W	Clybucca Wetlands Tidal Restoration	NSW Local Land Services / State Government Contract	$141,000.00
Glamore, W	Hunter River Estuary Water Quality Model	Hunter Water Corporation / State Government Contract	$252,667.00
Glamore, W | Johnson, FM | Andersen, MS | Rau, GC | Anderson, DJ	Developing an Integrated Water Balance Budget for Thirlmere Lakes To Provide a Detailed Understanding of Hydrological Dynamics	NSW Office of Environment and Heritage (OEH) / Thirlmere Lakes Research Program	$50,000.00
Glamore, W | Miller, BM | Deiber, M	Flow Model Development (WRL2018052)	Hunter Water Corporation / State Government Contract	$15,000.00
Glamore, W | Rayner, D | Drummond, C | Harrison, AJ	Area E - Restoration site	Newcastle Coal Infrastructure Group Pty Ltd / Contract Research	$55,500.00
Glamore, W | Rayner, D | Harrison, AJ | Tucker, TA	Manly Lagoon Survey and Water Levels (WRL2017081)	Northern Beaches Council / Local Government Contract	$41,505.00
Glamore, W | Rayner, D | Ruprecht, JE	Clyde Terminal Conversion: Restoration of Green and Golden Bell Frog Habitat & Field Monitoring and Assessment of Clyde Terminal Wetland	Viva Energy Australia Pty Ltd / Contract Research	$196,965.00
Glamore, W | Smith, G | Miller, BM | Anderson, DJ | Rayner, D | Ruprecht, JE | Tucker, TA | Harrison, AJ	Evaluation of Hydrological Impacts on Highland Swamps - WNSW Project 4945	Water NSW / State Government Contract	$39,182.00
Glamore, W | Smith, G | Rayner, D | Harrison, AJ	Hydrological Study of Teal Lagoon (WRL2017022)	NSW Office of Environment and Heritage (OEH) / State Government Contract	$21,495.00
Glamore, W | Smith, G | Rayner, D | Ruprecht, JE | Tucker, TA	Everlasting Swamp Hydrodynamic Modelling Study	Clarence Valley Council / Local Government Contract	$10,000.00
Glamore, W | Smith, G | Rayner, D | Tucker, TA | Deiber, M	Provision of modified floodgate design for Fullerton Cove and Tilligerry Creek	NSW Office of Environment and Heritage (OEH) / State Government Contract	$945.00
Harrison, AJ | Carley, JT | Smith, G	Concept Design of Permanent River Entrance at Browns River (WRL2017043)	Kingborough Council / Local Government Contract	$24,615.00
Keith, DA | Mason, TJ | Simpson, CC | Glamore, W	Predicting swamp community persistence after underground mining	NSW Environmental Trust / Environmental Research Program	$11,557.00

WRL Investigators	Topic	Partners/Providers	2018 Total $
Miller, BM	Lyttelton Port Cruise Facility Project: Breakwater Stability under Propeller Wash Physical Model Testing (WRL2018079)	Haskoning Australia Pty Ltd / Contract Research	$55,800.00
Miller, BM | Anderson, DJ	ENSure Foreshore Beach Contract # 26638/732 (WRL2018008)	GHD PTY LTD / Contract Research	$19,330.00
Miller, BM | Carley, JT | Coghlan, IR | Rahman, PF	Lucky Bay Grain Project Proposal for Coastal Engineering Studies (WRL2018032)	T-Ports Pty Ltd / Contract Research	$43,103.00
Miller, BM | Deiber, M	Dye Tracing - Merimbula (2017037.01)	AECOM AUSTRALIA PTY LTD / Bega Valley Shire Council Subcontract	$35,500.00
Miller, BM | Glamore, W | Rahman, PF	Hunter Estuary Ramsar Site Chemical Contaminant Modelling (WRL2018059)	Department of the Environment and Energy / Commonwealth Government Contract	$22,800.00
Miller, BM | Glamore, W | Smith, G | Rayner, D | Deiber, M	Hydrodynamic Fate and Dispersion Modelling (WRL 2017029.01)	Hunter Water Corporation / State Government Contract	$306,719.00
Miller, BM | Harrison, AJ | Rahman, PF	Ceduna Keys Circulation Modelling (WRL 2018009)	Tonkin Consulting / Contract Research	$23,115.00
Miller, BM | Rahman, PF	Wilden Reach - Katherine River Hydrodynamic Modelling (WRL2017020)	Charles Darwin University / Contract Research	$16,000.00
Modra, BD	Aerial and Hydro Survey of Breakwater Structures of Port Kembla	Port Kembla Operations Pty Limited / Contract Research	$19,500.00
Modra, BD	Seawall Survey of Port Botany (2017061.01)	Port Botany Operations Pty Ltd as trustee for the Port Botany Unit Trust / Contract Research	$5,858.00
Modra, BD | Miller, BM | Glamore, W | Drummond, C | Tucker, TA | Paice, L | Howe, D	SPEL Filter Performance Testing (WRL2016030)	SPEL Environmental / Contract Research	$67,200.00
Modra, BD | Smith, G | Howe, D | Jenkins, RB	Hydrosystem Performance Testing (WRL2017066)	SPEL Environmental / Contract Research	$67,930.00
Modra, BD | Smith, G | Miller, BM | Felder, SM | Drummond, C | Harrison, AJ | Deiber, M | Tucker, TA	Somerset Dam Supplemental Geotechnical Investigations, Physical Hydraulic Model, Concept Assessment and Selection. (WRL2017049)	AECOM Services / Queensland Bulk Water Supply Authority Subcontract	$530,387.00
Modra, BD | Smith, G | Miller, BM | Felder, SM | Simpson, JH | Harrison, AJ | Deiber, M | Paice, L | Jenkins, RB	Lake Macdonald 3D Physical Model (WRL2018046)	AECOM AUSTRALIA PTY LTD / Queensland Bulk Water Supply Authority Subcontract	$217,490.00
O'Carroll, DM	Fate of engineered nanoparticles: Challenges in informing human and ecological health risk assessments	Australian Research Council / Future Fellowship	$111,127.00
Peirson, WL | Kingsford, R | Felder, SM | Suthers, IM | Harris, JH	LF015 - Pump Fishway Project: Phase 2 - Fish transfer	NSW Department of Industry / Recreational Fishing Trust	$32,000.00
Rayner, D | Blacka, MJ | Harrison, AJ | Miller, BM | Carley, JT | Smith, G | Coghlan, IR | Tucker, TA | Glamore, W | Flocard, FD	Lake Illawarra Entrance Channel Management Options Development (WRL2017104)	Wollongong City Council / Local Government Contract	$238,968.00

WRL Investigators	Topic	Partners/Providers	2018 Total $
Rayner, D | Glamore, W	Yeramba Lagoon Restoration (WRL2018006DSR)	NSW Office of Environment and Heritage (OEH) / State Government Contract	$43,371.00
Rayner, D | Glamore, W | Miller, BM | Rahman, PF	Hunter River Estuary Water Quality, Catchment Management Scoping Study (WRL2018053)	Hunter Water Corporation / State Government Contract	$36,200.00
Rayner, D | Tucker, TA	Manly Lagoon Acid Sulphate Soil Testing and Borelog Digitising (WRL2018040)	Northern Beaches Council / Local Government Contract	$11,000.00
Rayner, D | Tucker, TA | Anderson, DJ | Smith, G	John Fisher Park Groundwater Monitoring (WRL2018026)	Northern Beaches Council / Local Government Contract	$28,305.00
Ruprecht, JE | Glamore, W | Harrison, AJ	Big Swamp Monitoring Program (WRL2014086)	Mid-Coast Council / Local Government Contract	$45,535.00
Smith, G | Glamore, W | Miller, BM | Rayner, D | Deiber, M | Rahman, PF | Heimhuber, VF	Provision hydraulic and cost benefit assessment of the impact of climate change on the Hunter Valley Flood Mitigation Scheme (WRL2018101)	NSW Office of Environment and Heritage (OEH) / State Government Contract	$420,364.00
Smith, G | Johnson, CR	Independent Peer Review of the Edward-Wakool Modelling (WRL2018043)	Murray-Darling Basin Authority / Commonwealth Government Contract	$26,875.00
Smith, G | Miller, BM | Rahman, PF	Throsby Creek Sediment Study (WRL2018015)	Hunter Water Australia / Contract Research	$14,445.00
Splinter, KD | Turner, IL | Harley, MD	Delivering a Beach Erosion Forecasting System	NSW Environmental Trust / Environmental Research Program	$36,133.00
Tucker, TA	Narrabeen Lagoon Entrance Clearance excavation and placement design (WRL2018050)	Northern Beaches Council / Local Government Contract	$22,500.00
Turner, IL | Splinter, KD	An Australian storm wave damage and beach erosion Early Warning System	Australian Research Council / Linkage Project ARC Linkage Project Partner Organisation Contribution -Northern Beaches Council / Bureau of Meteorology / NSW Office of Environment and Heritage (OEH) / City of Mandurah /	$276,000.00
TOTAL WRL 2018			**$4,666,507.00**

PhD Graduates

Ademir **Abdala Prata Junior**
Analysis of methods for estimating the emission rate of odorous compounds from passive liquid surfaces
Supervisor/s: R Stuetz & V Timchenko

Rebecca **Allan**
Backward Erosion Piping
Supervisor/s: KJ Douglas

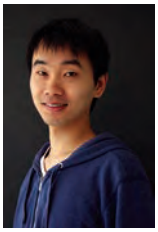
Abdulaziz Saud A **Almohssen**
A new methodology for tracking the performance of subcontractors in the construction industry
Supervisor/s: SR Davis

Raed Abdulrahman H **Alsalhi**
The Relationship between Traffic Safety and Macroscopic Fundamental Diagram (MFD)
Supervisor/s: V Dixit

Seyed Mahdi **Babaee**
Corrosion of reinforcement In alkali-activated materials
Supervisor/s: A Castel

Khalegh **Barati**
Modeling Fuel Use, Emissions and Mass of On-Road Construction Equipment through Monitoring Field Operations
Supervisor/s: JX Shen

Juan Carlos **Castilla Rho**
The effects of climate change on coastal aquifers
Supervisor/s: M Andersen



Zheyuan **Du**
Mapping Earth Surface Deformation using New Time Series Satellite Radar Interferometryr
Supervisor/s: L Ge

Ruth **Fisher**
Influence of biosolids processing on the production of odorous emissions at wastewater treatment plants
Supervisor/s: R Stuetz

Nassim **Ghosni**
Fibre reinforced concrete structures
Supervisor/s: H Vali Pour, SJ Foster

David **Green**
Probabilistic analysis for computational mechanics with applications in Civil Engineering
Supervisor/s: KJ Douglas

Huan **He**
Dynamic properties of crushable soils
Supervisor/s: A Khoshghalb

Chao **Jiang**
Mechanism and kinetics of ferrous iron oxidation and ferric iron reduction in photolysed natural waters
Supervisor/s: TD Waite & S Garg

Tae Ho **Kang**
The cognitive classification of model deficiency in hydrology
Supervisor/s: LA Marshall & A Sharma

Mst Shakera Karim **Khan**
A nonlinear prediction approach for catchment classification
Supervisor/s: S Bellie

Chenyang **Li**
Carsharing and route choice
Supervisor/s: V Dixit

Xun **Li**
Equity in transportation system
Supervisor/s: V Dixit & ST Waller

Lei **Liu**
Fluid-structure interaction analysis using the scaled boundary finite element method
Supervisor/s: S Song

Angus **Murray**
In-Service Behaviour of Reinforced Concrete based on a Variable Transfer Length Model
Supervisor/s: A Castel, RI Gilbert

Nur Kamaliah **Mustaffa**
Emissions, production and cost in construction operations
Supervisor/s: DG Carmichael

Zahra Sadat Moussavi **Nadoushani**
A computational approach for estimating and minimizing construction-related and end-of-life carbon footprint of concrete structures
Supervisor/s: A Nezhad

Thi Tua Ha **Nguyen**
A framework for correcting biases in climate model simulations in the frequency domain: Implications for hydrology
Supervisor/s: A Sharma & R Mehrotra

Amin **Noushini**
Low carbon concrete design
Supervisor/s: A Castel & RI Gilbert

Guido Esteban Aquiles Carvajal **Ortega**
Assessing validation and reliability of water and wastewater treatment processes using Bayesian techniques
Supervisor/s: SJ Khan & D Roser

Sahani **Pathiraja**
Improving Data Assimilation Algorithms for Enhanced Environmental Predictions
Supervisor/s: A Sharma

Weebadda Arachchilage S **Perera**
Study causes of defect occurence and issues
Supervisor/s: SR Davis

Matthew **Phillips**
Wave-driven recovery of sandy beaches following storm erosion
Supervisor/s: I Turner

Bambang **Piscesa**
Modeling confined concrete using plasticity formulation
Supervisor/s: MM Attard

Edward Nguyen **Robson**
Computable general equilibrium modelling for urban transport planning and appraisal
Supervisor/s: V Dixit & ST Waller

Hongyan **Rong**
Redox Transformations of Silver Nanoparticles in Natural and Engineered Systems
Supervisor/s: TD Waite & S Garg

Neeraj **Saxena**
Modelling the Effect of the Number of Stop-&-gos on the Route Choice Behaviour of Car Drivers
Supervisor/s: ST Waller

Syed Abu **Shoaib**
The relative importance and characteristics of uncertainty in hydrology
Supervisor/s: LA Marshall & A Sharma

Joshua **Simmons**
Improved model calibration techniques for predicting coastal storm erosion
Supervisor/s: I Turner

Reza **Taheriattar**
Sustainability and adaptable/flexible infrastructure
Supervisor/s: DG Carmichael

Soo Huey **Teh**
Integrated carbon metrics and assessment for the built environment
Supervisor/s: S Moore & T Wiedmann

Phillip **Watson**
Improved techniques to estimate mean sea level, velocity and acceleration from long ocean water level time series to augment sea level (and climate change) research
Supervisor/s: RJ Cox

Binhua **Wu**
Time-variant hybrid stochastic interval uncertainty analysis of concrete-filled steel tubular arch structures
Supervisor/s: W Gao

Miaomiao **Zhang**
Enrichment, isolation and characterization of phenazine-1-carboxylic acid (PCA)-degrading bacteria under aerobic and anaerobic conditions
Supervisor/s: M Manefield

Yang **Zhang**
Natural hazards analysis
Supervisor/s: S Lim

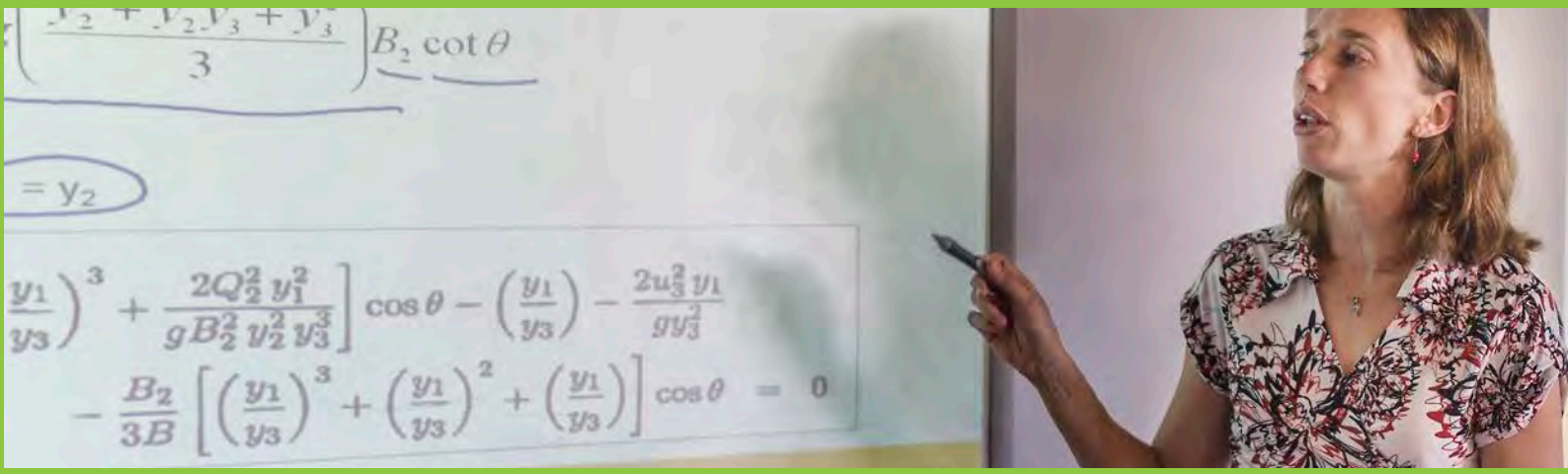
ME

Mingnan **Li**
Soil dynamics
Supervisor/s: A khoshghalb, K Senetakis

Thomas Anthony **Grinter**
Implementing a PPP service within CORSnet-NSW
Supervisor/s: CA Roberts

Yang **Yang**
Finite Element Analysis of Thermal Upheaval Buckling of Concrete Pavement
Supervisor/s: MA Bradford

OUR
TEACHING



Our Teaching

In the 21st century the School is moving towards a blended learning approach – utilising creative, efficient and educationally sound digital teaching and learning methods, as well as continuing our high quality embodied teaching – lectures, laboratories, site visits and workshops.

The School is one of the largest of its kind in the world, with 3,824 students – one quarter being women - enrolled in 2018.

Undergraduate Programs

The School offers single (4 year) Bachelor of Engineering Honours programs in Civil Engineering, (UAC425400) Environmental Engineering (UAC425470), Civil Engineering with Architecture (UAC425450), and Surveying (UAC 425500).

Our civil engineering degree offers wide options to suit our comprehensive profession, with courses including geotechnical, management, structural, transport, water and coastal engineering.

As part of our global impact strategy in 2018 we began providing humanitarian engineering courses within our BE civil and environmental engineering degrees.

In addition, the School offers a wide range of increasingly popular dual degree programs (5-6 years) in which students can combine their engineering studies with degrees in Arts, Science, Computer Science, Law and Commerce.

The School enrolled 2,235 undergraduate students in 2018.

Our postgraduate coursework degrees such as the Master of Engineering Science (MEngSc) offer many specialisations including geotechnical, project management, structural engineering, sustainable systems, transport and water engineering. There is also a very popular two-year coursework ME in Civil and Environmental Engineering, first introduced in 2015.

In 2018, 1416 postgraduate coursework students were enrolled, more than double the amount in 2016.

The School has a tradition of **educational innovation**. It was the first School in Australia to offer a postgraduate coursework program (1958), the first BE in Environmental Engineering (1991) and the first BE in Civil Engineering with Architecture (2007).

In the 21st century the School is moving towards a blended learning approach – utilising creative, efficient and educationally sound digital teaching and learning methods, as well as continuing our high quality embodied teaching – lectures, laboratories, site visits and workshops.

From strong foundations in mathematics and core engineering sciences, our courses – both undergraduate and graduate – are designed to be at the cutting edge of the profession and to produce leaders and thinkers. We want our students to graduate with the vital technical fundamentals of mechanics and mathematics, but also with the overarching, value adding, skills of creative problem solving.

Our degrees are not just about the 'what' but about the 'how' of learning. Our aim – and the focus of our teaching and learning – is to prepare our students to meet the challenges of contemporary society, and to be part of its useful, innovative and informed leadership.

Teaching & Learning Committee

The major drive behind the Committee's agenda is to improve the learning experience of students

Members and Coordinators of the Teaching & Learning Committee in 2018

Members of the Teaching & Learning Committee in 2018
Chair: Dr Steven Davis
A/Prof Mario Attard
Dr Juan Alvarez Gaitan
Dr Lauren Gardener
Dr Milad Ghasrikhouzani
A/Prof Ehab Hamed
Dr Bruce Harvey
Robert Holdom
Dr Fiona Johnson
Prof Stuart Khan
Dr Arman Khoshghalb
Dr David Rey
Prof Richard Stuetz
Natalie Sufong – Student Services Manager
A/Prof Hamid Vali Pour
A/Prof Tommy Wiedmann
Undergraduate Program Coordinators
Civil Engineering - Mario Attard
Civil with Architecture - Lauren Gardner
Environmental Engineering - Stuart Khan
Surveying - Bruce Harvey
Postgraduate Coursework Coordinator
Tommy Wiedmann
Postgraduate Coursework Specialisations Coordinators
Civil Engineering: Mario Attard
Environmental Engineering: Stuart Khan
Geospatial Engineering: Jinling Wang
Geotechnical Engineering & Engineering Geology: Kurt Douglas
Project Management: Steven Davis
Structural Engineering: Mario Attard
Sustainable Systems: Tommy Wiedmann
Transport Engineering: Vinayak Dixit
Water, Wastewater and Waste Engineering: Martin Andersen & Stuart Khan
Water Resources (includes coastal engineering courses): Martin Andersen & Stuart Khan

The Teaching and Learning Committee (TLC) of the School is responsible for all academic matters relating to all undergraduate and postgraduate coursework programs; these involve:

- encouraging teaching quality,
- providing teaching aids to staff,
- monitoring courses through student focus group surveys,
- interaction with student representatives of CEVSOC and research student demonstrators through CERSA,
- setting policy regarding academic aspects of undergraduate and postgraduate examinations and enrolments,
- providing a focal point for student assistance in undergraduate and postgraduate coursework matters. The major drive behind the Committee's agenda is to improve the learning experience of students.

CEVSOC 2018 Professional Development Camp

School Teaching Initiative Grant Scheme (STIGS)

In 2018 the Committee continued with the innovative School Teaching Initiative Grant Scheme (STIGS) – the aim being to develop and implement innovations in School teaching and learning, and to support the improvement of the student experience through teaching related activities. The nine successful 2018 projects – involving seventeen teaching staff were:

- Gamification of the Network Design Problem (Milad Ghasri, and Lauren Gardner)
- Digital improvement of the laboratory component of Soil Mechanics (Arman Khoshghalb)
- Automated graphical feedback for assessment of graphical modelling using Fault Trees and Event Trees (Steven Davis)
- Story-telling as a teaching aid to support industry course engagement (Ruth Fisher, Juan Pablo Alvarez-Gaitan, and Richard Stuetz)
- Authentic Learning – Part 2: Improving student accessibility to Big Data and further incorporation of practice-focused work in CVEN9415 (Kasun Wijayaratna, Sisi Jian, Travis Waller, and Emily Moylan)
- Interactive experiences for water and wastewater engineering students: linking hydraulics and treatment process operations (Ademir Abdala Prata Junior, Richard Stuetz, Stefan Felder, Stuart Khan, and Nhat Le-Minh)
- Towards a fully automated communication platform for students and lecturer (Taha Hossein Rashidi, Milad Ghasri, and Ali Akbarnezhad)
- Utilising Virtual Reality Technology to Develop Virtual Field Trips (Milad Ghasri)
- Mapping graduate attributes in the Environmental Engineering program: Are we producing unique, innovative and entrepreneurial graduates who are globally-focussed leaders? (Juan Pablo Alvarez Gaitan, Richard Stuetz and Stuart Khan)

New equipment

In addition the committee has funded new equipment to keep the School at the cutting edge of teaching:

- Geotechnical Engineering Field Equipment for use by students on field trips (Kurt Douglas)
- Fully Automatic Oedometer System so that students will be familiar with the latest equipment used in industry (Arman Khoshghalb, Adrian Russell, Babak Shahbodagh, Kurt Douglas, Nasser Khalili)
- Leica Viva RTK GNSS equipment for precise real-time and static positioning for use in Surveying practical classes (Craig Roberts, Bruce Harvey, Jinling Wang, Yincai Zhou)
- Equipment for in class demonstration of the measurement of CO_2, humidity, temperature and total VOC (volatile Organic Compounds) and their interdependence (Richard Stuetz, Stuart Khan, Denis O' Carroll, Stefan Felder, Nhat Le-Minh, James MacDonald, Matt Lee, Ruth Fisher and Ademir Abdala Prata Junior

Student Associations

It was an exciting year for postgraduate course work students, with the establishment of the Civil and Environmental Engineering Postgraduate Coursework Student Association (CEPCA). A committee was formed at the start of the year to begin organising events, which led to official formation of the Association recognised by Arc. Mentored by Dr Steven Davis they organised several events to introduce the students to and prepare them for the Australian engineering industry:

- Getting Your Foot in the Employment Door (covering resume writing, using professional social media platforms, and answering interview questions)
- A Peek into the Engineering World in Australia (with representatives from Engineers Australia, state and local governments, and both consulting and contracting firms)
- Kick Start Your Career (where students could practice their interview skills with industry personnel and ask individual questions)
- Tell Us What It Is Like (with Alumni presenting how their careers have unfolded since graduation)
- Be Prepared – Thesis Ahead (where a variety of senior students portrayed their projects to junior students)

The TLC also supported CEVSOC, the undergraduate student society, who ran a slew of events, mainly focused on senior students giving junior students an idea of what is ahead so they can take advantage of the various opportunities available to them:

- Industrial Training Night *(pictured below)*
- Diversity Night
- Professional Electives Night
- Thesis Night
- Industry Disciplines Networking Night (with Engineers Without Borders)
- Getting Involved

Lunchtime teaching discussions

The lunchtime teaching discussions begun in 2017 by the School's education focussed academics have continued this year. The format of these discussions is based on a conversation. For example the week where we discussed group work involves different academics sharing how they organise group work, the challenges they face, and the solutions they use to deal with them. Topics covered ranged from "What to do in week one?" to "How to mark exams." The discussions were attended by both permanent academic staff and post-doctoral teaching assistants. This gives a good mix of both the voice of experience and new ideas shared by up and coming staff. In addition members of staff from other parts of the University would occasionally attend, adding diversity to the opinions expressed. Support from Kate Brown, the School's IT coordinator, meant that in addition to discussing the pedagogy we could discuss the practical technical issues of implementing solutions on Moodle.

From Two to Three

As part of its UNSW 2025 Strategic Plan, the University's academic year structure will change from two 12-week semesters (maximum of 4 courses each semester) to three 10-week trimesters (maximum of 3 courses each semester) from 2019. The School commenced revision of its BE Hons and related programs in 2017 and continued throughout 2018 to fit the trimester model. This involved fitting and optimising the sequence of courses over the trimesters and required only minimal changes to the content of the courses themselves.

New Coursework Student Society

"A recent massive growth surge in Masters coursework enrolments... inspired the School's Teaching and Learning committee to find ways for this new and large body of students to organise and represent themselves..."

CEPCA Executive Team

Name	Executive Position
Kimiko Katherine Harumi Rengifo **Arakaki**	President
Osama **Khursheed**	Vice President
Hary Setya **Budhi**	Treasurer
Muthu Hari Viginesh Thiraviya **Narayanan**	Secretary
Kane **Ligawan**	Marketing Director
Preety Moni **Doley**	Teaching and Learning Committee Representative
David Mathew **Kochakken**	ARC delegate
Elnaz **Tavakol**	Public Relations director 1
Lepei **Bao**	Public Relations director 2

New student organisation formed in 2018

2018 was the year that the Civil & Environmental Engineering Postgraduate Coursework Student Association - CEPCA was established.

A recent massive growth surge in Masters coursework enrolments (from 660 in 2016 to 1100 in 2017 and 1400 student enrolments in 2018) inspired the School's Teaching and Learning committee to find ways for this new and large body of students to organise and represent themselves.

Dr Steven Davis, co-Chair of the TLC, instigated, advised and mentored the new organisation. With increasing numbers of full-time coursework students studying for two years or longer, he felt that a student association could be formed with a real chance of survival which would be able to pass the organisational baton on to incoming students.

Following some discussion and much encouragement, a new team of coursework students hit the ground running to start the journey with their first event in week 2 of semester 1, 2018. More events followed with great interest and attendance.

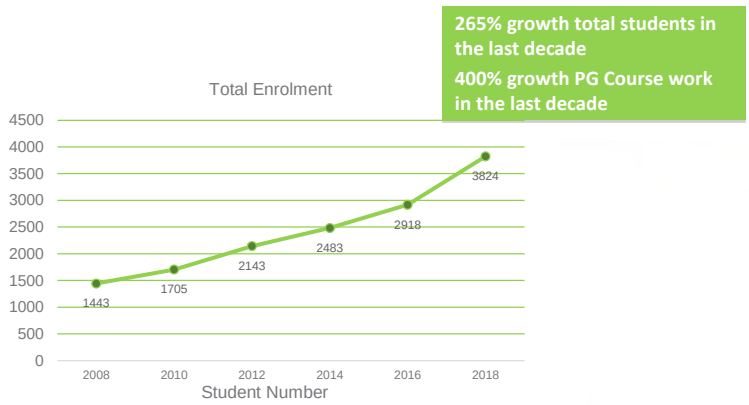
CEPCA Events held in 2018:

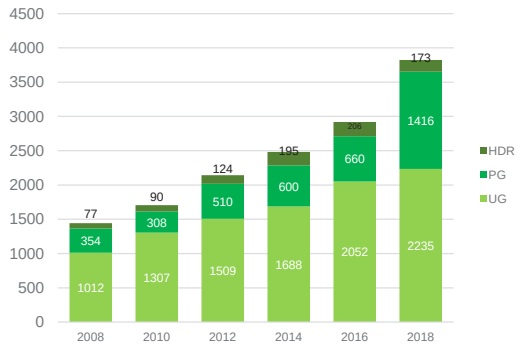
Getting your Foot in the Employment Door

The event focused on resumes, cover letters, job interviews and the usage of LinkedIn and other social media networks within an industrial setting.

A Peek into Engineering in Australia

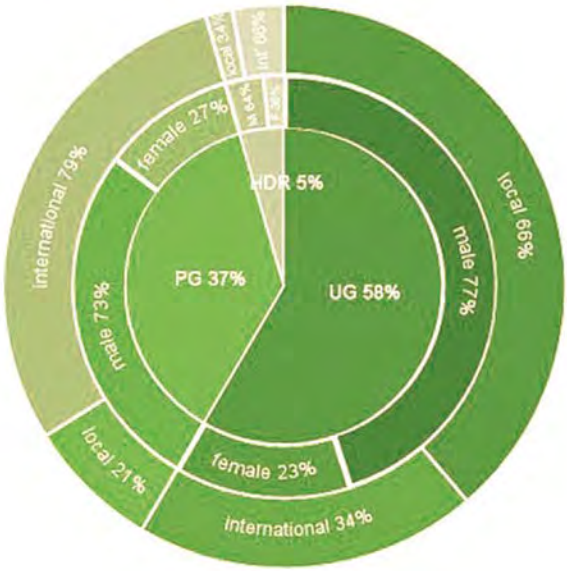
This event brought in a range of speakers from the industry who provided an insight into the various facets of the Civil and Environmental Engineering sector in Australia, their scopes and how students can get the edge when it comes to seeking jobs. In addition, the event featured a brief networking session where students got the opportunity to interact with the speakers of their choosing.





CVEN TEACHING Achievements:

1. Seamless transition to 3+
2. Class sizes of 500+
3. Supervision 400+ students
4. Digital uplift/online learning tools in most courses
5. MyExp satisfaction > 92%
6. Full accreditation of two-year masters program
7. First indigenous female engineering graduate
8. Continued high demand - local and international students



Kickstart your Career

This event involved a group discussion that focused on career progression with insights from professional engineers and a recruitment expert. Additionally, students were able to have private sessions with the speakers to have the opportunity of refining their networking skills or participating in a mock interview.

Pizza night

This event brought the perfect opportunity to meet and get to know other postgraduate coursework students from our school. We had a wonderful time together and on top of that, we arranged FREE FOOD to entertain the night!

Alumni Night - Tell us what it is like

This event brought recent graduates from Postgraduate Master's programs in Civil and Environmental Engineering who shared their experiences and gave insights into job seeking, career progression, characteristics of the engineering sector in Australia, etc. In addition, the event featured a networking session where students had the opportunity to interact with the speakers of their choosing.

Be prepared - Thesis ahead event

This event had a presentation from Richard Collins, Master's Thesis coordinator of the School of Civil & Environmental Engineering. He gave details about the modifications on the thesis component due to the change to trimesters (UNSW 3+) next year and answered the questions students had. Students currently working on their thesis, shared their experiences and gave their insights into the different stages throughout their journeys.

For Steven Davis, it's another form of education, enabling the School to provide a more holistic learning experience. "We wanted to support and guide the students to run their own organisation," he said. "They all gained great experience in people and events management, gaining not just technical knowledge but increasing their connective and organisational skills."

SURVSOC Report

Report from Callum Putt, President of SURVSOC 2018

Start of Year BBQ

The year kicked off with a BBQ on the naked lady lawn. Snags and drinks were provided. Lots of catching up and talk about what happened over summer, work and holidays and welcoming new students to the degree.

Semester 2 BBQ

Following the standard SURVSOC tradition another BBQ was at the start of semester 2. Chit chat regarding subjects and planning for trimesters next year.

Cardno Cup + ENGSOC Sports day

A few members from SURVSOC got involved with the ENGSOC Sports day and Cardno Cup organized by CEVSOC in semester 2. Played their hearts out, put 110% on the line but unfortunately this wasn't enough to win the cup. Next year!

GMAT3150 – Survey Camp

GMAT3150 is an integral subject of the surveying degree, students go down to Berry on the south coast of NSW for a week to hone their surveying skills. SURVSOC is not involved in any way with organising the subject but a lot of students/members do attend, and the feedback generally states that is the highlight of the uni year.

SURVSOC Newsletter

Exec team decided to start a monthly newsletter, still early days with first edition shared via Facebook and email in October.

Last Lecture - Emeritus Professor John Trinder

On Friday, 19 October 2018 Emeritus Professor John Trinder gave his last lecture to UNSW students. He has been teaching at UNSW for 53 years. His last lecture was as up-to-date as ever - covering the principles and the latest technical information of photogrammetry. One of his former students, and academic colleague Dr Br¬uce Harvey said "It was a pleasure to be there".

John is a UNSW alumnus, a former Head of School, the winner of many national and international awards. John has published over 180 scientific papers on a range of topics in spatial information, in journals and conference proceedings. He has received several awards with the American Society for Photogrammetry and Remote Sensing for research papers published in their journal, Photogrammetric Engineering and Remote Sensing.

John graduated from UNSW with a BSurv in 1963, MSc at ITC in The Netherlands (1965), returning to UNSW to undertake his PhD which he completed in 1971. He was employed at the School of Surveying and Geospatial Engineering (now part of the School of Civil and Environmental Engineering) at UNSW from 1965 to 1999, progressing to the position of Professor in 1991 and Head of School from 1990-1999. He is currently Emeritus Professor in the School of Civil and Environmental Engineering.

His research and research supervision will continue.

Leaders in the field of coastal and port engineering (from left to right): Prof Robert Care, Mr Edward Couriel, Mr Angus Gordon, A/Prof Ron Cox, Prof Ian Turner, Ms Tanya Stuhl and Ms Marika Calfas

Thank you and best wishes to a great teacher, mentor and colleague

Associate Professor Ron Cox

In July the **UNSW School of Civil and Environmental Engineering** sponsored a 'Celebration of a Career in Coastal Engineering' networking event held at the University's CBD campus, attended by more than 80 professionals from across the government, industry and university sectors.

Five eminent leaders in the field of coastal and port engineering spoke candidly about their own career pathways, highlights and lessons learnt. Coinciding with the recent retirement from UNSW of **Associate Professor Ron Cox**, each of the speakers also took the opportunity to touch on Ron's influences as a teacher, mentor and colleague.

Hosted by the School's Water Research Laboratory Director, **Professor Ian Turner**, guest speakers included the Chair of Engineers Australia National Committee on Coastal and Ocean Engineering Ms Tanya Stuhl; NSW Ports CEO Ms Marika Calfas; and member of the newly-established NSW Coastal Council Mr Angus Gordon OAM. Associate Professor Ron Cox also addressed the audience, reflecting on his 50 year association with the University, School and WRL.

CEVSOC Report

CEVSOC is UNSW's largest engineering school society

2018 CEVSOC Office Bearers

Leila **Bowe**	President
Courtney **Bell**	Vice President
Michael **Blumor**	Treasurer
Brian **Au**	Secretary and Public Relations Manager
Jordan **Jaafar**	Arc Delegate
Jessica **Athayde**	Academic Events Manager
Charlotte **Gray**	Career Development Events Manager
Varsha Sivagurunathan/ Xianrong **Cai**	International Students and Diversity Manager
Jasvir **Boparoy**	Promotions Manager
Brady **Rengger**	Social (External) Events Manager
Rehnuma **Tarannum**	Social (Internal) Events Manager
Angus **Nelson**	Sports and Charity Events Manager

Leila Bowe
CEVSOC President 2018

In 2018, CEVSOC continued its growth in becoming one of UNSW's most active, inclusive and diverse student societies. We run events, create new initiatives, and develop merchandise and publications for approximately 2000 students enrolled in Australia's top civil and environmental engineering school. Our aim for 2018 was to refine and improve on our events from 2017 whilst creating new initiatives to broaden our scope to appeal to and engage as many students as possible.

In addition to running events, CEVSOC offers the opportunity for members to get involved in event ideation and organisation in our subcommittee teams and through our 2 annual camps. This year we expanded our recruitment to include 22 subcommittee members and 12 camp activity coordinators. Holding a position on the committee, subcommittee or as a camp coordinator gives students the opportunity to develop leadership, teamwork, communication skills and other skills that contribute to personal and professional development.

Building off the successes and feedback from past years' committees, we refined and delivered approximately 40 events, 15 publications, over 400 items of merchandise and a multitude of memories. Aside from the classic events, CEVSOC introduced new initiatives such as professional development workshops, trivia nights and a brand-new publication designed to help local and international students get involved during their university experience.

CEVSOC has had the privilege of having an undergraduate representative on the School's Teaching and Learning Committee and has continued thriving as the link between the student body and the School. Further, the Academic Events Subcommittee ran Professional Electives and Thesis information Nights for students in their penultimate years as well as student feedback and focus groups to give our students a voice

in the structure and delivery of courses.

Our Career Development Events Subcommittee piloted a 3-part professional development program to give students the opportunity to advance their job interview skills and personal branding. In addition to other networking events, we hosted the inaugural Industry Disciplines Night with Engineers Without Borders to introduce students to different civil, environmental and humanitarian engineering disciplines. The School's industry sponsors had the opportunity to present on the night and participate in open floor networking with our students.

Our annual Professional Development Camp was yet again a resounding success. The camp provides an opportunity for 120 students from different years to engage in personal and professional development challenges over the course of a weekend. Networking can often be daunting for students, so the weekend provides an opportunity for casual networking with industry mentors and student mentors who have experience in varying industry disciplines. As with our annual First Year Camp, we are very lucky to be supported by the School with resources and guest speakers.

Following on from the success of last year's initiative, the International Students and Diversity Subcommittee ran the CEVBuddy Mentoring Program, this time in both semesters. The Program pairs first year international students with older year local students to aid the transition to UNSW and Australian culture; it cultivates a support network through several checkpoints and events. There was huge interest by both mentors and mentees, and the program went on to be Highly Commended for Arc Club On-campus Activity of the Year for 2018.

Other highlights included collaborations with over 10 other student societies (including ArtsSoc, MECHSOC, Psychsoc, MSOC, BESS and others), UNSW's largest off-campus social activity of the year, entering multiple sports teams into evening competitions and saving over 100 lives with our regular blood drives.

I've been very grateful to lead such a wonderful society over 2018; it has been such a rewarding opportunity to give back to the student body and School. The success of this year has been the direct result of our enthusiastic and vibrant student body, dedicated committee and subcommittees and of course the ongoing support from the School and our industry sponsors. I can't wait to see the innovation, continued growth and success that next year's committee brings in their transition to 2019.

Leila Bowe

CEVSOC President 2018

Student Prizes and Achievements 2018

Grateful thanks to our industry sponsors for continuing to encourage and support our fantastic students.

Year 4 Industry Prizes 2018

L-R Jessica Athayde, Eryan Chen, HoS Professor Nasser Khalili, Jianan Jiang, Allison Wong
Front row: Christopher Chun-Hung Ho, Joshua Yu, Sepehr Zarrin, Jefry Halim, Wing Lun Lam

Sepehr Zarrin : **The Civil and Environmental Engineering Practice Prize** (E2K52U) For the best performance in Civil and Environmental Engineering Practice.
Sponsored by Cardno

Christopher Chun-Hung Ho: **The Civil and Environmental Engineering Civil with Architecture Discipline Prize** (E2K67U) For the best performance in selected undergraduate courses including an Honours Thesis in Civil Engineering with Architecture.
Sponsored by ARUP

Jianan Jiang: **The Civil and Environmental Engineering Construction Management Discipline Prize** (E2K590) For the best performance in selected undergraduate courses including an Honours thesis in Construction Management.
Sponsored by MULTIPLEX

Joshua Yu: **The Civil and Environmental Engineering Environmental Discipline Prize** (E2K55U) For the best performance in selected undergraduate courses including an Honours Thesis in Environmental Engineering.
Sponsored by Jacobs

Allison Wong: **The Civil and Environmental Engineering Geotechnical Discipline Prize** (E2K59U For the best performance in selected undergraduate courses including an Honours Thesis in Geotechnical Engineering.
Sponsored by Pells Sullivan Meynink

Jefry Halim: **The Civil and Environmental Engineering Structures Discipline Prize** (E2K58U) For the best performance in selected undergraduate courses including an Honours Thesis in Structural Engineering.
Sponsored by Aurecon

Eryan Chen: **The Civil and Environmental Engineering Surveying Discipline Prize** (E2K79I) For the best performance in Surveying discipline courses.
Sponsored by RPS

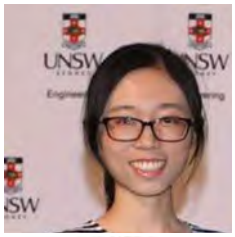
Jessica Athayde: T**he Civil and Environmental Engineering Transport Discipline Prize** (E2K57U) For the best performance in selected undergraduate courses including an Honours Thesis in Transport Engineering.
Sponsored by Turnbull Engineering

Wing Lun Lam: T**he Civil and Environmental Engineering Water Discipline Prize** (E2K56U) For the best performance in selected undergraduate courses including an Honours Thesis in Water Engineering.
Sponsored by GHD

Student Undergraduate Prizes 2018

2018 University Medallists

The University medal is one of the most distinguished awards to be bestowed on a UNSW undergraduate. We congratulate Dan and Jianan on their tremendous achievements.



Ms Dan Su - Hons Class 1 and University Medal in Civil Engineering

Mr Jianan Jiang - Hons Class 1 and University Medal in Civil Engineering

The School congratulates all our 2018 prize winners.

The Alexander Wargon Prize (E2K60U) For the best performance in the Structures Discipline in the Bachelor of Engineering in Civil Engineering degree program. Awarded to Ms Dan Su

The Australian Steel Institute Undergraduate Steel Design Award (E2K63U) For the best performance in CVEN3301 Structural Analysis and Modelling and CVEN3302 Structural Behaviour and Design. Awarded to Chengli Shi

The Association of Consulting Surveyors' NSW Prize in Land Development (E0215U) For the graduating students with the best total mark in Cadastral and Land development courses. Awarded to: Orestis Georgiou Zervos

The Association of Public Authority Surveyors Prize (E0955U) For the best performance in GMAT courses, Year 1. Mohsen Rabbaniha

The Bossi Medal (E0953U) For the most outstanding performance in the final year of the Bachelor of Surveying and Spatial Information Systems. Awarded to: Eryan Chen

The Crawford Munro Memorial Prize (E2K77E) For the best performance in CVEN3501 Water Resources Engineering. Awarded to Prashanth Gunasekaran

The EGM Memorial Prize (E0954U) For outstanding performance in GIS courses. Awarded to Hayden Andrew Lawson

Engineers Australia Civil and Structural Engineering Prize (E2K66U) For the best performance in structural design in the final year of the degree. Awarded to Dan Su

The Full Time Class of 1962 Civil Engineering and Surveying Alumni Prize (S0478E) For the highest WAM at the end of 3rd Year to a local female in the School of Civil and Environmental Engineering. Awarded to Ada Lok Yee Ching

The Institution of Surveyors New South Wales Incorporated Prize (E0216U) For the best performance by a graduating student in the Bachelor of Engineering in Surveying and Spatial Information Systems program. Awarded to: Eryan Chen

The Jacob N Frenkel Prize (E2K62U) For the best achievement in Civil Engineering for a first year student. Awarded to: Glen Dimitri Odang

The JK Geotechnics Prize (E0179U) For the best performance in CVEN3202 Soil Mechanics. Awarded to: Toby Du

The Maurice Maughan Prize (E2K80E) For the best student with the best total marks in GMAT2500 and GMAT2550. Awarded to Dimitar Gliguroski

The RS Mather Memorial Prize (E0219U) For outstanding performance in Geodesy courses in the Bachelor of Engineering in Surveying and Spatial Information Systems program. Awarded to Daniel Benjamin Fowler

The Surveying and Spatial Sciences Institute Prize (E0210U) For the best performance in remote sensing and Photogrammetry courses in the Bachelor of Engineering in Surveying and Spatial Information Systems program. Awarded to Omar Mohammad El Hassan

The Welding Technology Institute of Australia Prize (E0182U) For the best performance in CVEN3303 Steel Structures – Awarded to Igor Buvac

Dean's Awards (2019) for CVEN students - studies completed in 2018

The Dean's Awards are highly prestigious awards offered by the Dean of the Faculty of Engineering. They are designed to recognise the Faculty's high-achieving students – those who have a minimum High Distinction average (an overall cumulative myUNSW WAM of 85). Dean's Awards are just one way we offer our students recognition for their hard work. Congratulations to CVEN's thirteen stars!

Jesse Reid Bonanno
Chang Chen
Anthony John Drinnan
Lachlan Andrew Emerson
Iek Hong Fong
Gunasekaran Prashanth
James Hong
Patricia Kesuma
Daniel Negru
Glen Dimitri Odang
Lachlan Jacob Sue
Brandon Tsun-Ting Wong
Charlie Zeng

Year 4 Dinner

OUR **COMMUNITY**

External Relations Committee Report

...strategic objectives... include the development of effective outreach and profile raising programs, as well as building and maintaining strong relationships with our industry and alumni communities..

2018 External Relations Committee

Dr Kurt Douglas	Chair
Dr Craig Roberts	Deputy Chair
Dr Mary O'Connell	External Relations Manager (Semester 1)
A/Prof Cox	External Relations Manager (Semester 2)
Dr Lauren Gardner	
Robert Holdom	
Dr Taehwan Kim	
Dr Kristen Splinter	
Professional Staff	
Tricia Tesoriero	Schools Outreach Programs
Tamara Rouse	Industry Partners Liaison

The strategic objectives of the External Relations Committee (ERC) of the School of Civil & Environmental Engineering (CVEN) include the development of effective outreach and profile raising programs, as well as building and maintaining strong relationships with our industry and alumni communities.

In February 2018 outgoing External Relations manager Mary O'Connell coordinated a successful industry research event at UNSW O'Connell St campus. Over 120 people including sixty industry representatives from 44 organisations attended. With the major theme as 'Meeting the challenges together' it was a day at which the cutting edge research of the School was showcased, focusing on our successful and ongoing collaborations with industry and government. Soon afterwards a collection of research future profiles and articles was produced.

ERC members organise the promotion and representation of the School at many presentations and functions on and off campus. In 2018, these included UNSW and Engineering Information Days, UNSW's flagship annual Spring event - Open Day (35,000 visitors to campus, High School visits on and off campus, the Indigenous Australian Engineering Summer School, UNSW Nura Gili Winter School, and the NSW Careers Advisors Annual Conference. Our thanks to all ERC members and CVEN staff who participate in these events.

In 2018, we have continued our focus on increasing the numbers of students doing Surveying degrees in response to industry demand. The dual award

CVEN Open Day

program civil engineering/surveying, which began in 2016, continues to be a popular addition. We are also working closely with Faculty on achieving a key objective of having at least 30% females in our incoming engineering student cohort by 2020. It has been exciting to see the great support that the Industry has provided to the various successful Women in Engineering activities organised by the Faculty.

The annual Year 10 work experience week was held in June. The week was designed and organised by the School's external relations and industry advisory committees, approved by the NSW Department of Education and Communities, and co-ordinated by Ms Tricia Tesoriero. We have had 177 NSW secondary schools participate since this fantastic outreach project commenced in 2010.

In 2018 we accepted 63 students from 63 high schools. This included 23 females and 14 students from regional schools. This year, we had 142 competitive applications so unfortunately could not accept a number of outstanding students. Due to the increasing popularity of this program, we have already begun exploring ways to upscale the program to ensure we can take at least one student from each school that applies.

The students appreciated visiting a wide variety of civil engineering sites – in progress, accomplished and in creative incubation – including Laing O'Rourke's 'Innovation Space', A number of large construction sites on and off campus, several UNSW Laboratories, Port Botany, Centennial Parklands, Seacliff Bridge, Cronulla

Waste Treatment Plant, Manly Beach, CoastSnap Station, Sydney Harbour Bridge, the Opera House, and the NSW Transport Management Centre. Students also tried their hands at their own structural design on the last day.

As a result of this successful program, Dr Douglas was invited onto the Department of Education's Workplace Engagement Reference Group which is tasked at looking at ways to increase engagement between industry and schools.

The ERC also coordinates the annual highly sought after Elite Student/Industry Partner Breakfast, the fabulous 4th year dinner, the ever popular CVEN Primary School Maths prize, and IAC meetings. The ERC also works with the School's Teaching and Learning Committee and student society CEVSOC to facilitate various functions that bring our industry partners and supporters onto campus to enhance our undergraduates' understanding of the engineering profession. And we continued to develop the School's relationship with our graduates, industry and academia through our various reports and e-newsletters.

For further information on external relations, alumni, the IAC and our Industry Partnership Program contact Dr Kurt Douglas at k.douglas@unsw.edu.au.

Industry Advisory Committee

it is impossible to not be impressed by the range and depth of the people in the School and the work they undertake

The Industry Advisory Committee is a sounding board for the Head of the School of Civil and Environmental Engineering and the School staff. It is an important means of access for the School to a broad range of relevant industry organisations and people at senior levels. The membership is a balanced coverage of public sector organisations, private sector consultancies, private sector constructors and secondary school careers advisers that brings a valuable range of perspectives and insights to the school. It meets four times each year.

The membership is not static and is gradually renewed with a modest turnover rate reflecting changes according to the career moves of its members. The people on the committee care deeply about the progress and wellbeing of the School of Civil and Environmental Engineering and are never shy when an opportunity to assist the School presents itself.

This is reflected in the provision of sites and experiences for the very popular and successful program of work experience for Year 10 Secondary School students, the organisation of young engineers to interact with prospective students, representation of the School in the Primary School Mathematics prize program and facilitation of the bi-annual Industry Research Forum that occurred in February 2018. It is also reflected in the committed and lively discussions that occur between academics and the committee in an effort to see over the horizon and be prepared for whatever circumstances may arise in the future of the School.

The committee has this year sought to better understand the huge range of expertise and capability that the School has within its ranks and the wide-ranging teaching and research activities that it conducts by including particular academics as guests in its regular meetings. It is impossible to not be impressed by the range and depth of the people in the School and the work they undertake. It is clear that the size of the School relative to all others in Australia and most others in the world is a positive advantage in gathering together preeminent people covering close to the full scope of possible fields under the Civil and Environmental Engineering umbrella. At the same time, that size comes with its own set of challenges and the committee looks for opportunities to assist the School to progressively improve its ability to deal with challenges arising from the numbers of students, academics, research staff and administrative staff that are involved in this very busy and productive enterprise. In this regard, the Committee has been asked to assist with review of certain courses in the light of increased student numbers and members are taking an active role in collaboration with academic staff.

The Committee members certainly enjoy being able to celebrate the academic ranking and research successes of the School and the international recognition of staff. We look forward to enabling a continued and enhanced engagement between the School and the industry organisations that depend upon it.

Ian McIntyre
Chair,
Industry Advisory Committee.
20 March 2019

Ian McIntyre,
Chair, CVEN Industry Advisory Committee and Director at Ian McIntyre & Associates Pty Ltd

Ian McIntyre was, until "retirement" in late 2017,a Principal of Advisian and the Service Lead, Contractual Services. He graduated in Civil Engineering from UNSW in 1974 with First Class Honours. As a consultant for the past 31 years, Ian has advised in relation to project delivery processes on a wide range of infrastructure, building and systems integration projects throughout Australia and Asia. His previous experience was in project management and construction engineering for a contractor on major civil engineering and multi-disciplinary projects throughout Australia and in Hong Kong.

He is frequently retained in "trouble shooting", independent review and due diligence roles and has considerable experience in analysis of the reasons for project delivery problems. As a result, he is particularly interested in promoting awareness of the factors which are typically associated with successful project delivery strategies leading to successful project outcomes.

Ian is an experienced expert witness in relation to project performance issues and is, notwithstanding retirement from Advisian, active on several expert evidence assignments and a member of two Project Dispute Boards.ustralasia) of the Dispute Resolution Board Foundation.

Deirdre Agnew
Student Careers Advisor

Deirdre Agnew has worked in banking, insurance broking and market research in the UK. She has also been employed in public relations/events management role for international conferences at the University of the Witwatersrand. She taught at Hornsby Girls' High School, before moving into careers counselling. She spent fifteen years at St. Ignatius' College, Riverview and ten years at St. Aloysius College at Milsons Point in that role. Deirdre is currently a director of Australian Careers Advice, a professional careers consultancy.

Christine Atkins
Transport for NSW

Christine Atkins is the Business Case Manager, Circular Quay Renewal at Transport for NSW.

Before taking up this role, she was Strategy and Policy Development Manager for Future Transport at Transport for NSW, working on the Long Term Transport Master Plan.

Prior to working for Transport for NSW, Christine was National Manager, Transport Policy at Infrastructure Partnerships Australia –the nation's peak infrastructure forum, comprising public and private sector CEO Members, advocating the public policy debate around solutions to Australia's infrastructure challenges.

Christine has over twenty years' experience in analysis and assessment of major transport and infrastructure projects, having worked on complex and high-profile projects both within Australia and overseas. Her experience spans the project development life-cycle, from strategy and policy analysis and development through financial modelling and business case development to government sector procurement and transactions including process design and tender evaluation.

Greg Bowyer
Principal, GHD

Greg is currently GHD's Manager Western Sydney, based in Parramatta, where he is driving GHD's expansion into new markets and clients.

Greg has a civil engineering degree from UNSW, University College (now known as ADFA). After 23 years as an engineering officer in the Australian Army in command, leadership, staff and training roles, Greg's final posting was Commanding Officer, School of Military Engineering. In that role he was able to apply his passion for training and development of future engineering professionals, working closely with ADFA academic staff. He was awarded a Conspicuous Service Medal for his service in this role in 2003.

After eight years at Jemena managing the engineering and capital delivery programs for multiple gas infrastructure asset owners, Greg moved to GHD. As a Principal of GHD, he specialises in managing consulting projects in the transport, energy & resources, water and property markets for projects in Australia and overseas. Being a Project Director on a range of structural, transport, property, demolition, rail infrastructure, power supply, gas transmission, due diligence, resource and mineral processing infrastructure projects, Greg has also developed complementary skills in managing risk, reliance and probity on complex projects.

Laurie Foy
Consultant

Laurie has over 30 years construction industry experience gained both locally and in South East Asia, and is currently providing consultant services in Development Management / Project Management to Indian company SHPL.

Prior to this Laurie worked for Brookfield Multiplex from 1991 to 2015, beginning with leading the Sheraton on the Park project. He then provided leadership to teams on some of Multiplex's most exciting and challenging projects, among them the $287m Parramatta Justice Precinct, the $360m BER Schools Program and more recently, Lifehouse at RPA and the Charles Perkins Centre at the University of Sydney.

Dr James Glastonbury
Technical Director, Laing O'Rourke

James is Technical Director for Laing O'Rourke's Australia business, with key executive level accountability for technical performance in work winning strategy and delivery assurance. He is a member of the Australia Hub executive leadership team with operational and strategic responsibilities for consultant engagement, design management, digital engineering, quality and specialist engineering/SME disciplines. He manages a team of internal technical specialists covering key market sectors including rail, buildings, airports, defence and resources.

Prior to taking up operational responsibilities, James was Engineering Director within Laing O'Rourke's in-house innovation team - the Engineering Excellence Group. In this role he was responsible for establishing systems and processes to foster construction-related innovation within various project teams including for Alliance and Delivery Partner teams.

James was the Innovation Lead with the Pacific Complete Delivery Partner team on the $4.5B Pacific Highway Upgrade (Woolgoolga to Ballina) where circa 100 innovations were progressed realising approximately $120m in improved public value. He was also instrumental in establishing innovation processes for the North East Programme Alliance (NEPA) as part of Melbourne's level crossing removal programme.

His background includes over 20 years in consulting roles across a range of sectors including transport, mining, oil & gas and tunnelling before joining Laing O'Rourke.

Andrew Johnson
Principal, ARUP

Andrew is a structural engineer with a passion for design philosophies combining innovation with efficiency in holistic building or structure solutions to achieve better buildings. He leads an integrated multi-disciplinary buildings design group in the Sydney office of ARUP.

His experience in Australia and London includes collaboration with some of the world's leading architects on commercial, education, sport & leisure, industrial, retail, residential, and marine projects for both government and private sector clients.

His structural expertise includes tall buildings, long-term serviceability of structures, seismic analysis and design, and long-span lightweight roof structures.

Ross Jones
Vice President and Executive Director - Strategic Growth - APAC & Middle East, Jacobs

Ross Jones is Jacob's Vice President and Executive Director- Strategic Growth - for APAC & Middle East. Prior to taking up this role he was Vice President Operations - Infrastructure & Environment.

Ross is a Company Director of Jacobs, having been with the organisation (incl. SKM) for over 20 years. His experience covers a variety of technical disciplines, including environmental impact assessment and management, community consultation, air quality management, traffic noise and ecologically sustainable development. He has project managed integrated concept design and EISs, predominantly for transport projects and has prepared numerous construction environmental management plans. He has also been project manager on several community consultation projects. In recent years, Ross has been involved in collaborative contracting at the ALT level on construction and planning projects.

Previously, Ross held the position of SKM's Global General Manager – Water & Environment prior to the merger with Jacobs. Before that, he held a range of operations, client management and technical leadership roles in SKM.

Kourosh Kayvani
Global Managing Director - Design, Innovation & Eminence, Aurecon

Professor Kourosh Kayvani is the Global Managing Director – Design, Innovation & Eminence at Aurecon, covering a team of 7,000 people in engineering and advisory practices across 25 countries.

In his 30 years in the industry, Kourosh has played key roles in the engineering of many innovative, complex structures across the globe, including Wembley Stadium in the UK, West Kowloon Terminus in Hong Kong, Barito Suspension Bridge in Indonesia and in Australian projects such as ANSTO OPAL nuclear reactor, the Sydney Hockey Stadium, Brookfield Place in Perth, Melbourne Star Observation Wheel, and Civic Tower, 5 Martin Place and Liberty Place in Sydney. He specialises in long-span structures, tall buildings, stadiums, seismic design and forensic engineering. He has served on the Australian Standards code committees for Concrete Structures and Wind Loads for over 10 years.

Kourosh graduated as a Civil Engineer from Tehran University and has a master's degree and a PhD in Structural Engineering from UNSW Sydney. He is the winner of the 2016 John Connell Gold Medal from the Structural College of Institution of Engineers Australia. He has Professorial appointments at University of Sydney and UNSW. Kourosh is a Director of Australian Steel Institute (ASI) and the President of Lightweight Structures Association of Australasia.

Garry Mostyn
Principal, PSM

Garry Mostyn graduated from UNSW Australia in civil engineering in 1973. He subsequently completed a master's degree in geotechnical engineering at UNSW and a bachelor's degree in geology and statistics at Macquarie University. He worked as a cadet and engineer with the NSW Department of Public Works and with consulting geotechnical engineers from 1970 until 1986. He then joined the Department of Civil Engineering at UNSW Australia where he lectured in civil and environmental engineering practice and geotechnical engineering. He joined PSM in 1997 as a Principal Consultant while retaining a part time appointment at UNSW.

Garry's fields of specialist expertise include slope engineering; foundation engineering; rock mechanics; geotechnical risk analysis; and forensic engineering. He has authored or co-authored over 80 journal and conference papers. He has worked on major projects throughout Australia and in Thailand and PNG. He has been an active member of several national and international code and practice committees and been involved at the highest levels of the Australian Geomechanics Society and the International Society for Rock Mechanics.

Paul Plowman
Acting General Manager - Customer Delivery, Sydney Water

Paul Plowman is the Acting General Manager - Customer Delivery at Sydney Water.

Before taking up this role Paul was the General Manager, Liveable City Solutions at Sydney Water. Paul has led strategies to enable the delivery of products and services to Sydney Water customers to ensure that Sydney remains one of the most livable cities in the world.

Sydney Water is Australia's largest utility, providing drinking water, recycled water, wastewater and stormwater services to its customers, extending from Sydney to the Blue Mountains and the Illawarra.

Paul has more than 20 years' experience in the water industry with particular focus on the development and delivery of investment programs. He has successfully led large, complex infrastructure projects that have involved significant interaction with the community and stakeholders. Paul has held previous senior executive roles in the Northern Territory Power and Water Corporate and Melbourne Water Corporation. Paul is a qualified Civil Engineer and also holds a Masters of Business Administration.

Iain Scoular
Senior Advisor, E3 Advisory

Iain has more than 35 years' experience working with major contractors in the Australian construction industry. As a General Manager with Leighton Holdings for ten years, Iain was responsible for leading specialist engineering teams covering the fields of Pre-Contracts, Insurance and Risk Management, Planning and Controls, Carbon and Environmental Management, with the overriding objective of raising the standards of project delivery performance. Iain's 'hands-on' project experience includes road and railway infrastructure construction, dams and water supply, large multi-function public entertainment complexes and the restoration of heritage-listed buildings.

Iain has an Honours degree in Civil Engineering from UNSW, is a Member of the Institution of Engineers Australia and is a Chartered Professional Engineer.

Gareth Swarbrick
Principal, Pells Sullivan Meynink

Dr Gareth Swarbrick has a Bachelors degree in Civil Engineering from Adelaide University and a PhD in Geotechnical Engineering from UNSW. After a 14 year career as a UNSW academic he joined the engineering consultancy PSM in 2005 where his expertise centres on tailings dam design and operation, assessment and management of mine subsidence impacts and numerical analysis. Signature projects include protection of the Upper Canal and Hume Highway during undermining, prediction of steam pressures at Lihir Gold Mine, numerical analysis of hydromechanical coupling at Olympic Dam, Brisbane Airport Link tunnel design and investigation of the Lane Cove Tunnel collapse.

Gareth has continued close links with UNSW including several projects with researchers in the School of Civil and Environmental Engineering. He is currently a Visiting Fellow with the UNSW Water Research Laboratory.

Narelle Underwood
NSW Surveyor-General

Narelle Underwood is the Surveyor-General of NSW and Director of Survey Operations at Spatial Services, a division of the NSW Department of Finance, Services and Innovation. The Surveyor General is the leader and regulator of the land and mining surveying profession and plays a key advocacy role in the spatial industry in NSW.

Narelle graduated from UNSW in 2009 with a BE Hons 1 Surveying & Spatial Information Systems and the University Medal. She became a Registered Land Surveyor in 2010.

Prior to joining Spatial Services, Narelle worked in both private industry and state government. She was at NSW Roads and Maritime Services for over seven years and held a number of senior roles, including Southern Region Survey Manager and Principal Surveyor. Throughout her career Narelle has been actively involved in the surveying and spatial professional organisations in NSW. Narelle has won a total of nine industry awards for her innovation and commitment to quality outputs, including the Asia-Pacific Spatial Excellence Awards Young Professional of the Year in 2011, which she won from amidst a highly capable international field.

As Surveyor General she is the President of the Board of Surveying and Spatial Information (BOSSI), Chair of the Geographical Names Board, NSW Surveying Taskforce and the Surveying and Mapping Industry Council.

Athena Venios
Director Greater Sydney Project Office, Roads and Maritime Service

Athena leads a multidisciplinary team within the Technical and Project Services Division of NSW Roads & Maritime to develop and deliver projects across Greater Sydney.

Prior to this role she was Technical Director - Transport Group, AECOM, responsible for the delivery of complex transport projects including motorways, railways and multi-modal infrastructure, working closely with government and key stakeholders.

As AECOM Technical Director she was accountable for securing a pipeline of projects and setting the strategic direction for AECOM's transport business, and for leading multidisciplinary teams in the acquisition and execution of major transport infrastructure projects.

In 2016 Athena was awarded the Judy Raper Award for Leadership in Engineering, in recognition of her sustained and significant contribution through demonstrated leadership within the profession in Australia.

Prof Nasser Khalili
Acting Head of School, Civil & Environmental Engineering, UNSW

Nasser Khalili is currently the Acting Head of School and brings to this position an international reputation for innovation and setting industry standards.

Dr Kurt Douglas
Chair, External Relations Ctte, Civil & Environmental Engineering, UNSW

Dr Kurt Douglas holds an industry sponsored position at the School in goetehcnical engineering. He has been active in industry and community outreach programs for over fifteen years, and has won a UNSW Staff Excellence Award for community engagement.

Industry Partner/Elite Student Annual Breakfast

Welcome Industry Partner

The School warmly welcomes new industry partner CMS Surveyors to our engineering community. Directors Stuart McEvoy and Andrew Cummins are UNSW alumni and in 2001 they joined with David Lovell and Stuart Soltau to form CMS Surveyors, which has since enjoyed continual commercial growth and workplace harmony.

CMS projects vary greatly in size, location and nature. With a large contingent of surveyors of various professional skillsets in land and engineering surveying, CMS Surveyors is able to undertake projects ranging from residential surveys to multi-million-dollar commercial developments.

Their multi-disciplinary approach to surveying has kept CMS at the forefront of surveying in NSW. Across Sydney their services have been used in such diverse and significant projects as the International Towers Project at Barangaroo and other high-profile building developments.

CMS SURVEYORS

Primary School Maths Prize

Claremont College Maths Prize

SCHOOL	FIRST NAME	SURNAME
Alexandria Park Community School		tba
Annandale North Public School	Ivy	Bourelly
	Tom	Kepert
	Justin	Roberts
	Ella	Tamir
Arncliffe Public School	Aaron	Hui
Australian International Academy	Farida	Elbakry
	Zuhayr	Haq
	Fatima	Muhammad
	Bareerah	Rizwan
Avondale School	Jacob	Daly
Balgowlah Heights Public School	Remy	Metzke
	Dylan	Potgieter
	James	Young-Thompson
Balmain Public School	Doniinic	Wee
	Xiao	Yu
Bankstown West Public School	Bella	Bui
	Troy	Vo
	Vina	Vuong
Beaumont Hills Public School	Isaac	Goh
	Alvin	Lee
Beauty Point Public School	Sharleen	Ho
Beecroft Public School	Warren	Song
Bellevue Hill Public School	Asher	Filipczyk
	Tomer	Weizman
Belrose Public School	Lachlan	Adamo
	Tim	Fortescue
Belrose Public School	Benjamin	Jewell
	Alex	Xu
Berowra Public School	Rubin	Luo
	Charlie	Manns
	Max	Mohi
	Matt	Saywell

SCHOOL	FIRST NAME	SURNAME
Blackheath Public School	Alton	Freeman
	Charles	Monks
Bondi Beach Public School	Lachy	Grant
	Otto	Torazzi
Bondi Public School	Lucas	Buchanan
	Sam	Caskey
Bronte Public School	Yiqian	Wu
Cammeray Public School	Anika	Gould
	Saoirse	Norrie
	Aidan	Tang
	Henry	Tidd
	Findlay	Walker
Canterbury South Public School	Jade	Huang
	Hayato	Kato
Carlingford Public School	Eric	Scholten
Carlton Public School	Adrika	Das
	Roger	Hu
	Nicol	Liu
	Nikola	Vasilevski
Casula Public School	Manuga	Egodage
	Muhammad	Kathia
	Max	Ruskin
	Yenuka	Welihinda Badalge
Chifley Public School	Clarinda	Marzukie
Claremont College	Mitchell	Gray
	Samuel	Hui
	Leticia	Hui
	Jack	Stone
Clovelly Public School	Malo	Breton
	Xuan	Jun Zhou

SCHOOL	FIRST NAME	SURNAME
Condobolin Public School	Sam	Cunningham
	Ollie	Jarick
	Jed	Neilsen
	Oscar	Todd
Cowra Public School	Charles	Coombes
	Niamh	Webster
Crescent Head Public School	Tully	Bryant
	Luca	Garcia-Kytola
	Wilbur	Gulaj
	Isabelle	Koivu
Crown Street Public School	Eleanor	Cassie
	Lucas	Chen
	Henry	Perey
	Ishani	Purohit
Croydon Public School	Amy	Cheong
Daceyville Public School	Clio	Cartwright
	Griffin	Middleweek
	Timothy	Wahib
Double Bay Public School	Jai	Dingess-Dunphy
	Lewis	Price
Earlwood Public School	Maxaviar	Lum
Eastlakes Public School	Chloe	Acland
	Rosabelle	Hasan
	Maria	Jimenez-Wafer
	Ratin	Razin
Eastwood Public School	Elijah	Fan
	Chloe	Liang-Benn
	Jeffrey	Liu
	Hongyi	Liu
Epping North Public School	Chloe	Chui
	Elisabeth	Guastini

SCHOOL	FIRST NAME	SURNAME
Ermington Public School	Amy	Li
	Kenneth	Liu
	Ben	Rogers
	Jack	Wong
Ermington West Public School	Daniel	Archer
	Damian	Carritt
	Gabriel	O'Keeffe
	Hannah	Sistrom
Ferncourt Public School	Athan	Arsenikos
	Leo	Edwards
	Vu	Nguyen
	Alex	Savidis
Glenhaven Public School	Alicia	McDonald
Harbord Public School	Hannah	Brown
	Mitchell	Murphy
	Koby	Smith
	Jennifer	Vu
Illawong Public School	Blake	Glenday
	Jake	Pollo
	Lachlan	Tkalec
Jasper Road Public School	Timothy	Hendriks
	Rishi	Jaiswal
	Daniella	Ma
	Justin	Zhou
Kambora Public School	Niamh	Dwyer
	Hannah	Hawkeswood
	Abigail	Macmillan
	Owen	Stacey
Kensington Public School	Edward	Charleston
	Zaydan	Hassan
	Ethan	Saputra
	Hanson	Xiao
Lugarno Public School	Alexander	Hu
	Dylan	Jarevski
	Anthony	Kariotis
	Andrew	Tran
Manly West Public School	Lachlan	Holloy
	Tara	Smith
Maroubra Junction Public School	Michael	Hazali
	Miji	Kwak
	Lauren	Leong
	Erwin	Mahdavi
Masada College	Alwyn	Zhou
Matraville Public School	Gayashan	Fernando
	Karthikeya	Kodide
Middle Harbour Public School	Hayden	Ngo
	Tadgh	Nolan

SCHOOL	FIRST NAME	SURNAME
Mosman Public School	Aaliya	Gupta
	Michelle	Plon
Mount Colah Public School	Aarav	Pokharna
	Joshua	Sayo
Mount Druitt Public School	Ahmed	Bin Rasheed
	Tipanio	Feiloakitau
	Zeenia	Khan
	Girish	Sikder
Narrabeen North Public School	Kai	Hunter
	Will	McDermott
Niagara Park Public School	Luka	Thomas
	Jayden	Weston
North Haven Public School	Angus	Bowen
	Nait	Boyan
Northmead Public School	Matej	Groombridge
	Pranaya	Prasath
	Zhiyuan	Yin
	Salman	Zabul
Oatley Public School	Martin	Roldon
	Richie	Ye
Our Lady of the Rosary Primary School	Otis	Dela Cruz
	Patrick	Khoury
	Zara	Salah
	Kayla	Thumwanich
Pagewood Public School	Alexandra	Koh
	Stan	Testard
	Gemma	Thompson
	Keegan	van Keulen
Pennant Hills Public School	Orlando	Pye
Picnic Point Public School	Sam	Bayley
	Jason	Ho
	Ethan	Phillips
	Bowen	Zhou
Rainbow Street Public School	Zarif	Faisal
	Chloe	Tjioe
Randwick Public School	Alexey	Luchkovskiy
	Ashley	Noesjirwan
Roselea Public School	Timmy	Lai
	Joseph	Lim
South Coogee Public School	Nicholas	Fung
	Fiona	Gu
	Jeffery	Lynd
	Flynn	McDermott
St Aloysius Catholic Primary School	Levi	Christoforidis
	Max	Harrington
	Sinead	Laney
	Xavier	Pyne

SCHOOL	FIRST NAME	SURNAME
St Declan's Catholic Primary School	Julia Ann	Licauco
	Anthony	Shashati
St Francis Xavier's Catholic Primary School	Matthew	Davison
	Anthony	Le
	Xavier	Spurrier
	Gabrielle	Sulliguin
St John Bosco Catholic Primary	Liam	Devlin
	Noah	Ovens
St Joseph's Catholic Primary School	Lexi	Brown
	William	Geest
St Philip's Christian College	Grace	Hodson
	Nathan	Hood
St Spyridon College Junior School	Alexandra	Bizannes
Sylvania Heights Public School	Daniel	Crisp
	Rhys	Novello
	Jenny	Wu
	Crystal	Yan
Tacking Point Public School	Brodie	Ferrett
	Bella	Riches
Tagai State College Mer Campus		tba
Toongabbie Public School	Katie	Liu
	Mayure	Raveendrana-than
Toongabbie West Public School	Savannah	Pradhan
	Oliver	Stanley
Turramurra Public School	Tana	O'Neill
	Sean	Pinsker
	Rory	Shearer
	Christo-pher	Wilson
Warrawee Public School	Alexander	Adams
	Lucas	Davies
	Oliver	Day
	Akshay	Krishnakumar
West Pennant Hills Public School	Jocelyn	Lui
	Chloe	North
	Declan	Vaz
	Ray	Zhang
Wheeler Heights Public School	Zoe	Davey
	Jonas	Kappelmann
	Hayden	Ling
	Kane	Sinclair
Wollondilly Anglican College	Luke	Webber
Woollahra Public School	Wensen	Dong
	Georgina	Doyle
	Alex	Pham
	Mark	Sukhovsky

In 2018 CVEN alumnus Marika Calfas was awarded the Judy Raper Award for Leadership

Marika, who graduated from the School in 1997 with a first class honours degree in environmental engineering, is the CEO of NSW Ports, the private sector organisation responsible for managing the ports of Botany and Kembla and intermodal terminals at Cooks River and Enfield.

Marika commenced with NSW Ports at its inception in June 2013 and led the development of the NSW Ports Long Term Master Plan, released in October 2015. She was appointed as the CEO of NSW Ports in December 2015.

With a strong belief that ports are crucial to our wellbeing and essential for the nation's economy Marika enjoys working in the industry. She is passionate about driving improvements and efficiencies across port supply chains, informing the wider community and decision makers of the importance and value of ports and identifying new opportunities.

Marika has over 18 years' experience in the port sector across a broad range of portfolio areas including strategy, planning, environment and infrastructure, including her previous roles with Sydney Ports Corporation. At Sydney Ports Marika was an integral part of the delivery of the $1 billion Port Botany Expansion development project.

Prior to working in ports, Marika worked in water resources with Sinclair Knight Merz. She holds an Engineering Degree (Environmental), Masters of Engineering Management and Masters of Environmental Law.

Marika is also a board member of Infrastructure NSW and Ports Australia, Deputy Chair of the Australian Logistics Council, Member of Infrastructure Partnerships Australia National Advisory Board and Chief Executive Women as well as Australia's representative to PIANC International Environmental Commission.

Our warmest congratulations to Marika Calfas, a worthy winner.

Staff and students of UNSW Civil & Environmental Engineering celebrated International Women's Day 2018 at NSW Parliament House, at an inspiring breakfast event hosted by CVEN alumnus Dr Mehreen Faruqi Greens NSW MP (MEngSc 1994 PHD 2000 UNSW)

Mehreen's IWD breakfasts have become renowned for an honest and radical discussion about gender and race with thought provoking speakers. This year we were addressed by two inspiring speakers, Indigenous poet Ali Cobby Eckermann and writer Saman Shad.

L-R Celebrating CVEN Women – Dr Hanna Grzybowska (rCITI), Sylvia Brohl,(rCITI), Dr Mehreen Faruqi (host), Tamara Rouse,(External Relations), Courtney Bell,(CEVSOC), Dr Mary O'Connell, Leila Bowe, (CEVSOC) A/Prof Lucy Marshall, Dr Pauline Manley, Deirdre Agnew(IAC)

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