

# **SCHOOL OF ENGINEERING, COMPUTER AND MATHEMATICAL SCIENCES**

## **POSTGRADUATE/ DOCTORAL RESEARCH SUPERVISION PROSPECTUS**

### **2020-2022**

*Topics and Projects for Supervised  
Postgraduate/ Doctoral Research*

## PREFACE

The Postgraduate/Doctoral Research Supervision Prospectus (“Research Prospectus”) presents research topics for supervised research projects at Honours, Master’s and PhD level, at the School of Engineering, Computer and Mathematical Sciences (ECMS). It provides information about the research expertise and areas of research interests of prospective academic supervisors, including contact email addresses (all information was current at the time of publication).

The first section of the Research Prospectus outlines the organisational structure of the School and provides relevant contact details. The next five sections present the research profile of each of the five departments within the School: Computer Science, Electrical and Electronic Engineering, Information Technology and Software Engineering, Mathematical Sciences, and Mechanical Engineering.

Additional information about postgraduate research opportunities can be found in the last section which lists the research institutes, centres, laboratories and groups associated with the School. A link to the respective website is included where available. For details about postgraduate study at the School, please refer to: <https://www.aut.ac.nz/study/study-options/engineering-computer-and-mathematical-sciences>

Master’s and Honours students: It is recommended to discuss prospective supervision directly with the respective academic(s) (for details, see pp.3-27). For enrolment enquires, contact your respective postgraduate coordinator (see pp. 2 for contact details). For academic advice, contact the respective postgraduate programme leader and/or directors of postgraduate research and study, or heads of department (see pp. 1 for contact details).

Prospective PhD students: Contact the respective PhD Admission team in the first instance (see pp. 2 for contact details), and follow the admission process as advised.

Enquiries welcome!

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# SCHOOL OF ENGINEERING, COMPUTER AND MATHEMATICAL SCIENCES (SECMS)

## HEAD OF SCHOOL

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## ASSOCIATE HEAD OF SCHOOL (RESEARCH)

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### Computer Science

(Acting Head of Department) Associate Professor Roopak Sinha,  
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### Electrical and Electronic Engineering

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### Information Technology and Software Engineering

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### Mathematical Sciences

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### Mechanical Engineering

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## DIRECTORS, POSTGRADUATE RESEARCH AND STUDY

### Director of Doctoral Studies

Associate Professor Boon-Chong Seet, [boon-chong.seet@aut.ac.nz](mailto:boon-chong.seet@aut.ac.nz)

### Director of Postgraduate Studies

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## POSTGRADUATE PROGRAMMES & PROGRAMME LEADERS

### Master of Analytics (mAnalytics), Master of Science (MSc) & Bachelor of Science (Honours) (BSc Hons)

Dr Nuttanan Wichitaksorn, Postgraduate Programme Leader  
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### Master of Computer and Information Sciences (MCIS)

Dr Sira Yongchareon, Postgraduate Programme Leader  
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### Master of Engineering (ME)

Dr Maziar Ramezani, Postgraduate Programme Leader  
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### Master of Information Security and Digital Forensics (MISDF)

Dr Alastair Nisbet, Postgraduate Programme Leader  
[alastair.nisbet@aut.ac.nz](mailto:alastair.nisbet@aut.ac.nz)

### Master of IT Project Management (MITPM)

Dr Stephen Thorpe, Postgraduate Programme Leader  
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## POSTGRADUATE ADMISSION & ENROLMENT ENQUIRIES

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# COMPUTER SCIENCE

## PROFESSORS

**Professor Ajit Narayanan** ([ajit.narayanan@aut.ac.nz](mailto:ajit.narayanan@aut.ac.nz))

Main areas of research:

- Nature inspired computing techniques for optimization and problem solving (e.g., genetic algorithms, convolutional and deep neural networks, swarm intelligence, artificial immune systems, neuro evolution)
- Quantum computing and DNA computing techniques to identify novel algorithms
- Computational statistics and machine learning, including big data analytics
- Intelligent bioinformatics for analysing clinical data
- Philosophy of artificial intelligence and machine ethics.

**Professor Dave Parry** ([dparry@aut.ac.nz](mailto:dparry@aut.ac.nz))

**\*Director, AUT Radiofrequency Identification Applications Laboratory (AURA)**

Areas of research interest include: Health informatics and computing applications in healthcare, radio frequency identification (RFID) data handling and system development, semantic Web, ontologies and information retrieval, disaster eHealth. Specific research projects:

- Knowledge-supported approaches to Artificial Intelligence (AI) in healthcare
- Crowdsourcing for ontology creation and use in the medical domain
- Ubiquitous computing in healthcare
- Platform design for data sharing amongst wellness and health devices
- Development of a disaster eHealth appliance.
- Spatio-Temporal data science approaches and AI.

**Professor Len Gillman** ([len.gillman@aut.ac.nz](mailto:len.gillman@aut.ac.nz))

Research interests: biogeography and conservation. Specific projects include:

- New Zealand plant spectral library
- Antarctic management planning
- Pest species detection using remote sensing from drones
- Biodiversity research
- New Zealand plant identification app.

**Professor Wai (Albert) Yeap** ([wai.yeap@aut.ac.nz](mailto:wai.yeap@aut.ac.nz))

**\*Director, Centre for Artificial Intelligence Research (CAIR)**

Main areas of research:

- A computational theory of the mind
- Using robots to unravel the mystery of the mind

- Spatial cognition with robots and drones
- Infant learning

## ASSOCIATE PROFESSORS

### Associate Professor Andrew Ensor ([aensor@aut.ac.nz](mailto:aensor@aut.ac.nz))

\*Director, High Performance Computing Research Laboratory (HPCRL)

Research areas include:

- Algorithms, concurrency and parallelization
- High performance computing, many core architectures
- Computer graphics rendering, computer vision, GPU programming
- Mobile and distributed systems
- Algebraic structures, commutativity.

### Associate Professor Barbara Bollard ([Barbara.bollard@aut.ac.nz](mailto:Barbara.bollard@aut.ac.nz))

\*Director, AUT Drone Lab (<https://aut.ac.nz/drone>)

Research interests: Landscape ecology, conservation and biodiversity, geographic information systems, photogrammetry and remote sensing, heritage and culture.

Specific research projects include:

- Developing novel methods for advancing the science of high resolution remote sensing
- 3D mapping of vegetation using multi- and hyperspectral imaging for conservation and cultural objectives in complex forests and in extreme environments such as Antarctic, Namib and Australian arid lands
- Using drones to study animal behaviour, and object recognition science
- Studying the interaction between human perceptions and the ecological status of the natural environment.

### Associate Professor Jian Yu ([jian.yu@aut.ac.nz](mailto:jian.yu@aut.ac.nz))

Areas of research interest include: Internet computing and Web services, Big data analytics and machine learning, recommender systems, context-aware IoT services, complex networks, ubiquitous computing. Specific research projects:

- Constructing and evaluating Web-API complex networks
- Probabilistic matrix factorization for Web services recommendation
- Network embedding based learning
- Web of things recommendation
- Deep learning for recommendation
- Online social networks and Web services.

**Associate Professor Roopak Sinha ([rsinha@aut.ac.nz](mailto:rsinha@aut.ac.nz)). Website: [www.roopaksinha.com](http://www.roopaksinha.com)**

**\*(Acting) Head of Department**

Roopak's primary research goal is systematic, standard-focussed design of complex, next-generation embedded software. Industrial Internet-of-Things (IIoT), Edge Computing, Cyber-Physical Systems, Home Automation and Intelligent Transportation Systems (ITS) all contain increasingly complex embedded software. Ensuring that such systems are maintainable, scalable, safe and secure is constantly testing the limits of current tools and technologies. A significant part of this research is dedicated to the creation of architectures, tools and technologies for systematic industrial adoption of upcoming technologies like digital twins, artificial intelligence, assisted transportation, active security protection and graph databases within commercial systems. This involves working closely with industry and on industry-relevant problems to help NZ businesses achieve a competitive edge in the production of embedded systems and software. Research topics include the design and development of novel next-generation software for any of the domains listed above. Please visit [www.roopaksinha.com](http://www.roopaksinha.com) for current research topics.

**Associate Professor Russel Pears ([rpears@aut.ac.nz](mailto:rpears@aut.ac.nz))**

Areas of research interest include: Machine learning and data mining, data warehousing, data compression. Specific research projects:

- Mining high speed data streams with decision trees
- Mining association rules in high speed data streams
- Mining highly imbalanced data sets
- Machine learning techniques for improving dynamic credit scoring using payment prediction
- Use of data compression techniques for optimizing queries in data warehouses
- Building of dynamic network models for multivariate time series: financial data behaviour, modelling and prediction.

**Associate Professor Wei Qi Yan ([wyan@aut.ac.nz](mailto:wyan@aut.ac.nz))**

**\*Director, Centre for Robotics & Vision (CeRV)**

Areas of research interest include: Computing cybersecurity: crypto, forensics, surveillance and privacy; visual computing: graphics, image and video, vision and multimedia; computational intelligence: event computing and deep learning. Specific research projects:

- Currency security
- Food security
- Abnormal event detection in surveillance
- Deep learning in computer vision.

## SENIOR LECTURERS

### Dr Boris Bacic ([bbacic@aut.ac.nz](mailto:bbacic@aut.ac.nz))

Prospective students should have a positive attitude and should be being able to acquire new skills and knowledge and learn or advance in these areas. They should have knowledge about: (i) hardware and/or software design, and software development and architecture; (ii) using languages and tools, and algorithm design and implementation. Areas of research interest include:

- Video, image, sound and alternative multimodal signal processing
- Sports coaching and biomechanical computation (automation)
- Digital media design and computing assisted software design
- Motion data acquisition, processing and visualisation
- Applications (including the areas above) in soft computing, machine learning and evolving (neuro/fuzzy/evolutionary) systems.

Examples of specific research projects:

- Marker and marker-less motion capture
- Human pose, body and silhouette estimation
- Scene modelling from video
- Ubiquitous computing for motion acquisition.

### Dr Ji Ruan ([ji.ryan@aut.ac.nz](mailto:ji.ryan@aut.ac.nz))

Areas of research interest include: Knowledge representation in artificial intelligence, model checking, multi-agent systems, social computing. Specific research projects:

- Reasoning under incomplete information for general game playing
- Verification of security protocols
- Multi-agent resource allocation for cloud services
- Formal methods for social networks.

### Dr Kenneth Johnson ([kenneth.johnson@aut.ac.nz](mailto:kenneth.johnson@aut.ac.nz))

Areas of research interest include self-adaptive systems, graph databases, big data and particularly social media data, algebraic theories of data, formal verification for dependable systems, logic and the theory of computation. Specific research projects:

- Incremental Verification Techniques
- Disaster Management Systems
- Verification of Socio-Cyber Physical Systems.

### Dr Minh Nguyen ([minh.nguyen@aut.ac.nz](mailto:minh.nguyen@aut.ac.nz))

Areas of research interest include:

- Computer and robotic vision
- Image processing and computer graphics

- Machine learning and artificial intelligence
- Mobile applications for augmented reality and virtual reality.

**Dr Muhammad Asif Naeem ([mnaeem@aut.ac.nz](mailto:mnaeem@aut.ac.nz))**

Areas of research interest include: Data science, big data management, active databases and near-real-time data warehousing, data stream processing, data mining and machine learning, social data analytics. Specific research projects:

- Smart shopping
- Performance optimisation of ETL in near-real-time data warehousing
- Frequent item set mining in supermarket data
- Smart power supply and consumption
- Affinity detection between users and their interests over time using social data
- Personalised customer marketing by analysing social and retail data
- Monitoring health using IoT
- Analysing forensic data and identifying useful patterns.

**Dr Parma Nand ([pnand@aut.ac.nz](mailto:pnand@aut.ac.nz))**

General research areas include natural language processing (NLP), text mining, and computational linguistics. These areas cover conceptualizing, representing and extracting information from unstructured text data such as web pages, micro-blogs and specific domain documents such as medical and legal documents. Generic NLP projects include low level tasks such as parsing, and part-of-speech tagging, named entity recognition, relation extraction, event modelling. Topic/concept modelling application areas:

- Concept tracking in microblogs
- Concept and speaker modelling in news articles
- Information extraction from tweets for business intelligence
- NLP generation for question answering systems.

## LECTURERS

**Dr Akbar Ghobakhlou ([akbar.ghobakhlou@aut.ac.nz](mailto:akbar.ghobakhlou@aut.ac.nz))**

Areas of research interest include:

- Artificial neural networks: deep learning
- Computer vision, vision-based driver assistance
- Signal processing: audio, images, video
- Geospatial data modelling and interpolation
- Wireless sensor network and applications
- Internet of things (IoT)
- Precision Agriculture
- Data mining, pattern recognition

**Dr Samaneh Madanian ([sam.madanian@aut.ac.nz](mailto:sam.madanian@aut.ac.nz))**

Areas of research interest include:

- Health informatics and computing applications in healthcare and disaster management
- Disaster e-health or disaster healthcare
- Internet of Things (IoT) and radio frequency identification (RFID)
- IT project management approaches for digital transformation - especially in healthcare and disaster management domains
- Data science approaches for analysing clinical data (including big data analytics and machine learning).

**Dr Weihua Li ([weihua.li@aut.ac.nz](mailto:weihua.li@aut.ac.nz))**

Interested in bridging academic research to industry. Areas of research interest include agent-based modelling and simulation, multi-agent systems (MAS), knowledge discovery, complex systems, social media intelligence, recommender systems, knowledge graph and natural language processing (NLP). Specific projects:

- Self-learning chatbot/ E-learning chatbot
- Multi-agent planning in resource optimisation
- Social influence diffusion mining and simulation
- Deep learning-based recommender system for used cars
- Knowledge base augmentation with knowledge graphs.

# ELECTRICAL AND ELECTRONIC ENGINEERING

## PROFESSORS

**Professor Adnan Al-Anbuky** ([aalanbuk@aut.ac.nz](mailto:aalanbuk@aut.ac.nz))

**\*Director, Sensor Network and Smart Environment Research Centre (SeNSE)**

Areas of research include: IoT based wireless sensor networks (WSN) with emphasis on cloud-based virtualization, Fog and Edge computing and software defined WSN targeting network quality of service, cyber physical system intelligence. Domain areas of research interest relate to smart cities with emphasis on human activity monitoring and precision health, public space ambient intelligence, and vehicular networks.

**Professor Krishnamachar Prasad** ([kprasad@aut.ac.nz](mailto:kprasad@aut.ac.nz))

Research interests include: Energy management in electric vehicles, charging station design for electric vehicles, renewable energy, high-temperature superconductor applications in power industry, technology development and reliability of semiconductor devices and integrated circuits, infrared photodetectors, solid state sensors, electronic materials.

**Professor Peter Han Joo Chong** ([peter.chong@aut.ac.nz](mailto:peter.chong@aut.ac.nz))

**\* Head of Department**

Research interests include: Wireless and mobile networking, mobile apps development, augmented reality (AR) technologies. Potential research projects:

- AR application development
- Wireless sensor network applications
- ID-based mobile applications using Bluetooth technology
- Camera detection technology for AR applications
- Networked mobile applications using Bluetooth.

**Professor Tek Tjing Lie** ([tek.lie@aut.ac.nz](mailto:tek.lie@aut.ac.nz))

**\*Acting Head of School**

**\*Director, Centre for Energy & Power Engineering (CEPE)**

Research interests include: Power system operation and control, artificial intelligence (AI) applications to power systems, energy management, renewable energy, smart grids, blockchain technology in energy.



## ASSOCIATE PROFESSORS

**Associate Professor Boon-Chong Seet** ([boon-chong.seet@aut.ac.nz](mailto:boon-chong.seet@aut.ac.nz))

**\*Director of Doctoral Studies**

**\*Group Leader, Wireless InnovationS in Engineering (WISE) Research Group**

Research interests include: Next-generation wireless communications, antennas and radio frequency based sensors, vehicular communications, ad-hoc/mesh/sensor networks, smart environments and ambient intelligence, smart textile and wearable technologies, radio frequency identification.

**Associate Professor David I Wilson** ([di.wilson@aut.ac.nz](mailto:di.wilson@aut.ac.nz))

**\*Director, Industrial Information and Control Centre (I2C2)**

Research interests include: Automatic control, industrial computing, control performance analysis, model predictive control, control audits, electrical system modelling, intelligent asset monitoring, electrical load modelling, numerical analysis, engineering mathematics, digital signal processing, GPS applications.

**Associate Professor Hamid Gholamhosseini** ([hgholamh@aut.a.cnz](mailto:hgholamh@aut.a.cnz))

Research interests include: Biomedical signal and image processing, patient monitoring systems, high performance embedded systems using DSP/FPGA technology, computer vision, electronic nose- and tele olefactory systems in fish freshness assessment. Current research projects:

- Vital signs monitoring and clinical decision support
- Medical image processing for early diagnosis
- Cuffless and continuous blood pressure measurement.

**Associate Professor Jack Xuejun Li** ([xuejun.li@aut.ac.nz](mailto:xuejun.li@aut.ac.nz))

Research interests include: Wireless networking, communication systems, radio frequency integrated circuits, networking protocol/ algorithm, system optimization.

**Associate Professor Tom J. Moir** ([tom.moir@aut.ac.nz](mailto:tom.moir@aut.ac.nz))

**\*Director, Centre for Signals & Systems**

Research interests include: Signal processing, robotics, adaptive filters and controllers. Real time LabView applications.

## SENIOR LECTURERS

**Dr Adam Taylor** ([adam.taylor@aut.ac.nz](mailto:adam.taylor@aut.ac.nz))

Research interests include: Power systems, power electronics, power electronic device modelling, linear induction motors, alternative and/or distributed generation, people in/and technology, grounded theory, narrative analysis, the quirky and the interesting.

**Dr Craig Baguley ([cbaguley@aut.ac.nz](mailto:cbaguley@aut.ac.nz))**

Research interests include: Magnetic material characterisation, magnetic component design, power electronics.

**Dr Gilbert Foo ([gfoo@aut.ac.nz](mailto:gfoo@aut.ac.nz))**

Research interests include: Control of electrical drives, power electronics, electrical machine design.

**Dr Jeff Kilby ([jkilby@aut.ac.nz](mailto:jkilby@aut.ac.nz))**

Research interests include: Biomedical signal processing and devices, LabVIEW applications.

**Dr Kosala Gunawardane ([kosala.gunawardane@aut.ac.nz](mailto:kosala.gunawardane@aut.ac.nz))**

**\*Director of Wellbeing, Inclusion, Communication, Education and Development (WICed)**

Research interests include DC-DC converters, inverters, linear regulators, super capacitor applications in power electronics, DC micro grid, high temperature superconductors application in power engineering.

**Dr Mark Beckerleg ([mark.beckerleg@aut.ac.nz](mailto:mark.beckerleg@aut.ac.nz))**

Research interests: I am currently studying the use of genetic algorithms, hardware evolution and other meta heuristic approaches in the use of robotic controllers. In general, my interests lie in robotic design and control, quadrotor usage in emergency rescue, embedded systems, FPGA and image processing.

**Dr Martin Stommel ([mstommel@aut.ac.nz](mailto:mstommel@aut.ac.nz))**

Research interests include: Image processing (object detection, classification), machine learning (for image processing or soft robotics), soft robotics (design and control of robots that have a soft rubber body), mechatronics (soft robotics; design and fabrication of soft robots; pneumatic actuation; measurement of the robot shape with embedded infrared sensors; control of a soft robot, movement planning).

## LECTURERS

**Dr Hakilo Sabit ([hakilo.sabit@aut.ac.nz](mailto:hakilo.sabit@aut.ac.nz))**

Research interests include: Architectures and protocols for ad-hoc, mobile and vehicular networks, wireless sensor networks, Internet of Things (IoT), cognitive radio and spectrum sharing, single and multi-user wireless transceiver-to-transceiver communication, wireless multi-hop network communications, communication system/circuit design. Specific research projects:

- Localization for wireless sensor networks (WSN)
- Design, modelling and analysis of mobile, wireless, and sensor networks

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**AUT**

TE WĀNANGA ARONUI  
O TĀMAKI MAKĀU RAU

- Internet of Things (IoT)
- Cloud computing and data analytics
- Applications of networked embedded systems

**Dr Ramon Zamora** ([ramon.zamora@aut.ac.nz](mailto:ramon.zamora@aut.ac.nz))

Research interests include: Power system modelling, simulation and control, power system management and controls, power electronic applications for power systems, grid integration of renewable energy and energy storage, micro grid and smart grid, distributed controls for power system applications.

# INFORMATION TECHNOLOGY AND SOFTWARE ENGINEERING

## PROFESSORS

Professor Edmund Lai ([edmund.lai@aut.ac.nz](mailto:edmund.lai@aut.ac.nz))

### \*Head of Department

Professor Lai's general research interests include multimedia signal processing, machine learning techniques, control theory, wireless networks and information theory. His main research areas include:

- Deep learning networks – theory, and applications such as moving objects tracking (with support from Defence Technology Agency)
- Graph neural networks and topological data analysis
- Control theory: complex systems and multiple interacting autonomous agents/vehicles
- Cognitive radio networks
- Network information theory.

Professor Jairo Gutierrez ([jairo.gutierrez@aut.ac.nz](mailto:jairo.gutierrez@aut.ac.nz))

### \*Director, Networking and Security Research Laboratory (NSRL)

Areas of research interest include: Computer networks (including wireless), network management systems, information security, business models for digital services, and telecommunications. Specific topics for graduate research:

- Trusted computing and management
- Provision of energy efficient networking architectures
- Dynamic spectrum management for 5G networks
- Cloud computing security
- Internet of Things security
- Business models for ICT-enabled services and products
- QoS (Quality of Service) / QoE (Quality of Experience) provisioning and resource management.

Professor Stephen G MacDonell ([stephen.macdonell@aut.ac.nz](mailto:stephen.macdonell@aut.ac.nz))

### \*Director, Software Engineering Research Laboratory (SERL)

Professor MacDonell's research is focused on teams, practices, analytics and evidence. He uses empirical methods to understand and improve the planning, estimation, monitoring and control of software processes and projects, often in conjunction with expert-judgment approaches. The emphasis is always on supporting the people involved - how and why they work, individually and collectively, to develop, manage, deliver and use software systems. Stephen's research programme reflects the growing diversity of information ecosystems and the need to consider, model and understand such systems in new ways - they are not fixed, engineered objects that

can be tightly controlled; rather, they are evolving, complex, interactive, data-rich and highly contextual. Stephen's research on software processes and projects has attracted significant external funding, supporting the work of numerous postdoctoral researchers and postgraduate students.

## DISCIPLINE ASSOCIATE

**Professor Felix B Tan ([felix.tan@aut.ac.nz](mailto:felix.tan@aut.ac.nz))**

**\*Associate Dean Research, Faculty of Design and Creative Technologies**

Professor Tan's research interests fall broadly into two main streams of investigation:

- IT User Behaviour: User adoption / acceptance as well as continuous use of various types of IT, including the general Internet, B2C websites, mobile information & entertainment services, mobile payments, on-line shopping, on-line knowledge communities, on-line consumer trust, user-generated content and communications media. Theories employed in this stream of work are borrowed from wider fields of psychology, sociology and communication studies. Of interest are also differences in behaviour between different cultures.
- Management of IT: Aspects of IT Management within organisations. Topics include global IT management, business-IT alignment, strategic information systems management, IT project management mentoring, skills archetypes of IT project managers, voluntary turnover decisions of IT professionals, IT post implementation innovation and IT governance.

## ASSOCIATE PROFESSORS

**Associate Professor Jacqui Whalley ([jwhalley@aut.ac.nz](mailto:jwhalley@aut.ac.nz))**

Areas of research interest include:

- Computer science education research
- Simulations and models of environmental systems
- Environmental data analytics
- Systems biology
- e-Heritage
- Nature inspired computing.

**Associate Professor Nurul Sarkar ([nurul.sarkar@aut.ac.nz](mailto:nurul.sarkar@aut.ac.nz))**

**\*Group Leader, Network and Security Research Group (NSRG)**

Potential areas of supervision cover all aspects of networking including wireless communication networks, network protocols, network design, modelling and performance evaluation, cross-layer optimization, disaster communications, cognitive radio, IoT, 5G, tactile internet, UAV, cloud and edge/fog networking, VANETs, sensor network, optical networks, network security, and computer education. Specific research projects:

- Network architecture, performance modelling and evaluation: 5G, Cognitive IoT, MANET/VANET, Sensor network, Energy harvesting networks, UAV Networks, Self-organising network/Bluetooth
- Disaster resilient communication networks: Cognitive IoT, network coding, D2D communications
- Next generation network: Performance modelling (channel modelling) of B5G and IEEE 802.11ax/be
- Wireless sensor network deployment: IoT based smart homes/buildings/Cities
- Tactile Internet: Cloud-based traffic flow framework
- Vehicular networking: Solutions for handover and mobility management
- Artificial Intelligence for wireless networks, unmanned aerial vehicles
- Investigating solutions for IoT, 5G, Cloud/Fog network security and privacy: Physical layer security
- IoT for medical/healthcare applications: Energy-efficient MAC protocols for eHealth applications
- Methods for improving student's critical thinking and problem-solving skills: developing innovative tools for teaching and learning computer networking.

**Associate Professor Tony Clear ([tony.clear@aut.ac.nz](mailto:tony.clear@aut.ac.nz))**

Areas of supervision include global software engineering (GSE), collaborative computing, developing and evaluating collaborative technologies, virtual environments, Global virtual teams, computing education research (CER), software development /software engineering and professional practice, the nature of research and the research process. Specific current projects:

- Text analysis of software project data for global software engineering, for example, dilemma analysis, and scaled agile vendor capability profiling
- 3D virtual worlds: Gamification and cyber icebreaker enhancements
- Software ecosystems (with Professor Daniela Damian, University of Victoria, Canada)
- Multi-vocal systematic literature reviews on scaling agile in GSE settings
- The role of engagement in agile GSE settings
- Mobile computing in Education: Tablet PCs and mobile platform implementations of explanograms
- Technology-use mediation in global software engineering teams
- Operationalising the theory of collaborative technology fit through field studies
- Extended bibliometric analysis of research performance in the computing disciplines using electronic databases and search engines.

## SENIOR LECTURERS

**Dr Alan Litchfield ([alitchfi@aut.ac.nz](mailto:alitchfi@aut.ac.nz))**

**\*Director, Service and Cloud Computing Research Laboratory (SCCRL)**

Dr Alan T Litchfield is interested in the following research areas:

- Applications of blockchain technologies, the evolution of crypto coin mining operations,

and the impact of cryptocurrencies on the organisational/cultural context

- Philosophy of technology: Particularly the relationship that exists between technology and humans and how people mediate between themselves and their environment through the use of technology
- Issues in processing large data sets in cloud computing environments
- Data base performance in cloud computing environments
- Graphing databases in cloud computing environments
- Security issues in cloud computing environments
- Re-architecting the enterprise for cloud computing readiness
- Development of tools for tribal genealogical research
- Governance of IT service management.

**Dr Brian Cusack ([bcusack@aut.ac.nz](mailto:bcusack@aut.ac.nz))**

- Digital forensics
- IT governance
- Security audit
- ISO / IEC standards implementation.

**Dr Farhaan Mirza ([farhaan.mirza@aut.ac.nz](mailto:farhaan.mirza@aut.ac.nz))**

**\*Director, Data Science Research Group (DSRG)**

Areas of research interest include usage of internet of things (IoT), mobile apps and web technologies for applications of public sector development, specifically towards domains of healthcare, transportation, education, and telecommunications. Specific research projects (all involve dealing with actual companies and real data):

- Sustainable, holistic and real-time precise management towards the well-being of ageing New Zealanders
- Using IoT and mobile applications to improve medical adherence, vital sign monitoring and health activities for management of chronic illness
- Hospital admission and readmission prediction – using data science methods, evaluating economic impact, proposing prevention strategies
- Temporary access to electronic health record (EHR) and eHealth in emergencies, remote care and disaster situations
- Evaluating and improving patient experience in health services - including pre/post treatment.

**Jim Buchan ([jim.buchan@aut.ac.nz](mailto:jim.buchan@aut.ac.nz))**

Areas of supervision and research interest relate to the broad area of evidence-based improvement of software engineering. This involves deepening our empirical understanding of software development processes, practices, tools and theory, with a view to applying these insights, coupled with the opportunities offered by new and emerging technologies, to advance the state of software development. Jim particularly enjoys working with industry partners on

interesting problems that result in some tangible value to the software industry, as well as adding to the body of knowledge. Specific research projects:

- Software development using an agile way of working
- High value development teams
- Data-driven decision making in software development
- Global and distributed software development
- Requirements engineering
- Software testing and software reliability
- DevOps and continuous deployment.

**Dr Krassie Petrova** ([krassie.petrova@aut.ac.nz](mailto:krassie.petrova@aut.ac.nz))

**\*Director of Postgraduate Studies**

Main research interests include mobile service design and adoption in areas such as education, health, finances, social media services; service value creation and co-creation; transaction and electronic payment security, big data security, social media privacy and security; information security frameworks, policies and management. Prospective research supervision areas:

- Mobile apps and platforms
- Mobile services and service ecosystems
- Mobile service value and business models
- Social media and value creation
- Value creation in blockchain applications
- Transaction security, e.g., blockchain transactions, and electronic payment
- Securing mobile services and applications.

**Dr Mahsa Mohaghegh** ([mahsa.mohaghegh@aut.ac.nz](mailto:mahsa.mohaghegh@aut.ac.nz))

**\*Founder/Director, She# and Director, Women in Technology (DCT)**

Areas of research interest include:

- Natural language processing
- Machine translation (statistical and hybrid machine translation methods)
- Data mining
- Wireless sensor networks and quality of service (QoS)
- Internet of things (IoT)
- Impact of AR/VR and emerging technologies in education
- Computer science education
- Diversity and women in STEM research.

**Dr Mali Senapathi** ([mali.senapathi@aut.ac.nz](mailto:mali.senapathi@aut.ac.nz))

Dr Senapathi identified the following potential areas of supervision:

- Kanban in Software Engineering
- Large-Scale Agile Transformations
- DevOps and continuous software engineering



- Coordination effectiveness in distributed agile software development
- Digital transformation
- Computing/Software Engineering Education.

**Dr Mee Loong (Bobby) Yang ([bobby.yang@aut.ac.nz](mailto:bobby.yang@aut.ac.nz))**

Areas of research interest include network security, cryptography for low power devices, security protocols for network communications, security in RFID and RFID capable devices. Specific research projects:

- Implementation and evaluation of honey pot servers for intrusion detection
- Implementation and evaluation of a secure communication protocol in an ad hoc mobile network
- FPGA implementation of an authenticated key agreement scheme
- Investigation of security protocols in RFID technologies.

**Dr Ramesh Lal ([ralal@aut.ac.nz](mailto:ralal@aut.ac.nz))**

Research areas include:

- Software engineering
- Development processes and methodologies (agile and scaled agile software development methods and practices)
- Software ecosystems
- Cloud application development computing
- PSP and TSP systems
- Human-computer interaction
- User interface design
- Usability issues and user involvement in design
- ERP systems implementation methods.

**Dr Robert Wellington ([rwellington@aut.ac.nz](mailto:rwellington@aut.ac.nz))**

**\*Director, Human Computer Interaction Laboratory (HCIL)**

Dr Wellington promotes, supports, and supervises research in the area of Human Computer Interaction (HCI). A variety of research is currently being undertaken, and much more possible with the resources available.

**Dr Shahper Richter ([srichter@aut.ac.nz](mailto:srichter@aut.ac.nz))**

Areas of interest include:

- Women in STEM (Science, Technology, Engineering and Mathematics)
- Digital natives / millennials (consumerization, development, identity, digital immigrants)
- Social media / social networks
- Ubiquitous Information systems
- Use of technology for language and culture revitalisation
- Virtual worlds, e.g., Second Life, World of Warcraft, Habbo Hotel, Minecraft

- Gamification of education.

**Shoba Tegginmath ([shoba.tegginmath@aut.ac.nz](mailto:shoba.tegginmath@aut.ac.nz))**

Areas of research interest include:

- Big Data management and analytics
- Near real-time data warehousing
- Natural language processing for healthcare
- Social influence mining
- Mining social networks
- Graph databases and algorithms.

Specific research project: Opinion mining using Python.

**Dr Sira Yongchareon ([sira.yongchareon@aut.ac.nz](mailto:sira.yongchareon@aut.ac.nz)). Website: [www.maxsira.com](http://www.maxsira.com)**

Areas of research interest include AI, Machine Learning, and intelligent information processing for pervasive/Fog/Edge computing, wireless sensing, and IoT systems in future environments (e.g., Smart cities/homes, healthcare, and transportation). Particularly, my current research focus is on sensor/radar-based human tracking and activity recognition in privacy-aware intelligent systems and applications. Specific research projects:

- Device-free localization and tracking of multiple persons
- Sensor/Radar-based complex human activity/behaviour recognition
- Anomaly detection of human activities based on radar signals
- Wireless sensing and AI system for vital sign monitoring of multiple targets
- Privacy-aware, lightweight data processing system in IoT and Fog/Edge computing
- Multi-objective optimization techniques for Fog-enhanced IoT systems
- Deep learning-based fusion model for road surface damage detection
- Deep online learning for detecting anomaly processes from event logs
- Context-aware Web service computing and recommendation
- Multi-modal Deep learning for depression detection for social hypermedia.

**Dr Stephen Thorpe ([sthorpe@aut.ac.nz](mailto:sthorpe@aut.ac.nz))**

Dr Thorpe identified the following potential areas of supervision: Online groups, global virtual teams, computer mediated communication, E-Government, cloud computing, social media, interactive learning systems, online learning, cloud security, systems usability, online leadership and facilitation, multi-stakeholder engagement. Specific research projects:

- Use of Galaxy, iPad and other mobile devices with pre-school and young people for learning
- The use of SharePoint in facilitating a collaborative research culture in crown research entities
- Facilitation and management of global virtual teams or cloud computing collaboration
- 3D virtual worlds and education
- Satisfaction drivers for participants in the emerging collaborative consumption culture
- Systemic literature review of virtual teams.

**Dr William Liu ([william.liu@aut.ac.nz](mailto:william.liu@aut.ac.nz))**

Areas of research interest include communications and computing for sustainable development, network survivability and service resiliency, cloud networking, and structure and dynamic of complex networks. Specific research projects:

- 5G for rural and low-income area
- Trust based routing in cyber physical system
- Green networking
- Greening cloud/fog/mobile edge infrastructures
- Network as a Service (NaaS)
- Dependability study of cloud systems
- Resilient and sustainable network design for a smart grid
- Evaluation study of network attacks
- Robustness in complex networks
- Less than best effort i.e., delay tolerant networking.

## LECTURERS

**Dr Maryam Dobarjeh ([mgholami@aut.ac.nz](mailto:mgholami@aut.ac.nz))**

Areas of research:

- Neuroinformatics
- Bioinformatics (genetic and biomolecular data modelling)
- Brain data modelling (EEG, MRI, fMRI) for prediction of brain diseases.
- Brain Computer Interfaces (BCI) and brain-inspired Artificial Intelligence
- Deep learning and deep knowledge representation.
- Spiking neural networks for spatiotemporal data modelling (prediction and classification) .
- Knowledge engineering and knowledge discovery using neural networks.
- Personalised modelling of integrated static and dynamic data domains.
- Multimodal data integration techniques
- Data Science.

**Dr Matthew Kuo ([matthew.kuo@aut.ac.nz](mailto:matthew.kuo@aut.ac.nz))**

Matthew's research focus includes cyber-physical systems, embedded systems, Internet-of-Things, edge nodes, robotics, real-time systems, industrial automation, industry 4.0, and safety-critical systems. A significant part of the research is dedicated to the creation of new methods, languages, architectures and tools to improve their functionality and to ensure that these systems behave and function predictably and correctly. These include the development of digital twins, artificial intelligence, simulations, formal models, advanced algorithms, and case studies. Research topics include the novel design and development of any of the above domains.

Specific project includes:

- Embedded software engineering

- Real-time scheduling of automotive systems
- Time predictable systems and architectures
- Digital twins for Industrial Automation
- IoT Edge nodes.

**Dr Raymond Lutui ([raymond.lutui@aut.ac.nz](mailto:raymond.lutui@aut.ac.nz))**

Areas of research interest include cyber security, cloud computing, e-government, cyber forensics, and cyber law.

- Wired and Wireless Network
- Network Security
- Internet of Things
- Information Security
- Cyber Criminology
- Cyber Investigation Frameworks
- Digital Forensics.

# MATHEMATICAL SCIENCES

## PROFESSORS

Professor Jiling Cao ([jiling.cao@aut.ac.nz](mailto:jiling.cao@aut.ac.nz))

\* Head of Department

\*Director, Mathematical Sciences Research Group (MSRG)

Professor Cao's research interests are within the following inter-related areas:

- Financial mathematics
- Mathematical economics
- Mathematical game theory
- Mathematical analysis and analytic topology.

Professor Sergei Gulyaev ([sergei.gulyaev@aut.ac.nz](mailto:sergei.gulyaev@aut.ac.nz))

\*Director, Institute for Radio Astronomy and Space Research (IRASR)

Research areas include:

- Astrophysics and radio astronomy: Interstellar matter, stellar atmospheres
- Statistical and atomic physics: Spectroscopy, quantum statistics
- Problems of tertiary science (astronomy) education
- Geospatial science: GIS, space geodesy.

## ASSOCIATE PROFESSORS

Associate Professor Sergiy Klymchuk ([sergiy.klymchuk@aut.ac.nz](mailto:sergiy.klymchuk@aut.ac.nz))

\*Director, Science, Technology, Engineering, and Mathematics Tertiary Education Centre (STEM-TEC)

Research areas include:

- Using counterexamples to enhance students understanding of undergraduate mathematics
- Effective teaching of mathematical modelling and applications to undergraduate students
- Analysing the transition from secondary to university education in mathematics
- Investigating the influence of attention on mathematical knowledge and assessment
- Analysing the effectiveness of digital technology use in the teaching and learning of STEM disciplines.

Associate Professor Willem van Straten ([willem.van.straten@aut.ac.nz](mailto:willem.van.straten@aut.ac.nz))

Projects include:

- Radio pulsar astronomy: Use high-precision pulsar timing to test General Relativity and detect ultralow frequency gravitational waves

- Interstellar holography: Develop methods based on cyclostationary statistics to study multi-path propagation in the interstellar medium and image otherwise invisible plasma structures
- Pulsar emission mechanism: Use higher-order multivariate statistics to study the electromagnetic radiation from pulsars
- Large-scale structure of the galactic magnetic field: Develop tomographic techniques of mapping the magnetic field of our galaxy using pulsar Faraday rotation measures
- Machine learning: Autonomous classification, scheduling, and data modelling for large-scale pulsar surveys
- High performance computing: Real-time digital signal processing in distributed, multi-processor architectures.

## SENIOR LECTURERS

**Dr Farida Kachapova** ([farida.kachapova@aut.ac.nz](mailto:farida.kachapova@aut.ac.nz))

Research areas include:

- Mathematical logic, more specifically, non-classical axiomatic theories and formalizing mathematics in a type theory/ COQ proof assistant
- Mathematical foundations of statistical mechanics.

**Dr Hyuck Chung** ([hyuck.chung@aut.ac.nz](mailto:hyuck.chung@aut.ac.nz))

Research areas include:

- Fluid mechanics
- Acoustics
- Elasticity.

**Kerri Spooner** ([kspooner@aut.ac.nz](mailto:kspooner@aut.ac.nz))

Research areas include:

- Mathematics education
- Teaching and learning of mathematical modelling
- Use of reflection to enhance student learning and academic relationships between students and lecturers
- Integrating educational technology.

**Dr Murray Black** ([murray.black@aut.ac.nz](mailto:murray.black@aut.ac.nz))

Research focus: statistics education. Current research projects: Inquiry-based teaching methods for teaching statistics.

**Dr Nuttanan (Nate) Wichitaksorn** ([nuttanan.wichitaksorn@aut.ac.nz](mailto:nuttanan.wichitaksorn@aut.ac.nz))

Areas of interest are:

- Bayesian statistics and econometrics

- Analytic methods in finance, economics, health science, and social science
- Computational statistics using Monte Carlo methods (Markov chain Monte Carlo and Direct Monte Carlo)
- Copula modelling
- Robust and parametric quantile regression
- GPU-based parallel computing for statistical modelling.

Related research topics/projects are welcome.

**Dr Robin Hankin** ([robin.hankin@aut.ac.nz](mailto:robin.hankin@aut.ac.nz))

**\*Director, Statistical Consultancy Centre (SCC)**

Robin Hankin is a computational statistician with interests including theoretical ecology, multivariate Gaussian Processes, and computational combinatorics. He has worked at various UK universities including Southampton and Cambridge and is a regular contributor to the R programming language.

**Dr Sarah Marshall** ([sarah.marshall@aut.ac.nz](mailto:sarah.marshall@aut.ac.nz))

Research areas include:

- Stochastic processes, including renewal processes, geometric processes and Markov decision processes
- Stochastic modelling of applications such as product recovery systems, inventory management, remanufacturing, queueing systems and warranty claims.

**Tim Natusch** ([tim.natusch@aut.ac.nz](mailto:tim.natusch@aut.ac.nz))

Research areas include:

- Radio astronomy
- Microlensing detection of extra solar planets.

**Dr Wenjun Zhang** ([wzhang@aut.ac.nz](mailto:wzhang@aut.ac.nz))

Research areas include:

- Financial mathematics
- Mathematical and statistical modelling
- Mathematical physiology
- Dynamical systems.

## LECTURERS

**Dr Alna van der Merwe** ([avanderm@aut.ac.nz](mailto:avanderm@aut.ac.nz))

Research areas include:

- Linear vibration models: Existence and uniqueness results
- Numerical analysis
- Modelling applications.

**Dr Patricio Maturana-Russel ([p.maturana.russel@aut.ac.nz](mailto:p.maturana.russel@aut.ac.nz))**

**Research interests:** The development and the computational implementation of Bayesian statistical methods, in particular with application in phylogenetics and gravitational wave data analysis.

Research areas include:

- Bayesian Inference
- Data analysis
- MCMC methods
- Nested Sampling
- Marginal likelihood estimation methods
- Bayesian spectral density estimation
- Phylogenetic inference
- Gravitational wave data analysis.

**Dr Victor Miranda ([victor.miranda@aut.ac.nz](mailto:victor.miranda@aut.ac.nz))**

**Research interests :** Focused on developing new methods and software for vector generalized linear and additive models (VGGLMs/VGAMs), and some extensions directed to some popular data types.

Research areas include:

- Generalized regression for time series analysis with VGGLMs/VGAMs.
- Cointegration with VGGLMs/VGAMs for time series.
- Hierarchical and dynamic regression modelling for longitudinal data.
- Statistical computing.
- Predictive risk modelling.



# MECHANICAL ENGINEERING

## PROFESSORS

**Professor Ahmed Al-Jumaily** ([ahmed.al-jumaily@aut.ac.nz](mailto:ahmed.al-jumaily@aut.ac.nz))

**\*Director, Institute of Biomedical Technologies (IBTec)**

Research interests include:

- Biomechanical engineering
- Respiratory therapy devices
- Airway smooth muscle dynamics
- Cardiovascular diagnostic devices
- System dynamics and control
- Vibrations and acoustics
- Electroactive polymers for biomedical applications
- Ultrasounds with applications to nanoparticles and fluid disintegration.

**Professor Andrew Lowe** ([andrew.lowe@aut.ac.nz](mailto:andrew.lowe@aut.ac.nz))

Areas of research interest include:

- Non-invasive modelling and measurement of the cardiovascular system
- Machine learning and intelligent systems applied to physiological modelling and signals
- Advanced textiles: electrospinning and sensors.

Specific research projects:

- Development of a heart-sounds database and app for teaching heart-sounds interpretation (as part of a wider project with Auckland City Hospital)
- Bio potential and bio impedance sensing for ECG, EMG and similar processes
- Better blood pressure and blood flow measurement.

**Professor Nicolai Bovin** ([nicolai.bovin@aut.ac.nz](mailto:nicolai.bovin@aut.ac.nz))

Research interests include:

- Kode technology bio surface engineering
- Chemical engineering
- Glycan biology.

**Professor Steve Henry** ([shenry@aut.ac.nz](mailto:shenry@aut.ac.nz))

**\* Director, Centre for Kode Technology Innovation (c4KTI)**

Research interests include:

- Kode technology bio surface engineering
- Biological engineering synthetic biofilms.

**Professor Zhan Chen ([zhan.chen@aut.ac.nz](mailto:zhan.chen@aut.ac.nz))**

**\*Director of Research**

**\*Director, Centre for Advanced Manufacturing Technology (CAMTEC)**

**\*Technical Director, Scanning Electron Microscope Lab (SEM)**

Research interests include:

- Additive manufacturing (selective laser melting, selective electron beam melting)
- Friction stir welding (current work on dissimilar metals)
- Machinability of Ni super alloys and Ti alloys
- Physical/mechanical metallurgy (in welding, casting and extrusion)
- Microstructure and mechanical properties of materials.

## ASSOCIATE PROFESSORS

**Associate Professor David White ([david.white@aut.ac.nz](mailto:david.white@aut.ac.nz))**

**\*Director, BioDesign Lab**

Research interests include:

- Human upper airway and respiratory mechanics
- Breathing therapies and devices
- Design and commercialisation of biomedical devices.
- Stroke and cerebral haemodynamics
- Metabolic disease
- Non-contact rehabilitation devices and therapies
- Ultradian and circadian rhythms of sleep
- Human performance and wellbeing
- Product and industrial design.

**Associate Professor Loulin Huang ([loulin.huang@aut.ac.nz](mailto:loulin.huang@aut.ac.nz))**

Research interests include robotics, mechatronics and control.

**Associate Professor Maziar Ramezani ([maziar.ramezani@aut.ac.nz](mailto:maziar.ramezani@aut.ac.nz))**

Research interests include:

- Tribology; tribo-corrosion
- Load-bearing orthopaedic implants; dental implants
- Friction sliding structural connections
- Bio-based lubricants; coating
- Metal additive manufacturing
- Composite materials
- Impact mechanics
- Fatigue and creep.

**Associate Professor Roy Nates ([roy.nates@aut.ac.nz](mailto:roy.nates@aut.ac.nz))**

Research interests include:

- Thermo-fluid issues with specific applications to renewable energy
- Bioengineering and combustion engines
- Power transfer and kinematics in sport science.

**Associate Professor Sarat Singamneni ([sarat.singamneni@aut.ac.nz](mailto:sarat.singamneni@aut.ac.nz))**

**\*Director, Additive Manufacturing Research Centre (AMRC)**

**\*Co-Director, 3D Printing Lab**

Research interests include:

- Metal cutting
- Numerical applications in engineering
- Finite and boundary element methods
- CAD/CAM
- 3D printing and additive manufacturing
- Additive casting.

**Associate Professor Tim Anderson ([timothy.anderson@aut.ac.nz](mailto:timothy.anderson@aut.ac.nz))**

Research interests include:

- Solar energy: solar heating and cooling, applied photovoltaics, concentrating solar power, novel solar absorber surfaces
- Built environment: energy use in buildings, building performance modelling and measurement
- Heat transfer: experimental and numerical modelling, natural convection.

**Associate Professor Timotius Pasang ([timotius.pasang@aut.ac.nz](mailto:timotius.pasang@aut.ac.nz))**

**\*Director, Engineering Research Institute (ERI)**

Research interests include:

- Fusion welding of aerospace alloys: titanium, aluminium
- Additive Manufacturing
- Microstructure and mechanical properties relationship of metals.

**Associate Professor Xiaowen Yuan ([xiaowen.yuan@aut.ac.nz](mailto:xiaowen.yuan@aut.ac.nz))**

Research interests include:

- Composite materials: Functional, natural fibre, nanocellulose, biomedical, biomorphic, sustainable; Advanced manufacturing and characterisation, bio composite 3D printing
- Fibre processing and surface modification: Clean, sustainable and environmentally friendly technology; biotreatment
- Energy storage materials: Supercapacitors, electrodes, batteries; sustainable
- Smart textiles: Biobased sensors; flexible supercapacitors.

## SENIOR LECTURERS

**Chris Whittington ([cwhittin@aut.ac.nz](mailto:cwhittin@aut.ac.nz))**

**\*Director of Learning and Teaching**

Research interests include:

- Human upper airway and respiratory mechanics
- Breathing therapies and devices
- Design of biomedical devices.

**Dr John Prince ([jprince@aut.ac.nz](mailto:jprince@aut.ac.nz))**

Research interests: in areas of mechanical and production Engineering.

**Dr Marcel Schaefer ([marcel.schaefer@aut.ac.nz](mailto:marcel.schaefer@aut.ac.nz))**

Research interests include, in a surface engineering context:

- Sustainable manufacturing; future manufacturing techniques
- Biomimicry
- Simulation techniques in surface engineering
- Advanced material analysis.

**Dr Michael Gschwendtner ([michael.gschwendtner@aut.ac.nz](mailto:michael.gschwendtner@aut.ac.nz))**

**\*Director, Sustainable Thermodynamics Lab (STL)**

Research interests include:

- Stirling cycle research
- Development of Stirling cryocoolers;
- Refrigerators; Heat pumps and engines;
- Heat-actuated refrigerators and heat-pumps
- Liquid piston systems
- Geothermal power generation and cooling waste heat recovery
- Renewable energy.

**Dr Mike Protheroe ([mprother@aut.ac.nz](mailto:mprother@aut.ac.nz))**

**\*Head of Department**

Research interests include:

- Thermodynamics
- Heat transfer.

**Dr Peter Hooper ([peter.hooper@aut.ac.nz](mailto:peter.hooper@aut.ac.nz))**

Research interests include:

- Internal combustion engine research
- Development of propulsion systems for marine, UAV and automotive application

- Advanced low emission two stroke engine technology
- Hybrid electric and range-extender vehicle technology
- Refinement of noise vibration and harshness (NVH)
- Alternative fuels.

## LECTURERS

**Dr Lorenzo Garcia ([lorenzo.garcia@aut.ac.nz](mailto:lorenzo.garcia@aut.ac.nz))**

See the research topics below, and also [www.biomd.org](http://www.biomd.org)

- BioDesign engineering
- Musculoskeletal biomechanics
- Animal biomechanics
- Soft-robotics and artificial muscles
- Biomechatronic design and exoskeleton
- Design of Medical Devices
- Healthcare, rehabilitation and assistive technologies
- Bioinspired underwater robots (ROV, AUV) and tools
- Ocean exploration, surveillance and conservation.

**Dr Maximiano Ramos ([mramos@aut.ac.nz](mailto:mramos@aut.ac.nz))**

Research interests include:

- Polymers and polymer composites ; Electroactive materials
- Discrete element modelling (DEM)
- Particle technology.

## RESEARCH UNITS

For more information, see <https://www.aut.ac.nz/study/study-options/engineering-computer-and-mathematical-sciences/research>

### RESEARCH INSTITUTES

#### Engineering Research Institute (ERI)

<https://eri.aut.ac.nz/>

#### Institute for Radio Astronomy and Space Research (IRASR)

<https://irasr.aut.ac.nz/home>

#### Institute of Biomedical Technologies (IBTec)

<https://ibtec.aut.ac.nz/>

#### Knowledge Engineering and Discovery Research Institute (KEDRI)

<https://kedri.aut.ac.nz/>

### RESEARCH CENTRES

#### Additive Manufacturing Research Centre

<https://eri.aut.ac.nz/research/additive-manufacturing-research-centre>

#### Centre for Advanced Manufacturing Technology (CAMTEC)

<https://eri.aut.ac.nz/research/centre-for-advanced-manufacturing-technology>

#### Centre for Artificial Intelligence Research (CAIR)

<https://www.aut.ac.nz/study/study-options/engineering-computer-and-mathematical-sciences/research/centre-for-artificial-intelligence-research-cair>

#### Centre for Energy & Power Engineering (CEPE)

<https://eri.aut.ac.nz/research/centre-for-energy-and-power-engineering>

#### Centre for Kode Technology Innovation (c4KTI)

<https://www.aut.ac.nz/study/study-options/engineering-computer-and-mathematical-sciences/research/centre-for-kode-technology-innovation-kti>

#### Centre for Robotics & Vision (CeRV)

<https://cerv.aut.ac.nz/>

### **Centre for Signals and Systems**

<https://eri.aut.ac.nz/research/css>

### **Industrial Information and Control Centre (I2C2)**

<http://www.i2c2.aut.ac.nz/>

### **Sensor Network and Smart Environment Research Centre (SeNSE)**

[http://sense.aut.ac.nz/SeNSE\\_Lab/](http://sense.aut.ac.nz/SeNSE_Lab/)

### **Science, Technology, Engineering, and Mathematics Tertiary Education Centre (STEM-TEC)**

<https://stemtec.aut.ac.nz/>

### **Statistical Consultancy Centre**

<https://www.aut.ac.nz/research/academic-departments/Mathematical-Sciences>  
Contact: Contact us for more information: [statistical\\_consulting@aut.ac.nz](mailto:statistical_consulting@aut.ac.nz)

## **RESEARCH LABORATORIES**

### **3D Printing Lab**

<https://3dl.aut.ac.nz/>

### **AUT Drone Lab**

<https://aut.ac.nz/drone>

### **AUT Radiofrequency Identification Applications Laboratory (AURA)**

<https://www.aut.ac.nz/study/study-options/engineering-computer-and-mathematical-sciences/research/aut-radiofrequency-identification-applications-laboratory-aura/>

### **BioDesign Lab**

<https://biodesign.aut.ac.nz/>

### **High Performance Computing Research Laboratory (HPCRL)**

<https://www.aut.ac.nz/study/study-options/engineering-computer-and-mathematical-sciences/research/high-performance-computing-research-laboratory>

### **Human Computer Interaction Laboratory (HCIL)**

Contact: Dr Robert Wellington, [robert.wellington@aut.ac.nz](mailto:robert.wellington@aut.ac.nz)

### **Networking and Security Research Laboratory (NSRL)**

Contact: Professor Jairo. Gutierrez, [jairo.gutierrez@aut.ac.nz](mailto:jairo.gutierrez@aut.ac.nz)

### **Service and Cloud Computing Research Laboratory (SCCRL)**

Contact: Dr Alan Litchfield, [alan.litchfield@aut.ac.nz](mailto:alan.litchfield@aut.ac.nz)

### **Scanning Electron Microscope Lab (SEM)**

<https://www.aut.ac.nz/study/study-options/engineering-computer-and-mathematical-sciences/facilities/scanning-electron-microscope>

### **Software Engineering Research Laboratory (SERL)**

<http://serl.aut.ac.nz>

### **Sustainable Thermodynamics Lab (STL)**

Contact: Dr Michael Geschwendtner , [michael.gschwendtner@aut.ac.nz](mailto:michael.gschwendtner@aut.ac.nz)

## **RESEARCH GROUPS**

### **Data Science Research Group (DSRG)**

<https://dsrg.aut.ac.nz/>

### **Mathematical Sciences Research Group (MSRG)**

<https://www.aut.ac.nz/study/study-options/engineering-computer-and-mathematical-sciences/research/mathematical-sciences-research-group>

### **Network and Security Research Group (NSRG)**

<https://www.aut.ac.nz/study/study-options/engineering-computer-and-mathematical-sciences/research/network-and-security-research-group/>

### **Security and Forensics Research Group (SFRG)**

Contact: Dr Alastair Nisbet, [alastair.nisbet@aut.ac.nz](mailto:alastair.nisbet@aut.ac.nz)

### **Wireless InnovationS in Engineering (WISE) Research Group**

<https://eri.aut.ac.nz/research/css/areas/wireless>

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