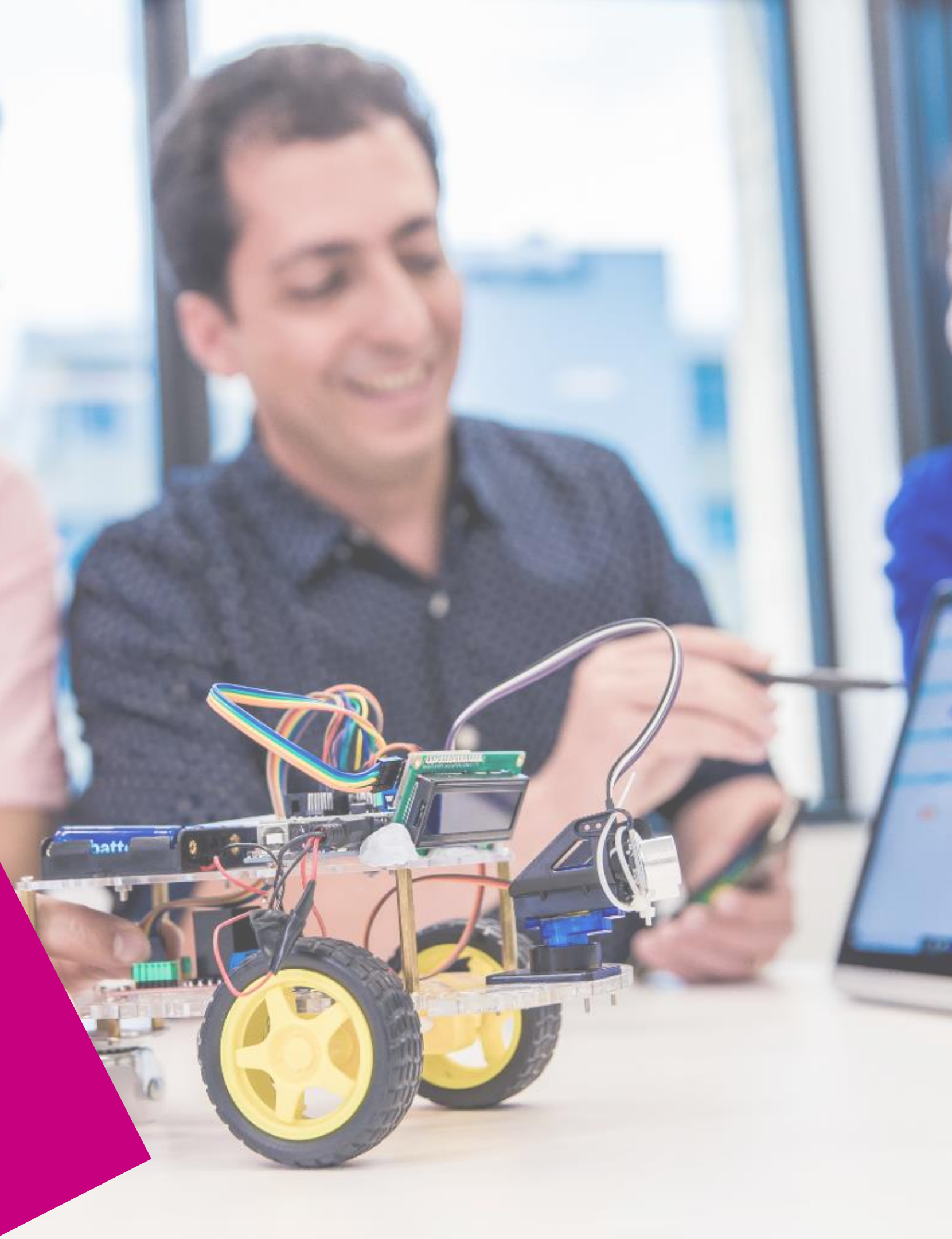


School of Computing 2023 Achievements

Faculty of Science of Engineering



MACQUARIE
University

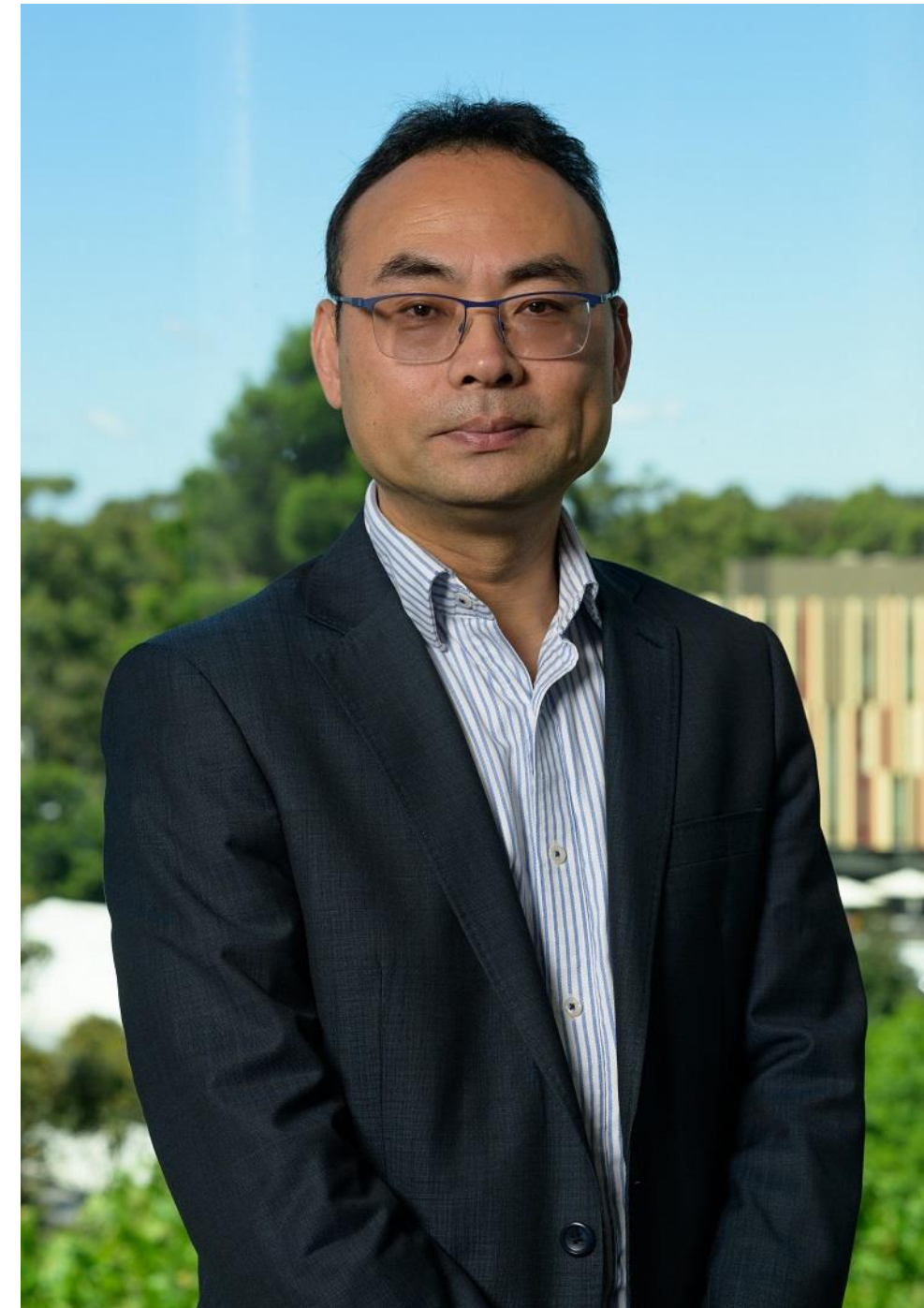


Welcome to the School of Computing

Distinguished Professor Michael Sheng, Head of School

Offering exceptional facilities at our own campus in Sydney's "Silicon Valley", our advanced resources allow students to excel on a cross-disciplinary basis. At the forefront of the revolution in digital technologies, Computing is a powerhouse for work-changing research from intelligent and data intensive computing, secure and reliable systems, to human computer interactions.

Our exciting goal is to make Macquarie well respected worldwide in Computing for generating and delivering high-impact research and education.



Snapshot of School of Computing



Top 125 in the
world
for Computer
Science

*Times Higher
Education World
University
Rankings 2024*



Dedicated
**Computing
precinct**
including state
of the art
computer and
specialised
teaching labs



Ranked
4 out of 5
research
quality ranked
above world
standard

ERA 2018

Macquarie University's Computer Science Made in the Top 125 Globally



In the newly released Times Higher Education (THE) World University Rankings 2024 by subject, Macquarie University's **Computer Science** entered the **Top 125 in the world** – steadily climbing over the past few years (2024: 101-125, 2023: 151-175, 2022: 201-250, 2021: 251-300, 2020: 251-300, 2019: 301-400).

Since 2017, the World University Rankings (THE) ranks the world's top universities in individual subject areas using a range of trusted and rigorous performance indicators including citations, industry income, international outlook, research, and teaching.

This latest ranking result is a reflection of our high quality teaching, research, and academic reputation recognised at an international level, and a testament to the hard work and dedication of the School's community towards being one of the highest-performing computing schools in Australia.



Research Achievements

Data Complexity and Uncertainty-Resilient Deep Variational Learning

Professor Longbing Cao (CI), Professor Joao Gama (PI)

\$452,390

Enterprise data present increasingly significant characteristics and complexities, such as multi-aspect, heterogeneous and hierarchical features and interactions, and evolving dependencies and multi-distributions. They continue to significantly challenge the state-of-the-art probabilistic and neural learning systems with limited to insufficient capabilities and capacity. This research aims to develop a theory of flexible deep variational learning transforming new deep probabilistic models with flexible variational neural mechanisms for analytically explainable, complexity-resilient analytics of real-life data. The outcomes are expected to fill important knowledge gaps and lift critical innovation competencies in wide domains.

Congratulations, Longbing!



**Distinguished Chair of AI
Professor Longbing Cao**

Computing research accepted at top-tier international conferences (NeurIPS, ICDM)

Well done to our School researchers, Distinguished Chair in AI Prof Longbing Cao, Prof Yan Wang, Dr Zhilin Zhao, and research student Yatong Sun for 4 papers accepted at the 37th Conference on Neural Information Processing Systems (**NeurIPS 2023**). Founded in 1987, NeurIPS is one of the top machine learning conferences in the world and this year it will be held at New Orleans, USA 10-16 Dec 2023.

Dr Shan Xue, Prof Jian Yang, Dr Xuyun Zhang, Prof Amin Beheshti, Prof Mark Dras, and our research students Mr Adeem anwar, Mr Malik Khizar Hayat, and Mr Haolong Xiang for 3 papers (2 full, 1 short) accepted at the 23rd International Conference on Data Mining (**ICDM 2023**). This year, only 94 regular papers were accepted from 1,003 submissions (at **9.37%** acceptance rate). ICDM is a premier conference in Data Mining and this year it will be held at Shanghai, China 1-4 Dec 2023.

Well done and congratulations!!!



Fujitsu Partnership to Break New Ground in AI



Prof. Shlomo Berkovsky (Centre for Health Informatics), Prof. Amin Beheshti (Centre for Applied AI), and Prof. Enrico Coiera (Centre for Health Informatics) are co-leading a groundbreaking project in AI with Fujitsu, titled:

**“Enhancing Human Reasoning with Generative AI:
Personalised Digital Coach for Effective Feedback”**

Initially for three years, the partnership will see Fujitsu and Macquarie working together to drive AI research in healthcare, manufacturing, and other sectors. This project aims to revolutionise personal development

by integrating advanced AI algorithms in a digital coaching tool. This tool is designed to analyse and adapt to individual learning styles and reasoning patterns, providing personalised feedback to improve critical thinking and decision-making skills. By leveraging generative AI, it offers dynamic, scenario-based challenges that evolve with the user, representing a significant step forward in AI-enhanced human intelligence and cognitive advancement.



Congratulations to Dr Guanfeng Liu and Prof Amin Beheshti, for securing **\$320K** from Lihan IT Service, for the project:

“Intelligent Health Data Analytics Platform”

This project aims to create a robust health data analytics platform that utilizes data science techniques to enhance healthcare by processing and interpreting large volumes of health data to improve patient outcomes and healthcare decision-making while ensuring data security and privacy.

Dr Xi Zheng, for securing **\$30K** from Ant Group, for Stage 1 of the project:

“Vulnerability Detection in Complex Software Systems using Deep Learning Models and Software Testing”

This project aims to leverage deep learning models and state-of-the-art fuzz testing methods to generate efficient and interpretable test cases. These test cases can effectively reveal and locate vulnerabilities in Ant Group's diverse and large-scale ecosystem.



Cyber Skills Partnership Grant Success of \$2.350 Million

Congratulations to Prof Dali Kaafar, sole and Lead CI from MQ of a grant of **\$2,350,000** from the Department of Industry, Science and Resources (DISER) under the competitive Cyber Security Skills Partnership Innovation Fund Grant (Round 2). The project is entitled:

“Development of a Cross-disciplinary Cyber Security Workforce Training Program”

The grant is for the development of the cyber range training centre (CRTC) which will support a world's unique multidisciplinary Cyber curriculum. The modern cyber security training centre equipped with a virtual cyber 'range' and cyber-physical simulation system provides an environment to hone specialist technical and transferrable or 'soft' skills using real-life scenarios.



Professor Dali Kaafar

2024 ARC LIEF Project Success

Federated Omniverse Facilities for Smart Digital Futures

Prof Longbing Cao, Prof Patricia Davidson, Prof Vijay Varadharajan, Prof Jinman Kim, Prof Ping Yu, **Prof Amin Beheshti**, A/Prof Quang Vinh Nguyen, Dr Sankalp Khanna

\$539,000

A world-first trans-disciplinary, -domain, and -institutional smart 3D omniverse R&D ecosystem AuVerse will be built in NSW, affiliated with Queensland, and accessible to academia and industry. AuVerse will support cloud-based, reality-virtuality-fused, immersive, interactive and secure future-oriented digital design, development, training and society. In the new era of digital innovation and paradigm shift, AuVerse will substantially boost Australia's pivotal research leadership and business competitiveness in nurturing new-generation, collaborative and transformative digital R&D and talent pipeline. It will enable large-scale strategic business innovation and transformation including smart manufacturing and Industry 4.0.

Congratulations, Longbing and Amin!



Research Accepted at Flagship ACM CCS 2023



Well done to our School of Computing researchers, Dr. Natasha Fernandes, Prof. Annabelle McIver, and Mr. Gabriel Nunes, for their accepted paper at the 30th ACM Conference on Computer and Communications Security (**ACM CCS 2023**), to be held in Copenhagen, Denmark, 26-30 Nov 2023.

A novel analysis of utility in privacy pipelines, using Kronecker products and quantitative information flow

The study combines Kronecker products and quantitative information flow to give a novel formal analysis for the fine-grained verification of utility in complex privacy pipelines. It explains a surprising anomaly in the behaviour of utility of privacy-preserving pipelines - that sometimes a reduction in privacy results also in a decrease in utility, also demonstrated on a number of common privacy-preserving designs. The research is co-authored with Dr. Mário Alvim (UFMG, Brazil), and Prof. Carroll Morgan (UNSW).



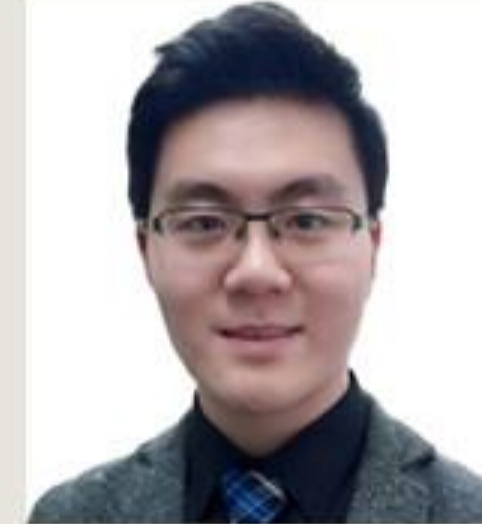
Well done and congratulations!!!

Research Accepted at ACM MobiCom 2023

Well done to our School of Computing researchers, Mr Xi Zhang, Dr Yu Zhang, Dr Zhenguo Shi, and **Professor Tao Gu** for their accepted paper at the 29th International Conference on Mobile Computing and Networking (**MobiCom 2023**), to be held in Madrid, Spain, 2-6 October 2023.

mmFER: Millimetre-wave Radar based Facial Expression Recognition for Multimedia IoT Applications

The proposed system leverages on a millimeter-wave radar device to extract facial muscle movements associated with mmWave signals for facial expression recognition. The researchers develop advanced face localization techniques and a cross-domain transfer learning pipeline to achieve high accuracy and robustness. This system can be further transferred into a commercial product at an affordable cost and can be widely used in many domains such as multimedia and recommendation systems, healthcare, and education, providing valuable user feedback and survey.



Well done and congratulations!!!



Computing Research Accepted at Top-tier International Conferences (IJCAI, KDD)

Well done our School researchers, Dr Yipeng Zhou, Dr Xuyun Zhang, Dr Jia Wu, Prof Mark Dras, Prof Amin Beheshti, Prof Michael Sheng, and our research students Ms Behnaz Soltani, Ms Venus Haghighi, and Mr Haolong Xiang, for their papers accepted at the 32nd International Joint Conference on Artificial Intelligence (**IJCAI 2023**).

Also congratulations to Mr Xiaoxiao Ma, Dr Jia Wu, Prof Jian Yang, and Prof Michael Sheng for their paper accepted at the 29th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD 2023**).

Congratulations!!!



Professor Amin Beheshti presents Keynote at IEEE ICSPIS 2023 Conference 2023

Professor Amin Beheshti delivered a keynote at the IEEE International Conference on Signal Processing and Information Security (IEEE ICSPIS 2023) held in Dubai, United Arab Emirates, 8-9 November 2023.



Professor Beheshti's talk titled "Understanding the Transformative Power of Generative AI in Modern Communication and Information Security" delved into the world of Generative AI and its transformative potential in signal processing and information security, using real-world examples and case studies to showcase the tangible benefits and opportunities that Generative AI brings to organizations across various industries.

Computing Research Accepted at Top-tier International Conferences (ACL, USENIX Security)

Congratulations to our school researchers, Mr Pedro Faustini, Mr Michal Kepkowski (Macquarie University Cyber Security Hub), Professor Dali Kaafar (Macquarie University Cyber Security Hub), for their accepted papers at the 61st ACL 2023 and the 32nd USENIX Security 2023.

Answering Unanswered Questions through Semantic Reformulations in Spoken QA

Pedro Faustini, Zhiyu Chen, Besnik Fetahu, Oleg Rokhlenko and Shervin Malmasi

Fast IDentity Online with Anonymous Credentials (FIDO-AC)

Wei-Zhu Yeoh, **Michal Kepkowski**, Gunnar Heide, **Dali Kaafar**, Lucjan Hanzlik



**Well Done and
Congratulations!!!**



A photograph of two women sitting at a white conference table in an office. The woman on the left is smiling and holding a pen over an open notebook. The woman on the right is also smiling and looking towards the camera. In the foreground, a third person's arm and hand holding a pen are visible, also over a notebook. There are two laptops on the table. The background shows a blue door and a glass-walled office area. A large red and pink geometric graphic is overlaid on the left side of the image.

New Staff and Achievements

Professor Jian Yang Appointed as the Director of the Industrial PhD Program, Digital Finance CRC

Congratulations to Professor Jian Yang, who has been appointed as the Director of the Industrial PhD Program, Digital Finance Cooperative Research Centre (DFCRC).

Started in 2022, the \$181 million, 10-year DFCRC brings together a unique group of stakeholders in FinTech, industry, research, and regulation to develop and capitalise on the huge commercial opportunities arising from the next transformation of the financial markets – the universal digitisation of all assets so they can be traded and exchanged directly and in real-time between any individual or organisation.



Celebrate 25-Year Service of Prof Bernard Mans

On 29 March 2023, Macquarie University held a special anniversary event to celebrate long-serving staff who have recently surpassed 25 or 40 years of employment at Macquarie.

Over past 25 years, **Professor Bernard Mans** has made enormous contributions, serving a number of significant leadership roles including Head of Department of Computing, Deputy Dean and Interim Executive Dean of Faculty of Science and Engineering.

Thank you Bernard!



Warm congratulations to Professor Tao Gu for being elevated to an **IEEE Fellow**

for contributions to mobile and wireless sensing systems

Each year, following a rigorous evaluation procedure, the IEEE Fellow Committee recommends a selected group of recipients for elevation to IEEE Fellows. Less than 0.1% of voting members are selected annually for this member grade elevation.

Congratulations, Tao!



Prof Tao Gu

Professor Longbing Cao Joins School of Computing as the Distinguished Chair of Artificial Intelligence

Professor Longbing Cao is an ARC Future Fellow (Level 3) and a pioneering researcher in AI, data science, and advanced analytics. He was the Founding Director of UTS Advanced Analytics Institute (now Data Science Institute) and served on different professional roles including being the Editor-in-Chiefs of IEEE Intelligent Systems and Springer-Nature's Journal of Data Science and Analytics (JDSA) and the lead General Chair of KDD 2015. He created several data science initiatives including the IEEE International Conference on Data Science and Advanced Analytics (DSAA) and JDOSA.

Professor Cao's research efforts have focused on fundamentals for AI, data science, machine/deep learning and behaviour informatics. He served on different roles including being a CTO before joining academia and has devoted to various enterprise applications in both public and private sectors.

Prof Cao's work has been recognised by several prestigious awards including the Eureka Prize for Excellence in Data Science in 2019.



**Distinguished Chair of AI
Professor Longbing Cao**

New Computing Academic Staff



Dr Yan Li

Lecturer in Computing (IoT & Networking)

Areas of Expertise:

- Internet of Things
- Mobile Computing
- Wireless Sensor Network
- Localisation & Tracking
- Machine Learning



Dr Shan (Emma) Xue

Lecturer in Computing

Areas of Expertise:

- Artificial Intelligence
- Data Mining
- Web Search



Dr Yimeng Feng

Lecturer in Computing (IoT & Networking)

Areas of Expertise:

- Internet of Things
- Intelligent Transportation Systems
- Service Computing
- Wireless Sensor Network Technology



Dr Adnan Mahmood

Lecturer in Computing (IoT & Networking)

Areas of Expertise:

- Internet of Things
- Trust Management
- Software Defined Networking
- Cloud, Fog and Edge Computing
- Next Generation Wireless Networks

New Computing Academic Staff



Dr Endrowednes Kuantama

Lecturer in Computing (IoT
& Networking)

Areas of Expertise:

- Internet of Things
- Drone System and Applications
- VTOL/Drone control systems
- Embedded Systems
- Aerial Manipulation



Dr Qiongkai Xu

Lecturer in Computing (Natural
Language Processing)

Areas of Expertise:

- Natural Language Processing
- Machine Learning
- Security and Privacy
- Evaluation Theorem



Dr Ningning Hou

Lecturer in Computing (IoT
& Networking)

Areas of Expertise:

- Internet of Things
- Low-Power Wide-Area Networks (LPWANs)
- Wireless networking and sensing
- Wireless security

Computing Academic Promotions for 2023

Congratulations to the following School of Computing staff who have been promoted in 2023:



Dr Mitchell McEwan
promoted to
Senior Lecturer

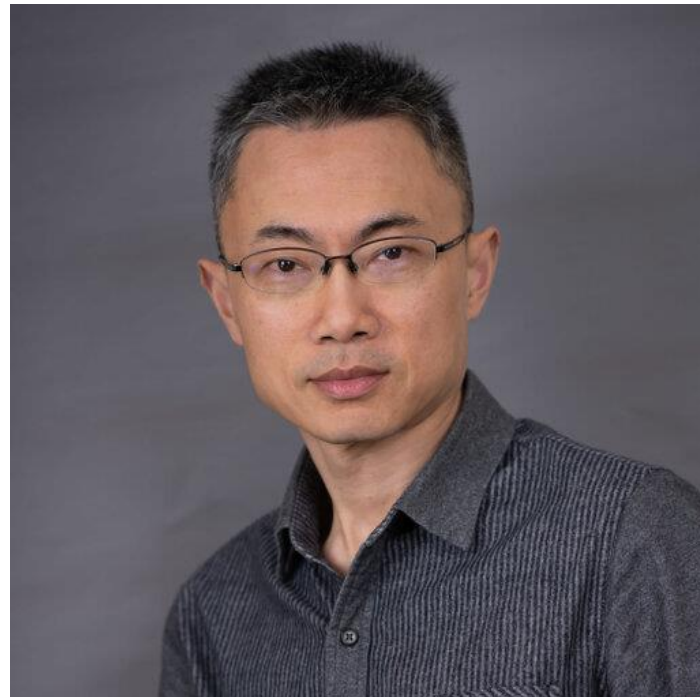


Charanya Ramakrishnan
promoted to
Senior Lecturer



Dr Jia Wu
promoted to
Associate Professor

2023 Academic Staff Awards



Professor Tao Gu



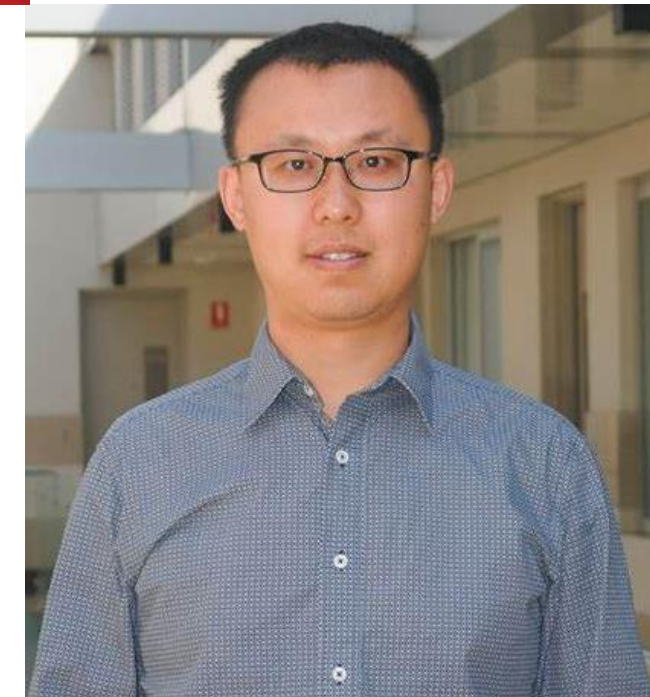
**Excellence in Research
Five Future-Shaping
Research Priorities
(Innovative Technologies)**



Dr Malcolm Ryan



**Vice-Chancellor's
Educational Leader
Award**



Dr Yipeng Zhou



**Excellence in
Research
Five Future-Shaping
Research Priorities**

Student Achievements



Ms Mahdieh Labani Awarded 2023 Google PhD Fellowship

Google Research

School of Computing PhD candidate Ms Mahdieh Labani is one of the only three recipients of this prestigious award across Australia. She is one of only five recipients worldwide under the field of “Algorithms, Optimization and Markets”. Ms Mahdieh Labani is supervised by Professor Amin Beheshti.

The Google PhD Fellowship was created to recognise outstanding graduate students doing exceptional and innovative research in the areas relevant to computer science and related fields.

Well done and warm congratulations, Mahdieh!!!

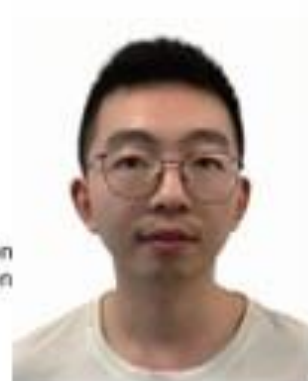


Ms Mahdieh Labani

2023 HDR Research Rising Stars



Behnaz Soltani



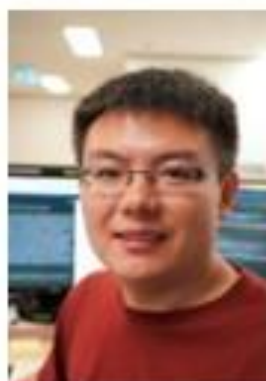
Haolong Xiang



Pedro Faustini



Gabriel H. Nunes



Xiaoxiao Ma



Michal Kepkowski



Xing Su



Zhenyu Yang



Malik K. Hayat



Yatong Sun



Pengfei Ding



On 31 March 2023, Macquarie University Faculty of Science and Engineering held a special event (FSE High Achievers Breakfast) to celebrate students who attained the highest grade in a unit in Session 2 and 3, 2022 or who are on the Merit List for 2023.

Well done and congratulations!

Head of School Professor Michael Sheng with some computing high achievers: Connor Sanders, Eric Ferguson, Maddison Lynch, Sebastian Rasmussen, Hamish Thomas, Shirsho Zahid Riddhy

Congratulations to Our Women in Cyber Team

Big congratulations to our undergraduate student team of **Izabella Lloyd-White, Zahlia Hamer, Yvonne Smith, Vrinda Maini** and **Evelyn Choukhman** who placed **3rd in Australia** in the female-only category in the recent hacking competition DownUnderCTF.

The students, supervised by Dr Natasha Fernandes, are part of the Women in Cyber Computing Club which was formed this year to train female-identifying students in penetration testing and hacking skills. An amazing achievement for these students in their first competitive event!

DownUnderCTF is a world-wide online Capture The Flag (CTF) competition that is based in Australia with the goal of educating Australian High School and University Students in Cyber Security.

Well done and congratulations!



Evelyn Choukhman, Izabella Lloyd-White, Yvonne Smith, Zahlia Hamer, Vrinda Maini

A photograph of four people (three women and one man) standing in front of a colorful, cartoonish backdrop. The backdrop features the text '10 YEARS!' in large white letters on a red background. The people are all smiling and waving. They are wearing lanyards with 'VISITOR' tags. The man is wearing a red and black jacket. The woman on the far right is wearing a colorful patterned sweater. The woman on the far left is wearing a floral top. The woman in the middle is wearing a black and red jacket. The backdrop also features various cartoon elements like buildings, a clock, and a person holding a sign.

10 YEARS!

Events and
Outreach

Computing Game Design and Development Group host DiGRA Australia 2023 National Conference!

The Computing Game Design and Development Group hosted the Digital Games Research Association (DiGRA) Australian national conference on 6-7 Feb 2023. It was the biggest conference so far with 37 speakers and 124 attendees, both online and in person.

Many great talks with speakers from all over Australia presented topics from creative arts, design and the humanities.

Congratulations to **Dr Malcolm Ryan**, **Dr Cameron Edmond**, **Dr Mitchell McEwan** and **Kayson Whitehouse** for hosting a successful conference!

Special thanks to our student volunteers Sandra Trinh, Isabelle White, Mungo Lennon, Martin Cai, Jimmy Ouk, and Guriqbal Singh Majhali.



DIGRAa
Australia

<https://digraa.org/post/category/digraa2023/>

Celebration of International Women's Day 2023



Faculty of Science
and Engineering
(FSE) IWD 2023



Charanya
Ramakrishnan



On 8 March 2023, Faculty of Science and Engineering (FSE) at Macquarie University celebrated IWD 2023 and Computing's Lecturer Charanya Ramakrishnan was among the outstanding female academics to share their inspiring stories. Congratulations, Charanya!

Computing's Engagement with Big Day In 2023

The School of Computing showcased its programs and research at the Big Day In on 14th and 15th March 2023. The two day exhibition is designed to inspire high school students on the many avenues of career in information technology.

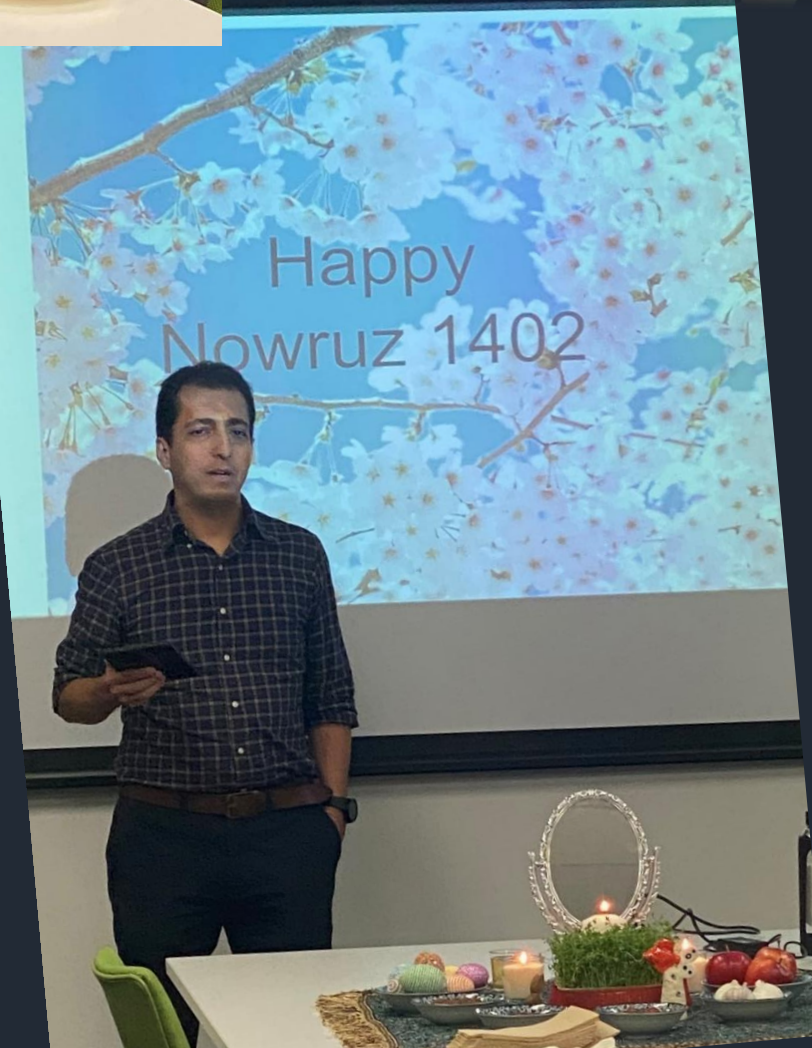
This year over 1000 high school students from all over NSW attended the two day event at the University of Technology. Highschool students were intrigued by the VR games display and engaging with student ambassadors, Chelsea, Calvin and Hadeer.

Special thanks for Dr Malcolm Ryan for showcasing the VR demos; thanks to the Game Design students Guri Singh and Katelyn Bell for assisting with the demos. We thank Macquarie's Global Domestic Student Recruitment for sponsoring the event.





On Monday 20th March, 2023, the School of Computing gathered to celebrate and learn about Nowruz. Prof Amin Beheshti led the way & explained the importance of Nowruz and it's place in our lives today.



Computing's Engagement with Big Day In – May 2023

The School of Computing showcased its programs and research at the Big Day In on 18th May 2023. The exhibition is designed to inspire high school students from Western Sydney on the many avenues of career in information technology.

This year over 250 high school students from all over NSW attended the event at the Western Sydney University. Highschool students were intrigued by the VR games display and engaging with student ambassadors, Calvin Trunswell and Chelsea Gatsi.

Special thanks to our student volunteers, Isabelle White and Sandra Trinh for showcasing the VR demos. We thank Macquarie's Global Domestic Student Recruitment for sponsoring the event.



Computing engagement with National Science Week 2023

As part of the celebration of National Science Week 2023, Associate Professor Abhaya Nayak and Dr Adnan Mahmood from the School of Computing gave a joint talk on the Artificial Intelligence of Things (AIoT) at Ryde Library, 16 August.

A/Prof. Nayak gave a general introduction to Artificial Intelligence with focus on its societal aspects. This was followed by a talk by Dr Mahmood explaining the fundamental notion of the Internet of Things (IoT), as well as its current and future applications in our daily lives. A highlight of the talk was the HEXA (Spider) Robots in action.



MQ Game Jam triples in size!

The MQ Games team have hosted their biggest game jam yet with the "REVIVE" Game Jam, tripling attendance since 2022.

Run in collaboration with Riot Games Sydney and Blowfish Studios, the two-day event saw over 60 students from MQ and TAFE NSW come together to create games on the theme of "Revive".

Staff and industry representatives helped students solve design, development and production challenges across both days. Teams consisted of students ranging from first to third year.

Students were invited to provide feedback on the event. Of those who have responded, 95% reported feeling a sense of belonging during the event, and 90% reported feeling a connection to industry. Students stated:

"Being able to work in a team to produce something in 48 hours was a real fun challenge, and many of the games that were made ended up really cool!"

"The atmosphere this time around was buzzing ... Holly and Luke are some of the best Industry guests I have interacted with, that level of involvement and dedication towards student success is a very rare thing to see."

The game jam was organized by Dr Cameron Edmond and Dr Mitchell McEwan, with Lizzy Clarkson and the FSE Student Experience team providing invaluable support to make the event happen.

Industry guests: Luke Ledwich (Riot Games Sydney), Holly Hawkins (Riot Games Sydney) and Mitchell Sayer (Blowfish Studios).

Student volunteers: Caleb Cruz, Jimmy Ouk, Bailey Wilson.



Photos by Jimmy Ouk & Chloe Szilas
Games: Cardboard Chef, Summoner's Symphony, Renaissance Man

Camp Aspire 2023: Computing collaborate with MQ Walanga Maru

Computing's Game Design and Development Group partnered with MQ Walanga Maru on their Camp Aspire event, which saw 20+ indigenous students engaging with the Faculty of Science and Engineering.

The two-day event consisted of facilities tours and hands-on activities. The Games team engaged with the students in the Computing games teaching lab. Students spent some time in the games labs testing out computer games created by our current Macquarie students.

Walanga Muru is an office within Macquarie University that seeks to support and assist Aboriginal and Torres Strait Islander students to choose the right path, navigate the obstacles of life, and to emerge as strong, resilient leaders.



Computing and Careers with STEM x Google Showcase

Professor Deborah Richards hosted the Macquarie University booth at the 10th anniversary of the Careers with STEM event, held 17 Oct 2023. To celebrate 10 years of the Careers with STEM magazine, Careers with STEM and Google hosted ~100 Year 9-10 high school students at the Google offices in the city.

Students heard from Google staffers, learning about their pathways and successes, had a tour of the Google office, and had the opportunity to interact with STEM Exhibitors including employers, programs, and education providers. The high schools represented ranged from all around Sydney to the Central Coast, private and public such as, Giraween, Granville, Central Coast Grammar and Killara. There was also a small Year 11 cohort from a new tech/STEM college called Westbourne College Sydney.



Engage with Us



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