Special Session

Swarm Intelligence for Robotics and Mechatronics

Special session objectives and topics

Swarm Intelligence, includes the biologically-inspired swarm intelligence, is an important embranchment of series on computational intelligence, which plays a crucial role for robotics and mechatronics. The autonomous robot, mechanical industry, and electrical industry have had an immense impact on our economy and society, and this trend will continue with biologically inspired intelligence techniques. These algorithms are about learning from nature, which can be applied to the real world robotic and mechatronic systems. Recently, some new researches and developments of bio-inspired swarm intelligence for robotic and mechatronic applications is increasingly expanding worldwide. They contain emerging sub-topics such as, e.g., bio-inspired neural network algorithms, swam intelligence, ant colony optimization algorithms (ACO), bee colony optimization algorithms (BCO), particle swarm optimization (PSO), immune systems, and evolutionary optimization and algorithms. Additionally, it is decomposed of computational aspects of bio-inspired systems such as machine vision, machine learning, pattern recognition for robot and mechatronic systems, motion control, motion planning, movement control, sensor-motor coordination, environment perception, and learning in biological systems for robotic and mechatronic systems. The goal of this special session is to present a collection of state-of-the-art contributions describing recent developments concerning the application of emerging swarm intelligence, especially bio-inspired swarm intelligence to robotic and mechatronic systems.

This special session seeks to highlight and present the growing interests in emerging research, development and applications in the dynamic and exciting areas of swarm intelligent and biologically-inspired swarm algorithms for robotics and mechatronics (autonomous robots, unmanned underwater vehicles, and unmanned aerial vehicles, etc.).

Original research papers are solicited in related areas of swarm intelligence and biologically-inspired algorithms for robotics and mechatronics. Submissions to the Special Session should be

focused on theoretical results or innovative applications of computational intelligence of swarm and biologically-inspired swarm algorithms for robotic and mechatronic systems.

Specific **topics** for the special session include but are not limited to:

- Theory, design, and applications of swarm intelligence for swarm robotics;
- Ant colony optimization algorithms (ACO), bee colony optimization algorithms (BCO), particle swarm optimization (PSO), immune systems, artificial neural networks and firework algorithms for robotics on motion planning, computer vision, navigation, mapping, localization, image processing, etc;
- Development, optimization and testing of effective biologically-inspired algorithms for robotic and mechatronic systems;
- Evolutionary optimization, machine vision, machine learning, environment perception, pattern recognition for robotic and mechatronic systems;
- Evolutionary fuzzy system and uncertainty analysis and applications in robotics and mechatronics;
- Bio-inspired system on machine learning, intelligent systems design for robotics;
- Bio-inspired intelligence and swarm intelligence used on underwater vehicles, aerial flying robots, and robotic manipulators;
- Stigmergy and pheromone mechanism for robotics and mechatronics;
- Experimental developments and applications of bio-inspired intelligence on real physical robotic and mechatronic systems.

Organizers:

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