AI-Driven Control, Monitoring and Estimation in Robotics, Smart Agriculture and Energy Harvesting

Organizers

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Scope and Objectives

This session brings together recent advances in artificial intelligence and nonlinear dynamics for the control, condition monitoring and data-driven estimation of robotic, agricultural and smart mechanical systems. Contributions cover neural-network algorithms in robot-arm control, including residual and adaptive learning schemes combined with model-based controllers and state estimation, as well as lightweight algorithms suitable for edge implementation. The session also addresses machine-vision, signal-processing and deep-learning approaches to machine diagnostics and the health monitoring of agricultural machinery, including evolutionary optimization of convolutional networks and wavelet-based feature extraction. Further topics include multi-sensor data fusion and spatially validated machine learning for in-field yield estimation, as well as nonlinear and multistable vibration energy harvesting with smart materials for self-powered sensing and monitoring. The session aims to connect researchers working at the intersection of control engineering, nonlinear dynamics, machine learning and precision agriculture, with emphasis on robustness, energy autonomy and practical deployment.

Keywords: Artificial Intelligence; Intelligent Control; Condition Monitoring; Smart Agriculture; Robotics; Energy Harvesting.