

CAREERS WITH STEM™

DOUBLE ISSUE
FLIP FOR
APPRENTICESHIPS
& TRAINEESHIPS

ENGINEERING

GRADUATE
ENGINEERING
TEAM



5
grads changing
up the bank p10

Join the robot
revolution p22

6
fastest
growing
engineering
careers p6

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ECU ranked 151-175 for Engineering (Times Higher Education 2021)



MAKE YOUR OWN WAY

Carly Wehbe found her own path into engineering and made it better for others along the way

In high school, I had no idea what I wanted to do when I grew up, apart from being an actor! Then at 19, I realised I just couldn't see myself acting for the rest of my life and walked away. I then dabbled in floristry, diving and telemarketing for tech parts! When the company I was working for needed someone to support the implementation of a new contact management system, I put my hand up, and literally fell into IT.

From there I did one project after another, always saying yes to whatever came up. Within 10 years I was managing multi-million-dollar projects and still learning on my feet.

Managing big projects and working with engineers was my skill set. But while my career moved from strength to strength, I faced huge personal challenges after being diagnosed with cancer. It was a rough couple of years, and changed my way of thinking about the work choices I was making. Who exactly was I growing up to be? I decided from then on my work couldn't just be about earning money – it had to be about people.

I found the Commonwealth Bank of Australia (CBA), and was lucky enough to get a manager who was passionate about culture. I realised that there was an opportunity for a role putting the emphasis on people, rather than just the project or the product... and my manager said go for it!

People at the heart of engineering

I went into this new role with an attitude of listening and heard that people who are skilled technically aren't always good at leading people. So, over time working with a diverse group of leaders at the bank, we landed on a model where we support leaders to invest in the success of the individual, which also benefits the team and the organisation.

As Head of Systems Engineering, I create frameworks and processes to enable engineers to have numerous pathways through work. Anybody can be an engineer and learn the technology, but I have found that as a society we don't spend enough time investing in the more 'human skills'. For example, working with people, problem-solving and critical challenge are some of the core skills our engineers need to learn.

CARLY WEHBE
HEAD OF SYSTEMS
ENGINEERING



I'm extremely passionate about investing in the 'human' side of engineering. We need that diversity of thought and to humanise what we're doing. In 10 years' time, AI will be able to do many of the core tech roles of today – but it won't be able to do the human side of things.

Engineering is critical to everything. From the automatic soap dispenser in the bathroom to the app you use for banking, everything involves engineering. And if we don't get the best people into engineering, we won't get the best solutions. We need more diversity of thought. Teams with women, for example, think and plan differently.

I still don't know what I want to be when I grow up! My advice is to find something you have an aptitude for and you feel passionate about, or that will add value for you or others. Oh, and you don't need to be a math genius to get started – just jump in and give it a shot, you will learn more as you go!

Carly Wehbe

Head of Systems Engineering,
Commonwealth Bank of Australia

IF WE DON'T GET THE BEST PEOPLE INTO ENGINEERING, WE WON'T GET THE BEST SOLUTIONS"

What's inside?

P6 Top 6 engineering jobs

STEM + X = 😊

Looking for ways to combine maths (STEM) with your passion (X)? Start here!

Engineering + ...

P8 Innovation

P14 Global problem-solving

P18 Agriculture

P22 Automation

P24 Health



P26 Advanced manufacturing

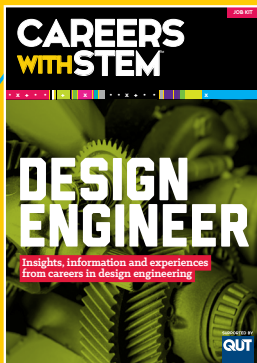
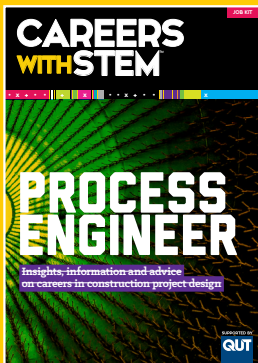
P28 Pathways

ENGINEERING SOLVES PROBLEMS

“It is vitally important to continue the progress made on encouraging greater participation in STEM. This participation will increasingly play an important role in industry, in the economy and in the way communities shape the future. Things such as the micro-recycling science and new technologies my team and I are pioneering to help solve some of our urgent waste and resources challenges. Engineering and science play such a vital role in helping to improve our environmental, social and economic wellbeing.” – *Laureate Professor Veena Sahajwalla*

PROFESSOR VEENA SAHAJWALLA IS A SCIENTIST, ENGINEER, AND INVENTOR WHO DEVELOPED A NEW GENERATION OF GREEN MATERIALS USING HIGH TEMPERATURE TRANSFORMATION OF WASTE. SUPER COOL (OR HOT EVEN!).

STEM JOBS SET TO BOOM!



The Careers with STEM Job Kits are free downloadable 8-page e-mags which offer a complete introduction to individual STEM careers. Discover what a specific STEM job is all about, meet real people working in that job and find out what you can do right now to set your career on the right path.
CareerswithSTEM.com.au/product-category/stem-job-kit/



Australian Government



I AM READY TO SUPPORT TO MOTIVATE TO FIND MY CAREER

Leaving school and thinking about next steps?

The YourCareer website has everything you need to support your next steps in training, education and employment.

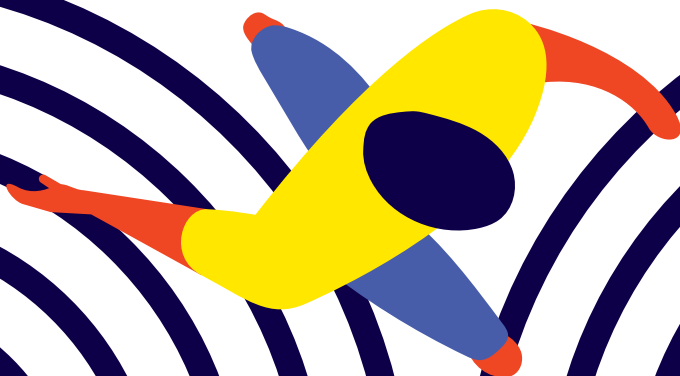
The tools on YourCareer offer personalised information and advice by matching your skills, interests and goals to careers that may suit you.

You can explore over 1200 occupations listed from A-to-Z, see how much you might earn, learn what a real day on the jobs looks like, understand what kind of job prospects exist in a particular field - and what skills you need to get you there.

Find up to date, accurate careers information and advice about where the opportunities are now and where they'll be in the future [@yourcareer.gov.au](https://yourcareer.gov.au)

You can also access the School Leavers Information Service:

- calling **1800 CAREER** (1800 227 337), or
- texting 'SLIS2020' to **0429 009 435**



Going somewhere REAL fast

Job security, much?! The demand for engineers is increasingly on the up. We've rounded up six of the fastest-growing specialisations

So, who's hiring?

In terms of the number of advertised job vacancies over the past 12 months, civil engineers are the most spoilt for choice – followed by mining engineers, industrial, mechanical and production engineers and ICT and support test engineers.

Engineers have always been important innovators, but as the world recovers from COVID-19, they're literally at the forefront of rebuilding everything – from the economy, to our health system, agricultural practices and building new products. In fact, in 2021 there are more engineers needed than ever, which makes studying it at uni – or through a TAFE or trade school – a seriously smart career move. Stumped on how to sift through the thousands of engineering-types out there? With so many different variations to the 'E' in STEM, we've short-listed six of the most in-demand job titles worth a search.

#1

ROBOTICS AND AUTOMATION ENGINEER

The deal: People who design, build and test robots – or anything really, with machine learning capabilities! And nope, not just the *Wall-E*-types. Household helpers (shout out to Siri!), medical lifesavers (google “robotic surgery”) and agricultural innovations (self-driving tractors, anyone?) all require robotics specialists.

The growth: If you're an automation engineer, the robots (that you've built) won't take your job! In fact, they'll make more of them – what with all the programming that'll be needed to maintain them.

Vacant engineering jobs + skilled migrants = ALL the diversity!

Yep, the biggest reason for increased diversity in engineering since 2020 is skilled labour migration!

#2

CIVIL ENGINEER

The deal: Forget the hard-hat wearing stereotype! Civil engineers don't just hang out at construction sites all day. They design, build, service and adapt the public infrastructure that we depend on – high-capacity roads, cost-effective transport systems, railways, waste networks, airports, flood defences and pollution control facilities.

The growth: A recent Graduate Outcomes Survey report revealed above-average employment outcomes for civil engineers, with graduates boasting an 88.2% chance of landing a job just four months post-uni.

#3

RENEWABLES ENGINEER

The deal: Renewables engineers work on creating and implementing alternative energy sources such as solar, wind power and green energy tech!

The growth: As alternative energy sources become the done thing in most households, installation costs have gone down. This, in turn, has helped boost demand for people to work on developing new tech, as well as inspect, repair and install existing systems.

#TRENDING

TOP 5 ENGINEERING RELATED HASHTAGS

- 1 #WORLDENGINEERING
- 2 #ENGINEERINGPROBLEMS
- 3 #ENGINEERINGBASICS
- 4 #ENGINEERINGMARVEL
- 5 #CIVILENGINEER

32% The percentage of women enrolled in biomedical engineering degrees, much higher than most engineering disciplines

#4

ENVIRONMENTAL ENGINEER

The deal: These engineers test and operate technologies that correct air and water pollution, clean up contaminated sites, manage land resources, handle certain aspects of public health and design sustainable infrastructure.

The growth: Jobs for environmental engineers are predicted to grow an epic 8.3% by 2026.



#5

BIOMEDICAL ENGINEER

The deal: Can't decide between medicine and engineering? Biomedical engineers are awesome at both, applying their problem-solving skills to design and build devices and equipment used in healthcare and medicine. Think: bionic limbs, sophisticated prosthetics and hearing implants!

The growth: According to Engineers Australia, there are at least 500 other businesses and startups in the biomedical sector, with demand only set to increase as our population ages and healthcare needs increase.

#6

SYSTEMS SOFTWARE ENGINEER

The deal: Systems software engineers design, develop and test the operating systems within which our cities function.

The growth: The world needs innovators (shout out to every other type of engineer), but it also needs people to create the software to support their big ideas. The demand for software engineers is set to increase by 11% in the next few years. – Cassie Steel

90.7% Employers overall job satisfaction level with engineering graduates in 2020

SCIENCE AND ENGINEERING CHALLENGE

Since 2000, the University of Newcastle's Science and Engineering Challenge has been inspiring Australian school students to pursue future careers in STEM.

Every year, over 30,000 students from across Australia explore robotics, engineering, the sciences, and more. Participants develop hands-on, practical STEM skills while design-and-build experiences challenge their creative thinking.

The program is an opportunity for students to build critical teamwork, innovation, and problem-solving skills and to imagine themselves making a meaningful difference through a career in STEM.

LEARN MORE AT NEWCASTLE.EDU.AU/CHALLENGE



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA



science and engineering
challenge



Career changemakers

Engineers are the innovators in the workplace, introducing new ideas and products

When you study engineering, you learn a problem-solving approach that's totally different from the way scientists, marketers or business-minded professionals approach a problem. You learn to challenge what's established and break big problems down into smaller ones. Wherever you work, as an engineer you are an innovator – disrupting the way things are and creating a better way of doing things.

You'll be in demand from day one – and work with a mix of people, from those just starting out like you, to the people calling the shots. And it couldn't be more rewarding! You'll work in major companies creating new ideas to transform workplace processes, technologies and ideas. – *Heather Catchpole*

START YOUR CAREER HERE

ENGINEERING+ INNOVATION STUDY

Bachelor of Engineering (Honours) / Bachelor of Creative Intelligence and Innovation, UTS

Bachelor of Design and Technology Innovation, Flinders University

Bachelor of Engineering (Honours) (Software), University of Adelaide

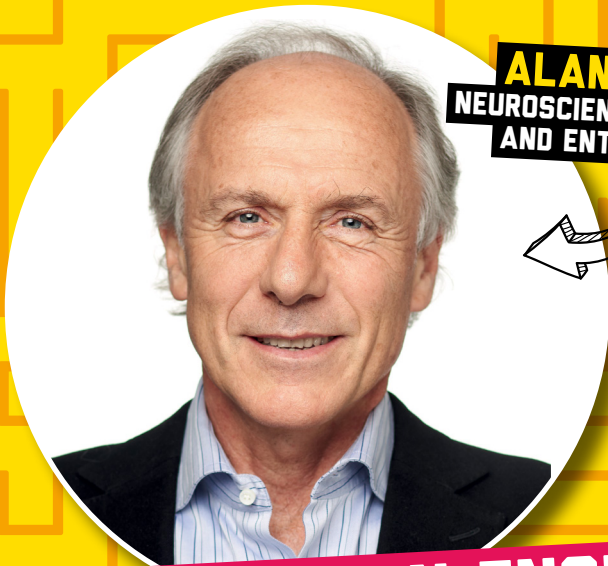
ENGINEERING+ INNOVATION JOBS

Software engineer: \$57K–\$112K

Product designer: \$51K–\$103K

Customer service engineer: \$41K–\$124K*

*Source: salaries according to payscale.com



ALAN FINKEL
NEUROSCIENTIST, ENGINEER
AND ENTREPRENEUR

GOOD ENGINEERS GENUINELY BELIEVE THEY CAN CREATE SOMETHING NEW, BETTER AND MORE QUICKLY THAN WHAT'S COME BEFORE"

THINK LIKE AN ENGINEER

NEUROSCIENTIST, ENGINEER AND ENTREPRENEUR **ALAN FINKEL** GIVES US AN INSIDER'S TAKE ON THE KEY WAYS ENGINEERS WORK

CwS: What is unique about the way engineers work when they're approaching problems to be solved?

Alan: The art of engineering is optimisation. They say the art of politics is compromise, but believe me, there is no room for compromise in building bridges or computer chips. And there is no room for pursuing the other extreme – perfection – because it is simply too expensive and too slow. Good engineers genuinely believe they can create something new, better and more quickly than what's come before.

CwS: Why is this important for society right now?

Alan: We face multiple global threats and unless we can find the workable middle ground, these threats will not be resolved.

CwS: What can you tell us about the key parts to the engineering 'thinking process'?

Alan: Start with the belief there is always a better way. Then, the first step is to articulate the problem. Then analyse it and propose a solution. Too many people jump to a solution. – *Heather Catchpole*

Alan Finkel is a neuroscientist, engineer and entrepreneur. He was Australia's Chief Scientist from 2016 to 2020, during which time he led the National Electricity Market Review, the development of the National Hydrogen Strategy, and the panel that advised the Australian Government on the 2020 Low Emissions Technology Roadmap.

CHOOSE YOUR PATH

Every stage of your career involves making choices. We talked to two graduates in the CBA's Enterprise Services team about the choices that led them there

TRY SOMETHING NEW

IN YEAR 12, JESS HUANG WANTED TO BE A MEDICAL SCIENTIST. SHE'S NOW A SOFTWARE ENGINEER AT THE COMMONWEALTH BANK OF AUSTRALIA (CBA)

Jess studied chemistry and biology, but realised she didn't like them as much as she thought she would. She started thinking about engineering – “you get to make stuff and change the world” – but there was just one problem. She hadn't studied physics.

“That's what pivoted me towards software engineering,” she says. “It was a risk, but it paid off!”

Jess is now part of the CBA's grad program where she works with the mobile team on the CommBank app. “It's really exciting, and I love it here!”

Working on the app gives Jess the chance to combine her passions for development and design – she does graphic design in her spare time.

As part of the grad program, Jess has also learned about career management and presentation skills, “which is really valuable,” she says.

JESS HUANG
SOFTWARE ENGINEER
+ IOS DEVELOPER

**IT'S REALLY EXCITING,
AND I LOVE IT HERE!**

BACHELOR OF ENGINEERING
(SOFTWARE ENGINEERING)/BACHELOR
OF SCIENCE (MATHEMATICS).
UNIVERSITY OF SYDNEY

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SOFTWARE
DEVELOPMENT INTERN.
AMAZON WEB SERVICES

GRADUATE
SOFTWARE ENGINEER
+ IOS DEVELOPER.
CBA

THE BIG SWITCH

SAM BARKER ORIGINALLY WANTED TO STUDY THE STARS, BUT DISCOVERED THAT MANY ASTRONOMERS START OUT IN SOFTWARE ENGINEERING

SAM BARKER
SOFTWARE
ENGINEER

During his degree at Curtin University in Perth, Sam did an internship at ID verification company Veritas. He enjoyed it so much he stayed on for a year after graduating – but working at a small company had some limitations.

“I wanted to learn how it's all done at scale,” Sam says. His interview for the CBA grad program was his first visit to Sydney. “By the time I moved to Sydney, I'd spent a grand total of seven days there.”

Sam's first rotation in the grad program was in DevOps, where he worked on tools that help other developers build product features. He then moved over to the NetBank team after conducting a number of ‘reverse interviews’. “We went to teams and asked, why should we join you?” he says. “It was a bit weird at first, but we got to dig into what each team did.”

Seeing his work out in the world is a highlight for Sam, and he plans to stay with the NetBank team for now. “My career goal right now is to learn as much as I can.”

**I THOUGHT, THAT SOUNDS
LIKE A GREAT IDEA. I'LL DO THAT.**

BACHELOR OF ENGINEERING
(SOFTWARE ENGINEERING).
CURTIN UNIVERSITY

WEB DEVELOPER.
VERITAS GROUP

GRADUATE DEVOPS ENGINEER
+ SOFTWARE ENGINEER. CBA

SOFTWARE ENGINEER.
CBA

LAUREN TROMPP

TEAM UP

Teamwork is critical to innovation and helps engineers make game-changing new products for the bank

With seven million customers and more than 43,000 employees, it's critical that the Commonwealth Bank of Australia (CBA) is at the forefront of new technology – not just for banking, but also to understand how their technology performs, if there are any pain points in their systems and software, and how easy it is to use.

GRADUATE SOFTWARE ENGINEER. CBA



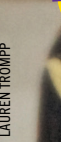
PRODUCT SALES ACTIVATION. GOOGLE AUSTRALIA



INTERN PLACEMENTS - WESTPAC, PWC AUSTRALIA + MSD AUSTRALIA



BACHELOR OF INFORMATION SYSTEMS (CO-OP) (HONOURS). UNSW



ELYSEE NG
GRADUATE SOFTWARE ENGINEER

Creates an automated monitoring and alert tool for data extracts and data visualisations for CBA stakeholders.

TEAM TIP "It's okay not to know the answer all the time and to revel in the joy of the process and discovery. It's important to share success stories and failings! Recently, our team implemented a "tips and tricks" session to highlight cool functionality the team has discovered or created and how we can become more effective and efficient engineers."

JAV VOGT
GRADUATE PRODUCT OWNER

Represents the needs of the internal stakeholders and clarifies the requirements for the scrum team.

TEAM TIP "Creating an open supportive team culture is key to unlocking the full success of the team. If everyone is comfortable sharing ideas and collaborating then challenges can be worked through with ease."

BACHELOR OF SCIENCE IN IT/CREATIVE INTELLIGENCE AND INNOVATION. UTS



INTERN PLACEMENTS - AUSTRALIAN INSTITUTE OF PROJECT MANAGEMENT + PRONEXUS



GRADUATE PRODUCT OWNER. CBA



SOFTWARE ENGINEER. CBA

BACHELOR OF ENGINEERING (HONOURS) (SOFTWARE). UNIVERSITY OF ADELAIDE

BUSINESS + INTEGRATION ARCHITECTURE ANALYST. ACCENTURE

GRADUATE SYSTEMS ENGINEER. CBA

GRADUATE PRODUCT OWNER. CBA

LAUREN TROMPP



CHARLIE ACAR
GRADUATE ENGINEER

Creates a script that collects information on Jira (productivity software) tickets, plus acts as scrum master.

WHAT I LOVE "I love that as a graduate I'm supported to learn and grow. Coming from a commerce degree I was hesitant to step into an engineering role as I knew the learning curve would be steep. I am so happy I decided to go down this path as the challenge has been rewarding and I'm surrounded by a team that's happy to help me on my journey."

FASHION/GRAPHIC/EDUCATION STUDIES AT UTS/UNSW

SWITCHED TO BACHELOR OF COMMERCE MAJORING IN BUSINESS INFORMATION SYSTEMS, UTS

GRADUATE AGILE ANALYST, CBA

GRADUATE ENGINEER, CBA

Enter the metrics team! These graduates and engineers write code to extract data out of the tools CBA uses, including GitHub (to store and collaborate on code), TeamCity (for deploying and testing code) and Artifactory (to store the final product).

Together with senior engineers and product managers, they're creating a tool that provides metrics and insights for managers to see how teams across the bank perform. "When you work as a team, everyone contributes to the solution," says team member and software engineer Troy Poulter. Meet the team and get their tips on working innovatively together.

MICHAEL MADRY
SOFTWARE ENGINEER

Works on the initial stages of extracting GitHub data and enriching with human resources data mapping. Also sets up the test environment for storing and displaying the data.

WHAT I LOVE "One thing I love about my job is the people I get to work with! The culture of CBA fosters high-performing teams who are not afraid to have fun along the way. It's possible to learn and extend your skills beyond your designated role – your job title doesn't lock you into one function. Be curious and discover what else is out there – you never know what the next opportunity will be."

TROY POULTER
SOFTWARE ENGINEER

Works on extracting GitHub-related metrics for software engineers.

TEAM TIP "You don't need to be a gun engineer or even have done engineering at uni. Tech skills are great but having the right personality is so important. Engineering is so far from the stereotype of 'guys in the basement'. We need all personality types to make the best tools."

BACHELOR OF INFORMATION TECHNOLOGY, UTS

INTERN PLACEMENTS - CBA, WISETECH GLOBAL

GRADUATE SOFTWARE ENGINEER, CBA

SOFTWARE ENGINEER, CBA

THE FUTURE OF WORK

Welcome to work 2.0, where your perspective is valued within an inclusive team



PRODUCT MANAGER - NEW PRODUCTS. ATLASSIAN

CONSULTANT. MCKINSEY

INTERNSHIP. ATLASSIAN + MCKINSEY

BACHELOR OF INFORMATION SYSTEMS. UNSW

RACHEL LIN
PRODUCT MANAGER

ALEX MORGAN
SOFTWARE ENGINEER

In schools, we're unconsciously taught that individual competition is the way to get ahead. Today, the traditional top-down workplace that your parents probably knew has been replaced with a workspace that values individual perspectives and collaborative work practices.

Atlassian is a star example. Founded in 2002 by Aussie grads Mike Cannon-Brookes and Scott Farquhar, the then-startup – focused on the project management and bug tracking software tool Jira – went on to become Australia's most aspirational and successful technology company.

It's also a completely cool place to work. Early on, Atlassian created branded team workwear – from baseball caps to the hoodie dress. Today, employees can pledge 1% of their time towards volunteering through the Atlassian Foundation. Teams can also participate in quarterly innovation hackathons called ShipIt. Running over a 24-hour period, these 'fast and scrappy' events allow teams to create their best ideas and test them quickly by pitching the concepts internally.

Rachel Lin, Alex Morgan and Pat Hwang are all part of Atlassian's graduate program as well as ShipIt 50's winning team.

Reward yourself

Their winning idea? An app like Spotify's end-of-year Wrapped review, but for Atlassian products.

"The app aggregates data from Atlassian apps to create insights tailored to the individual, showing how much of a team player you really are," says Rachel, who initially worked as a management consultant after uni and joined Atlassian in 2020 as a Graduate Product Manager, which she says is a "really creative role".

"I felt like I took a lot of my learning into my own role at team central into the hackathon – it can be very scrappy at the start," says Rachel.

Pat Hwang, a Product Designer, says he contributed a lot during the project's ideation phase. "Early in the morning I set up an onboarding whiteboard online using Mural, so we all started on the same page," he says.

BACHELOR OF ENGINEERING
(SOFTWARE),
UNIVERSITY OF AUCKLAND

SOFTWARE ENGINEER INTERN.
OLYMPIC SOFTWARE LTD

SOFTWARE ENGINEER.
ATLASSIAN

PAT HWANG
PRODUCT DESIGNER

PRODUCT DESIGNER.
ATLASSIAN

EXPERIENCE DESIGN INTERN.
DELOITTE DIGITAL

BACHELOR OF DESIGN
COMPUTING, UNIVERSITY
OF SYDNEY

BACHELOR OF
ENGINEERING, UNSW

Being valued for who you are

Collaboration is central to working as an Atlassian grad. Rachel says there's a "tonne of value we have in terms of fresh eyes, blank canvas and challenging norms."

"You get put on exciting projects," she says. "My experience so far has been on Jira Cloud Services, then I rotated into a new product. When I started, the product was a blank screen, now it's in beta testing. It's amazing to be part of that."

Pat values the diversity of people who work at Atlassian, and says he loves "the chance to collaborate with other tech companies from around the world on integrations with our products. Despite timezone challenges, it's really cool collaborating, running design workshops and presenting to teams in other countries."

"Having a team full of diverse backgrounds and life experiences ensures we are able to think with greater perspective, come up with more creative solutions, and make sure we're not always designing for the same type of users."

Engineering the future

Alex Morgan nailed his role at Atlassian before he even left uni. "I particularly enjoyed ShipIt 50 because it gave me an opportunity in a different role. It allowed me to play the role of a feature lead which was really interesting to me."

"Being a grad at Atlassian means everyone is in the same boat – we're all fresh out of uni and there's no judgement when you ask for help!"

TO GET THERE:
atlassian.com/students

Kicking global goals!

From infrastructure to recycling, energy to sustainability, engineers are at the core of solving all the problems of tomorrow and the world knows it

At the 2019 World Engineers Convention a declaration was signed to give engineers a clear directive on their role in making global changes for a sustainable future. The UN Sustainable Development Goals (SDGs) aim to tackle poverty, climate and environment – and engineering skills in civil, design, biomedical and renewable energy will make all the difference.

Locally engineers are feeling the love, too. In October 2020 the Australian Government forked out \$2.47 billion to help find ways to lower energy costs and reduce emissions. From this bumper cash injection into renewables, \$43 million has been allocated specifically to engineering research.



PROBLEM		ENG SOLVING IT
Climate crisis		Renewable energy engineer
Clean water		Civil engineer
Food shortages		Agricultural engineer
Digital inclusion		Design engineer
Healthcare		Biomedical engineer

COOL (SMART) THREADS

Engineers solve so many problems, they've even got their own logo on a tee...

A problem shared...

From solving energy issues by recycling and expanding battery usage, to finding global warming solutions, engineers are all over it. Tapping into solar? Associate Professor Deepak Dubal, from QUT, reckons the motion of sea waves is a winner. "Whatever we generate and move, we can convert to some kind of energy."

Good health systems and finding solutions fast is where biomedical engineers step up to the plate (hi COVID-19!), and civil engineers play their part, too. Think: irrigation systems for drinkable H₂O. Yep! Engineers are pretty important for a great future. – Pippa Duffy



START YOUR CAREER HERE

ENGINEERING+GLOBAL PROBLEMS STUDY

Bachelor of Renewable Energy Engineering (Honours), The University of Newcastle

Bachelor of Mechanical Engineering (Honours), Monash University

Bachelor of Design (Industrial Design) / Bachelor of Engineering (Honours), QUT

ENGINEERING+GLOBAL PROBLEMS JOBS

Civil engineer: \$56K–\$108K

Electrical engineer: \$56K–\$119K

Biomedical engineer: \$52K–\$91K*

*Source: salaries according to payscale.com

FROM WASTE TO WORTH

HOW DO YOU MAKE MINING LESS DAMAGING TO THE ENVIRONMENT? BY USING CLEAN TECHNOLOGIES AND RECYCLING EVERY SCRAP OF WASTE YOU CAN

Mining is Australia's biggest sector, making up more than one-tenth of the entire economy. It is also a focus for the public's growing environmental and climate-change concerns.

People recognise mining is essential, but they also see that it can pollute the air and drinking water, reduce wildlife habitats and permanently scar natural landscapes.

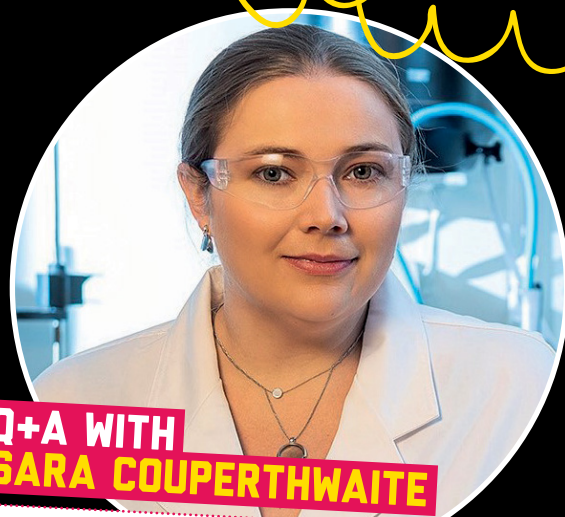
"I believe mining can be made more environmentally sustainable," says Sara Couperthwaite, of Queensland University of Technology (QUT). Sara's world-leading research focuses on the waste produced by mining, designing new technologies that reduce this waste or transform it into something useful.

CLAY FOR THE WIN

One of Sara's biggest projects sees her teaming up with mining company Lava Blue. Lava Blue had been mining for sapphires on the North Queensland clay beds in 2017 when they noticed that the clay, which has no commercial value, contained aluminium oxide.

They came to Sara to see if the aluminium oxide could be extracted from the clay to produce high-purity alumina (HPA). HPA is used to make LEDs and the lithium-ion battery separators powering smartphones and electric cars.

Sara used advanced technologies and machine learning to prove it could be done, and sustainably. "We are just about to start construction of a mini-plant research facility," she says. "And we are aiming to translate this into a commercial plant that will provide up to 40 jobs." – Ben Skuse



Q+A WITH SARA COUPERTHWAIT

Why have you stayed at QUT throughout your career?

My passion really lies with undertaking research and teaching that generates tangible outcomes.

Translating research into commercial outcomes that benefit the community requires fundamental knowledge to be demonstrated at a number of scales. QUT provides a platform to do this.

What makes QUT a great place for students to learn?

QUT is continuing to increase the authenticity of its courses to provide graduates with the knowledge and skills to be competitive in finding jobs.

We strive to ensure students leave having an appreciation of the professions they'll enter, and provide hands-on experience to put theory into practice.

For example, for my Minerals and Mineral Processing unit I have worked with Adroit Programming to integrate a virtual simulation of a mineral processing plant into my teaching, so students can experience what they may encounter on a mine site from the safety of their home.

Do you have any advice for young aspiring innovators in sustainable technologies?

My plan since high school was to become a teacher. During my second year of undergrad at QUT, a professor tapped me on the shoulder and asked if I would like to do some research with him. This opened a whole new perspective on where my science degree could take me.

If you are presented with an opportunity to expand your knowledge and skills, take it, irrespective of whether it was part of your original plan. – Ben Skuse

SENIOR LECTURER, QUT

RESEARCH FELLOW, QUT

PHD IN INDUSTRIAL CHEMISTRY, QUT

BACHELOR OF APPLIED SCIENCE (CHEMISTRY), QUT



QUT IS CONTINUING TO INCREASE THE AUTHENTICITY OF ITS COURSES TO PROVIDE GRADUATES WITH THE KNOWLEDGE AND SKILLS TO BE COMPETITIVE IN FINDING JOBS"

THE PROBLEM-SOLVERS

Meet three women in STEM using engineering to change the world

Helping the environment was always something Professor Kylie Catchpole of the Australian National University (ANU) wanted to do. Kylie, who also has a PhD in engineering, is currently working on a range of projects to improve the efficiency and reduce the cost of solar energy, through new materials and devices. "We are working on perovskite solar cells – a new low-cost material that can be used to make high-performance solar cells," she explains. Her advice for future engineers? "Just go for it. It's an exciting area with lots of different directions where it can take you. Look for opportunities to combine STEM with your other interests."

1 

PROFESSOR KYLIE CATCHPOLE
SOLAR CELL RESEARCHER

ENGINEERING + CLEAN ENERGY



ENGINEERING + POLITICS

2 **DR MEHREEN FARUQI**
PARLIAMENTARIAN

After a 25-year career in civil and environmental engineering, Dr Mehreen Faruqi says her journey into politics was pretty organic. "I studied engineering in Pakistan to make the point that women can and should be free to choose any line of study and work," she says. "It is this same sense of social justice that led me to the Greens and politics."

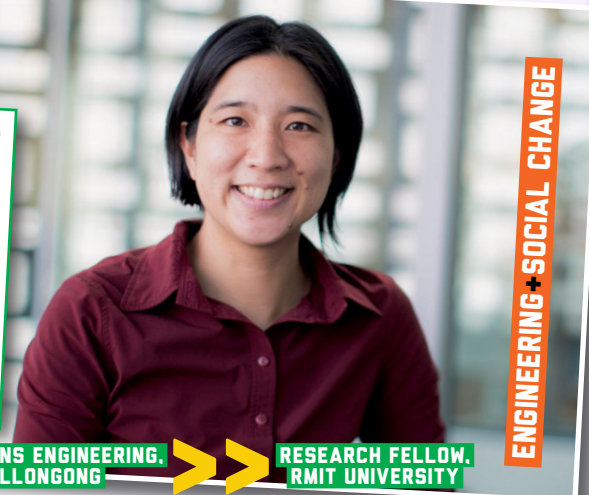
During her time in parliament, Mehreen has worked on a long list of environmental projects like stormwater reuse and recycling infrastructure, integrated water cycle management, rainforest rehabilitation and action for climate change. Her engineering skills have come in handy through all of it! "The many complex problems we face today need innovative solutions," Mehreen says. "Engineers and scientists are trained to be problem-solvers and creative thinkers and these skills can be used equally in any role."



3 **DR EVA CHENG**
DIRECTOR OF WOMEN IN ENGINEERING AND IT

Dr Eva Cheng is passionate about increasing women's participation in engineering and IT. Eva oversees programs like Lucy Mentoring, connecting women at UTS studying an engineering or IT degree with industry pros. She also works with Engineers Without Borders Australia (EWB), where students get to address real-world challenges.

This year, EWB is working with the Centre for Appropriate Technology in Cape York, allowing students to learn about designs for Indigenous communities. Want to combine engineering with your passion? Eva suggests internships and volunteering. "I volunteered for girls in STEM school outreach activities for many years before it became part of my job."



ENGINEERING + SOCIAL CHANGE



SHUTTERSTOCK

Schooling STEM entrepreneurs

Move over Elon Musk, Year 8 girls in NSW's Hunter Region are gearing up to give you some competition



Four years ago, a group of seven inspiring women in STEM from the University of Newcastle set up the HunterWiSE program to encourage girls to follow in their footsteps.

The 'WiSE' stands for 'Women in STEM and entrepreneurship'. Over 10 weeks, students work with industry sponsors (like Transport NSW, Hunter Water, Glencore, GHD and NCGI) and uni mentors to hatch business ideas that help their communities.

Since 2017, more than 200 girls have taken part, and one of the program co-founders, Professor Anna Giacomini, hopes some of them will move on to engineering and STEM degrees.

Helping the community

Engineering uses creativity and tech to help improve people's lives and the HunterWiSE students have come up with some great ways to do just that. For example, some students from dairy-farming families created an app that connected farmers directly to buyers to help them make better profits.

HunterWiSE co-founder Associate Professor Elena Prieto says the students also enjoy working with their female mentors from the uni, on a weekly basis. "The mentors are amazing. Some are undergrad STEM students and some are studying for a PhD," Elena says.

HunterWiSE helps open up exciting career opportunities for female students outside the inner city. – Nadine Cranenburgh



STEM Women working together

Teamwork is a big part of engineering and other STEM careers. The HunterWiSE founders – all professors or associate professors – have a powerhouse of skills to share. Pictured, from left: **Anna Giacomini, civil engineering; Erica Wanless, chemistry; Regina Berretta, computer science; Elena Prieto, maths/computer science/education; Sarah Johnson, electrical engineering; Juanita Todd, psychology; Karen Blackmore, information technology.**

Career harvest

As farmers adapt to a growing population, water shortages and rising temperatures, engineers are helping them find smarter ways to feed the world

Farm life and cutting-edge tech might not seem to go together – but farmers are increasingly turning to engineers for answers. Satellites, sensors and seeing robots are helping them understand how much fertiliser and feed they need, and which trees are producing the best crops. Researchers predict that by 2033, Australian agricultural tech (AgTech) will be worth \$100 billion, and create 540,000 jobs. That’s a lot of opportunities for enterprising engineers! – Nadine Cranenburgh

Did you know...

- Engineers are **finding ways to measure** how much carbon **crops trap in the soil?**
- They’ve also discovered an **Australian seaweed** that can **reduce global warming-causing methane in cow burps by 82%?**
- By **2050, global food production needs to rise by 60%** as the world’s population grows to nine billion?
- **Australian farmers export 70%** of their produce to other countries? Go Aussies!

START YOUR CAREER HERE

ENGINEERING+AGRICULTURE STUDY
 Bachelor of Engineering Science (Agricultural Engineering), University of Southern Queensland
 Bachelor of Engineering (Honours) / Bachelor of Computer Science, Swinburne University
 Bachelor of Mechatronics Engineering, University of Newcastle
 Bachelor of Engineering, (Software), University of Adelaide

ENGINEERING+AGRICULTURE JOBS

Robotics engineer: \$53K–\$138K
 Agricultural engineer: \$56K–\$84K
 Project engineer: \$61K–\$126K
 Software engineer: \$57K–\$112K*

*Source: salaries according to payscale.com

FEED THE WORLD. PROTECT THE PLANET

AEROSPACE ENGINEER DR ANASTASIA VOLKOVA IS COMBINING HER PASSION FOR FOOD AND FLIGHT WITH BUSINESS KNOW-HOW TO HELP FARMERS PRODUCE CROPS THAT DON'T COST THE EARTH

After an undergrad degree and Masters in Europe, Anastasia came to Australia to study a PhD in autonomous systems at Sydney University. There, she founded FluroSat to use drones and satellite data to help farmers grow more with less.

This year, FluroSat joined forces with US AgTech startup Dagan to create software models that use satellite and sensing data to accurately measure how different farming practices can help trap more carbon in the soil.

“We are not just embracing productivity. We’re minimising the cost to the planet,” Anastasia said.

Engineers can do anything

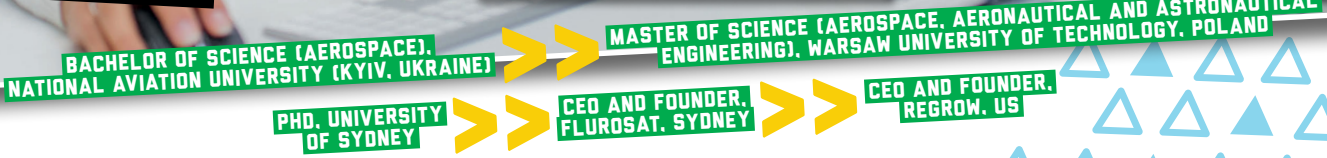
From the Ukraine to Poland and Sydney to California, Anastasia has had a truly international career. She’s also raised millions of investment dollars for her business ventures, and is now the CEO of her third startup!

The technical skills Anastasia learned at uni mean she understands what’s possible. And her programming skills mean she can read code. She says her mum told her an engineering degree would give her the skills to do anything.

“That’s been true in my case,” Anastasia says. – Nadine Cranenburgh



DR ANASTASIA VOLKOVA
AEROSPACE ENGINEER



PIECE OF CAKE

CHEMICAL ENGINEERING UNDERGRAD **LUCY PENNA** IS USING A BIOFUEL BY-PRODUCT TO MAKE SUSTAINABLE, NUTRITIOUS VEGAN FOOD



LUCY PENNA
CHEMICAL ENGINEER

Biofuel is a type of renewable fuel made using plants. One of the ways it's produced? Mustard seeds. Yep! The biofuel process leaves behind a pressed mustard seed 'cake' – and this is the focus of chemical engineering student Lucy Penna's work at the University of Adelaide.

Still in her undergraduate years, Lucy's designing a machine to separate the protein-rich component of the mustard-seed cake to turn it into an affordable, nutritious and tasty vegan ingredient.

This is just one example of how diverse chemical engineering can be, Lucy says. "We learn about applications in mining and minerals, oil and gas, food and beverage, water and waste management and renewable energy."

Lucy says she is excited about the opportunities emerging around

biofuels and hopes to one day use her engineering skills to solve some of humanity's biggest challenges.

Lucy was inspired by a trip to rural Nepal with Engineers Without Borders Australia where she saw human-centred design and humanitarian engineering in action.

"This experience made me realise I have a lot more to learn in this area, but my ultimate goal is to be able to apply my skills and knowledge in a humanitarian setting," she says. – Astha Singh

WE LEARN ABOUT MINING AND MINERALS, FOOD AND BEVERAGE...

UNDERGRADUATE, BACHELOR OF ENGINEERING (CHEMICAL) (HONOURS) / BACHELOR OF SCIENCE, UNIVERSITY OF ADELAIDE

ENGINEERING REINVENTED

Industry-relevant majors

Defence Systems Drive improvements in this multi-billion dollar tech industry.

Medical Technologies Be part of the biomedical engineering and healthcare revolution.

Renewable Energy Create global solutions to the world's growing energy demands.

Smart Technologies Redefine how we live with the exciting world of machine learning.



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*Academic Ranking of World Universities 2021.
^ Our engineering degrees are internationally recognised and accredited by Australia's peak professional body, Engineers Australia (EA).

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adelaide.edu.au/degree-finder

REAP WHAT YOU SOW

Braden Hellmuth has invested in his education for over a decade, building his skills and qualifications and growing a successful career in agriculture

Braden Hellmuth got his first taste of farming picking watermelons during school holidays in Bundaberg, Queensland, when he was 14. "It was hard work but rewarding and enjoyable, so I asked if I could keep working on weekends throughout the year," he says.

A big fan of STEM subjects at school, Braden signed up for a Bachelor of Science at the University of Queensland – but continued working at the farm during uni holidays and full-time after he graduated.

Braden says he loved his science degree ("It improved my writing and ability to find information. It also taught me some life skills") – but working on the farm he realised he needed to upskill to become better qualified for a career in agriculture.

"I was able to get a broad range of exposure to machinery and agricultural problems, and when



**BRADEN HELLMUTH
ENGINEER**

time permitted I spent time in the shed working on the company machinery. I could see gaps in my knowledge, and looked for information sources to learn," Braden explains. "I decided to undertake an apprenticeship, and with the assistance of some fantastic supervisors and mentors, I learned a range of skills which enabled me to become who I am today."

Hands-on experience

Braden enrolled in a Certificate III in Engineering (Diesel Fitting Trade) where he says he gained a lot of practical skills and experience.

Today Braden is still employed at Greensill Farming – the same place he picked watermelons when he was in school – but with a growing crop of qualifications to his name, he's now head of engineering, automation and technology.

"A day in my life is always different," he says. "One day it's fixing the hydraulics on a machine, the next it's soldering circuit boards, or maybe it's a day in the office. That's one of the great things about being in a dynamic industry and business."

And Braden has never stopped learning, either. He has gained a range of industry-relevant licences and is currently enrolled in a Certificate IV in Engineering (Higher Level Trade in Fluid Power) to improve his skills in hydraulics.

"Each day I look for the next opportunity to develop my skills, improve the company outcomes and help others," he says. – Gemma Chilton

I LEARNED A RANGE OF SKILLS WHICH ENABLED ME TO BECOME WHO I AM TODAY"



FARMHAND, GREENSILL FARMING

BACHELOR OF SCIENCE, UNIVERSITY OF QUEENSLAND

CERTIFICATE III IN ENGINEERING (DIESEL FITTING)

CERTIFICATE II IN AUTOMOTIVE AIR CONDITIONING

CERTIFICATE IV IN ENGINEERING (FLUID POWER)

HEAD OF ENGINEERING, AUTOMATION AND TECHNOLOGY, GREENSILL FARMING



Think Engineering. Think QUT.

As a proud Gangalu woman growing up in Far North Queensland, Taylah Griffin dreamed of heading to the big city to pursue higher education. At QUT, she soon excelled in her studies, and ultimately graduated with an Honours degree in electrical and aerospace engineering.

During her time at QUT, Taylah completed internships with Qantas and Boeing, experiences that inspired her with a taste of real-world work in her chosen field. She now works on Wedgetail aircraft as a systems engineer for Boeing Defence Australia.

Taylah's achievements through QUT include being a recipient of the Aboriginal and Torres Strait Islander Tertiary Student STEM Achievement Award, tutoring other students, working as an industry presenter, and leading as a STEM ambassador. Importantly, this proud, young Indigenous woman is also inspiring other young Indigenous people to study STEM and follow their dreams.

 QUT STEM

the university
for the real world



The robot revolution is here

If you want a job that won't be taken over by robots any time soon, choose a career in robotics and automation!

Robots seem to be everywhere these days, from picking, packing and loading your favourite chocolate bar faster than the eye can see, to exploring the alien surface of Mars. Where there's a job that is dull, dirty or dangerous, it's usually better to send in a robot.

But with advances in automation, robots are set to branch out even further. Dr Pauline Pounds, a University of Queensland researcher and Vice President of the Australian Robotics & Automation Association, thinks this will eventually mean rethinking our idea of what 'work' means. "We will reimagine work from a task of labour to being a task of supervision," she says.

Some jobs will be history – but engineering won't be one of them. Mechanical engineers, electrical engineers, computer engineers and more specialised mechatronics engineers all have important roles to play in designing, building and maintaining robots now and into the future.



DR PAULINE POUNDS
ASSOCIATE PROFESSOR

START YOUR CAREER HERE

ENGINEERING+ AUTOMATION STUDY

- Bachelor of Engineering (Mechatronics), University of Queensland
- Bachelor of Engineering (Mechanical Engineering), University of Wollongong
- Bachelor of Robotics and Mechatronics Engineering, Monash University

ENGINEERING+ AUTOMATION JOBS

- Mechanical engineer: \$55K–\$110K
- Control/Automation engineer: \$59K–\$126K
- Robotics engineer: \$53K–\$138K*

*Source: salaries according to payscale.com

THERE HAS NEVER BEEN A BETTER TIME TO GET INTO ROBOTICS"

Luckily for you, right here, right now is where the robotics revolution is kicking off.

"There has never been a better time to get into robotics," says Pauline. And Australia punches above its weight in robotics automation, with innovators using sensors and systems made overseas and then developing algorithms to make them do useful tasks. As a result, Australia is a leading player in mining, infrastructure and agricultural automation.

The best part? There's a place in robotics for everyone. "I'm thrilled to see so many girls and young women involved in robotics and automation," says Pauline. – Ben Skuse

HANS LOHR
MATERIALS AND PROCESSES RESEARCH OFFICER

3D-METAL MAKER

HANS LOHR IS UPCYCLING FACTORY ROBOTS TO 3D-PRINT METAL PARTS IN A CHEAPER WAY

Growing up in rural Victoria, Hans Lohr developed a passion for engineering at a young age. Now, he's at the CSIRO engineering new ways to 3D-print metal.

This 'additive manufacturing' involves using an automated robot laser system to build 3D objects layer by layer. He is using existing factory robots like those used on a factory production line. But 3D-printing metals is complex and expensive.

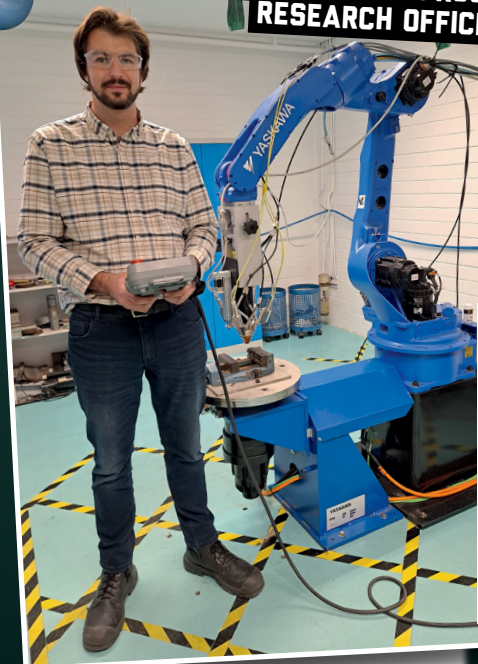
Hans works with experts in a range of sciences to understand the challenges in 3D printing with these robots. Then, he uses his coding knowledge to help make 3D printing robots easier and cheaper to use for others.

"I find it really satisfying to click the run button in my program and a complex task is executed flawlessly on its own," he says. – Ben Skuse

BACHELOR OF AEROSPACE ENGINEERING, MONASH UNIVERSITY

RESEARCH PROJECTS OFFICER (MATERIALS AND PROCESSES), CSIRO

SHUTTERSTOCK



HOOKED ON ROBOTICS

MECHATRONICS STUDENT SCOTT CASHMAN TOOK THE LONG ROUTE. BUT EVENTUALLY FOUND HIS CALLING IN ROBOTICS AT ECU

Scott left school without a career goal in mind, but after years of different jobs in various industries, he says he “caught the ‘electronics bug’” while working as a technician at a white goods repair store, and set his sights on becoming an engineer.

Scott started looking for the right degree and university to kickstart his new career direction, but the hunt didn’t last long. He chose a bachelor’s degree in Mechatronics Engineering “because I’m doing this for the love of engineering,” he says.

And the university was a no-brainer. “Not only is Edith Cowan University (ECU) close to my house, but the atmosphere is excellent, the campus feels like its own little community and the lecturers genuinely want everyone to do well.”

In Scott’s first year, he competed in a team robot-building competition and instantly became hooked on robotics. This inspired him to later help form ECU Robotics, a student society for anyone interested in robotics to learn skills and join teams working on robotics projects. “ECU loved this initiative and before we knew it, they were practically throwing robots at us!” Scott says.

Now in the final year of his degree, Scott is working on two projects intended to solve



SCOTT CASHMAN
ECU MECHATRONICS
ENGINEERING STUDENT

THE CAMPUS FEELS LIKE IT'S OWN LITTLE COMMUNITY

problems in the real world: an unmanned ground vehicle (UGV) and a robot barista.

“We aim to have a robotic arm side-by-side with a barista making your coffee more efficiently and consistently,” he explains. Already able to make 250 cups of coffee in four hours, expect to see Scott’s ECU robot barista in your local coffee shop soon!



MEET YOUR NEW WORK COLLEAGUE: ROBOT JAGUAR UGV

ECU STUDENT OLIVER SHAW HOPES HIS FINAL-YEAR PROJECT – HELPING BUILD JAGUAR UGV, AN OFF-ROAD ROBOTIC VEHICLE ON TANK TREADS – WILL ASSIST MINERS, FARMERS AND OTHERS WORKING THE RUGGED TERRAIN OF WESTERN AUSTRALIA

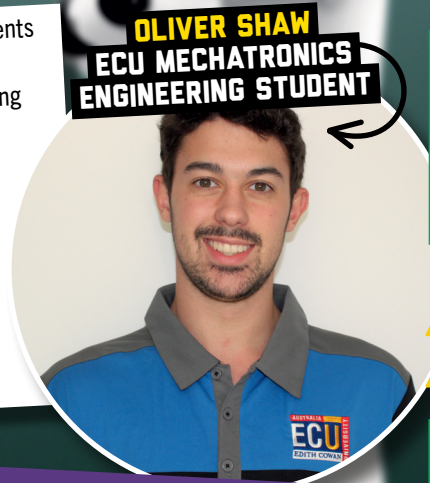
Q+A WITH OLIVER SHAW

CwS: What is your final-year project about?
Oliver: “The UGV project aims to deliver a modular tracked platform that is able to perform a variety of tasks. Currently, there are two versions of the UGV. Mk1 was built by previous student teams and is now being used as a testing platform for the electrical and software components. Mk2 is currently under development and aims to be completed by the end of the year with hopes of marketing and selling to potential clients.”

CwS: How does ECU support the project?
Oliver: “The robotics labs have many industry-standard robots for learning how basic systems operate, and I have always had great guidance and assistance from the teaching

staff to help me excel. ECU also links students with many industry contacts and regularly hosts career fairs. This provides engineering students with an excellent opportunity to network and discuss current projects with industry professionals.”

CwS: What do you do on the project?
Oliver: “My area of research is electrical integration of the onboard systems: UGV’s motors, motor controllers and power supply.”



OLIVER SHAW
ECU MECHATRONICS
ENGINEERING STUDENT

THE ROBOTICS LABS HAVE MANY INDUSTRY-STANDARD ROBOTS

STEM TUTOR, FIRETECH AUSTRALIA
 ENGINEERING INTERN, AUSTRALIAN POTASH LIMITED
 BACHELOR OF ENGINEERING, ECU

WORDS BY BEN SKUSE

DOCTOR? NO, I'M AN ENGINEER...

There's a world of opportunity in combining engineering with medicine and health

At first, it might seem like engineering and health are on different planets. Like, what can machines teach anyone about health? But think about it: if you've ever needed an X-Ray or diagnostic test, or seen someone with a prosthetic limb, then you've seen engineering and health working together.

STEM star

Often referred to as the field of Biomedical Engineering or Medical Science, this is one of the coolest, fastest-growing, cutting-edge pathways in the world of STEM. Research by Seek Australia in 2019 predicted a 30.3% job growth in the field over the next five years.

Dr Jiao Jiao Li (JJ), is a biomedical engineer and lecturer at the University of Technology Sydney (UTS). She's also a 2021-22 Superstar of STEM and a chief investigator at the ARC Training Centre for Innovative BioEngineering.

JJ's research is at the forefront of regenerative medicine which she describes as a combo of engineering, science and medicine. Specifically, JJ is interested in stem cells (cells that can go on to form any other kind of cells) and manipulating them to benefit the 500 million people worldwide who live with osteoarthritis.



JIAO JIAO LI
BIOMEDICAL ENGINEER

Let's hear it for the girls

JJ is ambitious, driven and incredibly passionate about the work she does in research, plus her role as a lecturer and her involvement with school outreach programs across the state. She really enjoys talking to students about finding their spark, to take on new challenges, and in particular uplifting Culturally And Linguistically Diverse (CALD) girls who are passionate about STEM.

JJ wants CALD girls to know it's OK to push back against barriers and that they can be powerhouses in their fields. She's a shining example that you can! – *Hannah Diviney*

Engineering and health might not be an obvious pairing but they're a match made in stem heaven!

START YOUR CAREER HERE

ENGINEERING+HEALTH STUDY

- Bachelor of Engineering (Honours) / Bachelor of Science (Medical Science), University of Sydney
- Bachelor of Medical Engineering (Honours), University of Newcastle
- Bachelor of Engineering (Honours) / Bachelor of Creative Intelligence and Innovation, UTS
- Bachelor of Engineering (Honours) / Master of Biomedical Engineering, UNSW

ENGINEERING+HEALTH JOBS

- Biomedical engineer: \$52K–\$91K
- Prosthetist: \$49K–\$107K
- Product development scientist: \$58K–\$90K
- Research and development manager: \$67K–\$149K*

*Source: salaries according to payscale.com

LECTURER IN BIOMEDICAL ENGINEERING, UTS

NHMRC EARLY CAREER FELLOW, KOLLING INSTITUTE, UNIVERSITY OF SYDNEY

PHD, BIOMEDICAL ENGINEERING, UNIVERSITY OF SYDNEY

BACHELOR OF BIOMEDICAL ENGINEERING/ MEDICAL SCIENCE, UNIVERSITY OF SYDNEY

5 WAYS ENGINEERS ARE BATTLING COVID-19

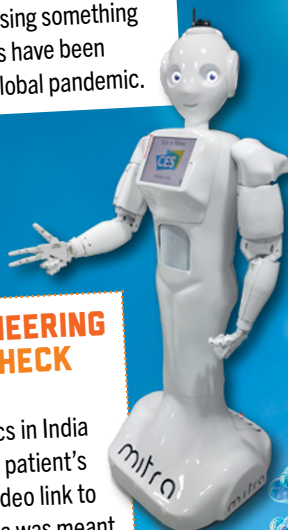
From 3D-printed door openers to medical robots, engineers around the world are finding creative ways to fight the spread of COVID-19

There are many types of engineers, and they're all problem-solvers. Whether it's repurposing something old or inventing something new, engineers have been working hard to keep us safe during the global pandemic.

#1

AREA: MECHATRONIC ENGINEERING
WHAT: USING ROBOTS TO CHECK FOR COVID-19 SYMPTOMS

Mechatronic engineers at Invento Robotics in India built a talking robot which can measure a patient's temperature, ask about symptoms and video link to doctors through a tablet on its chest. Mitra was meant to help out in nursing homes, but has easily adapted to COVID-19 screening in hospitals and offices.



#2

AREA: MATERIALS SCIENCE AND ENGINEERING

WHAT: CREATING A 3D-PRINTED TOOL TO OPEN DOORS AND PUSH BUTTONS

Touching surfaces is something to be avoided in our new COVID-19-normal world. Engineering student at Monash University in Melbourne Muthu Vellayappan has created a plastic "safety key" to help keep hands clean. It has grooves to lock on to L- and U-shaped door handles and a bump perfect for punching buttons at pedestrian crossings and in lifts.



MUTHU VELLAYAPPAN
POSTGRADUATE STUDENT

#3

AREA: CHEMICAL ENGINEERING
WHAT: DESIGNING A HEATED FACE MASK TO SLOW AND DEACTIVATE COVID-19

Face masks have helped keep COVID-19 in check, and chemical engineers at MIT in the US want to take them to a new level. They've prototyped a battery-powered, reusable mask with a heated copper mesh wrapped in insulating fabric. The heating system is designed to slow and deactivate COVID-19 in the air breathed in and out by the mask's wearer.



#4

AREA: BIOMEDICAL ENGINEERING
WHAT: USING A "LUNG ON A CHIP" TO TEST DRUGS AND PREVENT COVID-19

A team at Harvard University in the US used an artificial lung the size of a USB stick to show that an antimalarial drug may also help prevent COVID-19. They also designed a pseudovirus that mimics the virus which causes COVID-19. This virus can be safely used for research in laboratories that aren't set up to study dangerous diseases.

#5

AREA: OPTOELECTRONIC ENGINEERING
WHAT: USING AI (ARTIFICIAL INTELLIGENCE) TO DETECT PEOPLE WITH HIGH TEMPERATURES IN CROWDS

Not all COVID-19 patients have fevers, but a quick and reliable way to find people with high temperatures in crowded airports and hospitals could help keep others safe. In Scotland, engineers from Thales are testing a system that teams AI with thermal imaging. The system uses an app and webcams to scan people's faces for temperature, and machine learning to improve as it gathers data. – Nadine Cranenburgh

Materials of the future!

Engineers play a huge role in creating new and improved materials for everything from sports to the green economy



@williamsracingproducts



In high school, Michael Williams always thought about maths and physics concepts in relation to his mad love for BMX bike racing. Now, his passion has led to one of Australia's only niche specialist manufacturing businesses for high-quality bicycle parts, Williams Racing Products. "My business is founded on making custom parts for riders and to encourage the industry to think outside the box," he says.



MICHAEL WILLIAMS
MECHANICAL ENGINEER

START YOUR CAREER HERE

ENGINEERING+ADVANCED MANUFACTURING STUDY
 Bachelor of Mechanical Engineering (Honours), University of Newcastle
 Bachelor of Engineering (Honours) (Chemical Process), Queensland University of Technology
 Cert II in Engineering Pathways, Various suppliers

ENGINEERING+ADVANCED MANUFACTURING JOBS
 Process engineer: \$61K-\$121K
 Design engineer: \$57K-\$103K
 Mechanical engineer: \$55K-\$110K*
 *Source: salaries according to Payscale



BUSINESS IS BOOMING

Michael's business is part of a boom in advanced manufacturing based on need rather than mass production. Advanced manufacturing is a big growth area. Manufacturers employ 900,000 Australians, invest \$4 billion in research and development, and contribute \$100 billion to the economy. And, engineers are have a job to do at every stage, from the design cycle to the end product.

Michael's business stemmed from an idea for a new type of bike clutch that came to him in his final year of a Engineering (Mechanical/Civil) degree at Deakin University in Geelong. With help from his mentor, Associate Professor Paul Collins, he got in touch with Spark Deakin, the university's business accelerator program, won a scholarship and founded his business in 2017.

WHAT IS ADVANCED MANUFACTURING?

THINK 3D PRINTING, NANOTECHNOLOGY, ADVANCED MATERIALS AND BIOTECHNOLOGY. EXAMPLES INCLUDE 3D-PRINTED MEDICAL IMPLANTS, NANO (SUPER SMALL) SENSORS THAT CAN DETECT CONTAMINANTS IN FOOD, BREEDING PEST-RESISTANT PLANTS, OR CREATING LAYERED COMPOSITES LIKE CARBON FIBRES TO CREATE LIGHTWEIGHT BIKES AND PLANES.

SKILLS FOR LIFE

"We use different manufacturing techniques depending on the part we're making," says Michael.
 "Studying STEM fields is really important in high school because of the scope it opens up. Whether you work in a STEM area or not, having the knowledge and breadth of those skills is really important."
 - Heather Catchpole

Check out the Careers with STEM Job Kits for the lowdown on these awesome careers!

BACHELOR OF ENGINEERING (MECHANICAL/CIVIL), DEAKIN UNIVERSITY



SENIOR ENGINEER AND PROJECT MANAGER, VICROADS



CASUAL ACADEMIC TEACHER, SCHOOL OF ENGINEERING, DEAKIN UNIVERSITY



FOUNDER, WILLIAMS RACING PRODUCTS



MEET THE MANAGER

ANSTO'S ENGINEERING SUPPORT WORKSHOP MANAGER BIANCA SHEPHERD OVERSEES THE MANUFACTURING OF PARTS FOR AUSTRALIA'S ONLY NUCLEAR REACTOR



Seeing ideas go from concept to reality is an exciting part of Bianca's day-to-day at ANSTO. As the engineering support workshop manager, Bianca manages the operation of the workshop facility to make sure all requirements are met. This includes working with engineering teams to understand the scope of upcoming projects, organising materials and resources needed for manufacturing, quality checks, and sometimes even installing and maintaining parts onsite.

Bianca also oversees the manufacture of specialised parts for the OPAL multi-purpose reactor, which makes nuclear medicine for half a million Australians each year.

"The items that we manufacture are bespoke and not able to be purchased off the shelf," says Bianca. "Safety and quality are the keys to ensuring the work we produce is exactly what the client is after."

YOU NEED TO HAVE RESILIENCE AND GRIT

An engineering mindset

Bianca started her STEM journey as an electrical engineering cadet at BHP and says her engineering background ensures that safety is always a priority. Skills in troubleshooting and analysing problems have been really helpful too, and having a pragmatic, methodical approach has worked well for her.

Keen to get into engineering? Bianca says you should follow the path you want to take. "Your career is going to be a journey, there are going to be things that you do that you will absolutely thrive at and others that are going to test your mettle."

She also urges you to believe in yourself and to find a mentor. "You need to have resilience and grit. I found that having someone to bounce ideas off and discuss concepts with was a valuable key to success. It doesn't need to be a formal relationship to still add value to your development." – Louise Meers

ASSOCIATE DIPLOMA OF ELECTRICAL ENGINEERING, TAFE NSW

BACHELOR OF ARTS (MANAGEMENT + PSYCHOLOGY), UNIVERSITY OF WOLLONGONG

HUMAN RESOURCES DEVELOPMENT OFFICER, BHP STEEL

ENGINEERING SUPPORT WORKSHOP MANAGER, ANSTO

GET INTO ENGINEERING

There are paths into awesome engineering careers whatever your age

Year 7/8

Jump into workshops, camps, hackathons or school holiday activities:

Re-engineering Foundation rea.org.au

One million students who have taken part in these cool engineering programs can't be wrong!

Techgirls Movement Foundation techgirlsmovement.org

Team up with your friends to manage a tech project from start to finish!

Power of Engineering powerofengineering.org

Resources and events that introduce you to the awesomeness of engineering.



GENEVIEVE DE MICHELE
CIVIL + CONSTRUCTION ENGINEER



HELEN CARTLEDGE
MATERIALS ENGINEER



JOSÉ LAHOZ-MONFORT
SYSTEM DESIGN ENGINEER



HUY NGUYEN
SYSTEMS ENGINEER

Plus check out these cool role models online!

- Helen Cartledge volunteers in the STEM space at schools and was recognised as the 2019 Professional Engineer of the Year.
- José Lahoz-Monfort is using engineering know-how to track wildlife for conservation.
- Huy Nguyen is helping to improve lives and wellbeing using his skills and qualifications in systems engineering.
- Genevieve De Michele is a civil and construction engineer who loves seeing her work in the real world everyday.

Year 9/10

Get specific job info on engineering careers in the Careers with STEM Job Kits: bit.ly/CwSTEMJK

- Robotics & Automation Engineer
- Space & Defence Specialist
- Design Engineer
- Process Engineer
- Construction and Project Design

Enrol in the highest level maths you're comfortable with, plus physics, and also choose subjects you love like design, history, fashion or biology – you never know where engineering can take you!

At uni

You can choose to study postgraduate courses, or jump into work – most unis include an internship as part of your engineering degree.

You could also do Engineers Australia's 18-month grad program to get a head start into a career: bit.ly/EAggrad

Year 11/12

Good luck with study! Check out our essential tips to choosing your study pathway: bit.ly/CwSTEMstudy

Plus look out for uni open days and information around engineering degrees. You can also find vocational pathways into engineering including certificates and diplomas – check out P8 in our flip section for more info or search on studiesinaustralia.com.

Here's a few major courses we're excited about:

- Bachelor of Engineering (Honours) (Electrical and Aerospace), QUT
- Bachelor of Engineering (Adv Manufacturing and Mechatronics) (Honours), RMIT
- Bachelor of Engineering (Electrical and Renewable Energy) Honours, ECU
- Bachelor of Engineering (Honours) (Architectural and Structural), University of Adelaide
- Bachelor of Mechatronics Engineering (Honours), University of Newcastle

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We acknowledge the Traditional Owners of country throughout Australia and recognise their continuing connection to land, waters and culture. We pay our respects to their Elders past, present and emerging.

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