

Special Session Proposal for the Polish Control Conference 2026

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Proposed Session Title: “Modeling, identification and control of underactuated platforms”

Abstract:

Underactuated platforms represent a critical frontier in control systems, characterized by their nonlinear dynamics, inherent instability, and limited actuation capabilities. These challenges demand innovative modeling, identification, and control strategies that mix theoretical insights with practical implementation. This special session encourages submissions that explore classical and novel approaches to system identification, adaptive, robust and learning-based control. By taking advantage of interdisciplinary collaboration and showcasing experimental validations, this session aims to accelerate the development of reliable, efficient, and safe control solutions for underactuated vehicles and robotic systems.

Description:

This special session is aimed at providing the researchers with the insight to modeling, identification, and control of underactuated platforms both from theoretical and practical view, using classical and novel methods.

Topics would include identification, modeling, simulation, hardware-in-the-loop control, actuation techniques, robustness and model validation.

Underactuated systems pose unique challenges due to their inherent nonlinearities, instability, and limited actuation, requiring advanced modeling techniques and robust control strategies. The session will explore recent advances in system identification methods, including adaptive and learning-based approaches, to accurately capture the dynamics of these platforms despite uncertainties. Emphasis will be placed on bridging theoretical developments with real-world implementations, highlighting case studies and experimental validations that demonstrate effective stabilization and maneuvering of underactuated robotic systems.

By fostering interdisciplinary discussions, this session seeks to advance control methodologies that enable reliable, efficient, and safe operation of underactuated vehicles widely used in personal mobility and robotics.