2025 2nd International Conference on Advanced Robotics, Control, and Artificial Intelligence (ARCAI 2025)

24 - 27 November 2025
Nadi, Fiji

Conference Program

NADI, FIJI NOV. 24-27, 2025
ARCAI2025

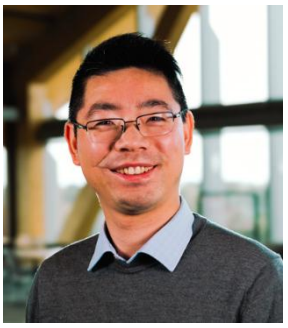
Murdoch University

Organised by

Murdoch University, Perth, Australia

WELCOME FROM GENERAL CHAIR

Welcome to ARCAI 2025!



Dear Esteemed Delegates and Friends,

We are delighted to welcome all of you to the 2nd International Conference on Advanced Robotics, Control, and Artificial Intelligence (ARCAI 2025), held from November 24th to 27th, 2025, in the beautiful island city of Denarau, Nadi, Fiji. It is our great honour to host you for this exciting and inspiring event.

Nadi, located on the western coast of Fiji's main island, Viti Levu, is known for its stunning beaches, lush tropical landscapes, and rich multicultural heritage. As a vibrant gateway to the South Pacific, Nadi offers a perfect balance of natural beauty and modern facilities. Delegates will not only experience the warmth of Fijian hospitality but also enjoy an ideal environment for meaningful academic exchange and international collaboration.

Following the success of our inaugural conference - ARCAI 2024, on December 9th – 12th, 2024 in Perth, Australia, ARCAI 2025 marks the second edition of this international gathering. It continues to serve as a premier global forum for academic scientists, researchers, and engineers to exchange and present the latest advances in robotics, control, and artificial intelligence. The conference particularly welcomes innovative methodologies and interdisciplinary techniques that bridge theory and real-world applications, while also addressing the practical challenges, deployment issues, and future opportunities in these fast-evolving fields.

This year's program has been carefully curated to foster knowledge sharing and collaboration. We are honoured to feature 3 distinguished keynote speakers, providing diverse perspectives across academia and industry.

ARCAI 2025 has received over 75 paper and abstract submissions, representing contributions from researchers in more than 10 countries worldwide. Each submission underwent a rigorous peer-review process, with every paper evaluated by at least two independent experts to ensure the highest academic standards. Ultimately, 58 papers and abstracts were accepted for presentation across 10 oral sessions, reflecting the growing impact and recognition of the ARCAI community.

We extend our heartfelt thanks to the organizing and technical committees, reviewers and our sponsors. Their unwavering support and dedication have been instrumental in making this conference a success.

We look forward to a productive and memorable event and to celebrating ARCAI 2025, the 2nd International Conference on Advanced Robotics, Control, and Artificial Intelligence with you. We wish you a very enjoyable time in Nadi, Fiji.

Kind regards,

Hai Wang

General Chair, ARCAI 2025

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Charles Darwin University, Australia
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Royal Melbourne Institute of Technology University, Australia
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Nanjing University of Posts and Telecommunications, China

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Qilu University of Technology, China

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En Fan,
Shaoxing University, China

Tutorial Chairs:

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Anhui Agricultural University, China
Jinlin Sun
Jiangsu University, China
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University of Doha for Science & Technology, Qatar

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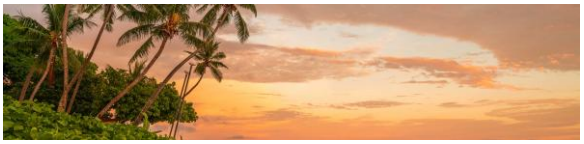

ARCAI 2025 Program Overview

<table>
<tr><th></th><th>24 Nov</th><th>25 Nov</th><th>26 Nov</th><th>27 Nov</th></tr>
<tr><td>08:00 - 08:30</td><td></td><td></td><td></td><td rowspan="20">Day Visit

(Departure: 07:30

Return: 15:00)</td></tr>
<tr><td>08:30 - 09:00</td><td></td><td></td><td></td></tr>
<tr><td>09:00 - 09:30</td><td rowspan="6"></td><td>Opening Ceremony</td><td></td></tr>
<tr><td>09:30 - 10:00</td><td rowspan="2">Keynote Speech-1</td><td rowspan="2">Keynote Speech-2</td></tr>
<tr><td>10:00 - 10:30</td></tr>
<tr><td>10:30 - 11:00</td><td>Coffee Break</td><td>Coffee Break</td></tr>
<tr><td>11:00 - 11:30</td><td rowspan="2">Oral Sessions
1,2</td><td rowspan="2">Keynote Speech-3</td></tr>
<tr><td>11:30 - 12:00</td></tr>
<tr><td>12:00 - 12:30</td><td rowspan="3">Lunch</td><td rowspan="3">Lunch</td></tr>
<tr><td>12:30 - 13:00</td></tr>
<tr><td>13:00 - 13:30</td></tr>
<tr><td>13:30 - 14:00</td><td rowspan="3"></td><td rowspan="3">Oral Sessions
3,4</td><td rowspan="3">Oral Sessions
7,8</td></tr>
<tr><td>14:00 - 14:30</td></tr>
<tr><td>14:30 - 15:00</td></tr>
<tr><td>15:00 - 15:30</td><td rowspan="3">Site Registration</td><td>Coffee Break</td><td>Coffee Break</td></tr>
<tr><td>15:30 - 16:00</td><td rowspan="3">Oral Sessions
5,6</td><td rowspan="3">Oral Sessions
9, 10</td></tr>
<tr><td>16:00 - 16:30</td></tr>
<tr><td>16:30 - 17:00</td></tr>
<tr><td>17:00 - 17:30</td><td rowspan="6">Site Registration</td><td></td><td>Closing Ceremony</td></tr>
<tr><td>17:30 - 18:00</td><td></td><td rowspan="7">Conference Gala Dinner & Award Ceremony</td></tr>
<tr><td>18:00 - 18:30</td><td></td></tr>
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<tr><td>21:00 - 21:30</td><td></td><td></td></tr>
<tr><td>21:30 - 22:00</td><td></td><td></td></tr>
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* Registration desk is open all day during the event.
** **Internet** is available at the Conference Venue, Sofitel Fiji Resort.

AGENDA

MONDAY, 24 Nov		
TIME	**ACTIVITY**	**VENUE**
15:00 - 20:00	Site Registration	Sofitel Fiji Resort

AGENDA

TUESDAY, 25 Nov		
TIME	**ACTIVITY**	**VENUE**
09:00 - 09:30	Opening Ceremony	Room 1
09:30 - 10:30	Keynote Speech 1	Room 1
10:30 - 11:00	Coffee Break	
11:00 - 12:00	Oral Sessions 1,2	Room 1, 2
	Intelligent Control and Robotics I	
	Intelligent Control and Robotics II	
12:00 - 13:30	Lunch	
13:30 - 15:00	Oral Presentations 3,4	Room 1, 2
	Machine Learning and Optimization I	
	Machine Learning and Optimization II	
15:00 - 15:30	Coffee Break	
15:30 - 17:00	Oral Presentations 5, 6	Room 1, 2
	Vision, Sensing, and Multimodal Intelligence I	
	Vision, Sensing, and Multimodal Intelligence II	
Online Link for Room 1	https://teams.microsoft.com/dl/launcher/launcher.html?url=%2F_%23%2Fl%2Fmeetup-join%2F19%3Ameeting_NGYzOTIyOWMtZTE3My00NzdlLTliYTYtNjQ5MDNhMDc1ZGQ4%40thread.v2%2F0%3Fcontext%3D%257b%2522Tid%2522%253a%2522c00d4c1b-cf7b-4e93-b7c7-10113a9bc230%2522%252c%2522Oid%2522%253a%25227a7dc7fe-afe9-4a76-852e-002ec419ae6d%2522%257d%26anon%3Dtrue&type=meetup-join&deeplinkId=938a9e1f-8b2e-4506-8deb-2a74b7885916&directDl=true&msLaunch=true&enableMobilePage=true&suppressPrompt=true	
Online Link for Room 2	https://teams.microsoft.com/dl/launcher/launcher.html?url=%2F_%23%2Fl%2Fmeetup-join%2F19%3Ameeting_Mzk5MTdkNDQtMzJiNS00ODZkLWI0YTYtYWViZGMxYWZlODg1%40thread.v2%2F0%3Fcontext%3D%257b%252	

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Keynote Speech 1

Mingcong Deng

Professor, Tokyo University of Agriculture and Technology, JAPAN

Nonlinear Modelling & Control of Micro Hands Using Learning and Operator Theory

Abstract: Learning & operator theory based robust nonlinear modelling and control design for nonlinear systems with uncertainties is shown. The relationship between operator theory and passivity for adaptive control is discussed. Meanwhile, I will introduce support vector regression (SVR) utilized for regression analysis, where the design parameters of the SVR are selected by using particle swarm optimization (PSO). In order to realize sensorless control, PSO-SVR-based moving estimation with generalized Gaussian distribution (GGD) kernel is employed. That is, learning & operator based sensorless robust adaptive nonlinear control system can be obtained. Further, current results on modeling by ant colony optimization (ACO)-MSVR for 3D actuator are shown. Finally, some current results on actuator position control for 2D/3D micro hands are introduced.

Bio: Prof. Mingcong Deng (IEEE Fellow) received his PhD in Systems Science from Kumamoto University, Japan, in 1997. From 1997.04 to 2010.09, he was with Kumamoto University; University of Exeter, UK; NTT Communication Science Laboratories; Okayama University. From 2010.10, he has been with Tokyo University of Agriculture and Technology, Japan, as a professor. Now he is the Chair of Department of Electrical and Electronic Engineering. Prof. Deng specializes in three complementary areas: Operator based nonlinear fault detection and fault tolerant control design; System design on human factor based robot control; Learning based nonlinear control. Prof. Deng has over 650 publications including 220 journal papers in peer reviewed journals including IEEE Press and other top tier outlets. He serves as a chief editor for 2 international journals, and associate editors of 6 international journals. Prof. Deng is a co-chair of agricultural robotics and automation technical committee, IEEE Robotics and Automation Society; Also, a chair of the environmental sensing, networking, and decision making technical committee, IEEE SMC Society. He was the recipient of 2014 & 2019 Meritorious Services Award of IEEE SMC Society, 2020 IEEE RAS Most Active Technical Committee Award (IEEE RAS Society) and 2024 IEEE Most Active SMC Technical Committee Award (IEEE SMC Society). He is a fellow of The Engineering Academy of Japan.

Oral Presentations

11:00-12:00|TUESDAY, 25 NOV

Intelligent Control and Robotics I
Chairs: Tianhong Pan, Nashit Ali
Venue: Room 1

Time	Paper ID	Title & Authors
11:00 - 11:15	9	Finite-Time Sliding Mode Speed Control with Enhanced Disturbance Rejection for SPMSM *Cao Li (Anhui University)* *Tianhong Pan (Anhui University) ** *Jiaqiang Tian (Anhui University)*
11:15 - 11:30	13	Neural Network Adaptive Sliding Mode Dynamic Positioning Control of Semi-Submersible Offshore Platform *Jiaxing Xu (Qingdao University of Science and Technology)* *Qilei Xu (Qingdao University of Science and Technology)* *Yun Zhang (Qingdao University of Science and Technology) ** *Baolin Zhang (Qingdao University of Science and Technology)*
11:30 - 11:45	69	Early Diabetic Retinopathy Detection Using TriFusionNet Approach *Nashit Ali (Murdoch University) ** *Nuo Chen (Murdoch University)* *Anum Fatima (Murdoch University)* *Hai Wang (Murdoch University)* *Amir Mehdi Yazdani (Murdoch University)* *Sheikh Izzal Azid (Murdoch University)*
11:45 - 12:00	81	Data-Driven Synthetic Generation of Residential EV Charging Profiles Based on Travel Behaviour and User Attributes *Yinan Wang (Murdoch University) **

Intelligent Control and Robotics II
Chairs: Shihong Ding, Shiron Melvin
Venue: Room 2

Time	Paper ID	Title & Authors
11:00 - 11:15	47	LESO-Based Generalized Super-Twisting Sliding Mode Control for a Bidirectional Half-Bridge DC-DC Converter *Ze Guo (Jiangsu University) ** *Jinlin Sun (Jiangsu University)* *Shihong Ding (Jiangsu University)* *Li Ma (Jiangsu University)* *Keqi Mei (Jiangsu University)*
11:15 - 11:30	78	Neural Network Adaptive Sliding Mode Dynamic Positioning Control of Semi-Submersible Offshore Platforms *Jiaxing Xu (Qingdao University of Science and Technology)* *Qilei Xu (Qingdao University of Science and Technology)* *Yandong Zhao (Qingdao University of Science and Technology)* *Zidong Ai (Qingdao University of Science and Technology)* *Baolin Zhang (Qingdao University of Science and Technology) ** *Shouxiang Yan (Qingdao University of Science and Technology)*
11:30 - 11:45	82	A Neural-Control Barrier Function for Navigation in Complex Environments *Zhuopeng Yang (Murdoch University) ** *Hai Wang (Murdoch University)* *Amirmehdi Yazdani (Murdoch University)*
11:45 - 12:00	83	DualLiDARNet: 2D-LiDAR-Based End-to-End Deep Learning Model for Pose Estimation in Symmetric Greenhouse Environments *Shiron Melvin (Murdoch University) **

Oral Presentations

13:30-15:00|TUESDAY, 25 NOV

Machine Learning and Optimization I
Chairs: Isabela Birs, Jianchen Hu
Venue: Room 1

Time	Paper ID	Title & Authors
13:30 - 13:45	5	A Simplified Robust Fractional Order PID for Dead Time Processes *Cristina Muresan (Technical University of Cluj-Napoca) ** *Marcian Mihai (Technical University of Cluj-Napoca)* *Erwin Hegedus (Technical University of Cluj-Napoca)* *Isabela Birs (Technical University of Cluj-Napoca)* *Clara Ionescu (Ghent University)* *Robin De Keyser (Ghent University)*
13:45 - 14:00	7	Lifelong Learning of Variational Bayesian Semi-Supervised Gaussian Mixture Model for Dynamic Data Stream Modeling and Industrial Process Soft Sensing *Le Yao (Hangzhou Normal University) ** *Xuanming Zhai (Hangzhou Normal University)* *Zeyu Yang (Hangzhou Normal University)* *Bingbing Shen (Hangzhou Normal University)* *Jiusun Zeng (Hangzhou Normal University)*
14:00 - 14:15	10	Truck-Drone-based Package Delivery in Mountain Areas *Chang Guo (Xi'an Jiaotong University)* *Jianchen Hu (Xi'an Jiaotong University) ** *Meng Zhang (Xi'an Jiaotong University)* *Chengshuai Wu (Xi'an Jiaotong University)* *Bo Fan (Xi'an Jiaotong University)* *Chao-Bo Yan (Xi'an Jiaotong University)*
14:15 - 14:30	27	Container Anomaly Detection Method Based on Improved Particle Swarm Optimization Algorithm-Optimized BiLSTM Neural Network *Chen Dai (Anhui Mingsheng Hengzhuo Technology Co., Ltd.) ** *Guoqing Liu (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)* *Ning Xu (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)* *Shiwei Guo (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)* *Qingsong Tian (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)* *Yanxia Cao (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)*
14:30 - 14:45	28	Making Virtual Data More Reliable: A Contrastive Learning-Based Active Data Augmentation Approach for Mechanical Fault Diagnosis *Zeyu Song (Zhejiang University)* *Xiaoyu Jiang (Beihang University) ** *Jinchuan Qian (Zhejiang University of Science and Technology)* *Danyang Han (Beihang University)* *Le Yao (Hangzhou Normal University)* *Zeyu Yang (Huzhou University)*
14:45 - 15:00	29	Mean Arterial Pressure Dynamics under Norepinephrine, Propofol and Remifentanil Drug Interactions: A PK/PD Validation Study in General Anesthesia *Isabela Birs (Ghent University) ** *Marcian Mihai (Technical University of Cluj-Napoca)* *Erwin Hegedus (Technical University of Cluj-Napoca)* *Vlad Dumitrescu (Pius Brinzeu County Emergency Clinical Hospital Rimisoara)*

		Clara Ionescu (Ghent University) *Cristina Muresan (Technical University of Cluj-Napoca)*

Machine Learning and Optimization II
Chairs: Nuo Chen, Qingyang Xu
Venue: Room 2

Time	Paper ID	Title & Authors
13:30 - 13:45	12	Finite Time Adaptive Enclosing Control for Multi-Agent Systems with Distance Constraints *Qingyang Xu (Anhui university) ** *Shuping He (Anhui university)* *Keyue Wu (Anhui university)*
13:45 - 14:00	51	A Set-membership Filter with UBB Input *Xinyu Zhang (Xi'an University of Technology)* *Jiemin Duan (Xi'an University of Technology)* *Xiaoxi Li (Xi'an University of Technology)* *Yinan Shi (Xi'an University of Technology) **
14:00 - 14:15	55	A Hierarchical Interact Migration Attention Multi-Contrast Network for MRI Reconstruction *Hao Qi (China Jiliang University)* *Jianwei Zhao (China Jiliang University) ** *Ruofan Ma (China Jiliang University)* *Zhenghua Zhou (China Jiliang University)* *Hai Wang (China Jiliang University)*
14:15 - 14:30	61	Privacy Preserving Collaborative AI for Osteosarcoma Classification using Federated Learning *Muhammad Atif Iqbal (The University of Sydney Australia) **
14:30 - 14:45	64	A Transformer and Loop-Aware Framework for Accurate RNA Secondary Structure Prediction *Wenyue Nian (Huaibei Normal University)* *Nuo Chen (Zhejiang University of Finance & Economics) ** *Ziyue Wu (Zhejiang University of Finance & Economics)* *Yiyao Du (Zhejiang University of Finance & Economics)* *Yongquan Zhang (Zhejiang University of Finance & Economics)*
14:45 - 15:00	67	Deep Learning and Machine Learning Models Across Domains: A Survey of CNN, XGBoost, and Transformers *Asam Akram (Murdoch University) **

Oral Presentations

15:30-17:00|TUESDAY, 25 NOV

Vision, Sensing, and Multimodal Intelligence I
Chairs: Le Yao, Sarah Khelil
Venue: Room 1

Time	Paper ID	Title & Authors
15:30 - 15:45	14	A Lightweight Method for Ship Detection in SAR Images *Jikai Zheng (Qingdao University of Science and Technology)* *Mingjia Wang (Qingdao University of Science and Technology) ** *Qi Zhao (Qingdao University of Science and Technology)* *Zekang Zheng (Qingdao University of Science and Technology)* *Baolin Zhang (Qingdao University of Science and Technology)*
15:45 - 16:00	15	Fixed-wing UAV sensor fault diagnosis based on CNN-BiLSTM-Attention model *Xiang Li (Hefei University of Technology) ** *Shuiqing Xu (Hefei University of Technology)*
16:00 - 16:15	16	A Neural Network-Based Allocation of Tire Forces for an Optimal Yaw Moment Control *Sarah Imene Khelil (ENSTA)**
16:15 - 16:30	19	Safety Control for Dynamic Safety Sets Based on Bézier Curves *Chen Liu (Hangzhou Normal University)* *Le Yao (Hangzhou Normal University)* *Zheren Zhu (Hangzhou Normal University) ** *Yi Chai (Chongqing University)* *Zhihuan Song (Zhejiang University)*
16:30 - 16:45	25	SDHN: Skewness-Driven Hypergraph Networks for Enhanced Localized Multi-Robot Coordination *Delin Zhao (northwestern polytechnical University) ** *Yanbo Shan (Northwestern Polytechnical University)* *Chang Liu (Northwestern Polytechnical University)* *Shenghang Lin (Northwestern Polytechnical University)* *Yingxin Shou (Southeast University)* *Bin Xu (Northwestern Polytechnical University)*
16:45 - 17:00	32	A Composite Adaptive Sliding-Mode Control with a Dual-Mode Disturbance Observer for Speed Regulation of Permanent Magnet Synchronous Motor *Long Chen (Hangzhou Dianzi University) **

Vision, Sensing, and Multimodal Intelligence II
Chairs: Juan Li, Yinan Wang
Venue: Room 2

Time	Paper ID	Title & Authors
15:30 - 15:45	34	Adaptive Fixed-time Sliding Mode Controller with Fixed-time Disturbance Observer for Quadrotor Trajectory Tracking *Long Chen (Hangzhou Dianzi University) **
15:45 - 16:00	36	Fast Anti-Disturbance Composite Speed Control Method for PMSM Based on Adaptive Gain Sliding Mode Surface and Adaptive Bandwidth Expansion State Observer *Long Chen (Hangzhou Dianzi University) **
16:00 - 16:15	41	Adaptive Neutrosophic-based Extended Kalman Filter for Greenhouse Robot Navigation *Yirong Liu (Southeast University)* *Guodong Wang (Dalian Maritime University) ** *Xiangyu Wang (Southeast University)* *Shihua Li (Southeast University)*
16:15 - 16:30	42	CycleGAN-UIE: An Underwater Image Restoration Algo-rhythm based on Super-resolution Reconstruction *Qirui Jiang (Qingdao Agricultural University)* *Haitao Li (High-tech Information Technology Co., Ltd)* *Siwan Ma (Dongrun Instrument Science and Technology Co., Ltd)* *Yuqing Chen (Qingdao Agricultural University)* *Kui Xuan (Qingdao Agricultural University)* *Juan Li (Qingdao Agricultural University) **
16:30 - 16:45	49	Robust Preprocessing Pipelines for Unifying Multi Institutional Histopathological Data in Single Disease Analysis *Muhammad Atif Iqbal (The University of Sydney Australia) **
16:45 - 17:00	54	An Effective Stereo Interaction Mamba Network for Stereo Image Super-Resolution *Peijun Zheng (China Jiliang University)* *Jianwei Zhao (China Jiliang University) ** *Yuanhao Chen (China Jiliang University)* *Zhenghua Zhou (Zhejiang University of Finance and Economics)* *Hai Wang (Murdoch University)*

AGENDA

WEDNESDAY, 26 Nov		
TIME	**ACTIVITY**	**VENUE**
09:30 - 10:30	Keynote Speech 2	Room 1
10:30 - 11:00	Coffee Break	
11:00 - 12:00	Keynote Speech 3	Room 1
12:00 - 13:30	Lunch	
13:30 - 15:00	Oral Presentation 7, 8	Room 1, 2
	Vision, Sensing, and Multimodal Intelligence III	
	Systems, Applications, and Emerging Technologies I	
15:00 - 15:30	Coffee Break	
15:30 - 17:00	Oral Presentation 9,10	Room 1, 2
	Systems, Applications, and Emerging Technologies II	
	Systems, Applications, and Emerging Technologies III	
17:00 - 17:30	Closing Ceremony	Room 1
17:30 - 21:30	Conference Gala Dinner & Award Ceremony	
Online Link for Room 1	https://teams.microsoft.com/dl/launcher/launcher.html?url=%2F_%23%2Fl%2Fmeetup-join%2F19%3Ameeting_MWJkNWI4YzctMDljNi00YTllLWJhMzAtMzMyNzM3YThiYjly%40thread.v2%2F0%3Fcontext%3D%257b%2522Tid%2522%253a%2522c00d4c1b-cf7b-4e93-b7c7-10113a9bc230%2522%252c%2522Oid%2522%253a%25227a7dc7fe-afe9-4a76-852e-002ec419ae6d%2522%257d%26anon%3Dtrue&type=meetup-join&deeplinkId=c3b6c6c5-8476-4863-82ac-28aba56ac51f&directDl=true&msLaunch=true&enableMobilePage=true&suppressPrompt=true	
Online Link for Room 2	https://teams.microsoft.com/dl/launcher/launcher.html?url=%2F_%23%2Fl%2Fmeetup-join%2F19%3Ameeting_NjY4OThmZTctMjQyMi00MWQzLThhNjUtZTQ5NjQxYTYxNmU3%40thread.v2%2F0%3Fcontext%3D%257b%2522Tid%2522%253a%2522c00d4c1b-cf7b-4e93-b7c7-10113a9bc230%2522%252c%2522Oid%2522%253a%252219f8f132-2e99-4326-9ee3-df841b7221a1%2522%257d%26anon%3Dtrue&type=meetup-join&deeplinkId=771d8932-2241-42d0-869d-1a8e13f25f4e&directDl=true&msLaunch=true&enableMobilePage=true&suppressPrompt=true	

Keynote Speech 2

Zhihong Man

Professor, Swinburne University of Technology, Australia

A New Fourier Series-based Machine Learning Framework

Abstract: In this talk, a new Fourier series-based machine learning (FSML) framework is presented for the modelling of nonlinear and aperiodic input-and-output datasets. It is seen that both input and output data of a dataset are assumed to be the functional data, uniformly sampled in a fundamental period, from two continuous functions, respectively, that are the linear combination of a finite number of orthogonal trigonometric base functions. The nonlinear relationship between input and output data of the dataset can then be optimally approximated in a fundamental period. The remarkable characteristics of this research are threefold: i) Any nonlinear and aperiodic input-and-output datasets can be optimally modelled in a fundamental period with a finite number of trigonometric base functions; ii) A new data-driven based Fourier auto-encoder is developed to perform both information compression and data reconstruction; iii) From the viewpoint of frequency component reduction, a second Fourier auto-encoder is proposed to perform both information compression and feature extraction with low frequency components. A few simulation examples are presented to show the excellent learning performances of the new FSML as well as Fourier auto-encoders.

Bio: Zhihong received his B.E. degree from Shanghai Jiaotong University, China, in 1982, M.Sc degree from Chinese Academy of Sciences in 1987, and PhD degree from the University of Melbourne, Australia, in 1994. From 2002 to 2007, he was the Associate Professor of Computer Engineering at Nanyang Technological University, Singapore. From 2007 to 2008, he was with Monash University Sunway Campus, served as the Professor and Head of Electrical and Computer Systems Engineering as well as the Chair of the Monash Sunway Campus Research Committee. Zhihong is currently the Professor of Robotics and Mechatronics in the School of Engineering at Swinburne University of Technology, Melbourne, Australia.

Zhihong's research interests are in sliding mode control, robotics, neural networks-based pattern classification, vehicle dynamics & control and diagnosis of aircraft engines. He has published more than 300 research papers in refereed international journals and refereed international conferences proceedings, and his research results have widely cited more than 20000 times by the researchers from more than 30 different countries. Since 1994, Zhihong has been actively serving engineering societies as the General Chair, Program Chair, Track Chair, Session Chair, the International Advisory Committee and Technical Committees of many international conferences in control, robotics, signal processing, neural networks and industrial electronics.

In addition, Zhihong received the Nanyang Technological University Best Teacher Award in 2004 and the Most Popular Lecturer in the School of Computer Engineering at Nanyang Technological University Singapore from 2002 to 2007, respectively.

Keynote Speech 3

Shivneel Prasad

Lead Simulator Engineer, Fiji Airways, Fiji

Leveraging Digital Transformation and AI for Next-Generation Aviation Training in the South Pacific

Abstract: This keynote address details the Fiji Airways Aviation Academy's (FJAA) strategic use of Industry 4.0 principles to sustain and optimize a world-class four-fleet of CAE 7000XR Level-D simulators. We examine the current state of Digital Operational Excellence at the Nadi facility, highlighting the Simorg management platform's critical role as a real-time control system for asset utilization, crew scheduling, and stringent regulatory compliance.

The core focus is on the future strategic planning around AI and data analytics. We discuss how FJAA is refining its data pipelines to align with the global shift towards Objective Performance-Based Training (OPBT), exemplified by systems like CAE Rise. Furthermore, we outline the groundwork being laid for Predictive Maintenance, actively exploring how foundational sensor data and Machine Learning could maximize critical asset uptime and guarantee regional training resilience. This provides a crucial industry perspective on building a robust, technology-aligned future for Pacific aviation.

Bio: Shivneel Prasad is Lead Simulator Engineer at the Fiji Airways Aviation Academy, overseeing four CAE 7000XR Level-D full-flight simulators for B737 MAX, A330, A350, and ATR72-600 aircraft. A University of the South Pacific alumnus, he specializes in advanced control systems, real-time data analytics, and AI integration.

Shivneel drives FJAA’s digital initiatives, enhancing simulator reliability through predictive maintenance and preparing infrastructure for Objective Performance-Based Training (OPBT) with high-fidelity flight data. His efforts ensure EASA/CAAF compliance and operational resilience in the Pacific’s unique environment.

At ARCAI 2025, he presents FJAA’s leadership in applying AI and Industry 4.0 to deliver adaptive, data-driven pilot training—establishing the region as a hub for next-generation aviation excellence.

Oral Presentations
13:30-15:00|Wednesday, 26 Nov

Vision, Sensing, and Multimodal Intelligence III
Chairs: Krishna Arjun, Yun Zhang
Venue: Room 1

Time	Paper ID	Title & Authors
13:30 - 13:45	43	Robust Control of Electric Forklift Steer-by-Wire System Using Fixed-time Sliding Mode *Zhigang Qiu (Hangzhou GESM New Energy Intelligent Equipment Joint Stock Co., Ltd)* *Zhihao Zhao (College of Information Engineering, Zhejiang University of Technology)* *Zi Yang (College of Information Engineering, Zhejiang University of Technology)* *Zhe Sun (Zhejiang University of Technology) **
13:45 - 14:00	44	Linear Sliding Mode Control of Electro-Hydraulic Braking System *Zhigang Qiu (Hangzhou GESM New Energy Intelligent Equipment Joint Stock Co., Ltd)* *Yuhao Lu (College of Information Engineering, Zhejiang University of Technology)* *Jiahao Wan (College of Information Engineering, Zhejiang University of Technology)* *Zhe Sun (Zhejiang University of Technology) **
14:00 - 14:15	58	A Multi-modal Conditioned GAN for Synthesis of PET from MRI and Clinical Data *Haoqi Yu (Zhejiang University of Finance & Economics) ** *Rui Hui (Zhejiang University of Finance & Economics)* *Nuo Chen (Zhejiang University of Finance & Economics)* *Yuanhao Chen (Zhejiang University of Finance & Economics)* *Yongquan Zhang (Zhejiang University of Finance & Economics)* *Changmiao Wang (Shenzhen Big Date Research Institute)* *Hai Wang (Murdoch University)*
14:15 - 14:30	59	Adaptive Object Detection via Multi-Sensor Fusion on Resource-Constrained Mobile Robots *Krishna Arjun (Murdoch University) **
14:30 - 14:45	77	Recoil Suppression Control for Deepwater Drilling Risers Using Sampled-Data Approach with Memory *Yuanjie Jiang (Qingdao University of Science and Technology)* *Haiyang Yu (Qingdao University of Science and Technology)* *Yun Zhang (Qingdao University of Science and Technology)* *Baolin Zhang (Qingdao University of Science and Technology) ** *Zidong Ai (Qingdao University of Science and Technology)*
14:45 - 15:00	79	Current Tracking Control of Single-Phase LCL Grid-Connected Inverter Based on Iterative Learning Observer *Shuxin Yang (Training Center of State Grid Anhui Electric Power Co., Ltd.) ** *Biyun Wang (Marketing Service Center of State Grid Anhui Electric Power Co., Ltd.)* *Yi Tang (Training Center of State Grid Anhui Electric Power Co., Ltd.)* *Caifang Li (Training Center of State Grid Anhui Electric Power Co., Ltd.)*

Systems, Applications, and Emerging Technologies I
Chairs: Zheren Zhu, Chuanyang Yu
Venue: Room 2

Time	Paper ID	Title & Authors
13:30 - 13:45	6	Reinforcement Learning-Based Security Control for Multiagent Systems *Yumeng Cao (Shanghai University) ** *Xiang Liu (Shanghai University)* *Yuhao Qing (Shanghai University)* *Weixiang Zhou (Shanghai Maritime University)* *Yueying Wang (Shanghai University)*
13:45 -14:00	11	RASS: Retrieval-Augmented Soft Sensing with Large Language Models for Zero-Shot Prediction Under Unknown Industrial Conditions *Zeao Li (Hangzhou Normal University)* *Le Yao (Hangzhou Normal University) ** *Zheren Zhu (Hangzhou Normal University)* *Jiusun Zeng (Hangzhou Normal University)*
14:00 - 14:15	17	S4-DIFF: An Industrial Time Series Imputation Method Based on Structured State Space and Diffusion Models *Yi Chai (Chongqing University) ** *Shuo Li (Chongqing University)* *Ke Zhang (Chongqing University)* *Zheren Zhu (Hangzhou Normal University)*
14:15 - 14:30	20	A Novel Method of Non-Singular Fast Terminal Sliding Mode Control for a High-Quality Tea-Picking System *Chuanyang Yu (Anhui Agricultural University) **
14:30 - 14:45	21	A Firmware Vulnerability Detection Algorithm Based on Adaptive Fusion Attention-Enhanced CNN *Ning Xu (Anhui Mingsheng Hengzhuo Technology Co., Ltd.) ** *Chen Dai (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)* *Guoqing Liu (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)* *Shiwei Guo (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)* *Qingsong Tian (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)* *Yanxia Cao (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)*
14:45 - 15:00	39	APG: Adaptive Prompt Generation for MAS *Long Chen (Hangzhou Dianzi University) **

Oral Presentations

15:30-17:00|Wednesday,26 Nov

Systems, Applications, and Emerging Technologies II
Chairs: Jiankun Sun, Le Yao
Venue: Room 1

Time	Paper ID	Title & Authors
15:30 - 15:45	33	Barrier Function Based Adaptive Non-singular Terminal Sliding Mode Attitude Control for a Quadrotor with Disturbance Observer *Long Chen (Hangzhou Dianzi University) **
15:45 - 16:00	35	Predefined-Time Observer-Based Adaptive Non-Singular Fast Terminal Sliding Mode Control for Mecanum-Wheeled Omnidirectional Robots *Long Chen (Hangzhou Dianzi University) **
16:00 - 16:15	37	Predefined-Time Consensus Tracking for Second-Order MASs with Observer-Aided Sliding Mode Control and Application to MWOMRs *Long Chen (Hangzhou Dianzi University) ** *Shuaikun Zhu (Hangzhou Dianzi University)* *Xu Yang (Hangzhou Dianzi University)* *Zeyuan Lu (Hangzhou Dianzi University)* *Bin Yan (Hangzhou Dianzi University)* *Yifeng Han (Hangzhou Dianzi University)*
16:15 - 16:30	46	Stochastic Configuration Network Based on Leave-One-Out Cross-Validation and Its Application to Industrial Soft Analyzer *Ze Tian (China University of Petroleum (East China))* *Yongjie Qin (China University of Petroleum (East China))* *Wenxue Han (China University of Petroleum (East China))* *Weiming Shao (China University of Petroleum (East China)) ** *Le Yao (Hangzhou Normal University)*
16:30 - 16:45	48	Active Inference Based Safe Adaptive Position Control for Quadrotor *Yuzhou Lu (Huazhong University of Science and Technology)* *Jiankun Sun (Huazhong University of Science and Technology) **
16:45 - 17:00	60	Accelerating PPO for UAV Obstacle Avoidance with Adaptive Prior Policy Decay *Huida Zhao (Northwestern Polytechnical University)* *Shankui Zheng (Henan TzRocket Co., Ltd)* *Xiangyun Meng (Northwestern Polytechnical University)* *Yue Guo (Northwestern Polytechnical University)* *Quan-Yong Fan (Northwestern Polytechnical University) **

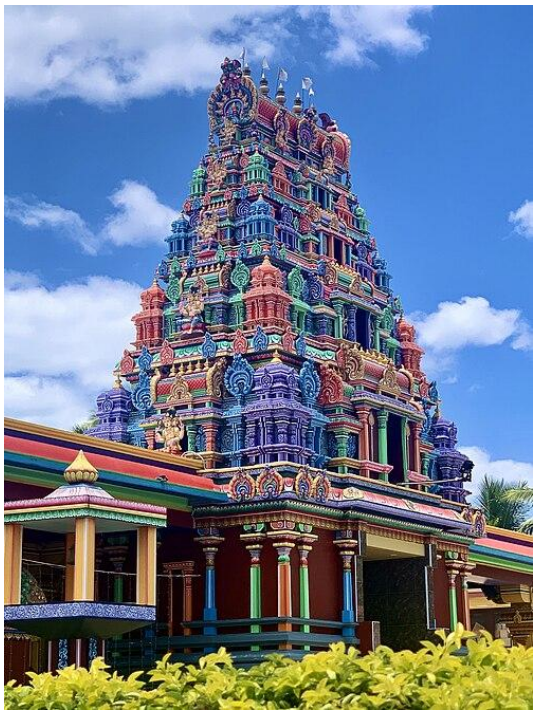
Systems, Applications, and Emerging Technologies III
Chairs: Yinan Wang, Zhijun Ding
Venue: Room 2

Time	Paper ID	Title & Authors
15:30 - 15:45	63	Adaptive Backstepping Optimal Tracking Control for Fractional-Order Nonlinear MASs with Hysteresis Nonlinearity *Guangyu Wang (Anhui University)* *Weidi Cheng (Anhui University)* *Longlong Wang (Anhui University)* *Chengcheng Ren (Anhui University) ** *Shuping He (Anhui University)*
15:45 - 16:00	**65**	A Roadmap for Embodied Intelligent Aerial Agricultural Robots: A DeepSeek-Inspired Approach to Precision Tea Breeding *Zhijun Ding (Murdoch University) **
16:00 - 16:15	**75**	Deformable Convolution and Adaptive Attention Enhanced CNN for Firmware Vulnerability Detection *Ning Xu (Anhui Mingsheng Hengzhuo Technology Co., Ltd.) ** *Yeming Ding (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)* *Hongfei Wan (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)* *Rui Dai (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)* *Heyi Liu (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)* *Guoqing Liu (Anhui Mingsheng Hengzhuo Technology Co., Ltd.)*
16:15 - 16:30	**80**	Control Strategy for Grid-Forming Full-Scale Wind Turbines Based on Sensor less Techniques *Chuanxing Zhu (GD Power Development Co., Ltd.) ** *Xihong Chuang (GD Power Development Co., Ltd.)* *Yaping Sun (CHN Energy New Energy Technology Research Institute Co., Ltd.)* *Lingxiao Xu (Guodian Ningbo Wind Power Development Co., Ltd.)* *Jiafei Qiao (CHN Energy New Energy Technology Research Institute Co., Ltd.)*
16:30 - 16:45	**66**	Fractional-Order Kalman Filtering for Nonlinear 2-DOF Robotic Manipulators *Mahdi Jafarpour (National Yunlin University of science and Technology)* *Sheikh Azid (Murdoch University)*
16:45 - 17:00		

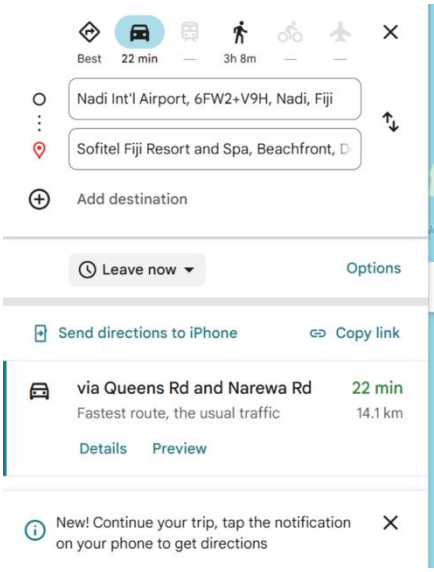
AGENDA

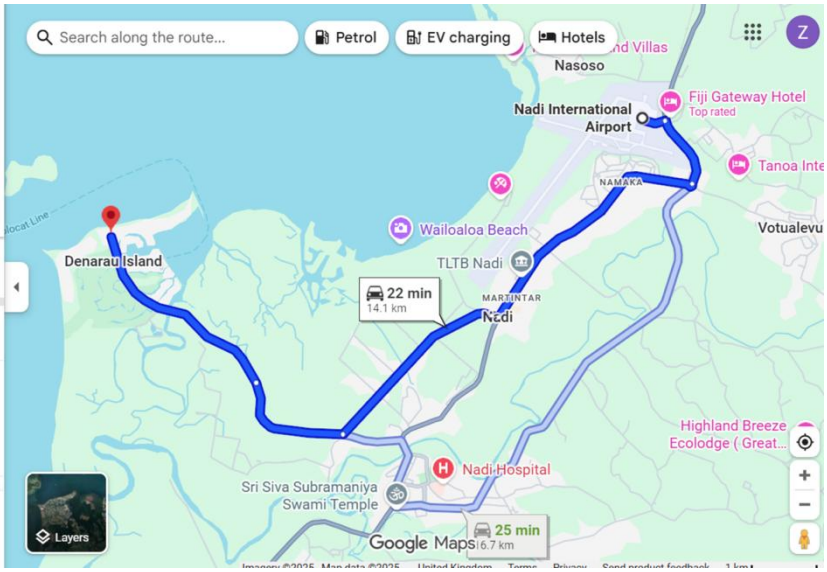
THURSDAY, 27 Nov

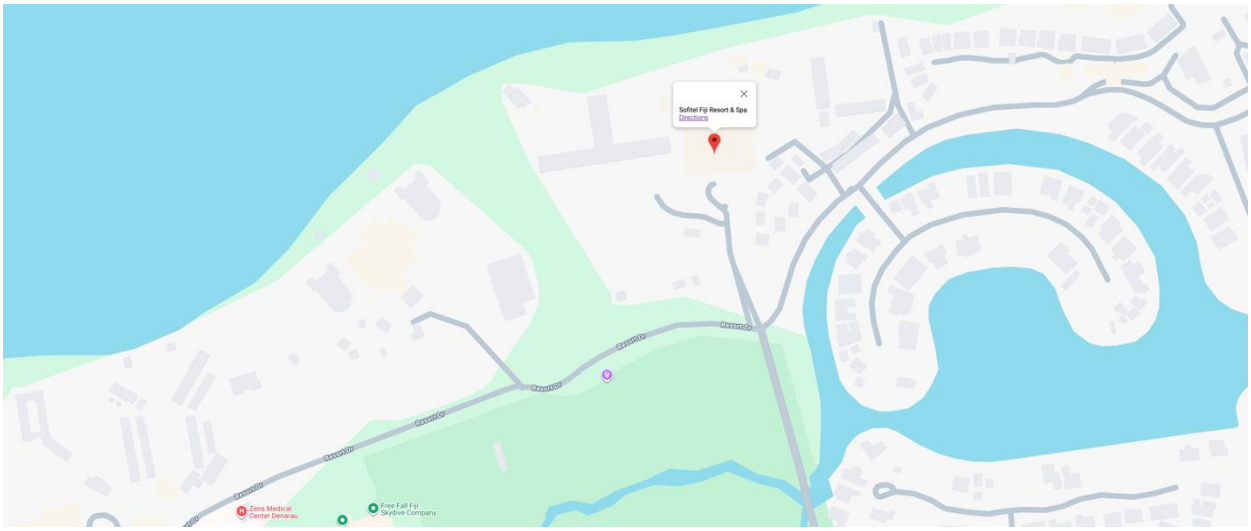
TIME	ACTIVITY	VENUE
08:00 - 10:00	Visit to Fiji Airways for Flight Simulator Experience	Fiji Airways
10:00-14:00	Visit to Garden of Sleeping Giants, Nadi Temple	Onsite



Conference Site (Sofitel Fiji Resort & Spa)







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