

ARCAI 2026 Special Sessions Proposal Form

Special Session on “Advances in Control, Optimization and Artificial Intelligence for Cyber-Physical Systems”

Organized by

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

Cyber-physical systems integrate physical processes with sensing, communication, computation, and control, creating significant opportunities for intelligent, autonomous, and resilient operation. This special session focuses on recent advances in control, optimization, and artificial intelligence for the modelling, monitoring, coordination, and decision-making of cyber-physical systems. Topics include robust, adaptive, nonlinear, predictive, distributed, and learning-based control; optimal control and real-time optimization; machine learning and reinforcement learning; data-driven and physics-informed modelling; state estimation, fault detection, diagnosis, and fault-tolerant control; digital twins; autonomous and multi-agent systems; cybersecurity and resilient operation; edge intelligence; and hardware-in-the-loop validation. The session welcomes theoretical, computational, and experimental contributions, together with practical applications in robotics, energy systems, manufacturing, transportation, healthcare and infrastructure.

Topics of the Session

- Modelling and analysis of cyber-physical systems
- Robust, adaptive, nonlinear, and predictive control
- Distributed, networked, and event-triggered control
- Optimal control and real-time optimization
- Multi-objective and distributed optimization
- Machine learning and reinforcement learning for control
- Data-driven and physics-informed methods
- State estimation and observer design
- Fault detection, isolation, and diagnosis
- Digital twins and intelligent monitoring
- Autonomous and multi-agent systems
- Cybersecurity and secure control
- Edge intelligence and embedded implementation
- Hardware-in-the-loop and real-time validation
- Applications in robotics, energy systems, manufacturing, transportation, healthcare and infrastructure