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VENTURE

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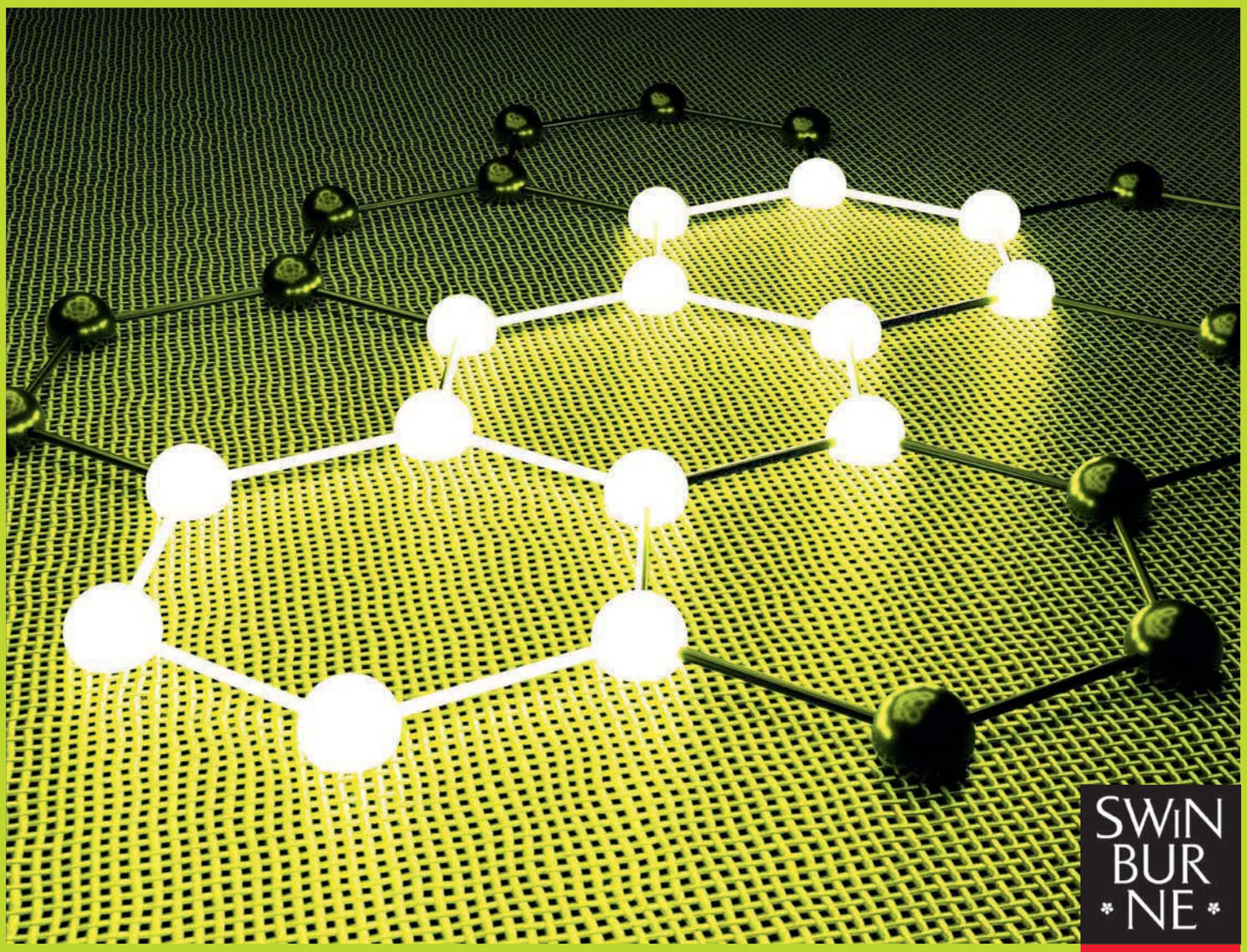
Dementia patients dance with robots

Farmers share digital stories

Lion director recalls uni days

LEADING THE CHARGE

COMMERCIALISING BATTERY TECHNOLOGY FOR THE FUTURE



DOCTOR
LEONIE WALSH
A CAREER IN A MAN'S WORLD

PROFESSOR
ELENA IVANOVA
NEW WAYS WITH NANOTECHNOLOGY

PROFESSOR
PATRICIA VICKERS-RICH
DISCOVERY OF THE NEXT BIG DIG

SWINBURNE UNIVERSITY OF TECHNOLOGY

SWINBURNE UNIVERSITY OF TECHNOLOGY

Swinburne alumni: a truly global community

Over our 100 plus year history, Swinburne has seen more than 170,000 students pass through our doors.

Today, our alumni community has a truly global footprint, with graduates in more than 140 countries around the world.

Our graduates are our greatest asset and the involvement of our alumni in the Swinburne community is a key ingredient to the university's continuing success.

As the alumni program continues to diversify, we encourage you to explore the terrific range of networking events, professional development opportunities and range of benefits and services you can access.

Tap into this community of diverse skills:
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by NARRELLE HARRIS

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Read more stories at **www.swinburne.edu.au/news**

Education of equals

In presenting this edition of *Venture*, I invite you to celebrate with us Swinburne's contribution to gender diversity in science.

The number of women studying at university has grown from 20 per cent mid last century to more than 50 per cent today, but continued gender equality cannot be taken for granted.

A 2015 report by the Australian Industry Group highlighted the unfortunate reality that throughout the education sector, participation in the disciplines of science, technology, engineering, maths and medicine – the STEMM disciplines – is in decline. This is particularly the case for young women, many of whom drop these subjects as they progress.

Victoria's former lead scientist, Dr Leonie Walsh stated that available career paths are often not clear to science students. *(See our article on Dr Walsh on page 20.)*

I am honoured to work with many talented Swinburne academics dedicated to inspiring the next generation of leaders in science, technology and engineering, research and education.

Professor Patricia Vickers-Rich is the founder and director of a science hub encouraging school students to study science. PrimeSci! is hosted at Swinburne's Wantirna campus. *(See our story on page 19.)*

Professor Baohua Jia, with her team at Swinburne's Centre for Micro-Photonics, has developed a safe, environmentally friendly battery that could revolutionise existing technology. *(See page 8.)*

As a way to redress the underrepresentation of women in STEMM disciplines, Swinburne is awarding four new research fellowships for women in science, IT, engineering and maths.

The engineering and IT fellowships are an Australian first and aim to encourage our best and brightest minds to be part of advancing Australia's competitive capability.

We also understand that to achieve gender equality in the workplace, we need to support staff to fulfil personal and professional responsibilities and have extended parental-leave entitlements to provide equal access to all primary carers.

Swinburne academics are dedicated to inspiring the next generation of leaders in science.

Swinburne, along with universities across the country, has committed to an important program called Respect. Now. Always. to prevent and address the problem of sexual assault and harassment on university campuses. Our position of zero tolerance of sexual harassment and assault underpins our preventative approach and includes a review of policies, reporting procedures and support services.

At Swinburne, we value the range of skills and talent that a diverse workforce brings. Supporting our staff and students to succeed at every stage of their careers can only lead to a stronger, fairer and more talented Australia.

Professor Linda Kristjanson
Vice-Chancellor and President
Swinburne University of Technology

WELCOME SCHOLARSHIPS FOR 2017

SWINBURNE is offering a suite of new scholarships that encourage refugees and asylum seekers to take up tertiary education.

The Welcome Scholarships initiative will provide eligible applicants with access to selected bachelor degrees, diploma/advanced diploma scholarships, Certificates I-IV and Foundation Year/UniLink courses.

Swinburne's Refugee and Asylum Seeker Student Retention and Support Project Co-ordinator Susan Oldham, who co-wrote the briefing paper for the initiative, says the scholarships recognise the acute social and financial pressures experienced by asylum seekers.

Ms Oldham says Federal Government policy stipulates that refugees and asylum seekers cannot apply for permanent protection, making them ineligible for loans and requiring them to pay their fees up front.

"These young people are so motivated and inspirational and we believe this will open genuine opportunities and pathways for them.

"We believe a quality education should be available to everyone living in Australia," she says.

swinburne.edu.au/giving

Women-only research fellowships

Swinburne is offering women-only research fellowships to help redress the underrepresentation of women in science, technology, engineering and maths (STEM).

The Vice-Chancellor's Research Fellowships – Women in STEM – are an Australian first and offer women a three-year research fellowship, followed by an ongoing research and teaching academic position.

In the first intake, four women were chosen from more than 200 applicants.

The three-year research-intensive fellowship, with dedicated mentors, offers the women job security while they build their research profile.

Swinburne Dean of Science, Professor Sarah Maddison *(pictured)* says the move comes after some "pretty stark" recent data from the Department of Education and Training that showed less than 20 per cent of senior STEM academics in Australian universities and research institutes were women – with 18 per cent in ICT and only nine per cent in engineering.

She says disruptive is needed. "Some people don't like the idea of gender quotas, but we need temporary special measures to help redress the gender imbalance in STEM."

App to conquer loneliness

A Swinburne lecturer is using digital media to conquer loneliness in young people.

Clinical Psychology lecturer Dr Michelle Lim *(pictured)*, who leads the Social Connectedness Laboratory, has created an app, +Connect (Positive Connect), to encourage people to improve the quality of their relationships.

Dr Lim says that standard practice is to treat mental health symptoms, but her research has shown the importance of addressing loneliness.

"My research found that if you are lonely at one point you will experience more severe mental health symptoms six months down the track."

She says the goal is to make sure those suffering from loneliness are able to develop more positive and meaningful connections.

"It's not simply about surrounding themselves in groups, but instead building stronger relationships with others, even if it is just one person."

The app was designed and built collaboratively with young people. Trials are under way and the app is expected to be released in 2018.

QUITCH GOES GLOBAL

Quitch, the student gaming and learning app developed by Dr Grainne Oates and Professor Dan Hunter is being commercialised. The Swinburne team has united with Michael McDonald and Sarah Gilkes from Melbourne's MDP law firm to form Scapegrace Pty Ltd and take the app to its next level. Quitch recently secured a 90-day residency in Singapore through the Federal Government's Landing Pad program. The team will use the residency to explore potential Asian education markets. quitch.com

INDONESIA LAW TOUR

Eighteen Swinburne law students will travel to Indonesia on a two-week study tour this year. The Indonesia Law, Governance and Culture study tour, hosted by Senior Lecturer Dr Jeremy Kingsley, will introduce students to the legal and political environment of Australia's northern neighbour. The students will visit Jakarta and Yogyakarta in central Java, to learn about Indonesian courts, government departments and local governance. The tour will run from 15-27 July.

MERGED MINDS

Melbourne accounting firm Pitcher Partners has joined with Swinburne's Australian Graduate School of Entrepreneurship (AGSE) to offer postgraduate entrepreneurship courses at a CBD location. Under the partnership, graduate certificate, diploma and master's courses in Entrepreneurship and Innovation will be delivered by the International Institute of Entrepreneurship, based at Pitcher Partners' William Street office. Students will also have access to Swinburne's Hawthorn-based Innovation Precinct, allowing them to share research, business development and commercialisation opportunities.

swinburne.edu.au/agse

Delving into data

Health, science, government and commerce will benefit from a new approach to data science.

Swinburne's new Data Science Research Institute is set to lead the way in data science in Australia.

The institute, launched this year, will use scientific methods, processes and systems to extract knowledge or insights from complex data in biology, physics, astronomy, economics and the social sciences.

Dr Raghu Ramakrishnan, Chief Technology Officer for Data at Microsoft, spoke at the launch: "Data science will have a transformative impact on society, meaning we can solve problems we couldn't contemplate before.

"It will result in data-driven science outcomes in commerce, government and social programs, manufacturing, and health. Swinburne's Data Science Research Institute is strategically positioned to make important contributions," Dr Ramakrishnan says.

Professor Timos Sellis *(pictured above)*, the inaugural director of the institute and a world-renowned data scientist, says Swinburne's long history in dealing with big data in fields such as astrophysics and brain science means it is well equipped to launch into other areas.

"Everyone we talk to says they have a lot of data, but don't know what to do with it. This is an excellent opportunity to leverage our collaborations with industry."

Professor Sellis says most corporations, governments and industries don't have the capacity, tools and techniques to properly analyse their own data.

The institute will focus on improving the study of traffic, pollution and urban development and will also work with the health sector to develop strategies for data analysis.

Professor Sellis says the institute will analyse the university's own data in areas such as student performance, culture and finances.

"I have high expectations that Swinburne will not only lead the way in data science in Australia but also make its mark internationally, shaping lives and communities," Professor Sellis says.

Bipolar websites

A research team led by Swinburne's Professor Greg Murray is set to launch two interactive, peer-based websites designed to support people with bipolar disorder. The websites are designed to improve quality of life for people who have had many episodes of depression and mania. The two sites are being compared to each other in a four-year $1million trial funded by the National Health and Medical Research Council. Professor Murray says the websites will offer self-management strategies for people in Australia, the US, Britain and Canada.

orbitonline@swin.edu.au

Design advisory role

Associate Professor Kurt Seemann has been appointed to the Research for Development Impact Committee in an advisory role. The appointment is a first for Swinburne and welcomes the university as an affiliate member of the Australian Council for International Development. Associate Professor Seemann, the director of Swinburne's Centre for Design Innovation, is leading Swinburne's Humanitarian Habitat and Design program and his work with the committee will focus on the importance of design in sustainable development and its influence on policy.

cdiengage.com.au

NEW GOALS FOR SPORTS LEADERSHIP STUDENTS

Swinburne has teamed up with Richmond Football Club to provide a real pathway into an enduring sporting leadership career.

The inaugural Richmond Institute of Sports Leadership program will combine a Diploma of Sports Development with a Diploma of Leadership and Management.

Jeremy Glover, from Swinburne's Pathways and Vocational Education Department of Business and Finance, says the program will provide students with business and practical sports development skills in a real-club environment.

"The students will learn through real tasks and events with industry experts around them, which makes it exciting," Mr Glover says.

The program will take full advantage of Richmond Football Club's state-of-the-art sports facilities and its alliance with Aligned Leisure (which manages the Tigers' health, fitness and leisure business interests).

Industry leaders including Richmond CEO Brendon Gale, club President Peggy O'Neal and Australian Diamonds Netball Coach Lisa Alexander will lead vocational training.

Aimed at students interested in coaching or other sporting careers, the program will also encourage greater links to tertiary education and provide much-needed business skills.

"The club has been amazing, with Brendon Gale working directly with the students. It's fantastic to have their support," Mr Glover says.

CALL FOR INDIGENOUS ALUMNI

As part of its broader Reconciliation Action Plan, Swinburne is reaching out to Indigenous alumni to form a mutually supportive network.

Professor Andrew Gunstone, Swinburne's Executive Director of Reconciliation Strategy and Leadership, says the plan, launched in 2014, has solid, measurable goals.

Forming closer ties with Indigenous alumni will ultimately strengthen the support Swinburne can offer them, he says.

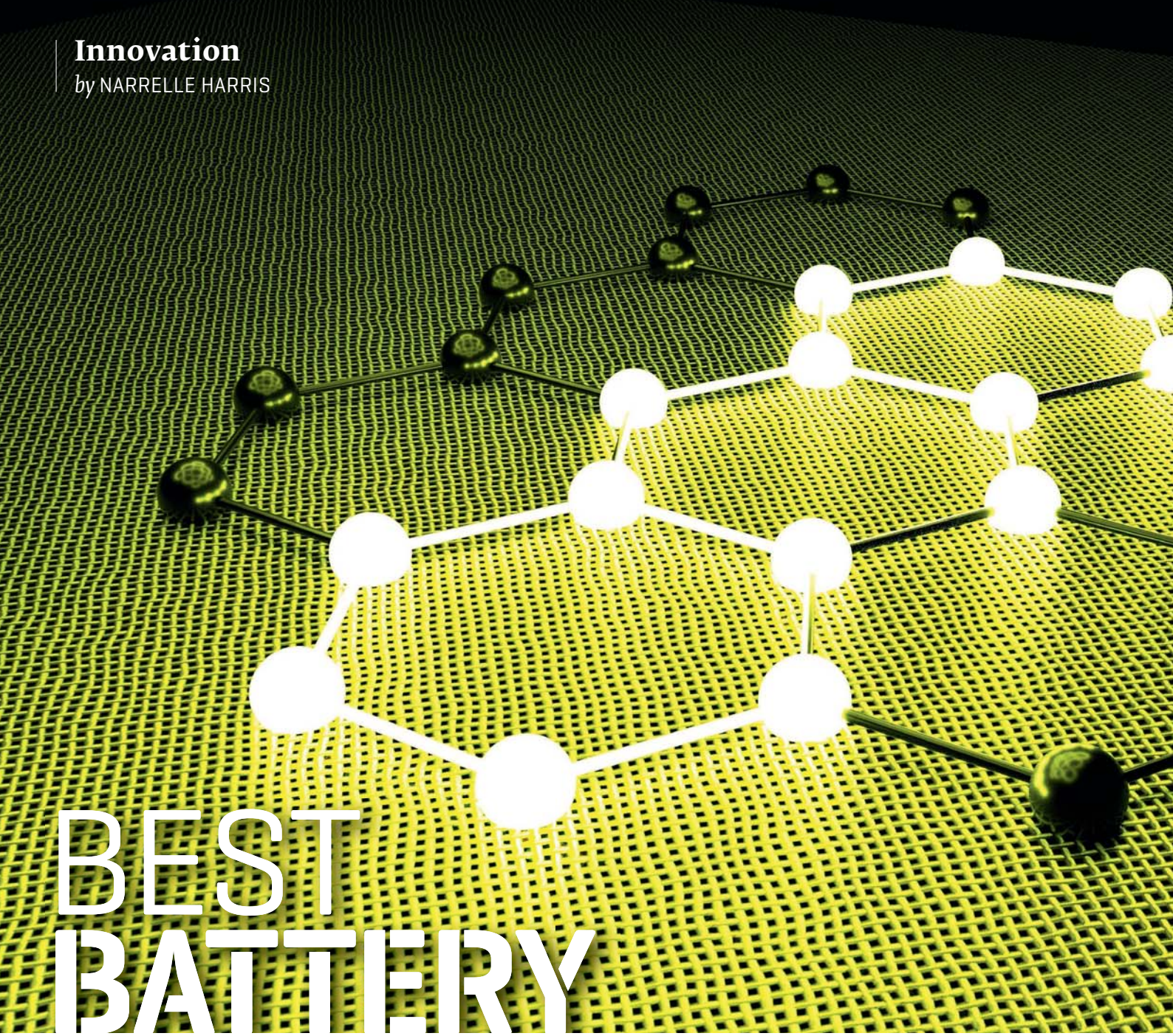
"Having an alumni network would help us connect with Indigenous people to say, 'this is what Swinburne is doing, you're welcome to come along'." This might include involving alumni in events such as the university's key Indigenous-focused public lectures, the annual Reconciliation Lecture and the annual Barak–Wonga Oration.

The network also will help to raise awareness amongst non-Indigenous alumni. "Universities have a great opportunity in helping reconciling the nation by turning out graduates who are culturally competent and knowledgeable about Indigenous issues," Professor Gunstone says.

alumni@swin.edu.au 03 9214 8705

PICTURED
Aunty Joy Murphy-Wandin *(top)* performs a Welcome to Country ceremony at Swinburne.

by NARRELLE HARRIS



BEST BATTERY FOR THE FUTURE

Breakthrough battery technology developed at Swinburne might change the way we live.

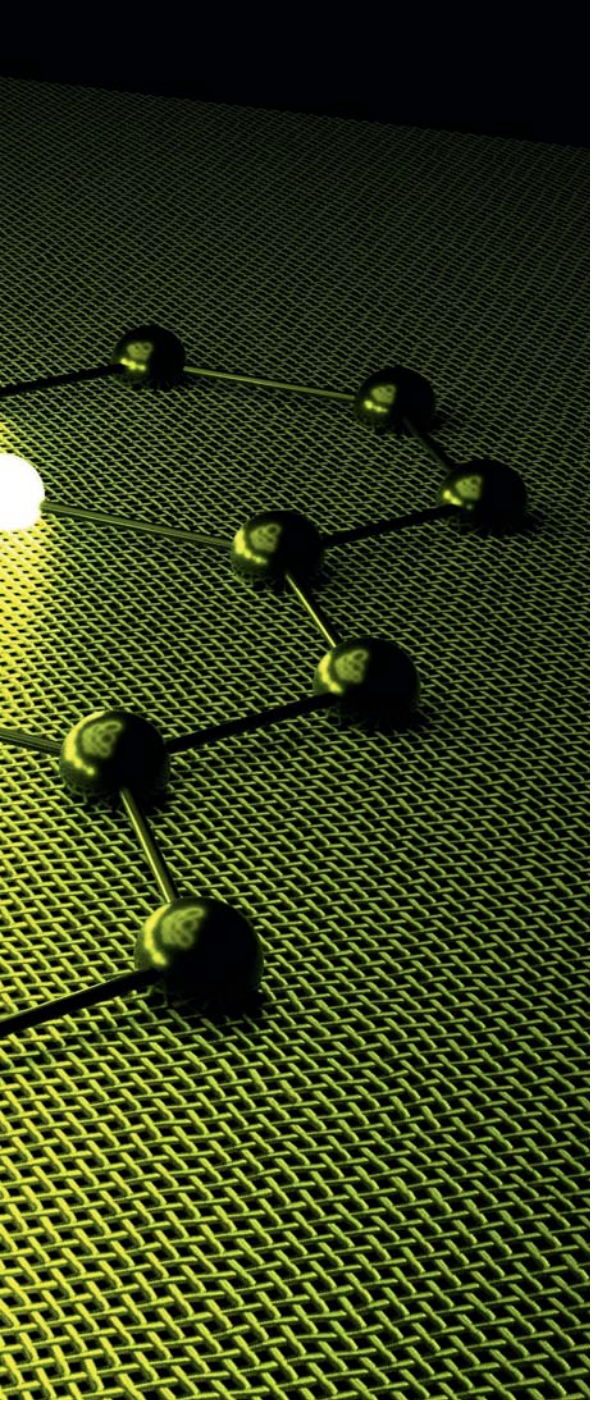
As exploding batteries in mobile phones, computers and headphones continue to make headlines, researchers at Swinburne's Centre for Micro-Photonics are one step closer to producing commercially viable, chemical-free, long-lasting, safe batteries.

Professor Baohua Jia and Dr Han Lin lead a team developing the Bolt Electricity Storage Technology (BEST) battery – a graphene oxide-based supercapacitor offering high performance and low-cost energy storage.

The technology could, according to one investor, make chemical batteries a thing of the past.

"The battery is very thin, it's carbon-based and it's environmentally friendly," Professor Jia says. "We filed a patent on the technology last year."

The technology is on the brink of becoming a commercial prototype.



Existing batteries generally can't store all the energy that a solar cell generates, so a proportion is wasted. The batteries have to be extremely large to store sufficient energy, and they can be damaged by fluctuations in the amount of sunlight being converted. They also have a limited lifetime, reduced by a cycle of charging during the daytime and discharging at night.

Chemical batteries, invented more than 200 years ago, are toxic to the environment. The chemicals degrade as they are used, producing spent, un-rechargeable batteries as waste products. Modern uses require batteries that charge and discharge quickly, too.

The BEST supercapacitor has an improved ability to quickly charge and discharge energy, and it can store significant power for longer. It's safer than current battery technology, as it is able to function without overheating or resulting in explosions or fires. The porous graphene surface stores charged atoms (ions) and moves them from one electrode to another.

"In this process, no ions are being generated or being killed," Dr Lin says. "They are maintained by charge and discharge, and are just moved around. Moving ions doesn't degrade the supercapacitor, so it can charge millions of times, in theory. Usually, a supercapacitor can work for at least 10,000 life-cycles."

That "in theory" is important. The efficacy of graphene oxide has been proven in the laboratory.

Energy & efficiency

For more on Professor Baohua Jia and other **Women in science,** see our special feature on page 15.

> **"The battery is very thin, it's carbon-based and it's environmentally friendly."**
>
> PROFESSOR BAOHUA JIA
> LEAD RESEARCHER

Investment in its development will soon be under way through Graphene Solutions, a joint venture between graphite miner First Graphite Resources (FGR) and Melbourne electronics company Kremford Pty Ltd.

The seeds of the BEST project were sown in 2015, with a $375,000 Australian Research Council Discovery Project grant for direct laser printing of thin films of activated graphene oxide. Graphene material is very porous, which gives it a hugely increased surface area on which to store electrical charge. The project aims to create a supercapacitor that could more efficiently collect, store and discharge the energy collected by solar cells.

"Our centre has a history of making very good solar cells," Dr Lin says. "But there's a challenge in storing the energy generated from them. Sunshine changes all the time, depending on the weather, and that makes the current and voltage unstable. That's no good for batteries."

PICTURED
Professor Baohua Jia *(left)* and Dr Han Lin *(right)* have filed a patent on the technology behind their supercapacitor battery.

by NARRELLE HARRIS

SWINBURNE RESEARCHERS ARE WORKING WITH INDUSTRY PARTNERS TO CREATE A COMMERCIALLY VIABLE **BATTERY FOR EVERYDAY USE.**

Making a commercial prototype is the next step.

Kieran Harford, of Kremford Pty Ltd, thinks that step is very close. "We're pretty sure we can hand-make a prototype within eight weeks," Mr Harford says. "But we need to be able to make it commercially."

On completion of the project, Kremford will own 40 per cent of Graphene Solutions; FGR will own the other 60 per cent.

"Warwick Grigor of Far East Capital has just raised $3.5 million for FGR, $2 million of which is earmarked for this project," Mr Harford says. "We'll be working with Baohua to make the prototype over a two-year period."

FGR issued a media release in March advising that due diligence on the BEST battery project had been completed on the science and facilities. Licence and co-operation agreements were signed at the end of May.

Kremford's electronics expertise will be key to the project. "Kremford has some ideas how to automate the process. It's early days yet, but we believe we can set up world-class manufacturing plants in Australia rather than offshore," Mr Harford says.

Further investment will be needed a few years down the track, but Mr Harford says battery and storage device businesses, or electronics and related industries, will be keen to get on board.

"A lot of people in the market are trying to do what we're doing. What's given us the advantage is Professor Jia and Dr Lin's innovations. If it comes out the way we're planning, we could get rid of chemical batteries from the environment. It's phenomenal."

> **"If it comes out the way we're planning, we could get rid of chemical batteries from the environment. It's phenomenal"**
>
> KIERAN HARFORD
> KREMFORD PTY LTD

A FLEXIBLE FUTURE

Graphene oxide has several properties that make it ideal for battery technology.

1. It can be produced in layers that are very thin and flexible.
2. It is easy and relatively cheap to produce via laser printing.
3. It's a clean-energy solution.

The Swinburne team has worked with graphene since 2012.

A thin layer of graphene film safely stores a large amount of energy. Creating several layers of graphene increases the surface area of the supercapacitor and the amount of charge that can be stored. **Ultra-thin graphene batteries** have potential to be used in many everday devices.

Graphene's flexibility means the supercapacitor could do everything from making solar, wind and tide-generated energy collection more efficient to replacing standard household batteries.

Dr Lin has been working on 3D laser printing of graphene material and is keen to expand its energy potential and **solve common problems** such as failing mobile phone batteries, too.

"Personal electronics are essential for our lives, and the energy consumption of personal electronics is huge; we hope to help people to maintain a high living standard, but to minimise both the impact to the environment, and electronic dependency," Dr Lin says.

Professor Jia says that light can be used to generate graphene sheets through laser printing, and that the result will be a **clean-energy solution**.

"This new energy storage device will give a really big push to the renewable energy industry because it provides a solution to balance the supply, and makes renewable energy reliable," she says.

She also says that, in the 21st century, all industries need to demonstrate that their technology is green.

by HARBANT GILL

Putty in their hands

A video game designed by Swinburne students has bounced and squished its way to success.

Laura Voss is not your typical gamer. She doesn't suffer the particular pain of numb thumbs and her list of crushes doesn't include video game characters. Well, maybe one.

Yet the Swinburne graduate has released her first video game, Putty Pals, which has recently caught the attention of PlayStation, Nintendo and Xbox. Negotiations are under way.

Ms Voss is the creative director of Melbourne's Harmonious Games. She co-founded the company in early 2016, aged 26, soon after graduating.

The team is made up of five of Ms Voss's Swinburne classmates, plus an artist. A Film Victoria grant helped develop the game.

Putty Pals launched this February on Steam, a global online portal for buying computer games. It was a "soft launch", to gather reviews to improve the game and get ready for the big time.

Ms Voss recently returned from the international Game Developers Conference in San Francisco, ready to join forces with the giants.

"It was an intense week for game developers from around the world, from the triple-As (big-name game companies) to the indies like us," she says.

"We had meetings with PlayStation, Xbox and Nintendo. We are looking to publish the game with them."

Putty Pals was Putty Party when it began as a final-year project, featuring "cute little faces" that look like animated emojis. A tornado has blown away the Pals and players work together to bounce, squish and fling them along narrow bridges, across ravines and through treacherous tunnels on the way home to Puttopia.

"We wanted to bring back the old way of playing games, that you'd laugh together, give each other high-fives, be physically together," Ms Voss says. "We've had loads of people who said they've wanted that again.

"I was adamant that there was no enemy. I wanted to show you can have a good game without killing or shooting. The most important thing is a good story."

Ms Voss credits her degree in Video Games and Interactivity and Psychology at Swinburne and her Deakin drama degree for her skill in engaging the player.

"My psychology side is about co-operation and communication, and the drama side asks 'how do we make this fun?'," she says.

"I love being part of good story-making and creating new experiences for people, like theatre does.

"I get the same experience from reading a good book ... it's the fascinating story where I cannot wait to find out what happens next.''

Ms Voss says her passion was inspired by growing up with two older brothers who were into games. "I wanted to prove that girls were just as good. I did," she says.

PICTURED

Laura Voss says storytelling and creating new experiences have driven the success of video game Putty Pals.

by JANE CANAWAY

ROBOTS PROGRAM PEOPLE

Human impersonators are effective motivators for people of all ages.

As interactive, 3D models that reward students' coding efforts with a physical response, robots have proved to be excellent teaching aides.

Swinburne senior lecturer and robotics expert Therese Keane has another reason for choosing NAO humanoid robots as teaching aides though: they're cute.

"We also work with LEGO robots – you still program them and they move, but they don't have that cuteness factor, or arms and legs that move like a human," she says. "With humanoid robots, you don't have to build anything; you start programming and get right into it."

Dr Keane, who is Deputy Chair of Education at Swinburne, is part of a team researching the use of humanoid robotics in education. The team has been tracking the success of two humanoid robots being shared by independent schools in South Australia.

"We've been looking at how each school integrates them into the curriculum, how teachers work with them and how the students interact," Dr Keane says.

"The students have wanted to connect with the robot, treat it as a friend or classmate, because these humanoid robots change eye colour, they move their arms and legs, they stand like a human, they sit like a human."

Students as young as four draw storyboards to work out what they want the robots to do. A rural school with a significant percentage of indigenous students has used the robots to teach traditional language skills.

"Aboriginal and non-Aboriginal students worked with humanoid robots to develop their programming skills and their understanding of the Narungga language and culture," Dr Keane says.

"By looking at how the robots have been used in different schools, we've come up with a model called the 4plus4 model. This was developed by investigating how humanoid robots integrated into the classroom and the common themes that emerged: curiosity, challenge, collaboration, communication, critical thinking, creative thinking, computational thinking and coding."

Dr Keane would love to see the humanoid robots rolled out to all states and schools, but funding is an issue.

"Programming is a skill just like literacy and numeracy; students need it to stay relevant in a knowledge economy."

DR THERESE KEANE
SWINBURNE SENIOR LECTURER AND ROBOTICS EXPERT

HUMANOID SOLUTIONS

A HUMANOID ROBOT programmed to dance is a key component of Dr Sonja Pedell's work seeking more holistic solutions to aged care.

Dr Pedell is the director of Swinburne's Future Self and Design Living Lab at the Centre for Design Innovation. "My research concerns enhancing the quality of life for older adults," she says.

"We're exploring the benefits of using technology with older adults and seeing what it can do to enhance the quality of life and enhance social interaction."

Dr Pedell, also department research director for the university's Department of Communication Design and Digital Media Design, says the work is part of a broader goal to ensure people are living well, not just living longer, and providing advocacy to shift how ageing is perceived.

Dr Pedell and her team introduced the robots to activity group sessions so participants – older adults living with dementia – could choose whether to associate with them. The robots were trained to mimic the group's exercises and dances.

"People copied the robot and there were little social interactions – it made it more like a naughty little child," she says, adding that the knee-high robot was purposefully cute and had been personalised, with a name – Kira – and a Twitter account.

Dr Pedell found older adults enjoyed the interactions and looked forward to Kira's visit, with some in a knitting group even making clothes for "her".

"We found it worked really well, in that they were not a threat to older adults or staff; instead they became an engaging mechanism."

However, she sees the robots more as entertainment than alternative carers.

"It certainly doesn't replace people on a social level," Dr Pedell says.

> **"People copied the robot and there were little social interactions – it made it more like a naughty little child."**

DR SONJA PEDELL
DIRECTOR OF SWINBURNE'S FUTURE SELF AND DESIGN LIVING LAB AT THE CENTRE FOR DESIGN INNOVATION

PICTURED
Dr Therese Keane and Dr Sonja Pedell with two Nao robots

by JANE CANAWAY

NAO revolution

NAO *[pronounced now]* is a humanoid robot developed in France.

NAO robots have:

25 degrees of freedom
These are its movement points

Four directional microphones
These detect sounds

Voice recognition
Text-to-speech capabilities

Nine tactile sensors and eight pressure sensors
Help maintain balance and bearings

Two cameras
One scans the horizon, while the second scans the immediate surrounds

Able to track and learn
They recognise images and faces

PICTURED
Dr Therese Keane with a NAO robot

"We'd like to see if there are more affordable technologies that might provide similar learning outcomes," she says.

Dr Keane is the Victorian Tournament Director for the FIRST (For Inspiration and Recognition of Science and Technology) LEGO League, which Swinburne hosts each November, attracting more than 300 students.

She is also a lead mentor with the RoboCats – an all-girl team of secondary school students who built an industrial robot for the international FIRST Robotics Competition.

The RoboCats took its 50-kilogram creation to compete against about 40 other teams in Sydney and won the 2017 South Pacific Championships. Dr Keane was awarded the Woodie Flowers Award for mentorship and the team will compete in Houston, Texas, later this year.

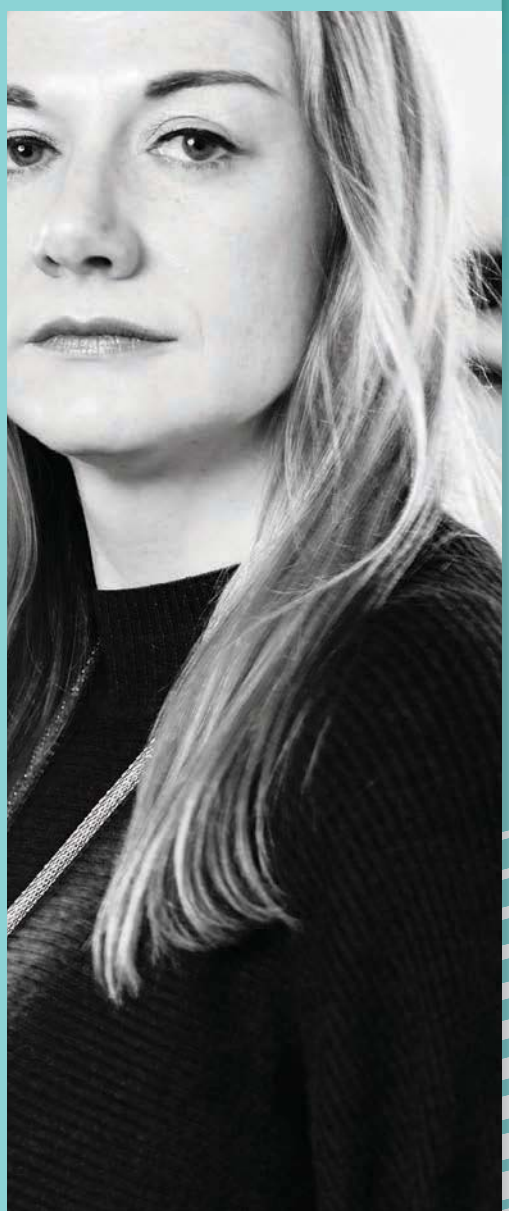
"Swinburne's Innovation Precinct and the Faculty of Health Arts and Design and Faculty of Science, Technology and Engineering are major sponsors of the team, alongside sponsors such as Ford, BAE Systems, Invetech, Boeing and Salesforce," Dr Keane says.

Extending the range of robotics teaching is a goal close to Dr Keane's heart. But, as an innovator in the field, she is wary of moving too quickly and oversimplifying the topic.

"Recently I've been appointed chair of the ICT Educational Committee with the Australian Computer Society. We're bringing out a program to help teachers because some are struggling to teach digital technology.

"Programming is a skill, just like literacy and numeracy; students need it to stay relevant in a knowledge economy," Dr Keane says.

To see NAO robots performing Born In The USA go to:
youtube.com/watch?v=ckDXsgwHUX4



WOMEN IN SCIENCE

These researchers are leaders in their fields and shine a light for the next generation to follow.

Creation leads to innovation

Women have a natural advantage in the sciences, this leading researcher says.

by IAN MUNRO

Multitasking is an asset to crafting a career in science, research psychologist Professor Susan Rossell says. Successful multitasking offers researchers the capacity to pursue "long-shot" projects while simultaneously following more mainstream paths of inquiry.

"I don't think there's any question that women are better multitaskers than men, so we can have slightly off-beat, innovative ideas," Professor Rossell, the Director of Swinburne's Centre for Mental Health, says. "I know many incredibly creative men in science, but I think women are a little more creative.

She adds, though, that a mix of male and female researchers enhances cohesion in the laboratory.

"Males can get very competitive with each other. Women who stay in the lab are competitive, too, but I think we are a lot more collegial."

Professor Rossell is a neuropsychologist whose work mapping the brains of subjects with schizophrenia has her exploring what she calls "one of the great enigmas". Through neuro-imaging she has established that the voices often experienced by sufferers of schizophrenia generate the same brain activity as external sounds: in other words, they are not the imagined experience they were once thought to be.

As well as investigating genetic links to mental illness, Professor Rossell is pursuing a promising lead that suggests certain types of memory loss might be the "biomarker" that could predict the onset of schizophrenia.

This work is now possible with Swinburne's imaging equipment, which includes a magnetic resonance-imaging scanner and a magnetoencephalography (MEG) unit, one of only two in Australia. The MRI offers a clear picture of the brain's anatomy and its responses to stimuli, albeit with a time lag, while the MEG shows the brain's electrical activity in real time.

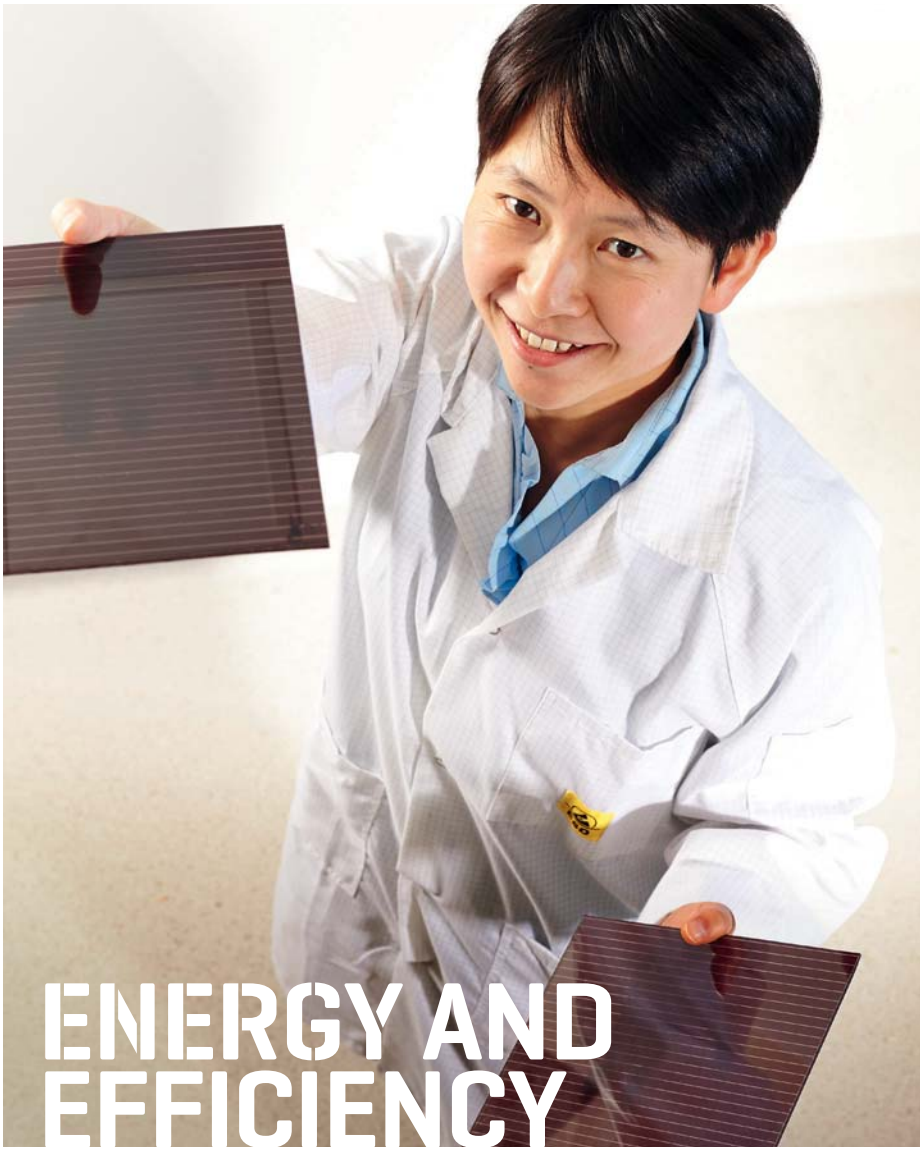
> **"I advise all my students to double train as clinicians so that they have a back-up plan."**
>
> PROFESSOR SUSAN ROSSELL
> DIRECTOR, SWINBURNE'S CENTRE FOR MENTAL HEALTH

Used in conjunction, they offer an accurate picture of the brain's anatomy complemented by the overlay of its activity.

"That was the first 10 years of my research profile: ways of understanding the brain in action. Now we are using it more to assist us with developing our interventions for different treatment protocols," Professor Rossell says.

She says her career has shown her that the measures of success in science — such as the frequency of publications and attendances at conferences — sometimes work against women, whose progression might be interrupted by starting a family. After that, resuming a career in research is problematic.

"I advise all my students to double train as clinicians, so that when it gets really hard as a researcher you have a back-up plan," she says. "I advise my male students to do the same thing, but I really do emphasise it with my female students."



ENERGY AND EFFICIENCY

Talent ignited the spark for this optics researcher. Planning and smart-thinking have lit the way.

by LUCINDA SCHMIDT

When Baohua Jia started her first postdoctoral job a decade ago, she found the demands overwhelming. She was leading an international project based at Swinburne's Centre for Micro-Photonics, co-ordinating 20 researchers across nine universities. And she had a one-year-old daughter.

"I was struggling and thinking about quitting my current profession to find a job that allowed me to better look after my family," says Professor Jia, whose husband is also a full-time researcher at Swinburne.

Instead, she asked a dozen high-achieving female scientists how they managed the juggle. The answer was planning.

These days, Professor Jia prepares a detailed annual plan each December, covering tasks such as team building, priority projects and grant applications.

Each week, she reviews how she's tracking against the plan and she wakes at 4.30am on workdays to prepare an action list for that day.

"If I do things efficiently for some time, I will book a trip with my family," she says. My positive attitude helps me to solve this problem and continue working in my beloved research and look after my family."

Chinese-born Professor Jia migrated to Australia in 2002, after majoring in physics and optics at Nankai University. Her love of physics was ignited in high school, when her teacher showed the class how simple the questions were on an exam that most of them had failed.

"He told us the reason we failed was because we believed it was so hard we couldn't pass," she says. "It was a new way of thinking for me; don't try to find the hard way, use instinct and common sense and the answer can be very simple."

Professor Jia's interest in optics was also fortuitous. A mentor urged her to focus on the area, predicting its rise in importance because it is about light and light is energy. She took the advice and completed her PhD in optics at Swinburne in 2006.

Since then, the hard-working Professor Jia has co-authored more than 200 articles and conference presentations and her groundbreaking research has generated more than 500 media reports globally. In the past decade, she's scooped 30 awards and grants, including a prestigious L'Oreal Australia for Women in Science Fellowship in 2012.

That there are female-only awards is a benefit for women scientists, she says. Plus, there is now a much greater awareness of issues facing women in science, as well as support groups such as SWAN (Swinburne Women's Academic Network).

"As long as you love it, it is worth the extra effort. If you are able to prioritise and work efficiently, you will find the way," Professor Jia says.

> **"As long as you love it, it is worth the extra effort … and you will find the way."**
>
> PROFESSOR BOAHUA JIA
> RESEARCHER CENTRE
> FOR MICRO-PHOTONICS

THE FUTURE HAS WINGS

The tiny seeds of trail-blazing nanotechnology research were sown half a world away.

by CATHY GOWDIE

When Elena Ivanova travelled from Russia to Australia in January 2001, she brought with her an international reputation, an impressive publishing record and her unique collection of marine bacteria, amassed over almost two decades.

"The collection is priceless to me," she told a Melbourne newspaper at the time. "Naturally it was never destined for the luggage hold and travelled business class with me in a specially designed container as part of my hand luggage."

The arrival of Professor Ivanova, a Russian-born and educated microbiologist who had worked in the US and Japan, was a coup for Swinburne.

Professor Ivanova, who was based in Vladivostok, had, among other important discoveries, identified ways in which marine bacteria behaved differently depending on the kinds of surfaces to which they were attached. She saw potential for applications in areas as diverse as medicine, manufacturing and shipping – if she could work further with people who had the right knowledge and skills.

When she was offered a permanent position at Swinburne's then Industrial Research Institute, where she could continue her work in biodiversity and marine microbiology, she knew she would be able to branch out into the fascinating and rapidly developing field of nanotechnology, the study and application of things smaller than an individual cell.

It was in some ways an unexpected shift across the globe, but the move into an interdisciplinary environment has produced many breakthroughs and successes. For Professor Ivanova, the most significant has been the discovery in 2013 of nanostructured surfaces capable of killing bacteria. That development came out of her team's study of the antibacterial properties of insect wings.

> **"Swinburne's great strength is that we have time to dedicate to our students."**
>
> PROFESSOR ELENA IVANOVA
> FACULTY OF SCIENCE, ENGINEERING AND TECHNOLOGY

The research, by the team in Swinburne's Faculty of Science, Engineering and Technology, has implications for antibiotic-free medical treatments and can be used in materials including silicon, glass, metals and ceramics.

"With colleagues, we are looking forward to commercialisation of our antibacterial surfaces to allow an antimicrobial nanosurface to be engineered onto existing medical devices, including implants," Professor Ivanova says.

The team she leads is also working with steel producer BlueScope to improve the performance of its well-known Colorbond product range.

Professor Ivanova has remained a lifelong student. In 2008 she added a Juris Doctor from the University of Melbourne to her already long list of degrees, honours and awards; her CV includes a Bachelor of Science from Vladivostok State University, a PhD from the Institute of Microbiology and Virology in Ukraine and further postgraduate qualifications from Belgium and Russia.

Although research remains her focus, she continues to teach, and says this attitude to giving back and sharing knowledge is a key part of Swinburne's success.

"I think what is Swinburne's great strength is that we make time to dedicate to our students," she says. "I am now more involved with postgraduate students, but we see that at all levels. We attract students because we can provide that level of attention."

A rich life

This passionate professor treks the globe digging for vital climate clues in rocks and fossils. Now she has her sights on a dig in South Gippsland.

by DOROTHY COOK

When Patricia Vickers-Rich was four, her uncle built her an elaborate cubby house.

The expectation was that young Pat would add a family of house-proud dolls.

Instead, she adorned its shelves with bottles of dead insects.

Professor Rich grew up in near poverty on a California farm. "We didn't know from one year to the next whether we would have enough money to get through," she says.

But this virtual self-sufficiency made her close to the land. Her childhood memories are of fishing for salmon, hunting deer for food and watching the world around her.

"I was interested in rocks and soils, and raising and observing animals, how they reacted to certain things."

Professor Rich, now 72 and a professor of paleobiology at Swinburne University, still gets excited talking about dirt and the secrets it yields. Her areas of expertise are ancient avifauna (bird fossils), polar dinosaurs, some of the Earth's first animals and how they have been affected by climate change.

She has written more than 20 books and 200 research papers, organised global exhibitions and travelled the globe to dig for fossils.

Driving this prodigious activity is a burning curiosity to understand life on Earth, and to communicate that science to young people and the public.

Professor Rich founded and directs PrimeSci!, a science hub aimed at primary and secondary school students. It moved to Swinburne's Wantirna campus earlier this year.

She also mentors young researchers such as Swinburne's Dr Stephen Poropat, who is focussing on "big" dinosaurs, mainly the Australian Cretaceous sauropods.

Professor Rich has funded much of her own research and is donating dinosaur casts worth $1 million to a new Queensland museum.

Now she is seeking $800,000 in funding to dig for dinosaur bones in Koonwarra in South Gippsland.

"In that region there are sediments representing an ancient cold-water lake more than 120 million years old," Professor Vickers-Rich says.

"We know those sediments are absolutely full of ancient fish, and insects, all kinds of stuff, but we're really wanting to dig more there in search of the tiny mammals and maybe even some feathered dinosaurs."

"We would like to source funding to excavate the remains of this ancient lake and expose it so that a regional museum can be built over it."

If the Koonwarra dig goes ahead, it would be the first of its kind in Australia, combining the expertise of 25 international scientists for four months. The buried Gippsland lake is similar to one in Jehol, China, which attracts thousands of tourists each year.

It's an amazing feeling, Professor Rich says of finding the fossilised remains of an ancient creature, "because you know you're the first human to see them".

"From this data, the real point is to understand how things have changed over the millions, billions of years and the causes for that change.

"That has true relevance to our work on fossils – crafting the future well, based on what we know about the past."

PICTURED
Patricia Vickers-Rich has discovered a dig of international significance on the site of an ancient lake in Victoria.

> **"... the real point is to understand how things have changed over the millions, billions of years and the causes for that change."**
>
> PROFESSOR PATRICIA VICKERS-RICH

Women in STEM

To learn more about supporting Women in STEM at Swinburne please visit

swinburne.edu.au/giving/women-in-stem

by PETER WILMOTH

Woman of measure

Leonie Walsh has long been a role model for women in non-traditional science careers.

Leonie Walsh sees many more women in science today than in the early stages of her career. "I didn't have my first female manager until I was 40," Dr Walsh says. "I had a number of female peers in the United States but I really didn't interact with professional women for long periods of my career."

The former Victorian government lead scientist and one of Swinburne's most successful science alumni says much has changed. "Now I see a mix of highly capable women coming through. I spend a higher proportion of my time around professional women. I see that they are quite resilient, determined and willing to take risks," she says.

"The young ones I see in the start-up space have a lot of self-confidence. Also, they have empathy and a willingness to support others in the professional female community."

As an advocate for science as a career path, Dr Walsh notes there is a need for a multifaceted approach to attracting more women into STEMM – science, technology, engineering, mathematics and medicine.

"You have to approach it at the earliest parts of the education system, even in early childhood development, programs that feed on each other throughout the education system," she says. "It's about getting to the parents and teachers and being able to improve communication on the opportunities and potential for young women's careers."

Dr Walsh's interest in science began when she was seven and conducted science "experiments" in her bathroom, mixing shampoo, hair oil and talcum powder to see what happened.

Her interest was encouraged at Mildura Technical School in northern Victoria where she thrived in discovering how work in the laboratory could be applied to our daily world.

Dr Walsh says she found a similar learning environment at Swinburne. She was attracted to the university because of its strong science and engineering courses, and also saw the career advantages of an internship as part of her Applied Science degree.

She notes that Swinburne had excellent connections with multinational companies, including GlaxoSmithKline and, significantly for her, Dow Chemical. "Swinburne offered a co-operative degree that meant that halfway through your education you'd spend a year in industry," she says.

On completion of the degree, these companies scouted students for career placements. "It was at that career session that I was exposed to Dow Chemical," she says. "The relationships that Swinburne has with industry are incredibly valuable for graduates."

Dr Walsh graduated with a Bachelor of Applied Science degree in 1981 and accepted an offer from Dow as a graduate chemist. "Most graduates ended up in the lab; I was more customer-focused," she says.

"It's about getting to the parents and teachers and being able to improve communication on the opportunities and potential for young women's careers."

DR LEONIE WALSH
FORMER VICTORIAN LEAD SCIENTIST

PICTURED
Dr Leonie Walsh says she sees strong young women entering science, technology, engineering, maths and medicine (STEMM).

Her role at Dow, based in Altona in the early 1980s, was in development for products that included tile adhesives, non-woven nappies and latex-modified concrete for roads.

"It was a fabulous training ground," she says. "You'd go out and explore an opportunity with a company, you'd come back, tinker a bit in the lab and return the product to the customer."

From 1998 to 2002, while working with Dow in the US, Dr Walsh was part of a team that created the first elastic fibre out of polyethylene. "They had a breakthrough in the catalyst technology, meaning you could make plastics but tailor the properties, design them to model the reaction and specifically design what you wanted out of that plastic," she says.

She returned to Australia in 2002, becoming the first female president of Australasian Industrial Research Group in 50 years, she took on roles focusing on industry and academic collaboration, and was nominated as a Fellow of the Academy of Technological Sciences and Engineering.

In 2013 she was appointed as the Victorian government's inaugural lead scientist, liaising between academia, business and government.

Reflecting on her career, Dr Walsh credits strong relationships with role models and mentors for her success.

John Ralston, one of Australia's top colloid scientists, motivated her to do a graduate diploma in colloid science (a combination of chemistry, physics, nanoscience and more). His successor, Ian Harding, challenged her to do a Master's degree, she says.

And Alexander Gosling, who sits on Swinburne advisory boards, was "always nudging me to take on roles I don't think I'm ready for or too busy for. He has been responsible indirectly for some of my most significant career progressions".

Dr Walsh was awarded an Honorary Doctorate (HonDUniv) from Swinburne this year for contributions and leadership in scientific enterprises, innovation and the community. Now she has been able to give back to those who supported her as she progressed.

"In my role as an ambassador for Women in STEMM Australia (a non-profit organisation founded in 2014), I am fortunate to have the opportunity to work as a role model and mentor and contribute to other young people's careers," Dr Walsh says.

A CAREER IN APPLIED SCIENCE

1981
Graduated with a Bachelor of Applied Science degree from Swinburne

late 1990s
Worked with Dow Chemicals in the US and helped develop the first elastic fibre out of polyethelene

2002
Became President of Australasian Industrial Research Group

2013
Appointed as the Victorian government's inaugural lead scientist

2017
Honorary Doctorate awarded from Swinburne

Bringing families together

A new program is supporting the families of people with mental illness.

A win for Carla McEnery is a win for the community. The provisional psychologist and PhD candidate at Swinburne recently won a prize in the university's first online Ideas Jam to help improve the way we live.

Her idea? To launch a program to train and support family and friends who are looking after someone with mental illness.

"We see family members dropping off or picking up the individuals who come to our Swinburne Psychology Clinic and I started asking 'who is looking after these people?'," Ms McEnery says.

"The experience can be devastating for family members. And there is good research to suggest that if you extend services to family members, it can improve the individual's long-term recovery."

The clinic is Australia's largest student-led psychology centre and has been running for more than 20 years. With its support, Ms McEnery is developing a group program that will be launched in mid-2017.

Her focus is to support family members and carers of individuals with schizophrenia-related conditions. "We require more programs in Victoria that cater for that niche," she says.

"There are still so many misconceptions and shame around schizophrenia and so much work needs to be done around that."

Ms McEnery has been a leader throughout her career. She was soaring in the corporate world in her native Ireland when she decided to switch to psychology.

Her main impetus, she says, was a family member's experience with mental ill health and wanting "to do something meaningful with my life".

"I saw the process of assessment and stigmatisation of being labelled with a mental illness and I saw how that affected his identity and my wider family members," she says.

Ms McEnery enrolled in a Bachelor of Psychological Science at La Trobe University and won several academic awards before scoring first-class honours.

Any university would have snapped her up at that stage. She chose Swinburne for its "unique capacity for making bridges between research and the extended community, for making a social impact".

Her idea has already caused ripples, here and overseas.

"The day after I won, I got so many private messages from people that I never knew had loved ones who experienced mental ill health," she says.

"Communication is half of it. It can be difficult to share your story because of shame or stigmatisation. Just offering the service has been enough for people to open up.

"Even people in Ireland felt they could tell me about their very personal issues, the struggles of feeling powerless.

"A lot of the time people are not given the tools to cope. So a good part of the therapy will be sharing lived experiences. That will be incredibly important."

Minders

An estimated **240,000** Australians care for an adult living with a mental illness; **14.7%** of carers are young people, under the age of 25.

ABOUT SCHIZOPHRENIA

Schizophrenia involves alterations in brain structure and function. Research suggests it might be a developmental disorder resulting from alterations in the maturation of the nervous system.

Approximately **1 in 100** people in Australia have or will develop schizophrenia.

Schizophrenia ranks among the **top 10 causes** of disability in developed countries worldwide.

Onset is typically between the ages of **15 and 30** with **genetic factors** involved in the causes of schizophrenia.

Up to 50% of people with schizophrenia attempt suicide.

Source: Schizophrenia Research Institute

by JOHANNA LEGGATT

STORIES FROM THE LAND

Farmers touched by rural suicide have come together to share and heal.

When the group of farmers arrived at Swinburne University of Technology's Hawthorn campus late last year, they were quiet and withdrawn.

All 12 had been touched by rural suicide and the university campus was a long way, physically and emotionally, from the world of commodity prices and dam levels.

"By lunchtime, however, they had really opened up and everyone was talking to each other," Valentina La Piana, Swinburne's Manager of Screen and Media, says.

"They realised that they weren't alone, that other people had felt that desolation as well."

The three-day digital storytelling project aimed to forge connections between farmers, show the pervasiveness of suicide in the bush, and explore the way isolation and depression can be a powder keg in rural communities.

The project was a joint venture between Swinburne and the National Centre for Farmer Health (NCFH). It involved each farmer creating a digital story to be shared with others who have been touched by suicide.

Selected stories have been uploaded to the NCFH website, The Ripple Effect. They can be accessed by other farmers when they log in and share their own story.

Ms La Piana says she was surprised by how many participants used their own voices for their digital projects.

"Digital storytelling involves many techniques to tell a story, such as text or images, but many of them wanted to use their own voice," she says.

by JOHANNA LEGGATT

"We have this preconception that farmers are stoic and hard, and when times are tough they simply soldier on. But they're only human."

VALENTINA LA PIANA
MANAGER OF SCREEN AND MEDIA, SWINBURNE

"It was almost as if speaking the words, saying out loud what occurred, was what needed to happen. There was one participant who had not shared his story for 20 years."

Ms La Piana says the project helped to broaden the way farmers viewed themselves.

"We have this preconception that farmers are stoic and hard, and when times are tough they simply soldier on," she says.

"But they're only human. And we needed to redefine what a farmer is, to bring them back into the fold. They face all sorts of pressure with regards to weather, economics and things that don't even come into our consciousness."

But, most of all, the project helped foster one of the big panaceas for suicide: connection with others.

"It validated what they were feeling, and I think that peer-to-peer support is really important," Ms La Piana says.

"There is a stigma attached to suicide and this is overcome by voicing their stories, by making these things known."

At the end of the project, Swinburne staff and the farmers gathered together to view the digital stories in succession.

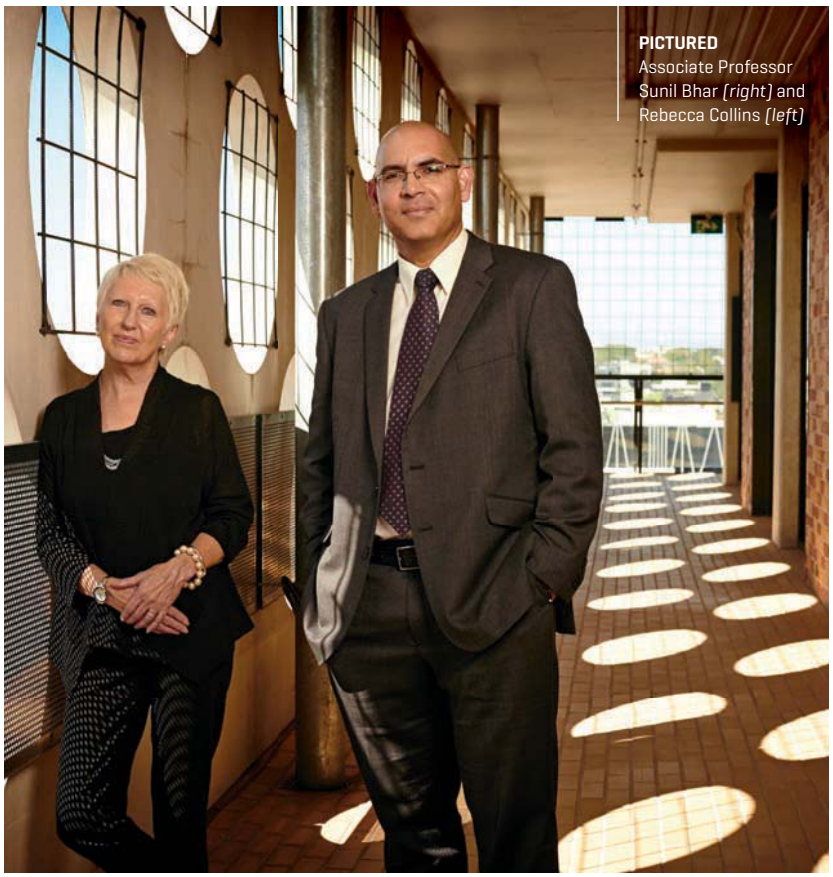
"The screening was quite a cathartic experience," Ms La Piana says. "There were people crying, but it was mainly very healing and empowering."

The impact on the farmers was clear. "You could really see them change, it was visceral," Ms La Piana says. "It was a physical transformation as well. Their faces changed, they softened."

Such was the success of the project, Ms La Piana's team is planning a second digital storytelling workshop in June — this time focusing on suicide in young rural residents.

For more information, visit **farmerhealth.org.au/page/research-centre/ripple-effect**

PICTURED
Valentina La Piana (centre front) with members of Swinburne's Screen and Media team who worked on the digital storytelling project.



PICTURED
Associate Professor Sunil Bhar *(right)* and Rebecca Collins *(left)*

A BRIDGE ACROSS THE YEARS

Aged-care residents and students build a deeper understanding.

Each year, a special connection is forged in aged-care facilities across Melbourne.

Twelve psychology students from Swinburne, usually aged in their 20s, are paired with aged-care residents, whom they visit weekly or fortnightly.

Sunil Bhar, Associate Professor of Psychology at Swinburne, helped establish the project almost three years ago. He says students must commit to spending one year with their resident and produce a three-minute digital story at the end of the year. The story highlights the life of the resident based on images and information they have provided.

"It's kind of like the show, *This is Your Life*, but it goes for three minutes," Associate Professor Bhar says.

"It's about showing the true essence of the individual and what has been important in their lives.

"The stories also become a frame for a deeper friendship that occurs between the resident and the student, and many students continue the friendships after they have made the digital story."

Associate Professor Bhar, and his colleagues, Rebecca Collins and Mark Silver, run the program through the Wellbeing Clinic for Older Adults, a counselling service established seven years ago. The digital storytelling project was developed in response to resident feedback.

"Some residents did not need counselling – they just needed a friend to talk to," he says.

"Older people often don't want to spend time with just older people, and even though there is an age gap, they always find something in common with the younger students.

"The digital storytelling format gives the friendship between the student and the resident a structure, a place to start," he says.

"Furthermore, a lot of staff in aged-care facilities do not have English as their first language so a digital story is much more feasible for them to watch and it gives them an insight into the residents in their care."

Associate Professor Bhar says the program will be expanded next year to include volunteers from the general community, as well as university students.

by STEPHEN A RUSSELL

A ROARING SUCCESS

Garth Davis breaks Australian records with debut.

It's no understatement to say that Swinburne alumnus Garth Davis's rapid upward trajectory has been incredible. His debut feature film *Lion*, starring Dev Patel as real-life figure Saroo Brierley, has captivated audiences worldwide.

Lion was nominated for six Academy Awards and four Golden Globes. Mr Davis also won the Directors' Guild of America's Outstanding Directorial Achievement of a First-Time Feature Film award.

The film tells the true story of a young boy who gets lost in India. He is adopted by Australian parents and, many years later, finds his birth mother, against all odds.

It also stars Nicole Kidman, David Wenham, Sunny Pawar and Rooney Mara and is knocking at the door of *Crocodile Dundee*, leap-frogging over *Mad Max*, to make it into the top five domestic best sellers.

But filmmaking was not Mr Davis's original path. He studied graphic design at Swinburne, receiving his Bachelor of Design (Hons) in 1995. "Swinburne changed my life, it really did," Mr Davis says.

"I came from Queensland when I was 17 and started uni at the Hawthorn campus and it was the most incredible course," he says. "My beautiful life-drawing teacher Patsy Blair, who taught me fine arts and my photography teachers ... just being able to work with such beautiful artists. It was such a deep course, so thorough in its understanding of design and art. It was just extraordinary and it shaped my understanding of everything. Denise Whitehouse, our art history teacher, was a legend. It was an extraordinary treat to go to that university."

It was while he was studying graphic design at Swinburne, that Mr Davis was first exposed to filmmaking. "I was directly opposite the film school and I loved seeing the film students hanging out, making their films. That was great fun," Mr Davis says.

"I never really thought about doing films. It was actually when computers came into design, and I found that incredibly stifling, that I started mucking around with film cameras."

After Swinburne, Mr Davis took a year off and travelled to Italy to pursue his passion for painting.

He cut his filmic teeth directing award-winning TV commercials including the Nocturnal Migration campaign for beer Toohey's Extra Dry, which featured a herd of deer storming a city on a grand night out.

Mr Davis, who lives in Melbourne with his wife and three children, has completed his second feature, the biblical epic *Mary Magdalene*. It is in post-production and slated for release later this year.

PICTURED
Garth Davis says he became fascinated by filmmaking during his design studies at Swinburne.

LION
A FEATURE DEBUT

LION TELLS THE TRUE STORY OF LOST INDIAN BOY SAROO BRIERLEY WHO USES **GOOGLE EARTH** TO HELP FIND HIS CHILDHOOD HOME.

Based on the novel, *A Long Way Home*, by Saroo Brierley

Grossed more than $126 million worldwide

Received six Oscar nominations at the 89th Academy Awards

Released in Australia on January 19, 2017

Australian box office record of $4.2 million in its first week

Filmed in Kolkata, India; Hobart and Melbourne

Photography: Mark Rogers; courtesy Screen Australia

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- Valuable links with industry that connect you to the real world.

It's just a matter of choosing the qualification that suits the future you can picture.

Dale DeSilva
Studying Computer Science

KNOWING

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