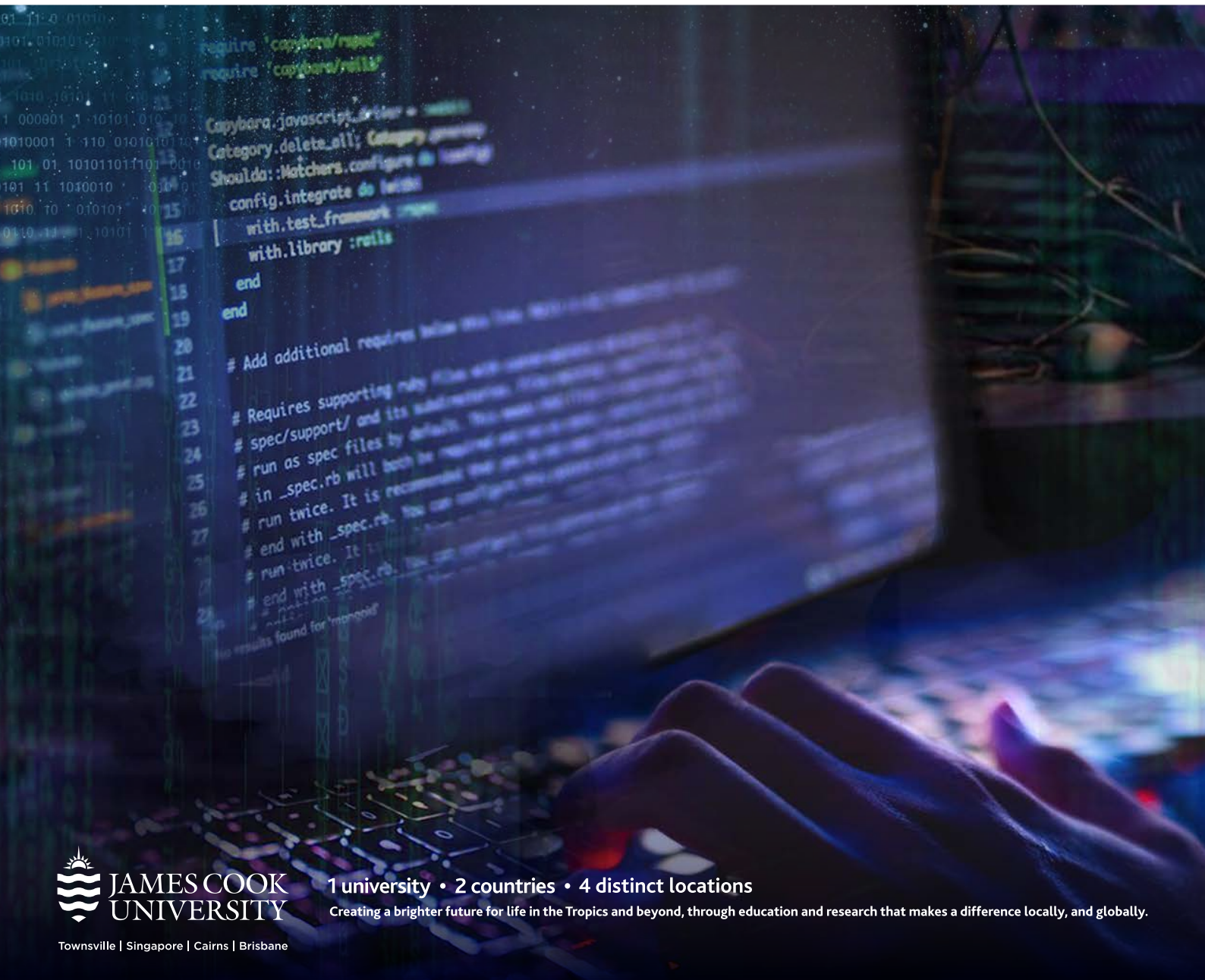
JAMES COOK UNIVERSITY SINGAPORE

Information Technology at James Cook University in Singapore



JAMES COOK UNIVERSITY

Townsville | Singapore | Cairns | Brisbane

1 university • 2 countries • 4 distinct locations

Creating a brighter future for life in the Tropics and beyond, through education and research that makes a difference locally, and globally.

Research in Information Technology

Information Technology continues to be a cornerstone in addressing complex global challenges by leveraging advanced analytical and computational capabilities to deliver innovative solutions. Its applications span a wide range of domains, including the Internet of Things (IoT), cybersecurity, artificial intelligence (AI) & machine learning (ML), data science, and game design, among others. At James Cook University in Singapore, IT research is both dynamic and interdisciplinary, encompassing areas such as software-enabled smart systems, secure and resilient digital infrastructures, data-driven decision-making, and intelligent learning systems aimed at tackling real-world challenges in tropical contexts. Through this broad and integrative approach, JCU's IT research continues to drive impactful advancements across both technological and societal domains.

James Cook University, strategically located in northern Australia and Singapore, especially focuses on tropical issues. James Cook University in Singapore researchers partner with industry, government bodies, universities and other stakeholders to conduct high quality research which contributes to tropical societies and more broadly to societies worldwide.

For further information or expression of interest to collaborate with James Cook University in Singapore, or to pursue a higher degree by research with us, please send an email to researchsupport-singapore@jcu.edu.au.



Profile



Dr Roberto Dillon

Associate Professor, Information Technology
James Cook University in Singapore

PhD, Electrical & Computer Engineering, University of Genoa, Italy

MEng, Electrical and Electronics Engineering, University of Genoa, Italy

MicroMaster's Certificate in Cybersecurity, Rochester Institute of Technology, USA

Certificate in Higher Education Teaching, Harvard University, USA

Background

Originally from Genoa (Italy) but based in Singapore since 2005, Dr Roberto Dillon holds a PhD in Computer Engineering from the University of Genoa, a postgraduate-level certificate in Cybersecurity from the Rochester Institute of Technology, and a Higher Education Teaching Certificate from Harvard University. He is the author of several well-received books published by AKPeters, CRC Press and Springer.

A speaker at many important game and tech industry conferences (TEDx Milan, Cyber Secure Singapore, TechFest in Mumbai, GDC in San Francisco, Serious Games Summit in Washington D.C., Game Connection in Paris, ChinaJoy in Shanghai, a.o.), Dr. Dillon is an ISC2 Professional Member and an IEEE Senior Member with cross-disciplinary research interests spanning serious games (health, training), emotional artificial intelligence, and behavioral analytics/machine learning applied to cybersecurity. In his first book, "On the Way to Fun" (AKPeters, 2010), he proposed the 6-11 Framework, a game analysis methodology that is now referenced within the curricula of several universities around the world, while his latest work, "The Cybersecurity Game Master" (CRC Press, 2026), redefines cybersecurity tabletop exercises within an RPG-like framework.

As a Principal Investigator/Researcher, he led teams in projects receiving funding for more than $1 million while, as a software developer, he also worked on large-scale, government-commissioned projects. As a developer, he released several Open Source cybersecurity analysis tools besides games that reached top positions on Apple's AppStore and Google Play across different countries and categories.

In 2012, he joined James Cook University Singapore where, in 2013, he founded the first permanent Museum of Video and Computer Games in Southeast Asia and spearheaded a new, dedicated Cybersecurity degree in 2020.

Roberto was awarded the "Best Professor in Technological Studies" Excellence in Education Award by CMO Asia (2023) and Springer Nature's "Editor of Distinction Awards: Author Service Award" in 2026.

Areas of expertise

- Emotional Artificial Intelligence / Kansei Engineering
- Behavioral Cybersecurity
- Computer Security and Privacy
- Ludology
- History of Technology

Impact of research and Achievements

- Formalized new models for game analysis and design (AGE and 6-11 Frameworks), now adopted in the industry and referenced in game education curricula in several universities worldwide
- Developed experimental games selected for international events like "Sense of Wonder Night" at the Tokyo Game Show and FILE Games in Rio de Janeiro
- Senior Member IEEE, Professional Member (ISC)2

Top five publications

- Dillon, R. (2026). The Cybersecurity Game Master: From Role Playing Games to Tabletop Exercises that Engage and Inspire. Boca Raton, FL: CRC Press.
- Dillon, R. (2026). From outcast to hero and back: The shifting portrayals of the hacker archetype. New Media & Society.
- Dillon, R., De Marsico, M. (2025). Behavioral Biometrics for Remote Exam Integrity: Continuous Authenticity Assessment via Keystroke Dynamics, Procedia Computer Science, 274, 402-411.
- Dillon, R. (2011). The Golden Age of Video Games: The Birth of a Multi-Billion Dollar Industry. Boca Raton, FL: CRC Press.
- Dillon, R. (2010). On The Way to Fun: An Emotion Based Approach to Game Design. Boca Raton, FL: AKPeters/CRC Press.

Further Information
JCU Research Profile



Dr Jusak Jusak

MIEEE, FHEA,
Senior Lecturer, Internet of Things
James Cook University in Singapore

PhD (Communications Engineering), RMIT University, Australia
B.Eng (Electronics Engineering), Brawijaya University, Indonesia

Background

Dr Jusak Jusak has research experience across Australia, New Zealand, and Indonesia through which He has gained solid skills in both theoretical and practical knowledge in distributed Internet of Things (IoT) technologies. This experience contributes significantly to accumulating his knowledge in which his research goal has been directed towards designing IoT systems and devices for monitoring, identification and interpretation signals from broad areas of disciplines with main focus in the implementation of IoT for tele-healthcare.

He is an accredited PhD advisor serving as a Primary Advisor, with research interests focused on the development of lightweight blockchain systems to enable scalable, fault-tolerant, secure, and traceable integration of blockchain networks, particularly for healthcare Internet of Things (IoT) applications. He is also actively engaged in the development and deployment of Tiny Machine Learning (TinyML), a lightweight approach designed for resource-constrained devices. This work aims to embed sophisticated machine learning capabilities into small-scale devices, thereby facilitating the widespread adoption of artificial intelligence (AI) within IoT ecosystems.

Areas of expertise

- Internet of Things (IoT) systems and architecture
- Internet of Things (IoT) for healthcare systems
- Integration of IoT and distributed ledger technologies, e.g., blockchain.
- Integration of machine learning and IoT systems

Impact of research

- He was awarded several nationally competitive research grants from the Indonesian Ministry of Education between 2011 and 2020.
- He also received the Best Paper Award at the International Conference on Information Technology Applications and Systems 2018 in 2018.
- He is also the receiver of several awards including the Cross Campus Collaboration Grant Scheme in 2021 (James Cook University).
- He received the Futuristic Technology Award from the Sustainability IMPACT10X programme in the design of Internet of Things devices for inland water body measurement in 2022 (James Cook University).
- He received a JCU Learning and Teaching Innovation Grants in 2023 (James Cook University).
- He received the Award for Excellence and Leadership in 2025 (James Cook University Singapore).
- He is currently involved in the COM/MobiNet-SC - Mobile Communication Networks Standards Committee, IEEE Communications Society, for creating the **Standard for 6G Empowering Robotics: Use Case Scenarios, Requirements, Architectural Impact, and Technical Assumptions (P1955).**

Top five publications

- Jusak Jusak and Steve Kerrison. (2026). Integration of IoT and Distributed Ledger Technologies: A Survey, Challenges, and Future Directions. ACM Comput. Surv. 58, 9, Article 233 (July 2026), 34 pages. https://doi.org/10.1145/3789255
- Huang, T., & Jusak, J. (2025). Security and Privacy for Modern Wireless Communication Systems, 2nd Edition. *Electronics*, 14(12), 2379. https://doi.org/10.3390/electronics14122379
- S. Kerrison and J. Jusak. (2024) Teaching the Internet with AR and Toy Bricks, *TENCON 2024 - 2024 IEEE Region 10 Conference (TENCON)*, Singapore, Singapore, 2024, pp. 1065-1068, https://doi.org/10.1109/TENCON61640.2024.10902721
- Kerrison, S., Jusak, J., & Huang, T. (2023). Blockchain-Enabled IoT for Rural Healthcare: Hybrid-Channel Communication with Digital Twinning. *Electronics*, 12(9), 2128. https://doi.org/10.3390/electronics12092128
- J. Jusak, S. S. Mahmoud, R. Laurens, M. Alsulami and Q. Fang. (2022). A New Approach for Secure Cloud-Based Electronic Health Record and its Experimental Testbed. *IEEE Access*, vol. 10, pp. 1082-1095, 2022, https://doi.org/10.1109/ACCESS.2021.3138135

Further Information
JCU Research Profile



Dr Insu Song

Senior Lecturer, Information Technology
James Cook University in Singapore

PhD Computer Science, University of Queensland, Australia
BInfoTech (Hons I), Griffith University, Australia
BSc Physics, Chung-Ang University, Seoul, Korea

Background

After completing his undergraduate studies in Physics in Korea in 1991, Dr Song followed up with an Honours degree in Information Technology in 2004, and completed his PhD studies in Computer Science in 2008. Dr Song's research interests include biomedical engineering, health informatics, mental health informatics, knowledge engineering, and text mining. He has more than 15 years of industry experience in information systems design, embedded system design, industrial control system design, electronics engineering, signal processing, patent analysis, and multimedia/game software development. Dr Song has published over 60 peer reviewed papers.

Areas of expertise

- Information systems design
- Embedded system design
- Industrial control system design
- Electronics engineering
- Signal processing
- Health Informatics
- Certified TAA for RTOs (Registered Training Organizations in Australia)

Impact of research

- In 2011, Dr Song was awarded a prestigious international grant (Global Grand Challenges) from the Bill and Melinda Gates foundation to work on mobile applications for providing "Early Child Health Intervention Using Breathing Sound."
- In emerging markets with vast populations, mobility is the key to health services. Mobile-focused healthcare advances simplify the way new technology is adopted by medical professionals and organisations.

Top five publications

- Huang, Y., Song, I., Rana, P., & Koh, G. (2017, May). Fast diagnosis of bowel activities. In Neural Networks (IJCNN), 2017 International Joint Conference on (pp. 3042-3049). IEEE.
- Chandrasekaran S., & Song I. (2016) Sustainability of big data servers under rapid changes of technology. In: Kim K., Joukov N. (eds) Information Science and Applications (ICISA) 2016. Lecture Notes in Electrical Engineering, vol 376. Springer, Singapore. doi: 10.1007/978-981-10-0557-2_15
- Tam N.T., & Song I. (2016) Big data visualization. In: Kim K., Joukov N. (eds) Information Science and Applications (ICISA) 2016. Lecture Notes in Electrical Engineering, vol 376. Springer, Singapore. doi: 10.1007/978-981-10-0557-2_40
- Song, I. (2015, July). Diagnosis of pneumonia from sounds collected using low cost cell phones. In 2015 International Joint Conference on Neural Networks (IJCNN) (pp. 1-8). IEEE. doi: 10.1109/IJCNN.2015.7280317
- Song I. (2015) Gaussian Hamming Distance. In: Arik S., Huang T., Lai W., Liu Q. (eds) Neural Information Processing ICONIP 2015 (pp. 233-240). Lecture Notes in Computer Science, vol 9491. Springer, Cham.

Further Information
JCU Research Profile



Dr Randy Zhu

Lecturer, School of Science and Technology
James Cook University in Singapore

PhD (Information Technology), James Cook University, Australia
MSc (Information Systems), Nanyang Technological University, Singapore
BSc (Computer Science), The University of Adelaide, Australia

Background

Dr Randy's research focuses on Human-Computer Interaction (HCI) with a particular emphasis on designing and evaluating technologies that improve accessibility, inclusion, and quality of life for people with disabilities and other marginalised communities. His work explores how emerging technologies including Artificial Intelligence (AI), Machine Learning, Wearables and the Internet of Things (IoT) can be developed responsibly to address real-world social and healthcare challenges.

A key theme of his research is the adoption of community-based co-design methodologies in technology development. Drawing on Participatory Action Research (PAR), Dr Randy works closely with end-users, caregivers, practitioners and community stakeholders throughout the design process to ensure that technologies are meaningful, usable and responsive to the needs of those they are intended to support. His research seeks to increase the usability, acceptance and long-term adoption of assistive and human-centred technologies.

Dr Randy possesses extensive expertise in designing and facilitating qualitative research workshops with diverse and underserved populations. Through stakeholder engagement, co-design activities and participatory research methods, he has contributed to the development of human-centred and ethically grounded AI-enabled solutions. His work combines strong technical AI capabilities with user-centred design principles, enabling the creation of innovative prototypes that are empirically evaluated in real-world settings. These projects contribute both practical solutions for communities and scholarly advancements in HCI, accessibility and responsible technology design.

Areas of expertise

- Ethical and Responsible Artificial Intelligence
- Human-Centred AI Design and Development
- Participatory Action Research
- Qualitative Research Methods
- Community-Based and Inclusive Research
- Human-AI Interaction
- Digital Inclusion and Technology Adoption
- Social Impact of Emerging Technologies

Impact of research

- Developed a framework and structured approach to engage adolescents with ASD for research through a support group
- Ethnographic study that provided insights into the implications of group culture and practices have on the co-design process.

Top publications

- Jusak, J., & Zhu, R. (2023, March). An Internet of Things Conceptual Model and User Experience Design for Forest Hiking Systems in the Tropics Tourism. In Sustainability, Economics, Innovation, Globalisation and Organisational Psychology Conference (pp. 227-243). Singapore: Springer Nature Singapore.
- Zhu, R., Hardy, D., & Myers, T. (2022). Community led co-design of a social networking platform with adolescents with Autism Spectrum Disorder. Journal of Autism and Developmental Disorders, 52(1), 38-51.
- Zhu, R., Hardy, D., & Myers, T. (2019, December). Co-designing with adolescents with autism spectrum disorder: From ideation to implementation. In Proceedings of the 31st Australian Conference on Human-Computer-Interaction (pp. 106-116).
- Zhu, R., Hardy, D., & Myers, T. (2018, October). Building applications that matter: Co-designing with adolescents with autism spectrum disorder. In International Conference on Health Information Science (pp. 167-174). Springer, Cham

Further Information
JCU Research Profile



Dr Steve Kerrison

Senior Lecturer, Cybersecurity
James Cook University in Singapore

PhD (Computer Science), University of Bristol, UK
MEng (Computer Systems Engineering), University of Bristol, UK
Advance HE SFHEA (2025), ISC2 CISSP (2020), ISC2 CCSP (2023)

Background

With a history of expertise in systems from the cloud right down to chip micro-architectures, Steve's current research interests focus on how to make cybersecurity easy, efficient and effective, aiming to create a safer, smarter and more environmentally friendly world.

Steve's research highlights include designing a formally verifiable time-deterministic network-on-chip for safety critical embedded multi-core systems, and creating an energy model that enables embedded software developers to understand how much energy their code consumes. More recently, Steve has hacked smart padlocks to turn them into fingerprint-stealing devices and is exploring deploying measures against such IoT-borne cyber-threats.

He has collaborated in various research projects in both Europe and Singapore. The EU-funded FP7 FET "ENTRA" comprised three academic institutions and one commercial chipmaker to explore energy reduction measures for modern embedded systems. The ARTEMIS Joint Undertaking project "EMC2" brought one hundred European academic and industrial organisations together to research mixed-criticality multi-core embedded real-time systems for space, aviation and automotive innovations. Steve conducted research into IoT for Industry 4.0 at A*STAR's "Model Factory @ ARTC", later participating in projects under Singapore National Research Foundation's National Cybersecurity R&D Programme whilst working at an IoT cybersecurity start-up, where he also co-authored a PKI-related patent.

Areas of expertise

- AI-assisted cybersecurity solutions
- Multi-core embedded systems
- Innovation in teaching technologies
- Cybersecurity for Internet of Things
- Public Key Infrastructure

Impact of research

- Patent PCT/SG2019/050382 is used in products securing IoT communications in systems ranging from smart homes to city infrastructure.
- Members of ENTRA project subsequently joined the coordination action "ICT-Energy", a group of cross-disciplinary researchers, receiving EU funding for fostering interdisciplinary dialogue.
- Demonstrated a formally-verified time-deterministic communication model for multi-core systems, overcoming drawbacks of unpredictable "best-effort" systems that are not acceptable in real-time embedded safety-critical environments.
- Created a 480-core real-time embedded system, the largest of its kind, contributing tools and designs publicly through an open-source model.

Top five publications

- Jusak, J., & Kerrison, S. (2026). Integration of IoT and Distributed Ledger Technologies: A Survey, Challenges, and Future Directions. ACM Computing Surveys.
- Kerrison, S., & Jusak, J. (2024, December). Teaching the Internet with AR and Toy Bricks. In TENCON 2024-2024 IEEE Region 10 Conference (TENCON) (pp. 1065-1068). IEEE.
- Kerrison, S. (2024, December). Building Touch-Less Trust in IoT Devices. In TENCON 2024-2024 IEEE Region 10 Conference (TENCON) (pp. 887-890). IEEE.
- Kerrison, S., Jusak, J., & Huang, T. (2023). Blockchain-Enabled IoT for Rural Healthcare: Hybrid-Channel Communication with Digital Twinning. Electronics 2023, 12, 2128. Security and Privacy for Modern Wireless Communication Systems, 209.
- Kerrison, S. (2022, August). IoT Droplocks: Wireless fingerprint theft using hacked smart locks. In 2022 IEEE International Conferences on Internet of Things (iThings) (pp. 107-112). IEEE.

Further Information
JCU Research Profile



Dr Ghazalnaz Sharifonnasabi

Lecturer, Information Technology
James Cook University in Singapore

Doctor of Philosophy (PhD), Computer Science, Taylor University
Master of Arts (Fine Arts), Science Technology and Sustainability, University of Malaysia
Bachelor of Education (Arts/Crafts), Business Information Technology, Staffordshire University

Background

Dr Ghazalnaz Sharifonnasabi is an interdisciplinary researcher specializing in Artificial Intelligence (AI), Machine Learning, Digital Innovation, and Data Science. Her research focuses on developing intelligent systems that address real-world challenges across healthcare, human well-being, sustainability, tourism, and digital transformation. Through the integration of machine learning, computer vision, statistical modelling, and behavioral technologies, she aims to bridge the gap between advanced AI research and practical societal applications.

A major focus of her research lies in healthcare AI and medical imaging. She is the developer of DentixAI, an intelligent age-estimation system that utilizes dental panoramic radiographs (OPGs) and machine learning techniques to support biological age assessment. The system has potential applications in forensic science, immigration, sports governance, and healthcare diagnostics. Her work also includes automated dental image segmentation, deep learning-based disease prediction, and computer vision applications for clinical decision support.

Beyond healthcare, Dr Sharifonnasabi investigates the transformative role of AI in sustainable development, smart tourism, and digital services. Her research explores how intelligent technologies can enhance tourism sustainability, improve service innovation, and support emerging digital ecosystems. She has also contributed to research on digital cultural experiences, including the development of Halal services capes within immersive virtual environments and the metaverse.

Her recent work has expanded into AI-driven behavioral technologies and human well-being. As Co-Principal Investigator of the SleepSync project, she is developing AI-enabled interventions to address bedtime procrastination and promote healthier sleep behaviors. She is also actively engaged in environmental and agricultural AI research, including intelligent fish detection systems for aquaculture and AI-based crop disease analysis.

Through international collaborations, interdisciplinary research leadership, and active student mentorship, Dr Sharifonnasabi continues to advance responsible and impactful applications of artificial intelligence that contribute to societal well-being, sustainable development, and technological innovation.

Areas of expertise

- Artificial Intelligence (AI)
- Machine Learning and Deep Learning
- Computer Vision
- Medical Image Analysis
- Healthcare Analytics
- Human–Computer Interaction
- Data Science
- Predictive Analytics
- Bayesian Modelling
- Digital Innovation
- Smart Tourism Technologies
- Sustainability Informatics

Impact of research

Dr Sharifonnasabi's research generates impact across healthcare, sustainability, behavioral science, and digital innovation by translating artificial intelligence into practical solutions that address societal and industry challenges.

Her work on DentixAI has contributed to the advancement of automated biological age estimation using dental imaging, supporting applications in forensic investigations, immigration processes, and sports governance. In healthcare, her research on medical image analysis, radiographic segmentation, and predictive modelling supports improved diagnostic accuracy and data-driven clinical decision-making.

Through the SleepSync initiative, she is exploring how behavioral technologies and AI can positively influence sleep health and overall well-being. Her contributions to sustainable tourism demonstrate how intelligent systems can enhance visitor experiences while supporting long-term sustainability goals.

In environmental applications, her research on intelligent aquaculture monitoring and agricultural AI showcases the potential of computer vision technologies to improve operational efficiency, sustainability, and resource management.

Her research is characterized by strong interdisciplinary collaboration, international engagement, and a commitment to developing responsible AI solutions that deliver measurable societal impact.

Top five publications

- Sharifonnasabi, (2022). Hybrid HCNN-KNN model enhances age estimation accuracy in orthopantomography. Frontiers in Public Health, 10, 879418.
- Sharifonnasabi, (2024). Halal servicescape in the metaverse. Journal of Islamic Marketing, 15(2), 101–115.
- Sharifonnasabi, (2024). A Bayesian approach for the parameter of Lindley model under Type-II censoring. Jordan Journal of Mathematics and Statistics, 16(1), 201–218.
- Sharifonnasabi, (2022). Comparison of deep learning and machine learning algorithms to diagnose and predict breast cancer. In Proceedings of the International Conference on Information Technology and Applications (pp. 31–43). Springer.
- Sharifonnasabi, (2021). Bone age measurement-based dental radiography, employing a new model. In Intelligent Computing and Innovation on Data Science (pp. 51–61). Springer.
- Sharifonnasabi, (2018). The effect of conception of internet usage and SMEs' activities on organisational performance among tourism enterprises in Malaysia. Malaysian Journal of Computer Science, 31(3), 215–230.

Further Information
JCU Research Profile



Dr Erik Hormann

Lecturer, Mathematics
James Cook University in Singapore

DPhil (Oxon), MIMA, FHEA

Background

Dr Erik Hormann is a Lecturer in Mathematics at James Cook University Singapore. He previously taught at the University of Edinburgh's School of Mathematics.

He earned his Bachelor's and Master's degrees from La Sapienza University of Rome and completed his DPhil in Mathematics at the University of Oxford under the supervision of Professor Renaud Lambiotte.

His research interests lie in the application of physics-inspired methods to the study of complex systems and networks.

Areas of expertise

- Network Science
- Complex Systems

Impact of research

Dr Erik Hormann's research lies at the intersection of statistical mechanics, network science, and information technology, with a focus on uncovering the fundamental laws governing complex systems. By analysing topologies ranging from higher-order hypergraphs to asymmetric directed networks, his work investigates the limits of predictability, inference, and scalable dynamics in large-scale networks.

His research contributions include:

- **Consensus and Adaptive Higher-Order Dynamics**
  Dr Hormann has characterised how non-linear group interactions on hypergraphs alter collective agreement, revealing how the co-evolution of node states and structural rewiring can either accelerate or prevent system fragmentation.
- **Statistical Mechanics and Community Detectability**
  His work has explored the relationship between information-theoretic detectability transition threshold and the behaviours of diffusion on networks. This research provides insights into the fundamental relation between community detection algorithms and the limits at which latent structures in sparse, infinite-dimensional graphs become methematically unrecoverable.
- **Coarse-Graining of Directed Networks via Ergodic Sets**
  Dr Hormann developed a rigorous matrix-compression framework based on ergodic sets and SVD to reduce the dimensionality of large directed graphs while preserving their macroscopic diffusion dynamics and non-equilibrium transport properties.

Top five publications

- Hormann, E., Lambiotte, R., & Cantwell, G. T. (2025). Approximation for return time distributions of random walks on sparse networks. *Physical Review E, 111*(6), 064306.
- Leonetti, M., Hörmann, E., Leuzzi, L., Parisi, G., & Ruocco, G. (2021). Optical computation of a spin glass dynamics with tunable complexity. *Proceedings of the National Academy of Sciences, 118*(21), e2015207118.
- Papanikolaou, N., Vaccario, G., Hormann, E., Lambiotte, R., & Schweitzer, F. (2022). Consensus from group interactions: An adaptive voter model on hypergraphs. *Physical Review E, 105*(5), 054307.
- Hormann, E. (2024). *Applications of random walks on complex networks: structural and dynamical insights* (Doctoral dissertation, University of Oxford).

Further Information
JCU Research Profile



Dr Lijuan Shen

Senior Lecturer, School of Science and Technology
James Cook University in Singapore

PhD (Systems Engineering), Beihang University, China
BSc (Information and Computing Science), Beijing Jiaotong University, China

Background

Dr Shen's research lies at the intersection of data science, reliability engineering, and systems resilience, with a focus on developing data-driven approaches to improve the performance of complex infrastructure systems. Her work addresses key challenges related to system degradation, uncertainty, disruptions, and recovery, with applications in transportation, energy, and other critical infrastructure sectors.

Her research integrates statistical modelling, machine learning and optimisation to develop innovative methods for predictive maintenance, fault detection, degradation modelling, resilience assessment, and decision-making under uncertainty. She has published over 40 peer-reviewed articles in leading international journals and has led and contributed to multidisciplinary research projects.

Areas of expertise

- Systems resilience and infrastructure resilience
- Reliability engineering and degradation modelling
- Predictive maintenance and remaining useful life prediction
- Fault detection and diagnostics
- Statistical modelling and machine learning
- Maintenance optimisation and asset management
- Data-driven decision support for critical infrastructure systems

Impact of research

Developed resilience assessment frameworks and recovery modelling approaches that improve understanding of how complex infrastructure systems respond to, adapt to, and recover from disruptions. This work supports the development of more resilient transportation, energy, and urban infrastructure systems.

Developed degradation modelling, reliability analysis, and predictive maintenance methodologies that enable earlier failure prediction and more effective maintenance planning. These approaches help improve asset reliability, reduce downtime, and enhance operational performance.

Applied statistical modelling, machine learning, and optimisation techniques to support evidence-based decision-making in complex engineering systems. The resulting methods help organisations manage uncertainty, assess risks, and allocate resources more effectively.

Top five publications

- Ye, X., Tang, L. C., Ye, Z., & Shen, L. (2026). Priority assignment of repair services for spatially distributed infrastructure. IISE Transactions, 58(5), 503-517.
- Zhu, Y., Zhang, F., Chen, W., Cheng, Z., & Shen, L. (2025). Order-preserving kernel contrastive learning with applications to cross-Domain RUL prediction. IEEE Transactions on Reliability, 75, 97-111.
- Shen, L., Tang, Y., & Tang, L. C. (2021). Understanding key factors affecting power systems resilience. Reliability Engineering & System Safety, 212, 107621.
- Shen, L., Cassottana, B., & Tang, L. C. (2018). Statistical trend tests for resilience of power systems. Reliability Engineering & System Safety, 177, 138-147.
- Shen, L., Wang, Y., Zhai, Q., & Tang, Y. (2018). Degradation modeling using stochastic processes with random initial degradation. IEEE Transactions on Reliability, 68(4), 1320-1329.

Further Information
JCU Research Profile

Information Technology teaching programs at James Cook University

The Singapore campus of James Cook University offers undergraduate and postgraduate programs in Information Technology and Game Design. As an IT student, you will be entitled to membership with two professional bodies: The Institute of Electrical and Electronics Engineers (IEEE) and the Singapore Computer Society (SCS).

Bachelor of Information Technology

This course brings together the knowledge and skills that are essential for professional IT careers along with subjects in interactive visualisation, games, big data and data mining, interactive 2D/3D graphics and web technologies, mobile technologies, programming and design thinking, and programming.

This course is accredited by the Australian Computer Society (ACS). Graduates are eligible to apply to join the ACS.

Bachelor of Information Technology graduates will be able to:

- Demonstrate essential knowledge for a career in technology related professions and practice;
- Synthesise industry standard and underlying principles and concepts for decision making;
- Critically evaluate data & resources in the context or relevant academic literature;
- Apply critical thinking to address IT related issues;
- Demonstrate the ability to work collaboratively

Master of Information Technology

Our Master of Information Technology program provides practical and relevant skills to allow graduates of different disciplines to move into the IT industry. Students have an opportunity to specialise in Business Informatics, Computing and Networking or Interactive Technologies and Games Design.

In the expanding e-Business/e-Commerce industry, there is a growing global demand for graduates skilled with a mix of marketing, management, internet, multimedia, computing, networking, software technologies and business operation skills.

Our Master of Information Technology program is fully accredited by the Australian Computer Society at the 'Professional Level' (its highest level).

Doctor of Philosophy (PhD) and Master of Philosophy

The Doctor of Philosophy (PhD) is a program of supervised original research. It culminates in the submission of a thesis that demonstrates the ability for critical analysis and research that makes a significant and original contribution to the knowledge and understanding of the field of study.

The Master of Philosophy offers postgraduate research supervision on a smaller scale than the PhD, towards which it can provide a pathway.

For further information on our courses, email admissions-singapore@jcu.edu.au or visit www.jcu.edu.sg





IT Activities @JCU Singapore

The IT department offers lots of activities for the students to experience and engage with the industry while studying at James Cook University in Singapore. Aspects of the curriculum require students to work with industry on real-world projects. Guest lectures from industry experts, academicians and practitioners are conducted during the course of study to enhance the subject knowledge of students and expose them to the applications of their knowledge from time to time. There are various other special events organized like Game Jam and Hackathons wherein students from other universities and institutions also participate and compete. The students meet their peers and relevant personalities from the industry for valuable feedback and networking. Another regular two-day event is Design Sprint which is conducted at the end of term. This event is based on the Google Ventures Design Sprint methodology where our students work in randomly allocated teams across various levels of study and collaborate to develop a design solution for a real-world problem posed by industry.

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