



Editorial: Special Issue on Selected Papers from CIS-RAM2019 — Cybernetics and Intelligent Systems (CIS) and Robotics, Automation and Mechatronics (RAM)

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Unmanned Systems journal covers advances in all areas related to automatic machine systems from unmanned hardware and software systems to modeling and controlling of multi-agent systems. IEEE CIS-RAM conference serves as a platform for worldwide intellects and professionals to discuss state-of-the-art results, novel methods, futuristic developments and innovative applications on areas related to cybernetics and intelligent systems (CIS), as well as robotics, automation and mechatronics (RAM). As the scopes of the Unmanned Systems and CIS-RAM align with each other perfectly, we bring forward this special issue containing the most outstanding work presented in IEEE CIS-RAM 2019.

Held from 18th to 20th November 2019 at Crowne Plaza Bangkok, Thailand, IEEE CIS-RAM 2019 was a huge success with a participation of 100+ researchers all around the world. There were 125 presentations of peer reviewed papers during two and a half days in three tracks under 17 sessions. IEEE CIS-RAM is organized by the collaborative efforts by IEEE Systems, Man and Cybernetics (SMC) Singapore Chapter, IEEE Robotics & Automation (R&A) Singapore Chapter and IEEE Singapore Section. The conference is supported by EXQUISITUS and Robotics Research centers of Nanyang Technological University and Intelligent Control and Advanced Robotics centers of National University of Singapore.

This special issue consists of seven research works presented in IEEE CIS-RAM 2019, based on the quality of the work and relevance to the Unmanned Systems journal's scope. All the papers were reviewed by the independent reviewers in accordance with the journal policy and

extended based on the reviewer's feedbacks. Effort and the corporation extended by all the reviewers and authors are sincerely appreciated in making this special issue a reality.

Four of the selected papers focus on different autonomous robotic systems. Most robotic applications with navigational ability make use of multiple sensors to see the environment. Sensing information from different sensing modalities needs to be fused together to make more accurate decisions. Li Qingqing *et al.* discuss results of robot localization accuracy improvements when 3D lidar data is fused with IMU, GNSS and wheel encoder readings in comparison to using individual sensor data. While individual robots navigate the environment, multi-agent systems should coordinate their path planning to achieve the common task. Jason Gibson *et al.* propose a framework for multi-agents to complete a motion task which is constraint to each other's kinematic and dynamic variations, and test it with both simulations and lighter-than-air robot agents. In comparison to path planning and navigational tasks, autonomous robotic arms are used in many industrial applications. While performing its task, these robotic arms may be disturbed by accidental interruption from human. Misaki Hanafusa *et al.* propose an RNN-based learning approach to estimate the external force on the manipulated object by human touch. Ching-Yen Weng *et al.* present a dual-arm robot manipulation using human operator to perform human-like tasks that require coordination of both robotic arms.

Yuanlong Xie *et al.* propose a sliding mode distance observer-based control scheme for functional order systems with unknown disturbances. Work presented by Andreas

Gienger *et al.* suggest using a CNN for diagnosis of sensor and actuator faults in high-rise truss structures. It shows that fault detection in a distribution manner yields better classification results and needs less training data due to reduced complexity and dimensionality compared to a centralized approach. Han Xiao *et al.* propose a novel neural decision tree to tackle the discontinuous conditioning in some applications with a decision tree structure using conditioned branches that can be approximated using continuous function allowing back propagation.

Thus, this special issue covers research work for autonomous systems in different fields and is associated

with interesting applications. We hope that the content in this special issue is useful and of great interest to our readers.

Guest Editors

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