Postgraduate Prospectus

Electrical Engineering & Telecommunications

UNSW SYDNEY


OUTLOOK
STUDENTS

Welcome from the Head of School

UNSW Electrical Engineering and Telecommunications is the largest School of its kind in Australia, and its international standing consistently attracts high calibre students from around Australia and the world. The School spans five research disciplines – Energy Systems, Telecommunications, Systems and Control, Nano / Micro Systems and Signal Processing.

Our education is recognised within UNSW and beyond for its quality and innovation, reflected in high student experience scores and many teaching awards. Our academic, professional and technical staff are internationally renowned experts in their fields and offer the widest range of specialised elective courses and honours thesis/masters project topics nationally.

Our research has received the maximum 5-star rating of "well above world class" in all Excellence in Research Australia evaluations: 2010, 2012, 2015 and 2018. Multiple university rankings list us as the top School in Australia, and within the top 50 globally. We work closely with industry globally on dozens of cutting-edge projects that underpin and advance our technological society. Electrical Engineering continues to feature in lists of the best, highest-paying or most in-demand jobs, e.g. Indeed https://www.indeed.com/lead/best-jobs-2020 (27/2/20), Business Insider https://www.businessinsider.com.au/highest-paid-jobs-australia-2020-7 (17/7/20) and Forbes https://www.forbes.com/sites/jonyounger/2019/05/17/the-best-paying-and-most-sought-after-jobs-for-new-grads-and-freelancers-now/#79e5457a687d (17/5/19).

With $104M recently invested, we are now home to many cutting-edge laboratory facilities that are unique nationally and offer our students fantastic opportunities to develop as engineers.

The School continues to provide a world-class, challenging and well-balanced learning environment that has produced excellent and valued engineering graduates since its inception.

Programs Available:

Master of Engineering (8621)
Accredited by Engineers Australia
Electrical Engineering
Telecommunications

Master of Engineering Science (8338)
Electrical Engineering
Energy Systems
Telecommunications
Systems and Control
Space Systems Engineering

Graduate Diploma of Engineering Science (5341)
Electrical Engineering
Energy Systems
Telecommunications

Graduate Certificate of Engineering Science (7320)
Electrical Engineering
Energy Systems
Telecommunications

Details available via: https://www.engineering.unsw.edu.au/electrical-engineering

UNSW EE&T graduates find themselves in constant demand everywhere, whether they are building motors for electric vehicles, designing new brain-computer interfaces, programming control systems for autonomous aircraft, pioneering quantum electronic circuits, doing financial modelling for a bank, developing gigahertz switching technology using microelectromechanical systems, or planning the next generation of wireless networks.

Our graduates work in more than 90 countries around the world. A UNSW Electrical Engineering degree will always have high value in the job market.

For more information, please contact:

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Deputy Head of School (Education)
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ELECTRICAL ENGINEERING PROGRAMS

PROGRAM OPTIONS (ELECTRICAL ENGINEERING)	PROGRAM CODE	UNITS OF CREDIT	DURATION (YEARS)*	COMMENCE
Master of Engineering	ELECAS8621	96	2	T1, T2 or T3
Master of Engineering Science	ELECBS8338	96	2	T1, T2 or T3
Graduate Diploma of Engineering Science	ELECQS5341	48	1	T1, T2 or T3
Graduate Certificate of Engineering Science	ELECDS7320	24	0.7	T1, T2 or T3

ENTRY REQUIREMENTS

Master of Engineering: Students need a recognised four year Bachelor degree in an appropriate area of engineering with Honours II/2 or equivalent. Relevant disciplines considered for entry include electrical engineering, as well as electrical engineering (for Systems and Control, or a mechatronic engineering degree including Control Systems).

Master of Engineering Science: Students need a recognised four year Bachelor degree in an appropriate area of engineering with Honours II/2 or equivalent. Relevant disciplines considered for entry include electrical or telecommunications or computer engineering where a sound foundation in telecommunications is provided.

Graduate Diploma: Students need a three- or four year degree in electrical engineering or a related discipline of engineering or science plus relevant professional experience . The Graduate Diploma is a common pathway to the Masters.

Graduate Certificate: Students need a recognised four year Bachelor degree in a relevant discipline of engineering with a minimum 65% average. A three- or four-year Bachelor of Engineering or Science combined with relevant discipline experience (exact positions and roles that will be considered relevant to be decided by each specialisation) may be recognised. Students who complete the Graduate Certificate may continue further to upgrade to Graduate Diploma.

CREDIT TRANSFER OR ADVANCED STANDING

Students may be granted credit for some courses. Those with a four year honours degree (for example in Electrical Engineering) can apply for credit for up to 48 UOC for the Masters (effectively reducing it to one year full time) or up to 24 UOC for the Graduate Diploma . Full details can be found on the program handbook page.

PROGRAM STRUCTURE

Master of Engineering: Students should complete the following courses:
Six L4, Five L5, Two ETM, One design course, Thesis A, B and C and 60-days Industrial training

Master of Engineering Science: Students should complete the following courses:
L4 – min four, L5 – min four, ETM – min one & max four (additional courses other than ones in the list are available. Full details can be found in the program handbook page.), GSOE9010, Project A & B, rest electives (L4/L5)

Graduate Diploma: Students should complete the following courses:
Three L4, three L5, two electives (L4/L5/ETM)

Graduate Certificate: Students should complete the following courses:
L4 (min one; max three), three L5 (min one; max two), GSOE9445 (optional)

ELECTIVES

DISCIPLINARY KNOWLEDGE COURSES

ELEC4601	Digital and Embedded Systems Design [T2]
ELEC4602	Microelectronics Design and Tech [T1, T2]
ELEC4603	Solid State Electronics [T3]
ELEC4604	RF Electronics [T1]
ELEC4605	Quantum Devices and Computers [T3]
ELEC4611	Power System Equipment [T1]
ELEC4612	Power System Analysis [T1]
ELEC4613	Electrical Drive Systems [T2]
ELEC4614	Power Electronics [T1]
ELEC4617	Power System Protection [T2]
ELEC4621	Advanced Digital Signal Processing [T1]
ELEC4622	Multimedia Signal Processing [T2]
ELEC4623	Biomedical Instrumentation, Measurement and Design [T3]
ELEC4631	Continuous-Time Control System Design [T2]
ELEC4632	Computer Control Systems [T3]
ELEC4633	Real-Time Engineering [T1]

ADVANCED DISCIPLINARY KNOWLEDGE COURSES

ELEC9701	Mixed Signal Microelectronics Design [T3]
ELEC9702	Radio Frequency Integrated Circuits [T1]
ELEC9703	Microsystems Design and Technology [T1]
ELEC9704	VLSI Technology
ELEC9711	Power Electronics for Renewable and Distributed Generation [T3]
ELEC9712	High Voltage Systems [T3]
ELEC9713	Industrial and Commercial Power Systems [T1]
ELEC9714	Electricity Industry Planning [T2]
ELEC9715	Electricity Industry Operation [T1]
ELEC9716	Electrical Safety [T2]
ELEC9719	Real time Digital [T3]
ELEC9721	Digital Signal Processing Theory and Applications [T2]
ELEC9722	Digital Image Processing
ELEC9723	Speech Processing [T3]
ELEC9731	Robust and Linear Control Systems [T1]
ELEC9732	Analysis and Design of Non-linear Control Systems [T3]
ELEC9733	Real Time Computing and Control
ELEC9741	Electrical Engineering Data Science
ELEC9781	Special Topics in Electrical Engineering 1 [T1]
ELEC9782	Special Topics in Electrical Engineering 2 T1

ENGINEERING AND TECHNICAL MANAGEMENT (ETM) COURSES

GSOE9210	Engineering Decisions [T3]
GSOE9420	Project Management in Engineering and Research
GSOE9445	Entrepreneurial Engineering [T2]
GSOE9510	Ethics & Leadership in Engineering [T1]
GSOE9747	Innovation and Commercialisation for Engineers
GSOE9820	Project Management [T1, T2]
GSOE9830	Economic Decision Analysis In Engineering [T2, T3]

ONE DESIGN COURSE

ELEC9123	Design Proficiency [T2]

MASTERS PROJECTS A,B,C(TOTAL 12UOC WITH 4UOC EACH)

ELEC9451	Masters Project A in one term in 2nd year [T1, T2, T3]
ELEC9452	Masters Project B in next term continuously [T1, T2, T3] after passing ELEC9451 [T1, T2, T3]
ELEC9453	Masters Project C in next term [T1, T2, T3] after passing ELEC9452 [T1, T2, T3]

INDUSTRIAL TRAINING

Need to have 60 working days of Industrial Training (IT) and submit the IT report; it is recommended to do the work experience by the end of your 1st year.

TELECOMMUNICATIONS PROGRAMS

PROGRAM OPTIONS (TELECOMMUNICATIONS)	PROGRAM CODE	UNITS OF CREDIT	DURATION (YEARS)*	COMMENCE
Master of Engineering	TELEAS8621	96	2	T1, T2 or T3
Master of Engineering Science	TELEBS8338	96	2	T1, T2 or T3
Graduate Diploma of Engineering Science	TELECS5341	48	1	T1, T2 or T3
Graduate Certificate of Engineering Science	TELEDS7320	24	0.7	T1, T2 or T3

ENTRY REQUIREMENTS

Master of Engineering: Entry is open to students with a four year non-accredited (under the Washington Accord) bachelor of engineering degree or equivalent. Alternatively, eligible applicants include those who hold a three year engineering science degree, at least equivalent to the first three years of a relevant engineering degree accredited under the Washington Accord.

Master of Engineering Science: Students need a recognised four year Bachelor degree in an appropriate area of engineering with Honours II/2 or equivalent. Relevant disciplines considered for entry include electrical or telecommunications or computer engineering where a sound foundation in telecommunications is provided.

Graduate Diploma: Students need a three or four year degree in a relevant discipline of engineering or science plus relevant professional experience .The Graduate Diploma is a common pathway to the Masters.

Graduate Certificate: Students need a recognised four year Bachelor degree in a relevant discipline of engineering with a minimum 65% average. A three- or four year Bachelor of Engineering or Science combined with relevant discipline experience (exact positions and roles that will be considered relevant to be decided by each specialisation) may be recognised. Students who complete the Graduate Certificate may continue further to upgrade to Graduate Diploma.

CREDIT TRANSFER OR ADVANCED STANDING

This is available only for 8338 and 5341 programs. 8621 students should undertake the full 96 UoC. Those with a four year honours degree (for example in Electrical Engineering) can apply for credit for up to 48 UOC for the Master of Engineering Science (effectively reducing it to one year full time) or 24 UOC for the Graduate Diploma. Full details can be found on the program handbook page.

PROGRAM STRUCTURE

Master of Engineering: Students should complete the following courses:
Six L4, Five L5, Two ETM, One design course, Thesis A, B and C and 60-days Industrial training

Master of Engineering Science: Students should complete the following courses:
L4 – min four, L5 – min four, ETM – min one & max four (additional courses other than ones in the list are available. Full details can be found in the program handbook page.), GSOE9010, Project A & B, rest electives (L4/L5)

Graduate Diploma: Students should complete the following courses:
Three L4, three L5, two electives (L4/L5/ETM)

Graduate Certificate: Students should complete the following courses:
L4 (min one; max three), three L5 (min one; max two), GSOE9445 (optional)

ELECTIVES

DISCIPLINARY KNOWLEDGE COURSES (L4)

ELEC4621	Advanced Digital Signal Processing [T1]
GMAT4900	Principles of GPS Positioning
TELE4642	Network Performance [T2]
TELE4651	Wireless Communication Technologies [T2]
TELE4652	Mobile & Satellite Communications Systems [T3]
TELE4653	Digital Modulation and Coding [T1]
PHTN4661	Optical Circuits and Fibres [T1]

ADVANCED DISCIPLINARY KNOWLEDGE COURSES (L5)

ELEC9725	Satellite Navigation: Systems, Signals & Receivers [T1]
ELEC9762	Space Mission Development [T1]
ELEC9764	The Ground Segment & Space Operations [T1]
TELE9751	Switching Systems Architecture [T2]
TELE9752	Network Operations and Control [T3]
TELE9753	Advanced Wireless Communications [T1]
TELE9754	Coding and Information Theory [T3]
TELE9755	Microwave Circuits, Theory and Techniques [T2]
TELE9756	Advanced Networking [T3]
TELE9757	Quantum Communications [T1]
GMAT9205	Fundamentals of Geo-Positioning [T1]
GMAT9210	GeoIT and Infomobility Applications
GSOE9758	Network Systems Architecture [T1]
TELE9781	Special Topics in Telecommunications 1 [T1, T2, T3]
TELE9782	Special Topics in Telecommunications 2 [T1, T2, T3]

ENGINEERING AND TECHNICAL MANAGEMENT (ETM) COURSES

GSOE9210	Engineering Decisions [T3]
GSOE9420	Project Management in Engineering and Research
GSOE9445	Entrepreneurial Engineering [T2]
GSOE9510	Ethics & Leadership in Engineering [T1]
GSOE9747	Innovation and Commercialisation for Engineers
GSOE9820	Project Management [T1, T2]
GSOE9830	Economic Decision Analysis In Engineering [T2, T3]

ONE DESIGN COURSE

ELEC9123	Design Proficiency [T2]

MASTERS PROJECTS A,B,C(TOTAL 12UOC WITH 4UOC EACH)

ELEC9451	Masters Project A in one term in 2nd year [T1, T2, T3]
ELEC9452	Masters Project B in next term continuously [T1, T2, T3] after passing ELEC9451 [T1, T2, T3]
ELEC9453	Masters Project C in next term [T1, T2, T3] after passing ELEC9452 [T1, T2, T3]

INDUSTRIAL TRAINING

Need to have 60 working days of Industrial Training (IT) and submit the IT report; it is recommended to do the work experience by the end of your 1st year.

ENERGY SYSTEMS PROGRAMS

PROGRAM OPTIONS (ENERGY SYSTEMS)	PROGRAM CODE	UNITS OF CREDIT	DURATION (YEARS)*	COMMENCE
Master of Engineering Science	ELECIS8338	96	2	T1, T2 or T3
Graduate Diploma of Engineering Science	ELECRS5341	48	1	T1, T2 or T3
Graduate Certificate of Engineering Science	ELECDS7320	24	0.7	T1, T2 or T3

ENTRY REQUIREMENTS

Master of Engineering Science: Students need a recognised four year Bachelor degree in an appropriate area of engineering with Honours II/2 or equivalent. Relevant disciplines considered for entry include electrical or telecommunications or computer engineering where a sound foundation in telecommunications is provided.

Graduate Diploma: Students need a three- or four year degree in electrical engineering or a related discipline of engineering or science plus relevant professional experience. The Graduate Diploma is a common pathway to the Masters.

Graduate Certificate: Students need a recognised four year Bachelor degree in a relevant discipline of engineering with a minimum 65% average. A three- or four year Bachelor of Engineering or Science combined with relevant discipline experience (exact positions and roles that will be considered relevant to be decided by each specialisation) may be recognised. Students who complete the Graduate Certificate may continue further to upgrade to Graduate Diploma.

CREDIT TRANSFER OR ADVANCED STANDING

Students may be granted credit for some courses. Those with a four year honours degree (for example in Electrical Engineering) can apply for credit for up to 48 UOC for the Masters (effectively reducing it to one year full time) or 24 UOC for the Graduate Diploma.

PROGRAM STRUCTURE

Master of Engineering Science: Students should complete the following courses:
L4 – min four, L5 – min four, ETM – min one & max four (additional courses other than ones in the list are available. Full details can be found in the program handbook page.), GSOE9010, Project A & B, rest electives (L4/L5)

Graduate Diploma: Students should complete the following courses:
Three L4, three L5, two electives (L4/L5/ETM)

Graduate Certificate: Students should complete the following courses:
L4 (min one; max three), three L5 (min one; max two), GSOE9445 (optional)

ELECTIVES

DISCIPLINARY KNOWLEDGE COURSES

ELEC4602	Microelectronic Design and Technology [T2]
ELEC4611	Power System Equipment [T1]
ELEC4612	Power System Analysis [T1]
ELEC4613	Electrical Drive Systems [T2]
ELEC4614	Power Electronics [T1]
ELEC4621	Advanced Digital Signal Processing [T1]
ELEC4631	Continuous-Time Control Systems [T2]
PHTN4661	Optical Circuits and Fibres [T1]
TELE4652	Mobile and Satellite Communication Systems [T2]

ADVANCED DISCIPLINARY KNOWLEDGE COURSES

ELEC4617	Power System Protection [T2]
ELEC9711	Power Electronics for Renewable Energy [T3]
ELEC9712	High Voltage Systems [T3]
ELEC9713	Industrial and Commercial Power Systems [T1]
ELEC9714	Electricity Industry Planning [T2]
ELEC9715	Electricity Industry Operation [T1]
ELEC9716	Electrical Safety [T2]
ELEC9719	Real-time digital simulation [T3]
ELEC9741	Electrical Engineering Data Science
GSOE9142	Energy Efficient Lighting
GSOE9141	Smart Grids and Networks [T2]

ENGINEERING AND TECHNICAL MANAGEMENT (ETM) COURSES:

COMP9021	Principles of Programming [T1, T2, T3]
CVEN9888	Environmental Management [T2]
CVEN9892	Sustainability Assessment [T1]
GSOE9017	Managing Energy Efficiency [T1] OR GSOE9121 Operational Energy Efficiency
GSOE9143	Sustainable Electrical Energy Technology Assessment
GSOE9210	Engineering Decision Structures [T3]
GSOE9340	Life Cycle Engineering [T2] OR SOLA9015 Life Cycle Assessment [T2]
GSOE9360	Professional Discourse in Engineering [T2]
GSOE9445	Entrepreneurial Engineering [T2]
GSOE9510	Ethics & Leadership in Engineering [T1]
GSOE9712	Engineering Statistics and Experimental Design [T1]
GSOE9810	Quality in Engineering [T1, T3]
GSOE9820	Project Management [T1, T2] OR CVEN9731 Project Management Framework [T1, T2]
GSOE9830	Engineering Economics [T2, T3] OR CVEN9701 Engineering Economics and Financial Management [T1] OR CEIC8204 Topics in Business Management in Chemical Engineering [T2]
MANF6860	Strategic Manufacturing Management [T1]
MANF9400	Industrial Management [T2]
MANF9472	Production Planning and Control [T2]
MATH3156	Optimization
MATH5846	Introduction to Probability and Stochastic Processes [T1]
SOLA5056	Sustainable Energy for Developing Countries
SOLA9004	Sustainable and Renewable Energy
SOLA9016	Sustainable Energy in Developing Countries
SOLA9103	RE System Modelling & Analysis [T2]

SYSTEMS & CONTROL PROGRAMS

PROGRAM OPTIONS (SYSTEMS & CONTROL)	PROGRAM CODE	UNITS OF CREDIT	DURATION (YEARS)*	COMMENCE
Master of Engineering Science	ELECPS8338	96	2	T1, T2 or T3

ENTRY REQUIREMENTS

Master of Engineering Science: Students need a recognised four year Bachelor degree in an appropriate area of engineering with Honours II/2 or equivalent. Relevant disciplines considered for entry include electrical or telecommunications or computer engineering where a sound foundation in telecommunications is provided.

CREDIT TRANSFER OR ADVANCED STANDING

Exemptions and advanced standing rules for the stream follow the program rules. A student may apply for exemptions. Students with a four year honours degree (for example in Electrical Engineering) may obtain a maximum of 48 UOC of exemptions.

PROGRAM STRUCTURE

Master of Engineering Science: Students should complete the following courses:
L4 – min four, L5 – min four, ETM – min one & max four (additional courses other than ones in the list are available. Full details can be found in the program handbook page.), GSOE9010, Project A & B, rest electives (L4/L5)

ELECTIVES

DISCIPLINARY KNOWLEDGE COURSES

ELEC4631	Continue-Time Control Systems Design (core course) [T2]
ELEC4632	Computer Control Systems (core course) [T3]
ELEC4633	Real-time Engineering (core course) [T1]
ELEC4601	Digital & Embedded Systems Design [T2]
ELEC4602	Microelectronic Design and Technology [T2]
ELEC4603	Solid State Electronics [T3]
ELEC4604	RF Electronics [T1]
ELEC4605	Quantum Devices and Computers [T3]
ELEC4611	Power System Equipment [T1]
ELEC4612	Power System Analysis [T1]
ELEC4613	Electrical Drive Systems [T2]
ELEC4614	Power Electronics [T1]
ELEC4621	Advanced Digital Signal Processing [T1]
ELEC4622	Multimedia Signal Processing [T2]
ELEC4623	Biomedical Instrumentation, Measurement and Design [T3]
PHTN4661	Optical Circuits and Fibres [T1]
TELE4642	Network Performance [T2]
TELE4651	Wireless Communication Technology [T2]
TELE4652	Mobile & Satellite Communications Systems [T3]

ADVANCED DISCIPLINARY KNOWLEDGE COURSES

ELEC9716	Electrical Safety
ELEC9719	Real-time Digital Simulations [T3]
ELEC9725	Satellite Navigation: System, Signals & Receivers [T1]
ELEC9731	Robust and Linear Control Systems (core course) [T1]
ELEC9732	Analysis and Design of Non-linear Control (core course) [T3]
ELEC9733	Real Computing and Control (core course)
ELEC9721	Digital Signal Processing Theory [T2]
ELEC9741	Electrical Engineering Data Science
CEIC8102	Advances process control [T3]
GSOE9141	Smart Grids and Networks [T2]
GSOE9142	Energy Efficient Lighting and equipment
COMP9517	Computer Vision [T1, T2, T3]
COMP9814	Ext Artificial Intelligence [T1]

ENGINEERING AND TECHNICAL MANAGEMENT (ETM) COURSES:

COMP9021	Principles of Programming [T1, T2, T3]
CVEN9888	Environmental Management [T2]
CVEN9892	Sustainability Assessment [T1]
GSOE9017	Managing Energy Efficiency [T1] OR GSOE9121 Operational Energy Efficiency
GSOE9143	Sustainable Electrical Energy Technology Assessment
GSOE9210	Engineering Decision Structures [T3]
GSOE9340	Life Cycle Engineering [T2] OR SOLA9015 Life Cycle Assessment [T2]
GSOE9360	Professional Discourse in Engineering [T2]
GSOE9445	Entrepreneurial Engineering [T2]
GSOE9510	Ethics & Leadership in Engineering [T1]
GSOE9712	Engineering Statistics and Experimental Design [T1]
GSOE9810	Quality in Engineering [T1, T3]
GSOE9820	Project Management [T1, T2] OR CVEN9731 Project Management Framework [T1, T2]
GSOE9830	Engineering Economics [T2, T3] OR CVEN9701 Engineering Economics and Financial Management [T1] OR CEIC8204 Topics in Business Management in Chemical Engineering [T2]
MANF6860	Strategic Manufacturing Management [T1]
MANF9400	Industrial Management [T2]
MANF9472	Production Planning and Control [T2]
MATH3156	Optimization
MATH5846	Introduction to Probability and Stochastic Processes [T1]
SOLA5056	Sustainable Energy for Developing Countries
SOLA9004	Sustainable and Renewable Energy
SOLA9016	Sustainable Energy in Developing Countries
SOLA9103	RE System Modelling & Analysis [T2]

SPACE SYSTEMS PROGRAMS

PROGRAM OPTIONS (SPACE SYSTEMS)	PROGRAM CODE	UNITS OF CREDIT	DURATION (YEARS)*	COMMENCE
Master of Engineering Science	ELECOS8338	96	2	T1, T2 or T3

ENTRY REQUIREMENTS

Master of Engineering Science: Students need a recognised four year Bachelor degree in an appropriate area of engineering with Honours II/2 or equivalent. Relevant disciplines considered for entry include electrical or telecommunications or computer engineering where a sound foundation in telecommunications is provided.

CREDIT TRANSFER OR ADVANCED STANDING

Exemptions and advanced standing rules for the stream follow the program rules. A student may apply for exemptions. Students with a four year honours degree (for example in Electrical Engineering) may obtain a maximum of 48 UOC of exemptions.

PROGRAM STRUCTURE

Master of Engineering Science: Students should complete the following courses:
L4 – min four, L5 – min four, ETM – min one & max four (additional courses other than ones in the list are available. Full details can be found in the program handbook page.), GSOE9010, Project A & B, rest electives (L4/L5)

ELECTIVES

DISCIPLINARY KNOWLEDGE COURSES

AERO4410	Advance Aerospace Structures & Vibrations
AERO9500	Satellite Systems (core course) [T3]
ELEC4604	RF Electronics [T1]
ELEC4614	Power Electronics [T1]
ELEC4621	Advanced Digital Signal Processing [T1]
ELEC4622	Multimedia Signal Processing [T2]
ELEC4633	Real-time Engineering [T3]
ELEC9762	Space Mission Development (core course) [T1]
ELEC9765	Space Law and Radio Regulations (core course) [T3]
GMAT9205	Fundamentals of Geo-Positioning [T1]
TELE4652	Mobile & Satellite Communications Systems [T2]
ZEIT8012	Space Systems Engineering (core course) [T1]

ADVANCED DISCIPLINARY KNOWLEDGE COURSES

AERO9610	The Space Segment (core course) [T1]
ELEC9701	Mixed Signal Microelectronics Design [T3]
ELEC9703	Microsystems Design and Technology [T1]
ELEC9721	Digital Signal Processing Theory and Applications [T2]
ELEC9722	Digital Image Processing
ELEC9725	Satellite Navigation [T1]
ELEC9731	Robust and Linear Control Systems [T1]
ELEC9741	Electrical Engineering Data Science
ELEC9764	The Ground Segment & Space (core course) [T1]
GEOS9012	Remote Sensing Applications [T3]
GMAT9200	Principles of GPS positioning
GMAT9765	Satellite Applications 2 (core course)
ZEIT8013	Space Applications 1 (core course)
ZEIT8230	Requirements Engineering [T1]

ENGINEERING AND TECHNICAL MANAGEMENT (ETM) COURSES:

COMP9021	Principles of Programming [T1, T2, T3]
CVEN9888	Environmental Management [T2]
CVEN9892	Sustainability Assessment [T1]
GSOE9017	Managing Energy Efficiency [T1] OR GSOE9121 Operational Energy Efficiency
GSOE9143	Sustainable Electrical Energy Technology Assessment
GSOE9210	Engineering Decision Structures [T3]
GSOE9340	Life Cycle Engineering [T2] OR SOLA9015 Life Cycle Assessment [T2]
GSOE9360	Professional Discourse in Engineering [T2]
GSOE9445	Entrepreneurial Engineering [T2]
GSOE9510	Ethics & Leadership in Engineering [T1]
GSOE9712	Engineering Statistics and Experimental Design [T1]
GSOE9810	Quality in Engineering [T1, T3]
GSOE9820	Project Management [T1, T2] OR CVEN9731 Project Management Framework [T1, T2]
GSOE9830	Engineering Economics [T2, T3] OR CVEN9701 Engineering Economics and Financial Management [T1] OR CEIC8204 Topics in Business Management in Chemical Engineering [T2]
MANF6860	Strategic Manufacturing Management [T1]
MANF9400	Industrial Management [T2]
MANF9472	Production Planning and Control [T2]
MATH3156	Optimization
MATH5846	Introduction to Probability and Stochastic Processes [T1]
SOLA5056	Sustainable Energy for Developing Countries
SOLA9004	Sustainable and Renewable Energy
SOLA9016	Sustainable Energy in Developing Countries
SOLA9103	RE System Modelling & Analysis [T2]

THE HIGH VOLTAGE LABORATORY

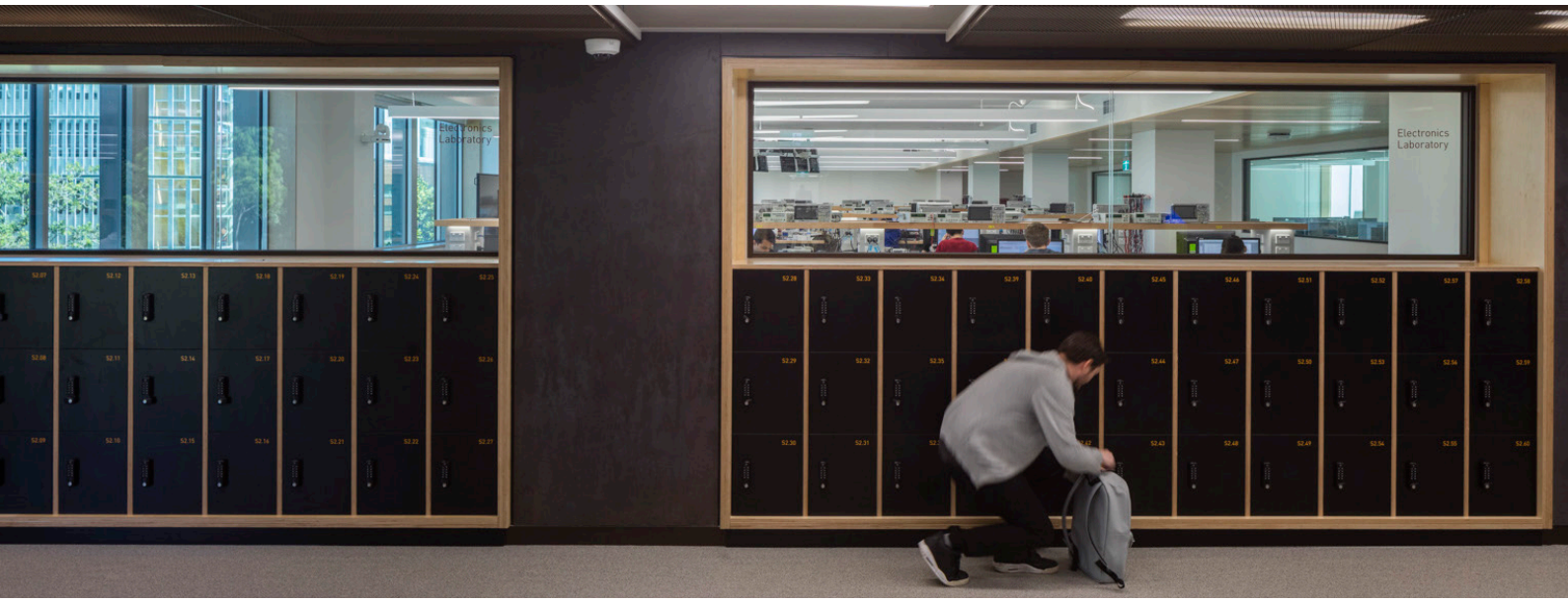
The UNSW High Voltage Laboratory provides a unique facility in Australia for teaching, testing and research activities in High Voltage Power Engineering. The Faculty of Engineering and UNSW invested $1.16M to modernise and refurbish the laboratory totally. Major facilities available include 5 screened high voltage test bays equipped with a 400kV/20kJ impulse generator, AC supplies up to 250kV/25kVA, variable frequency and DC supplies, and a wide range of advanced as well as industry-standard test and measurement instruments.

Large-scale electricity generation, transmission, and distribution systems operate at high voltage so facilities for teaching, research and testing of the design and operation of high voltage high power components and apparatus (e.g. transformers, rotating machines, cables, switchgear, etc) are essential. The use of electrical insulating materials plays a critical role in preventing breakdowns under severe electrical stress and it is necessary to know design requirements and diagnostic features for such applications of insulation materials.

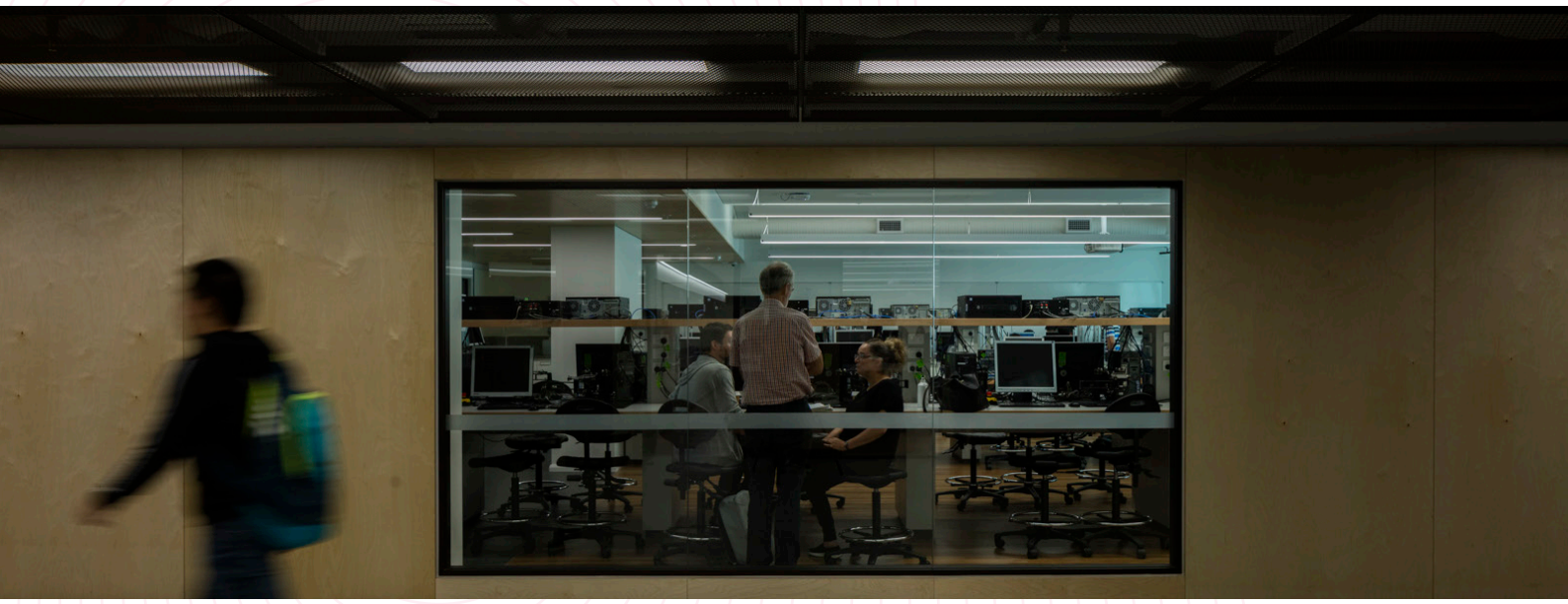
Research focuses on developing diagnostic techniques for condition monitoring, and in particular insulation assessment of power system equipment based on partial discharge measurements. The UNSW High Voltage group is recognised internationally and is the leader in Australia in the area of partial discharge research. There has been a long, ongoing, and close interaction between the group and power utilities throughout Australia.

Real Time Digital Simulation Laboratory

Modelling and simulations, especially when performed in real-time, are essential tools for understanding entire electricity grids, which can't be taken out of service just for research and teaching. The real-time digital simulations laboratory (RTS@UNSW) hosts a large variety of hardware and software tools, including one of the largest RTDS simulators globally, which enable research, testing and verification of power electronics, power systems analysis, power systems protection and smart grid technologies. The School of EE&T also offers the opportunity to postgraduate and final-year undergraduate students to learn and work with the simulators through both coursework and thesis project work. Notably, the new "Real-Time Digital Simulations" course created by Dr Georgios Konstantinou is a unique UNSW offering, allowing students to develop skills across a whole range of real-time modelling and simulation methods, software and hardware tools.



World Class Teaching and Research Facility



After 60 years, the Electrical Engineering Building has undergone a $104m refurbishment which provides a world class teaching and research facility for this world ranking school.

The Electrical Engineering Building is home to 5000m^2 of new teaching labs, 2000m^2 of new research labs, including a state-of-the-art Advanced Design Laboratory, huge public areas for informal and group learning, offices for student societies, and new storage for student projects and breadboards. The 35 new research laboratories are available to honours thesis and masters project students, bring new capability for microgrids, distributed energy systems, wind turbines, Internet-of-Things, software defined networks, quantum control, radar signal processing and optical fibre fabrication to the building. Over 20 new teaching laboratories bring new capability for quantum engineering and satellite systems to the School, in addition to extended opening hours for self-learning and non-curricular student projects.

Be part of STEEP

Society of Telecommunications & Electrical Engineers for Postgraduates

The Society of Telecommunications & Electrical Engineers for Postgraduates (STEEP) is an official society for all Postgraduate (Coursework) students in the School of Electrical Engineering and Telecommunications at UNSW. Established in 2018, they aim to provide a common platform for postgraduate coursework students to foster networking, discover opportunities for professional development and enrich their UNSW experience as a whole. By supporting students in the academics and organizing events, STEEP bridges the gap between students and the Faculty.

STEEP has been able to provide more support and reach further into the lives of EET PG students by organizing a growing number of events and activities every year, expanding its community.

Be part of STEEP

Meet and Greet BBQs provides students an opportunity to socialize and widen their network.

The Industry Night in collaboration with ELSOC is a pathway for students to meet and interact with professionals from the industry to gain insights into the skill set and knowledge base required to be industry-ready.

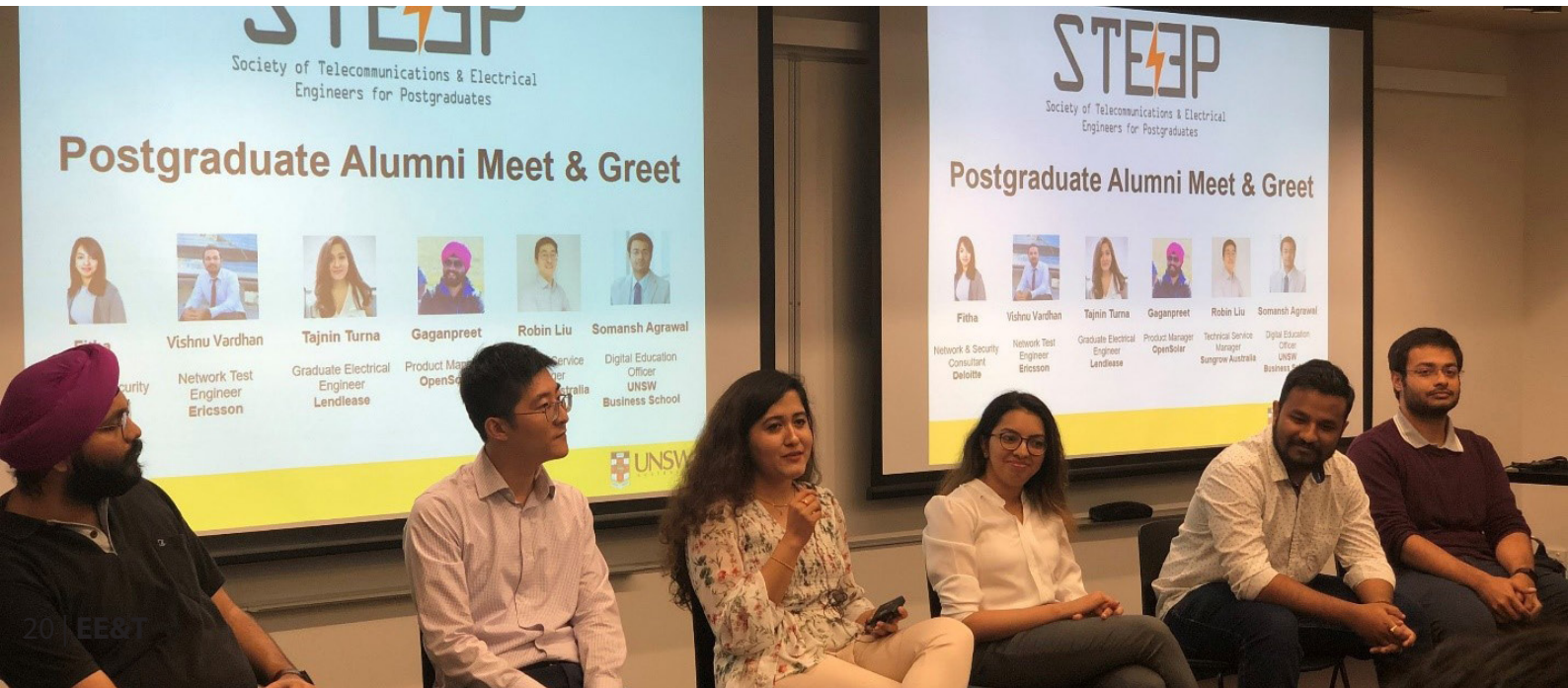
STEEP holds the Alumni meet & greet annually to provide an opportunity to interact and take guidance from Alumni working in different sectors in the electrical and telecommunication industry.

Along with fun filled socializing events, STEEP also hosts a range of technical skill building activities and software training workshops both to aid the students to do better in their academics as well as get a hands-on experience for industry level applications.

Further details and latest updates on upcoming events can be found below:

https://www.facebook.com/groups/unswsteep
https://www.linkedin.com/company/unsw-steep/

STEEP
Society of Telecommunications & Electrical Engineers for Postgraduates



Student Comments on Thesis Projects

Ben Hutton

Demand for electricity is on the decline due to the prevalence of energy efficient appliances and exciting new renewable distributed generation technologies. This is challenging the way we traditionally operate our electricity networks. I investigated methods for electricity network businesses to adjust their business models to embrace this new operating environment in a way that is both environmentally and economically sustainable.

Erica Barett

In my undergraduate thesis I investigated electricity load forecasting models from the angle of time series analysis. I built layered statistically based models which capture the structure of the univariate time series data, and analyze the residual diagnostics to assist in parsimonious model development. Forecasting electricity distribution network loads informs decisions regarding the various operational and economical needs of industry entities, which are facing new challenges in maximising the capacity of the existing network infrastructure and actively managing demand.

Cameron Brown

My thesis involved new research and prototyping in the backscatter RF area, a radical change to the way implantable biomedical systems can communicate with ultra low power consumption. A highly practical thesis, my work spanned from using coherent full-duplex software defined radio, to old HAM radio techniques for resonant antenna construction. The support and environment that the university provided has allowed me to learn and achieve the maximum from the experience.

Thomas Fisk

As a final year student, I chose a thesis project that involved designing an electronic payload for a small satellite (the UNSW-EC0 CubeSat), capable of detecting and correcting radiation-induced bit errors in reconfigurable logic. I found the project to be an exciting, challenging and rewarding experience.

Extraordinary Experiences of Our Graduates

Varuni Fernando
ResMed Ltd

Electrical engineering was definitely the right choice for me. Being able to link theory and the real world, as well as working in teams throughout my studies have been the highlights of my degree. I chose ResMed Ltd as my employer as I have always had a passion for the application of electrical engineering in the medical industry.

Mitchell Ward
Google Sydney

Studying at EE&T has given me an excellent, hands on, education. I have been able to develop practical engineering skills, participating in several of UNSW's thriving hobby societies. With a confidence to tackle all kinds of complex problems, I have started work at Google Sydney.

Jaclyn Egan
Coca-Cola Amatil

Excelling in maths, science and problem solving I was always drawn to the engineering industry, anticipating the challenges that an engineering degree would bring both technically and mentally. Studying EE&T at UNSW enabled me to enhance my technical skills in such a large array of industries (Power, Telecommunications and Control Systems) and has opened up so many wonderful opportunities for my future career. I am currently a graduate at Coca-Cola Amatil, where I am using my engineering skills to build innovative solutions to production issues within our manufacturing facilities.

Christopher Hines
Dolby

Working in the industry at a company like Dolby has been the ultimate payoff for all the hard work put in at UNSW. The courses in EE&T helped me develop solid engineering design and problem solving experience. It's these skills that have enabled me to pursue a dream career path in acoustic digital signal processing. UNSW EE&T has a strong practical focus, there will be no shortage of interesting labwork and projects on your plate should you come and join us!

Daniel Floyd
Jacobs

Completing my Bachelor of Electrical Engineering at UNSW has allowed me to begin my career at a first class engineering consultancy. The breadth of courses offered by the School of Electrical Engineering served as the ideal preparation for the diverse workload I now have at Jacobs, whilst completing group projects during electrical labs was a surprisingly great introduction to the project teams that I now work with each day. I've made some of my greatest friends at this school and am very proud to count myself as one of its alumni.

EXTRAORDINARY JOURNEYS OF OUR ALUMNI

MATTHEW BROWN

The man behind Polyphonic Music Transcription

Matthew Brown's idea came to him when he was music vice-captain at Scots College in Sydney. The then 17-year-old wanted to spend less time tediously transcribing music compositions and more time composing with his orchestra, and stage and jazz bands. He thought: "Wouldn't it be great if there was a piece of software that could listen to the music and transcribe it for me?"

Fast forward a few years and his unique software, Polyphonic Music Transcription, now exists courtesy of Matt's love of music and his degree in Electrical Engineering and Telecommunications (EET) at UNSW. It seems the only thing separating Matt and international recognition is the release of his secret, patent-pending algorithm and smartphone app.

Q&A

What exactly is Polyphonic Music Transcription?

It's the process of analysing a live musical performance and producing its musical notation. Picture an orchestra playing live, recording it using a microphone, and then printing out the exact manuscript of what was just played.

In the past, skilled musicologists faced the difficult and time-consuming task of notating musical performances music by hand. This often required intensive auditory training, especially for polyphonic music – where several instruments are played simultaneously. My motivation was to provide a tool that eased the workload for musicians and composers.

Back then, how long did it take you to transcribe a piece of music you had composed?
It used to take hours! A two to three minute piece of music for a 30-piece orchestra could easily take 30 hours to notate by hand and then type into a computer.

Why did you choose Electrical Engineering and Telecommunications at UNSW?

I knew what I wanted to develop but had no idea how I would actually make it, or what I'd need to study to learn how to make it. It wasn't until I went to UNSW's Open Day in 2007 and got talking to Professor Eliathamby Ambikairajah, that I got my first clue. I gave him a brief outline of my idea and he said to me: "You like music? You should look up audio signal processing". I looked it up, and saw there was a whole area of electrical engineering devoted to the electrical representation of sound. So I enrolled at UNSW and started the degree.

I didn't have much of a mathematics or physics background so I had to study particularly hard for a few years to understand the basics of electrical engineering. By the beginning of my fourth year, I started majoring in digital signal processing. It was around this time I had enough understanding to start to create my own software.

See more at:
https://www.engineering.unsw.edu.au/news/qa-with-the-man-behind-polyphonic-music-transcription

EXTRAORDINARY JOURNEYS OF OUR ALUMNI

RAMI BANNA

The inspirational world of Rami Banna

Q&A

How would you describe your career since leaving UNSW?

Exhilarating! Before finishing my degree I'd worked with Telstra and Alcatel-Lucent – thanks to UNSW's excellent Co-op Program Scholarship. After graduating I worked with Lucent Microelectronics (later Agere Systems) designing the world's first chips for 3.5G and 5G mobile phones. Chip design and silicon was my first engineering passion. From there I transitioned into medical devices and the wonderful world of product development and last year I started an MBA at London Business School to combine my love of product and technology with commercialisation and start-ups. I now run my own consulting company, working with start-ups all over the world. It's been a privileged and wonderful career so far.

What have been your major successes?

In product development and technology, success is a product of two things: teams and history. At Cochlear, a medical device company developing groundbreaking implantable hearing aids, I was part of a tremendous international team that built on a 30-year legacy of invention and pioneering to deliver several Red Dot-winning, International Design Award-earning and Engineering Excellence Award-leading products. One of which, the Cochlear Nucleus 5 System, was truly groundbreaking and set the industry benchmark for many years.

Another major success was winning the Medical Design Excellence Award and the Powerhouse Award in 2013. It started in a café with a 'back-of-napkin' sketch with a great friend and colleague. This conversation led to a series of revolutionary healthcare products and started a movement to make Cochlear implants accessible to many more people that needed them.

Why did you choose Electrical Engineering and Telecommunications (EET) at UNSW?

I believed then, as I do now, that engineering and technology is the most valuable degree for today and tomorrow. You just have to look at the explosion in the tech sector and its multi-billion dollar companies today to find evidence of that. Every major trend has electrical engineering at its core – internet, smartphones, wearable technology, virtual reality – you name it. It's the Golden Age of electrical engineering and the demand for engineers is insatiable. Companies fight for great talent the world over. So, I didn't need convincing that electrical and telecommunications engineering was what I wanted to study. It was just a matter of finding the best place in Australia to do it. That search didn't take too long.

What's your favourite/fondest or most striking memory of studying at UNSW?

UNSW meant so many things. It meant being out of high school; it meant starting to pursue my career; it meant living away from home; it meant being in a new city; it meant meeting life-long friends and it meant growing up to take on the world. I lived on campus for the majority of my time at UNSW and my fondest memories are the simple thinks like taking breakfast in hand and strolling into class two minutes before it started; like spending hours on the library lawn sipping coffee and debating with students from every field. I was even fond of the seemingly never-ending construction on campus – as cumbersome as it was, it really symbolised the pace of change, growth and success of UNSW.

I also remember the large contact hours in first year of Electrical Engineering and the countless all-nighters spent on projects and my final year thesis. You don't forget that mission easily!

See more at:
https://www.engineering.unsw.edu.au/news/the-inspirational-world-of-rami-banna

EXTRAORDINARY JOURNEYS OF OUR ALUMNI

VIRIYA CHITTASY

"When UNSW Electrical Engineer Viriya Chittasy unleashed his inner inventor on a problem facing his young son, little did he know he was laying the groundwork to establish his own company."

When UNSW Electrical Engineer Viriya Chittasy unleashed his inner inventor on a problem facing his young son, little did he know he was laying the groundwork to establish his own company.

You don't need to talk to Viriya Chittasy for very long to realise he has a special knack for plugging gaps.

As a cadet with Ausgrid, Chittasy enjoyed the benefits of being sponsored through his Electrical Engineering degree at UNSW and immediate exposure, following his graduation in 2012, to a variety of fascinating projects. "In one project, we closed George Street [a main Sydney artery] to install fibre optic cables, which was quite amazing; but one of the most interesting things they gave me was responsibility for the billion-dollar revenue model. That was quite confronting at the time, but after a few months I had senior managers coming to me for advice. It was a great way to start my career."

With a long-held ambition to start his own company, Chittasy found that day came much sooner than he imagined after some tinkering in his garage ultimately led to the establishment of Innovateur in 2015. "It all started with my frustration at my son's sippy cup," says Chittasy. "At home, we had this cupboard full of baby cups for different developmental stages, many of which were completely over-engineered. I came up with a solution that was simple and could be used for several stages of development.

Chittasy designed and prototyped the new cup, applied for a provisional patent, offered it for commercialisation and it wasn't long before he was signing a licensing agreement with Dr. Brown's, a big US baby product manufacturer. "I wouldn't say it was easy, but I was surprised how accessible it was. I didn't need a fancy logo or a massive team of experts around me; my strategy was to basically take the idea to the right level at which a company might show some interest in it," explains Chittasy.

This got him thinking about the gap between an idea and its commercialisation so he and his business partner Kevin Dam started talking to innovators and companies. To test the water publicly, they decided to run a community invention hackathon. The Innovateur Weekend was aimed at helping industrial designers, inventors and entrepreneurs develop and launch a new consumer product in 48 hours. The success of the event came with demand for product development and commercialisation help which led to establishing Innovateur as a company in July 2015.

Chittasy and Dam then started laying the groundwork for Innovateur: "We did a lot of research to find what companies were looking for and what level of IP they were after. We soon realised that it's not black and white, there's a grey area where you won't know if company is willing to take it on unless you ask them and just give it a crack," he continues.
On the other side of the fence, they also started collecting data on PhDs with IP, inventors, spinoffs and start-ups. What they started to notice was that the success rate between them was almost the same. "We came across a lot of stories of people with a napkin sketch and a crude prototype having equal, if not more, success than many start-ups and some spinoffs. We found a lot of people trying to venture IP through a company, but not many people taking smaller steps and trying to give commercialisation a shot at an earlier stage," he says.

"Innovateur is about helping companies source and commercialise new IP from the community of innovators, so universities like UNSW, research institutions, SMEs, start-ups and inventors. During our first year of operation, we realised that the innovation ecosystem had some serious flaws. We witnessed companies investing poorly in R&D and failing to innovate, and a start-up culture creating an enormous supply of new ventures, many of which aren't solving real problems, so we are working on a series of processes and resources to really help all innovators get their IP out there."

See more at:
https://www.engineering.unsw.edu.au/news/an-innovator's-best-friend

EXTRAORDINARY JOURNEYS OF OUR ALUMNI

NISHA PRADHAN

My journey to Electrical Engineering

When I think back to my high school years, I like so many other teenage girls, didn't even consider engineering as a possible career.

Some engineers I know had their hearts set on the profession from the very first time they stepped onto a plane and realised how engineering allowed them to fly; others knew it the instant they first gazed up at a skyscraper and felt a vertiginous pull toward high-tech construction; some had always known because they grew up surrounded by engineers and saw how rewarding the work can be. For me however, engineering wasn't always a burning ambition.

I grew up in Wollongong on the NSW South Coast. I had always had an interest in maths and science; so much so that my high school maths teacher, Mrs. Wilcock, got sick of me finishing the entire maths chapter before I even came to class. So, in year 10, when I was asked what I wanted to do when I graduated, the choice was obvious: I was going to be a hairdresser. I knew that I wanted to make a positive difference to the world. I wanted to bring joy to people's lives and give them a reason to smile.

Becoming a hairdresser seemed the perfect opportunity to make others happy — everyone loves a good haircut! Most of my friends intended to follow similar career paths, either as beauticians or hairdressers, and so it seemed like the right thing to do and, honestly, I didn't want to be left out. When I told my careers advisor about my plans he agreed that this was a great idea. Hairdressing offered stable, life-long employment: people were always going to need haircuts, right? So, my love of maths aside, the beauty industry beckoned. Until I told Mrs. Wilcock. She had something completely different in mind for my future. Thank God for Mrs. Wilcock!

She suggested that I think about engineering. My first thoughts were: "No way! I'm definitely not smart enough for that and, secondly, I wouldn't exactly be able to help people if I became an engineer. Don't engineers wear hardhats and build stuff all day?"

At a UNSW Women in Engineering event I had the opportunity to engage in hands-on engineering work as well as to meet current female engineering students. They were nothing like I had imagined. Speaking to them reassured me that, although the industry may be male-dominated, women are just as capable of becoming engineers as men. This is when I decided that I COULD, in fact, become an engineer, and that's exactly what led me to study engineering here at UNSW.

Initiatives such as these are incredibly important, not just for women but for the industry and society as a whole. I strongly believe that gender diversity is a driver of innovation and growth. Female engineers bring variety, fresh perspectives and new ideas to the profession, which is why we need to encourage more girls and young women to study Science, Technology, Engineering and Maths (STEM). Since being at university, I have come to realise that it is not only a matter of increasing the number of women studying STEM disciplines but of also lifting their retention rates. Programs like Women in Engineering are essential to creating a supportive environment at university and throughout our careers to sustain our social and professional development.

Nisha was awarded Faculty of Engineering Student of the Year by the then Dean Prof Mark Hoffman. The award recognised Nisha's outstanding service to engineering over several years while studying. Her leadership efforts are too numerous to fully list here, but included serving as President of The Women in Electrical Engineering and Telecommunications (TWEET), Engineers Australia Campus Coordinator, ENGSOC Executive member, Faculty Board and Faculty Program Committee member.

See more at:
https://www.engineering.unsw.edu.au/news/i-was-going-to-be-a-hairdresser

Enlighten your sensors

Professor François Ladouceur is feeling pretty chuffed. It's not every day that an industry specialist turned academic finds himself at the helm of a successful start-up company that has already attracted more than $3 million in investment funding and research opportunities.

Professor Ladouceur and his partners Dr Zourab Brodzeli and Dr Leonardo Silvestri from UNSW Electrical Engineering and Telecommunications incorporated their company Zedelef Pty Ltd in 2012 after realising the unique "liquid crystal" technology they created had significant commercialisation opportunities. In a particularly nice parallel, Prof Ladouceur is also responsible for the School's Entrepreneurial Engineering course, so he has become the very definition of "practice what you preach". Discover what he has to say in this inspiring Q&A:

Tell us about your liquid crystal technology. What can it do and why is it unique?
In its simplest form, our liquid crystal technology can take a small electrical signal from any type of sensor and turn it into an optical signal. It can do this passively and safely, which means it doesn't require any power and can be used in hazardous environments. This is breakthrough technology because in many industrial contexts where a single spark could cause an explosion – think mining for example – our technology presents substantial advantages over competing technologies.

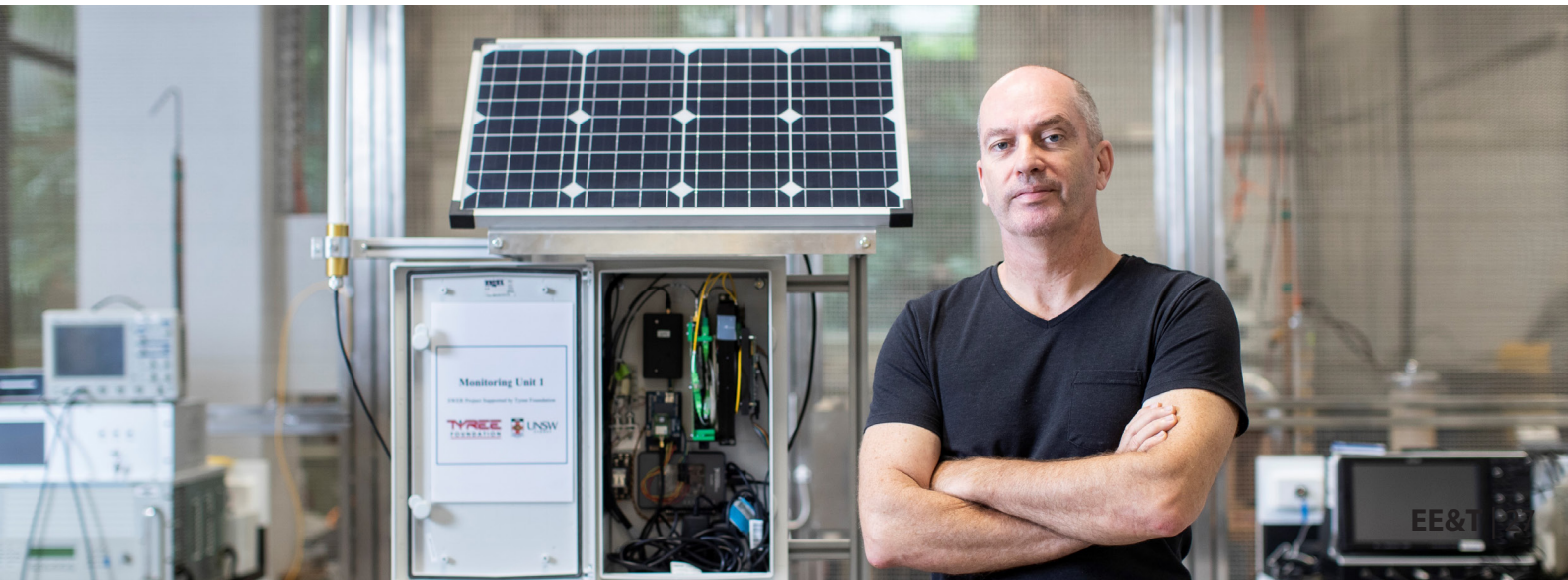
Firstly, we can take the optical signal, put it in an optical fibre and transport it across very long distances, many kilometres in fact. Secondly, optical signals are what we call "intrinsically safe"; they cannot spark and create an explosion. Thirdly, by assigning different colours of light to different sensors, we can use the same optical fibre to monitor many types of sensors over a very large area.

Who might be interested in this technology?
There are numerous applications. Let's say you're a petrochemical company operating a refinery. Of course, you need to measure continuously temperatures, vapour pressures, liquid levels at various places. Using our technology, we can "transduce" your sensor information into an optical signal, then carry it over long distances without the risk of starting a fire or cause an explosion. This has been difficult and costly in the past.

The same idea is true in the mining industry where safety of workers is paramount. In coal mines, the levels of CO, CO_2, methane, oxygen and coal dust must be precisely tracked as their drift outside of their allowed ranges can spell disaster. With our technology, we can string an optical fibre along the mines tunnels and have hundreds of sensors monitoring these quantities in complete safely.
Interestingly, the exact same technology is also being developed in collaboration with UNSW's Graduate School of Biomedical Engineering to look at the brain-machine interface. So, all of a sudden, the technology we developed for industrial sensing is now being used to detect neuronal activity in the brain and retina.

Can you describe what you're working on at the moment and what your next steps might be?
The life of a professor is one of exploration. Of course, we are pushing the commercialisation of our existing technology but we are also looking at new and exciting challenges.
With our startup, we are working in collaboration with industry partners to develop new types of lasers enabled by our technology (Lastek), to find a viable solution to the thorny problem of leak detection in water distribution networks (Sydney Water), to bring better, simpler solutions for safe monitoring of coal mines (Ampcontrol, BHP).

With my academic colleagues, we are focussing our effort on developing optical technologies that will allow a patient who has lost a limb to control her prosthesis with a great degree of accuracy. With more work on our part, the same technology could also be used to treat spasticity in children by using sophisticated neuro-modulation techniques that are yet to be fully invented. Science never sleeps!



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