Special Session Proposal

2nd International Workshop on Active Disturbance Rejection Control

COMRob 2026 • IBERO Ciudad de México • October 28–30, 2026

Session Title: Active Disturbance Rejection Control (ADRC): Robotics Applications

Session Proposers

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Abstract

Active Disturbance Rejection Control (ADRC) has established itself as a transformative paradigm in modern control engineering, bridging the gap between rigorous theoretical formulations and the practical demands of uncertain, real-world systems. Its core principle—real-time estimation of the total disturbance (encompassing unmodeled dynamics and external perturbations) followed by active online compensation—has proven particularly effective in robotic and mechatronic systems, where dynamic uncertainty, payload variation, joint flexibility, and environmental interaction are inherent challenges.

This special session focuses on the intersection of ADRC and robotics, bringing together contributions that advance the theoretical foundations of ADRC while addressing the specific challenges of robotic applications. The session builds on the momentum established by the broader ADRC community—particularly through the bandwidth-based parameterization framework—and targets its application to mobile robots, manipulators, aerial vehicles, and multi-agent robotic systems. By situating this session within COMRob 2026, we aim to catalyze new collaborations between the control theory and robotics communities, and to position ADRC as a principled and practical framework for next-generation robotic control.

Scope and Topics of Interest

Contributions are solicited on, but not limited to, the following topics:

- ADRC design and stability analysis for robotic and mechatronic systems
- Extended State Observer (ESO) design tailored to robot dynamics
- ADRC for manipulators: rigid, flexible-joint, and redundant configurations
- ADRC for mobile robots: wheeled, legged, and tracked platforms
- ADRC for aerial robots: UAVs, multirotors, and hybrid aerial–ground vehicles
- ADRC in multi-agent and networked robotic systems
- ADRC combined with trajectory planning and motion control
- Robustness analysis and frequency-domain interpretations for robotic ADRC
- Comparative studies: ADRC vs. PID, SMC, MPC, and learning-based controllers in robotics
- Real-time embedded implementation of ADRC on robotic platforms
- Experimental validation and field demonstrations
- ADRC in human-robot interaction and collaborative robotics

Motivation and Relevance

Robotic systems operate in environments characterized by persistent uncertainty: unmodeled friction, variable payloads, compliance, and external disturbances. Classical model-based controllers often require high-fidelity plant models that are costly to obtain and prone to parametric drift. In contrast, ADRC's philosophy of treating the aggregate effect of all uncertainty as a single "total disturbance" to be estimated and canceled in real time makes it an inherently robust and implementation-friendly approach—one that does not demand detailed system identification.

The COMRob conference provides an ideal venue for this session, bringing together the Mexican and international robotics and mechatronics communities. This session will highlight how ADRC can serve as a unifying control framework across diverse robotic platforms and will foster discussion on open research challenges including ESO bandwidth tuning for fast dynamics, ADRC scalability to high-dimensional systems, and its integration with modern data-driven and optimization-based methods.

Proposed Session Format

Session type	Special oral session within COMRob 2026
Target duration	90–120 minutes
Expected papers	4–6 full or short papers (peer-reviewed)
Presentation	15–20 min each + Q&A
Submission	Via EasyChair (COMRob 2026 track)

Submission and Contact Information

All papers must be submitted through the official COMRob 2026 EasyChair system and will undergo peer review. For questions regarding this special session, please contact:

EasyChair: https://easychair.org/account/signin?l=6089390214552530978.1778100054.b9a995d2

COMRob 2026: https://comrob2026.mecatronica-ibero.mx/

Contact: mario.ramirez@ibero.mx

Important Dates

Milestone	Date
Open Submission	**March 02, 2026**
Submission Deadline	**Jun 21, 2026**
Acceptance Notification	**Aug, 2026**
Camera-Ready Submission	**Sep 25 2026**
Special Sesion Date	**October 28, 2026**