Special Issue

Advanced Model Predictive Control and Intelligent Actuation for Multi-Agent and Complex Systems

Message from the Guest Editors

This Special Issue seeks to bring together novel research and its applications in model predictive control (MPC) and intelligent actuation systems, with a strong focus on multi-agent systems (MASs) and complex, interconnected environments. The articles published will address cutting-edge MPC strategies for MASs, such as distributed and adaptive MPC, which optimizes control actions across multiple agents under real-world constraints. A key area of interest is the development of resilient actuation mechanisms that continue to function effectively amidst communication delays, environmental changes, or faults, which are essential for critical applications like autonomous driving, industrial automation, and medical robotics. Emphasis will also be placed on emerging technologies for MAS stability, such as coalition-based control, topology switching, and resource-efficient predictive control strategies. This Special Issue will serve as a resource for those advancing predictive control and actuation technologies, particularly in systems that require real-time adaptability, robustness, and minimal resource consumption.

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About the Journal

Message from the Editorial Board

We are just entering the Next Wave of Technology (NWT) where actuators will play the same role as the computer chip did for computers/social media approximately four decades ago. Just in the U.S., production of $1 trillion year of electromechanical systems (vehicles, orthotics, manufacturing cells, freight trains, aircraft, etc.) will be impacted by the NWT, all driven by actuators. Five key trends can be found for the future perspectives: “Performance to Reliability”, “Hard to Soft”, “Macro to Nano”, “Homo to Hetero” and “Single to Multi functional”. We invite papers that primarily impact these economic sectors; those illustrating basic scientific principles are also welcome.

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