

ARCAI 2026 Special Sessions Proposal Form

Format: Maximum 4 pages. All pages are formatted to letter paper size with margins of one inch on every side. All texts use single space, Times New Roman, and a font size of 11.

Special Session on “Cooperative Control and Optimization of Multi-agent Systems with Applications”

Organized by

Xuechao Qiu,

qxc@jiangnan.edu.cn, Jiangnan University, Wuxi 214401, China

Guodong Wang,

wgd@dlnu.edu.cn, Dalian Maritime University, Dalian 116026, China

Xiangyu Wang,

w.x.y@seu.edu.cn, Southeast University, Nanjing 210096, China

➤ **Technical Outline of the Session and Topics (100-150 words):**

Multi-agent systems have attracted intensive research attention within modern control theory owing to their broad applications in robotic systems, traffic networks, smart grids and various other engineering fields. The core objective of multi-agent systems is to accomplish cooperative tasks, whose performance is affected by dynamic uncertainties, communication limitations, external disturbances and other factors. Serving as the core algorithms that dominate system operation, multi-agent cooperative control and optimization strategies dictate inter-agent synchronization, formation stability and overall operational efficiency. Therefore, this special session aims to gather frontier advances in multi-agent cooperative control, optimization algorithms and their practical engineering deployments. Relevant topics include, but are not limited to:

- *Distributed consensus, formation, containment and collision avoidance control*
- *Distributed optimization algorithms for heterogeneous multi-agent systems*
- *Cooperative fault-tolerant control under delays or noises*
- *Anti-disturbance control for multi-agent systems*
- *Lyapunov-based stability analysis of multi-agent systems*
- *Cooperative model predictive control for multi-agent systems*
- *Event-triggered and self-triggered coordination optimization frameworks*
- *Practical applications in unmanned aerial vehicles, industrial robots, smart grids and other systems*
- *Artificial Intelligence (AI) and learning-based multi-agent coordination optimization*
- *Model-free distributed cooperative control approaches*
- *Sliding mode and adaptive cooperative control schemes*