MONASH
ELECTRICAL AND COMPUTER SYSTEMS ENGINEERING

monash.edu/engineering/ecse

MONASH University

GROUP OF EIGHT AUSTRALIA
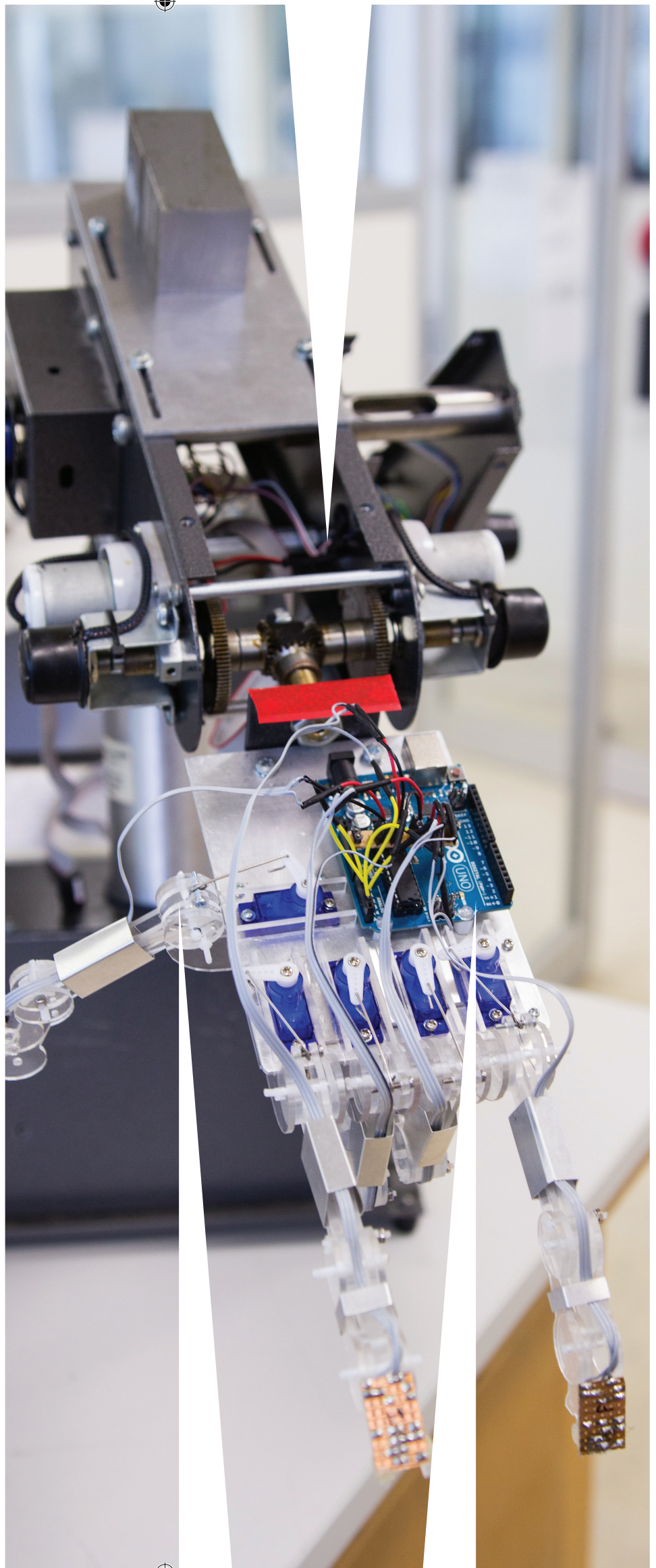
SEE YOUR FUTURE
IN A NEW LIGHT

CHALLENGING.

Electrical and computer systems engineering (ECSE) is a degree in problem solving, that will prepare you to face global challenges in power electronics and energy, computer vision and robotics, biomedical engineering, telecommunications, computing, signal processing, mathematics, electronics or any industry that manages complex systems or data, such as banking and finance.

EXCITING.

Studying ECSE gives you the opportunity to solve grand challenges, such as transforming underdeveloped countries through electricity and lighting, developing robots to provide disaster response, or saving and enhancing lives with revolutionary advances in biomedicine.

The Monash Vision Direct-to-Brain Bionic Eye will use ground-breaking technology to bypass damaged optic nerves and could benefit up to 85% of people who are clinically blind, with human trials scheduled to begin soon.

REWARDING.

An ECSE degree is a broad degree that is applicable to almost any industry and in any country. Graduates will have excellent employment prospects with an average Australian salary of $111,003 (Adzuna Job Report, 2018), and opportunities for cutting-edge research in a range of fields.

ECSE is also the discipline that most enables technological entrepreneurship in the 21st century.

DID YOU KNOW?

Electrical Engineers are at the forefront of this generation's most important developments and innovations – communications, AI, energy and power systems, and computerisation.
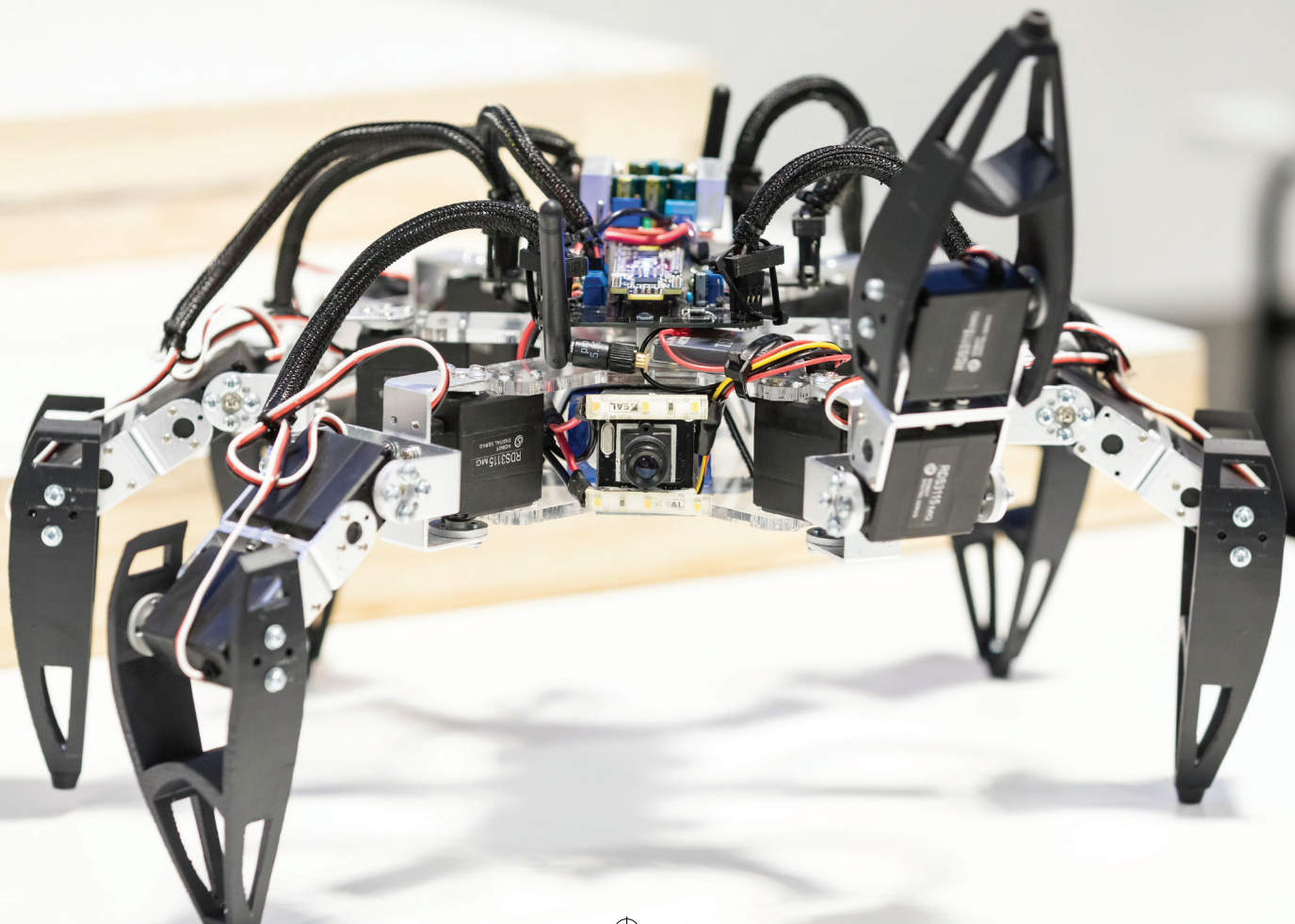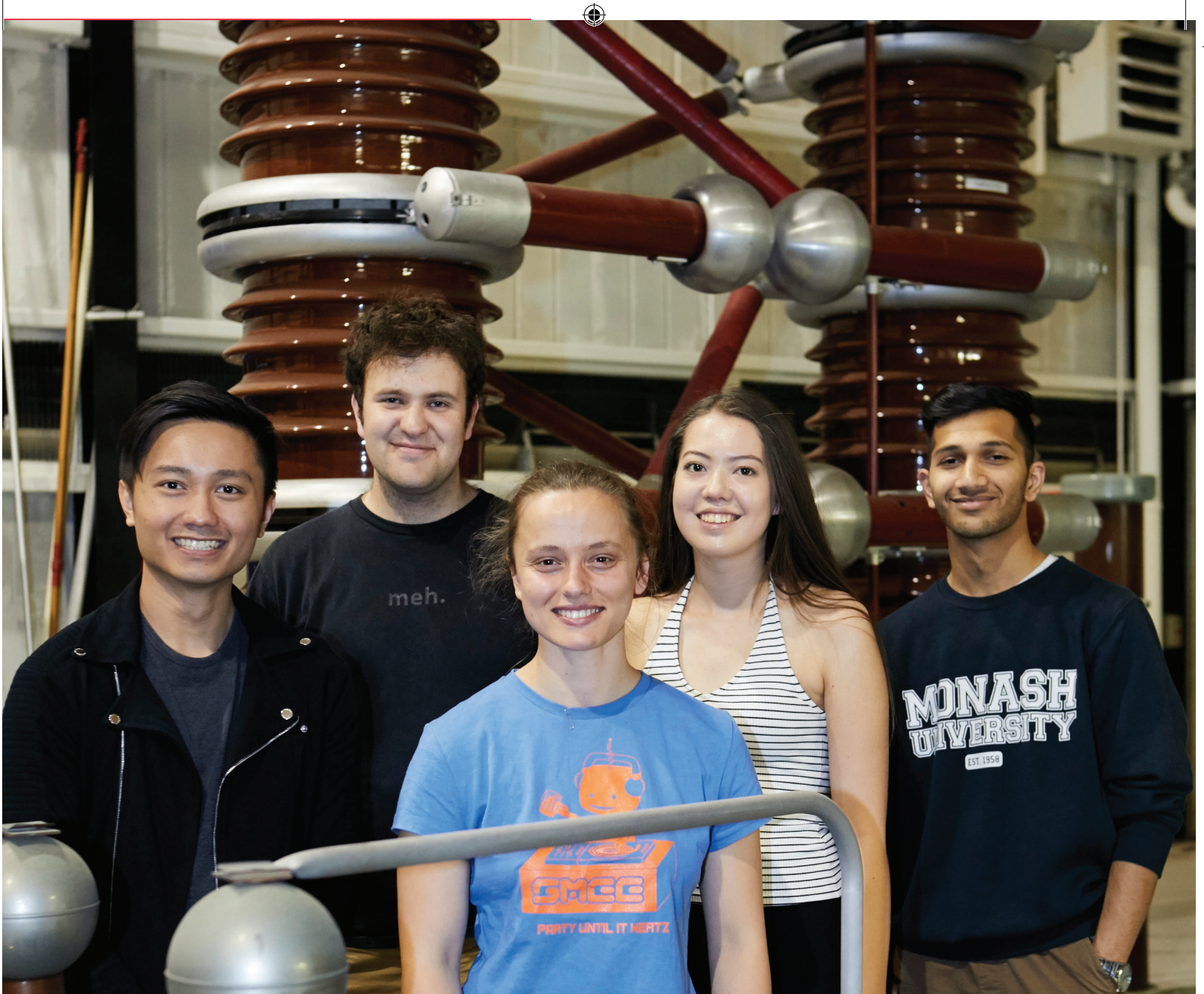
THE WORLD OF ELECTRICAL AND COMPUTER SYSTEMS ENGINEERING IS CHANGING RAPIDLY.

There are new and emerging areas for employment and research influencing a range of industries and the way we live and operate day to day.

INTEGRATED CAPSTONE DESIGN PROJECT

Students use knowledge from electronics, computer systems and communications engineering, to tackle a group project to design a robot.

This allows them to apply project management skills, and extend their experience of working in groups.

At the end of the semester, all robots are pitted against each other in a nerve wracking competition to find out which team's design and implementation is the best.

FINAL YEAR RESEARCH PROJECT

During level four, you will undertake an independent full-year project in an area of personal interest. Projects are often related closely to the department's exceptionally strong research and collaborative industry programs within research centres.

One key objective is to give you the experience of tackling a real problem and developing practical solutions.

The final year project often leads to graduate opportunities in that area – employers are very impressed by this practical demonstration of a graduate's abilities and interests.

The final year project builds self-reliance and planning capabilities in both individual and team-based environments.

BROADEN YOUR CAREER OPTIONS
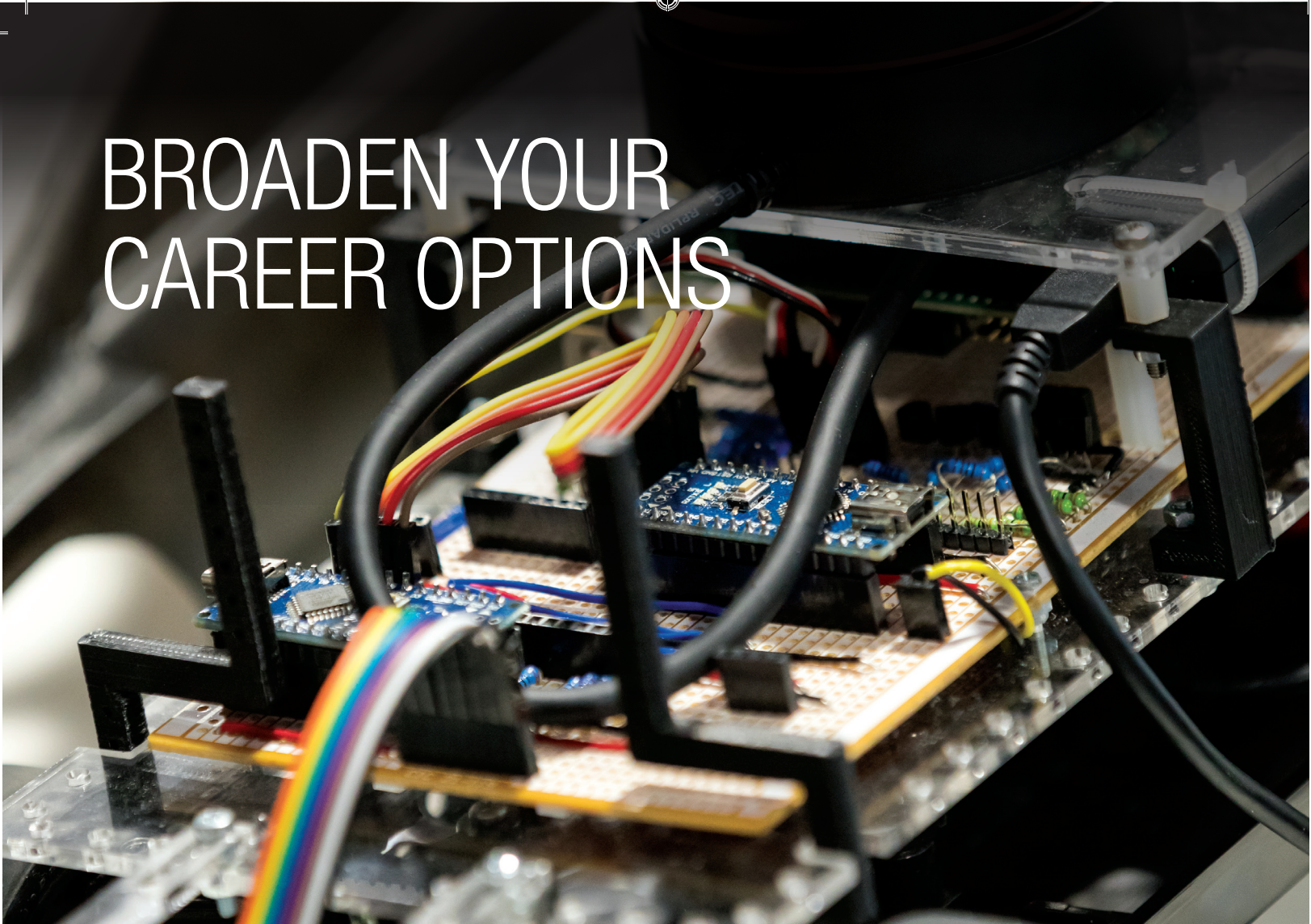
ARTIFICIAL INTELLIGENCE (AI)

AI is considered the next phase of human evolution. Learn how to design and build Artificial Neural Networks and use Deep Learning to solve fundamental problems in engineering, physics, health and social sciences. From machines classifying images, proving mathematical theorems, making medical diagnosis and driverless cars, AI will revolutionise our lives.

Applications

Data science, robotics, computer vision, natural language processing, medical, astronomy, banking, gaming, telecommunications, and more.

ANALOG ELECTRONICS

Learn how to combine 'analog' components such as resistors, capacitors, inductors, diodes, transistors, sensors etc. to create electronic circuits that manipulate electrical signals and solve problems. All electrical systems contain some analog electronics.

Applications

All electrical engineering.

MATHEMATICS

Master the mathematics that describe electrical and information systems, leading to the deep understanding of how they work and how they can be manipulated to solve new problems.

Applications

Used in all engineering applications.

DIGITAL ELECTRONICS

Learn how to use 'digital' components such as logic gates and memory to create systems that manipulate, transmit and receive information. Digital electronics enables the creation of computers, ranging from single purpose micro-controllers to general purpose microprocessors such as those found in smartphones and laptops.

Applications

Telecommunications, automotive, aerospace, military, banking, medical, computers, robotic, mobile phones, televisions, washing machines, microwave ovens, and more.

POWER ELECTRONICS/ENERGY

All electrical systems require power. Design solutions for efficiently generating, distributing, converting and managing energy. With the recent advancement in renewable energies such as wind and solar energy, the role of power electronics is becoming more critical to ensure we have access to sustainable, clean, and non-polluting energy.

Applications

Wind and solar energy generation and integration, electric cars, and chargers for various electrical systems such as laptops and mobile phones.

SIGNAL PROCESSING

Fundamentally, our interaction with the universe is through 'signals' that carry information. Signal processing enables humans and machines to sort signals from 'noise', in turn enabling efficient communication and interpretation of the world around us.

Applications

Wi-Fi, AM/FM Radio, optical fibre communication signals, and real time video/audio processing for robotics.

CONTROL SYSTEMS

Learn the principles of designing in-built 'control systems' that enable the effective automation of repetitive tasks and precise management of physical systems using electrical signals.

Applications

Autopilot in planes, targeting systems in fighter jets, steel rolling mills, car cruise controls, air conditioning systems, manufacturing, and monitoring.

ROBOTICS AND COMPUTER VISION

Learn how to enable robots to make smart human-like decisions. Combine sensors, computer processing and actuators to enable them to interact effectively with their environment whilst keeping humans safe.

Applications

Self-driving cars, robotic vacuum cleaners, and the Mars rover.

BIOMEDICAL ENGINEERING

We are all complex biological systems that are run on electrical signals. Learn how to create electrical systems to diagnose problems, assist and enhance the human body.

Applications

Bionics (limbs, hands, eye and ear, etc.), EEG (brain) and ECG (heart) monitoring, and MRI/PET/X-ray scans.

TELECOMMUNICATIONS

The ability to effectively communicate with each another is fundamental to society. Learn how to do this over extremely long distances using electrical and light signals through copper wires, radio waves and optical fibres. Learn how the internet works.

Applications

The Internet of Things, LED lights to transmit data – visible light communications, satellite communications, mobile phones, Wi-Fi, digital TV and audio broadcasting, and Netflix.

COMPUTING

Learn how computers work and how to integrate computer programs with electrical components such as the camera or touchscreens on your smartphone. Master your programming skills.

Applications

Auto-tuning guitar, Segway/hoverboard, and any system with the word 'smart' in front of it!

"My desire to understand how things work, coupled with a desire to solve real world problems to make the world better for other people, led me to pursue engineering."

JAMES SALAMY
Bachelor of Electrical and Computer Systems Engineering (Honours) and Bachelor of Science
Currently a graduate student at Massachusetts Institute of Technology (MIT)

"I'm fascinated by electronics, and I have always wanted a deeper understanding of how they work, and how they can be used to make systems. ECSE was the perfect choice for this. You explore all elements of electrical engineering, from the obvious ones, such as circuits and circuit design, to the perhaps less obvious sides of control, computer systems and communications. The highlight of my engineering degree was my final year project to design the supporting software, digital hardware and circuitry needed test a single photon sensitive camera!"

OUR STUDENTS
MAKING A DIFFERENCE

"Electrical Engineering has set me on a career path I could never have imagined when I started. It gave me the skills and logical approach that I need in order to be successfully self-employed.

Electrical and Computer Systems Engineering gives you the opportunity to be extremely creative and see the fruits of that creativity emerge rather quickly in prototype form prior to being incorporated into a wide variety of commercially significant products."

DR ALAN FINKEL

**Australia's Chief Scientist and former Chancellor of Monash University**

"After graduating I joined Ford Motor Company graduate program and have worked in Australia, China and US. I couldn't resist the excitement of joining initiatives overseas.

I work at Ford Greenfield Labs in Silicon Valley, in the San Francisco Bay Area leading a multidisciplinary research team in discovering new user experiences through wireless connected hardware – the Internet of Things. As part of Ford Smart Mobility initiative, we're the entrepreneurial, experimental, fast-paced, risk-taking side of an established global organisation. I've come to realise technical ability gives you credibility as a leader."

JOHN LUO

**Manager, Emerging Technology Integration & Wireless Connectivity, Ford, US.
Bachelor of Electrical and Computer Systems Engineering (Honours)**
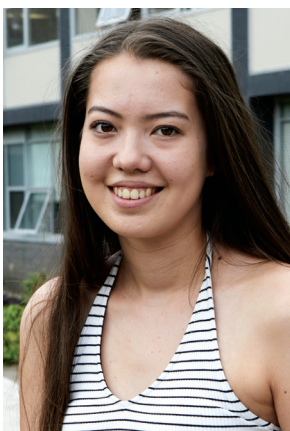
"I found Electrical and Computer Systems Engineering (ECSE) an interesting field and I really enjoyed coding. We are exposed to telecommunications, biomedical applications, robotics, power and many more, so I thought ECSE would provide me with many different opportunities in the future.

Joining a club committee was one of the best decisions I've ever made. I am the Vice President of Society of Monash Electrical Engineers (SMEE). I've met so many wonderful people through the club and it has taught me many great skills.

After graduating I hope to obtain a position in industry, preferably in the robotics or biomedical application fields."

AMY PRENTICE

**Bachelor of Electrical and Computer Systems Engineering (Honours)
Network Assessor at POWERPLANT Project Services PTY Ltd.**

NEXT STEPS

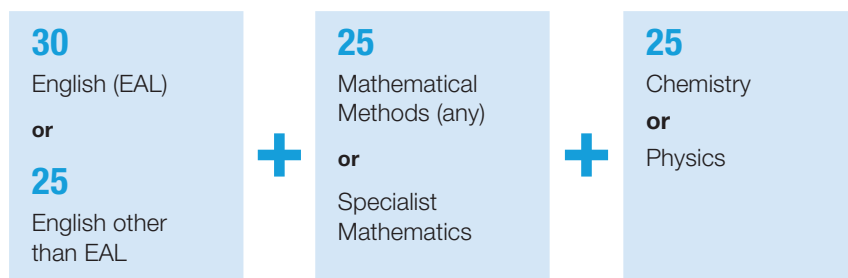## COURSE DETAILS

Location: Clayton

Indicative ATAR: 91.80*
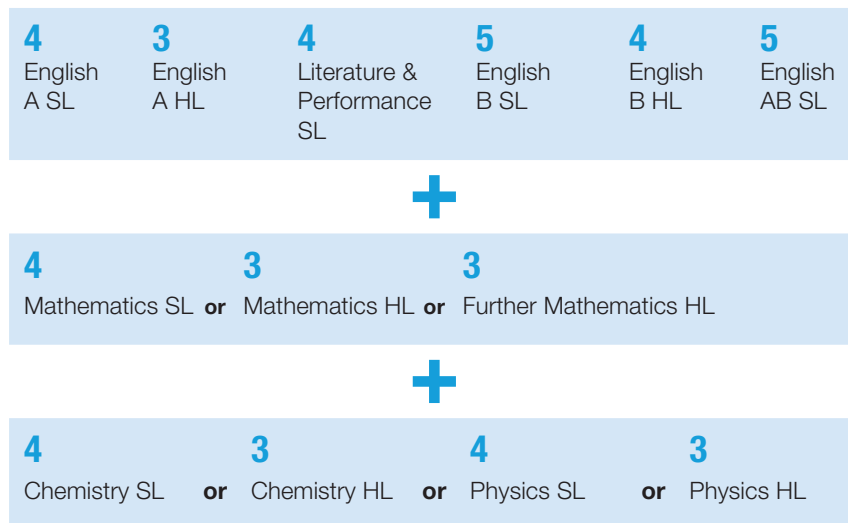
Indicative IB Score: 34*

Duration: 4 years

Degree awarded:
Bachelor of Electrical and Computer Systems Engineering (Honours)

VCE prerequisites (units 3 and 4)

30
English (EAL)
or
25
English other than EAL

+

25
Mathematical Methods (any)
or
Specialist Mathematics

+

25
Chemistry
or
Physics

International baccalaureate subject prerequisites

4 English A SL	**3** English A HL	**4** Literature & Performance SL	**5** English B SL	**4** English B HL	**5** English AB SL

+

4 Mathematics SL	**or**	**3** Mathematics HL	**or**	**3** Further Mathematics HL

+

4 Chemistry SL	**or**	**3** Chemistry HL	**or**	**4** Physics SL	**or**	**3** Physics HL

ENTERING THE ELECTRICAL AND COMPUTER SYSTEMS ENGINEERING SPECIALISATION

After you have successfully completed your first year, you may apply for entry into the ECSE specialisation.

* The scores are to be used as a guide only, and are either lowest selection rank to which an offer was made in 2019 or an Estimate (E).

HOW TO APPLY

Domestic (Australian) and onshore international students

If you are an Australian or New Zealand citizen, an Australian permanent resident, or you are an international student studying an Australian Year 12 or IB in Australia or New Zealand, apply through the Victorian Tertiary Admission Centre (VTAC).

Visit **vtac.edu.au** for more information.

International students

International students should apply directly to Monash University and must have completed an equivalent qualification to the Victorian Certificate of Education (VCE) and the prerequisite subjects or equivalent.

For more information, visit **monash.edu/study/international**

CONNECT

Please contact the Department of Electrical and Computer Systems Engineering to find out more.

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MONASH University

Further information

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