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News from Western Sydney University's School of Engineering

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## Western Sydney University's Solar Team gear up to take on the World!

Western Sydney Solar Team is striving to close the gap for a cleaner, sustainable future in the automotive industry and aiming to drive the shift towards renewable energy through solar car technology. In pursuit of this ideal, the team engineers and manufactures a solar powered car from our workshop in Kingswood Campus to compete in multiple global challenges including a gruelling 3022km challenge down the Stuart Highway from Darwin to Adelaide in outback Australia.

Our solar car team has had over 100 Western Sydney University students working hard for the better part of a decade to reach the pinnacle of manufacturing and engineering capability.

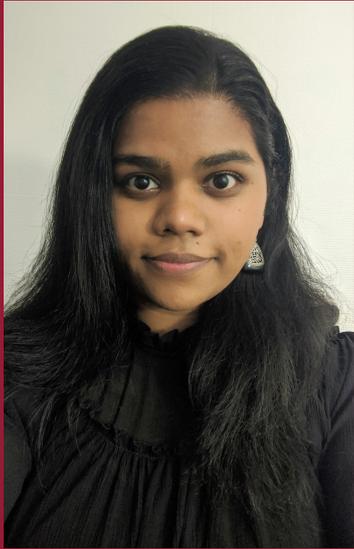
In 2018, our team claimed 1st place in the American Solar Challenge, taking out the University of Michigan's 17 year winning streak - a huge achievement for our team and local community,

and in 2019 pushed the boundaries of engineering, by designing and building a road registered car that weighs a total of 116.8kg, yet again breaking another record for the lightest car to be registered on our roads.

This year the team is striving for our best result yet for the upcoming Bridgestone World Solar Challenge in October 2021. Our goal is to push boundaries, designing our car to meet the global demands of a sustainable and innovative future, and represent Australia on the world stage on home soil, in 2021, driving the win home for our community.

Follow Western Sydney Solar Team's journey:  
[facebook.com/WestSydSolarTeam](https://facebook.com/WestSydSolarTeam)

For more information about the team or media and engagement opportunities, please email:  
[contact@solarcar.scem.westernsydney.edu.au](mailto:contact@solarcar.scem.westernsydney.edu.au)



## Student Achievement

A big congratulations to Michelle Dsouza who has just received the GE Biomedical Engineering Scholarship for Women.

Michelle is studying her Bachelor of Engineering (Honours). She was born in India and moved to Australia in late childhood. She developed an interest in medical instrumentation during her final years of high school. Receiving this scholarship enables her to focus more on her course work and dedicate some time to working on personal electronics projects as well.

## Engagement News

COVID 19 can't stop the School of Engineering's engagement efforts. We have been running events for high school students such as "Engineering & Beyond" an on-going webinar to showcase our school's facilities and a day in the life of an engineer as well as the Winter School "Engineering Your Future" organised by Engineers Australia from 13-17 July 2020. We have had more than 900 participants for these events. We demonstrated how COVID 19 affects the engineering industry, via an organised discussion panel where we invited Miss Thy Pham from CPB, Mrs. Laurena Basatu from TfNSW, Mr. Jon Lee from WSP and Mrs. Jessica Qiu from HKA. The engineering industry experts were very positive and ensured that there are still a many job opportunities available for our students.

## International News

Dr. Dharma Hagare is one of the investigators in the recently approved project "Outscaling of Managed Aquifer Recharge through Village level Intervention (MARVI) in Atal Bhujal Yojana (ABHY), India "This project builds on the current AWP 'Outscaling MARVI' activity, and the recently completed MARVI ACIAR project. The Government of India's National Groundwater Management Improvement Program, known as Atal Bhujal Yojana (ABHY), took effect on 1 April and will run for five years. The MARVI approach (<http://www.marvi.org.in/>) is aligned to the aims of the ABHY project, and the MARVI team can assist in the effective implementation of the activity goals. The purpose of this activity is to allow specific technical support to the Jal Shakti Ministry and the World Bank in the implementation of ABHY in the seven states, viz. Gujarat, Rajasthan, Haryana, Maharashtra, Karnataka, U.P. and Madhya Pradesh. MARVI was started by Prof. Basant Maheshwari of School of Science in 2014. Through MARVI, the team is engaging several villages in India for sustainable groundwater management. MARVI includes a large team of academics, scientists, NGOs and villages. More details can be found at <http://www.marvi.org.in>

Investigators: Basant Maheshwari, Peter Dillon, Maria Varua, Dharma Hagare, Brenda Dobia and Roger Packham, Funding: \$95,000, Funder: Australian Water Partnership, Australian Government, Duration: June 2020 – May 2021.



## Learning and Teaching Planning Day: A Success Story

The School held its first L&T Planning Day on 18 June 2020. Titled, “Engineering for the Future,” the day was structured to allow all academic and professional staff to provide input into development of the School’s L&T Strategic Plan (2021-2025). More than 90% of the School staff actively engaged and contributed to the discussions.

Prof Denise Kirkpatrick, Senior Deputy Vice-Chancellor at WSU, welcomed all participants to the Planning Day and Prof Bouchra Senadji from the School of Electrical Engineering and Robotics at the Queensland University of Technology set the scene by challenging the attendees to come up with innovative engineering programs that will fulfil the requirements set in Engineering Futures 2035 report commissioned by the Australian Council of Engineering Deans.

Ensuing discussions led to 16 recommendations in three broad themes structured for the day. The session on ‘the lessons learnt from the COVID-19 experience’ resulted in seven recommendations. The sessions on ‘future opportunities and sustainability’ and ‘enhance student experience’ resulted in five and four recommendations, respectively. Seven of the recommendations have already been implemented; the remaining nine recommendations have been actioned. Prof Mike Kagioglou, Dean of the School, began the session with an inspirational speech; his closing remarks were insightful and thought provoking. Prof Yang Xiang, Deputy Dean of the School, as always was an effective Master of Ceremony.

## School Research Planning Day

The School held its inaugural Research Planning Day on Friday 17th July 2020. In this important five-hour event, our SDVC, DVCREI, PVCRC, PRVC STEM Cluster joined us to discuss WSU research development strategies and their visions on engineering research development. The School’s staff team, led by Dean, Deputy Dean, AD Res & HDR and Research Leaders, was successfully engaged to discuss the School Research Strategic Plan 2020 and developed productive outcomes with valuable and constructive comments and feedback on four main themes – Research Planning, Research Quality, Research Income and Research Education via break-out room activities.

### School 3MT Competition 2020

The School 3MT was held on Friday 26th June 2020. We had 11 engineering HDR students participating the competition and Prof Ataur Rahman gave a keynote speech on ‘My reflection as a HDR Supervisor in WSU’. AD Res and HDR announced the final results as follows:

First: Sheen Sam

Runner up: Shohreh Alaedini

People’s Choice: Shohreh Alaedini

We would like to congratulate the award winners and all of our participants. We enjoyed hearing more about our HDR students’ research in their specific areas.

## Student Hardship Fund

The Student Hardship Fund urgently supports Western students experiencing financial hardship because of COVID-19. Many have lost their jobs. Buying food and paying rent has become unaffordable.

Donations to the Student Hardship Fund are tax-deductible and will help us support the next generation of engineers through this crisis. The University will match donations.



## **Vehicular Impact loading on earth retaining wall structures (Prof. Chin Leo)**

Earth retaining wall structures are a common part of infrastructure used to provide lateral support to road and highway embankment. With the size, weight limit and frequency of trucks using NSW road system increasing year by year, any unfortunate truck collision with an earth retaining wall structure can do significant damage. The risk of the collision imperilling the stability of the earth retaining wall is also very real. This project has developed coupled methods to analyse the dynamic interactions of vehicle, retaining wall structure, earth backfill and foundation. By assessing the dynamic implications, informed design guidelines were thus developed to avert destabilisation of the earth retaining wall structure from a potential collision. This research was funded by Roads and Maritime Services (now TfNSW).



## **Deep Excavations in Sydney Sandstone (A/Prof. Samantha Liyanapathirana)**

Deep excavations are an essential part of many construction activities. Ground movements around deep excavations can cause damage in foundations of buildings nearby. Therefore, this is a topic of great significance to geotechnical engineers. In a congested city like Sydney, which sits over sandstone with in-situ locked-in stresses, the detrimental effects of deep excavations are further aggravated. This project has developed mitigation measures to avoid damage to existing sensitive infrastructure during deep excavations moving away from the traditional approach, where ground deformations and structural responses are investigated using two separate analytical steps. By coupling the geotechnical and structural modelling, reliable damage mitigation measures are developed. This research was jointly funded by the ARC Discovery Scheme and Cardno Pty Ltd



## **In-house software development to support safer drilling offshore. (Dr. Pan Hu)**

The development of hydrocarbon resources continues to be an important component of energy supply. Engineering development offshore is more challenging due to lack of foundation stability, harsh environment, and space constraints. It is imperative to provide reliable and economic foundation solutions to support safe operation of offshore structures.

Through collaboration with Norwegian Geotechnical Institute, a new version of the in-house jack-up penetration analysis software was developed with incorporation of newly proposed mechanism-based design approaches. It is now being used to evaluate the failure potential and severity of drilling rig in engineering practice.



## Facilities

Our high pressure environmental triaxial testing system can accommodate specimens up to 50 mm diameter. It has an Environmental chamber to buffer the cell from changes in atmospheric temperature. Test samples can be subjected to confining pressures up to 20 MPa under different loading conditions (e.g., slow cyclic,  $K^\circ$ , multi-stage, stress paths, creep, consolidated undrained and unconsolidated undrained).

All tests can be performed with complete control of specimen temperature varying from ambient to  $60^\circ\text{C}$ . Also, we have an enterprise level dynamic environmental triaxial automated system, which has the capability to perform high speed dynamic/cyclic testing of soil and pavement specimens up to 150 mm diameter and loading up to 20 Hz. this system can provide climate control from  $-20^\circ\text{C}$  to  $+100^\circ\text{C}$ .



## Alumni Achievement

Mr Micah Fountain | Graduate, Civil Engineering

Micah is a current Graduate Civil Engineer in geotechnical department working for CIMIC group at EIC Activities. He graduated from a Bachelor of Civil Engineering at Western Sydney University in April 2019 and have worked in the engineering industry for a little over 3 years. The reason he chose WSU because he heard engineering program was excellent from an Alumni and WSU was close to home. When asked about his experience at WSU. He replied “I found that WSU had a dedicated team of lecturers and tutors who are willing to go the extra mile for their students. This support helped me achieve my full potential as an engineering student and win awards for academic achievements. At the end of my degree my thesis, supervised by Associate Professor Olivia Mirza, won the Rail Technical Society of Australia’s annual award recognising the most significant contribution to the Railway industry from Australia, New Zealand and Indonesia” He also found WSU was is a very practical university. Engineering covers a lot of the practical software that now he uses almost daily. Additionally, WSU’s connections with the engineering Industries helped him get his current job as he was recommended for an undergraduate position at EIC Activities by one of the staff Associate Professor Samantha Liyanapathirana.



## Student Success

Motorsport and Civil Engineering may not be the first two things that come to mind when looking at most people’s pastimes, but for 23 years old Lachlan Gibbons, that’s exactly what he enjoys spending time on. Currently in his penultimate year of studies at WSU, Lachlan has competed in motorsport at various levels since he was 11 years old.

In 2019 he scored himself a drive in the Toyota 86 race at the Toyota GAZOO Racing Festival held at Fuji Speedway in Japan in December 2019, after taking home the coveted Kaizen Award in the 2019 Toyota 86 Racing Series. This fulfilled a personal dream of his to compete internationally representing Australia.



## PEOPLE WHO INSPIRE

It is my pleasure to be invited to be a part of this people who inspire column, and I feel so honored. I should be an old face to most colleagues at the School of Engineering (SoEng). I am from China and received my PhD from the University of New South Wales (UNSW) in 2007. Then, I worked in the Laboratory for Simulation and Modelling of Particulate Systems (SIMPAS) at UNSW as a research fellow. In 2014, I joined Western Sydney University (WSU) and last year I received my 5 years' service award. I am now a Senior Lecturer in Infrastructure Computations at the Centre of Infrastructure Engineering (CIE), SoEng.

### **What motivated you to be in academia? Why did you choose to come to Western Sydney University?**

I have always been curious about mystery of nature. It is always exciting to read the stories of famous scientists about how they light the darkness and show us the essence of nature's beauty. I believe my curiosity is the ultimate reason that brought me here and makes me enjoy my work. After completion of my PhD, I was working at SIMPAS as a research fellow, supported by APD and DECRA fellowships.

In 2014, SIMPAS moved to Monash University. For various reasons, such as family ones, I looked for academic positions in other Universities. Fortunately, I joined WSU. Over the years, I have been helped by many colleagues here, and everyone is friendly and supportive. Our university is a young and brilliant university who highly values students and staff and have a promising potential. It is great for an academic to grow with the University and witness its success, like to enjoy fruits of our labor.

### **What is your research area? What impacts do your research outcome have on society?**

From PhD, my research is devoted to computer simulation and modelling of particle systems. Particles are ubiquitous. They are sand, iron ores, dust, and so much more. In industry, most handled solids are in particles. However, because their theoretical model is still in infancy, the understanding of their behavior is still unknown. For example, we do not know precisely how many particles can be put into a container (like in mixing concrete). We either do not know why a collection of particles sometimes act like a solid, and sometimes like a liquid, which is related to landslides and soil liquefaction. If they interact with fluid, particles get even naughty. For example, PM2.5 particles are still difficult to be separated from air, while they are responsible for the transmission of airborne diseases. My work is to develop accurate computer models to simulate these particles, which can help find solutions to related problems. We apply models in different industries, such as the industrial screening processes and the air purifying technologies, which aligns with the Australia's research priorities.

### **What strategies do you adopt to bring your research into your classroom?**

Engineering units involve lots of calculation using formulae, which could be boring for students. Through research undertakings, we can find that every formula has an interesting story behind it. Therefore, when I teach formulae, I start by teaching the related fundamentals using simple and illustrative visuals. This is also benefited from my research with computer simulations and visualizations. I inspire students to explore the equations themselves, such as what will be the formula for pipe loss, and how we should modify Hydraulics formulas if used on Mars. Positive feedback encourages me, and I will continue to inspire students' research motivation in their learning.

### **Tell our readers about our students and their strengths.**

From the chat with our students, I can see they have different backgrounds, but they are all interested in engineering and community. As the Academic Course Advisor for Honours Thesis, we face challenges in supervising many final year students. But challenges often bring opportunities. I am also supervising international HDR students from various countries. They like Australia and appreciate its multicultural value. They work hard and enjoy life in Australia. I believe with WSU serving the community and the world, we can be part of the history for Great Western Sydney and its internationalization.



**Dr Kejun Dong**