

# Machine and Deep Learning for Autonomous and Intelligent Robotic Systems

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## 1. Description

The rapid advancement of machine learning and deep learning has significantly expanded what robotic systems can perceive, understand, and accomplish. These learning-based methods enable robots to autonomously interpret sensory data, recognize patterns, predict outcomes, and adapt their behavior based on experience. As a result, modern robots are becoming capable of operating reliably in complex, unstructured, and dynamic environments where traditional rule-based or model-based approaches often fail. This special session highlights both theoretical foundations and practical applications that exploit learning algorithms to enhance the core functionalities of intelligent robots. This includes improving perception through better object detection, scene understanding, and sensor fusion; enhancing navigation and localization using data-driven mapping and motion estimation; enabling more precise manipulation through learned control and grasping strategies; facilitating natural interaction with humans using language and behavior models; and supporting coordinated multi-robot collaboration through learning-based decision-making. By gathering contributions across these domains, the session aims to showcase how machine and deep learning are reshaping the next generation of autonomous robotic systems.

## 2. Topics

The special session welcomes high-quality contributions on all aspects of learning applied to robotic systems including, but not limited to, the following areas:

- Machine learning for robotic perception and cognition
- Deep learning architectures for vision, sensing, and environment understanding
- Reinforcement learning and imitation learning for autonomous behavior
- Learning-based navigation, localization, and mapping
- Data-driven motion planning and decision-making
- Human-robot interaction enhanced by AI models
- Transfer learning and continual learning in robotics
- Learning on embedded, edge, or low-power robotic platforms
- Multi-robot learning, coordination, and swarm intelligence
- Sensor fusion, multimodal learning, and real-time inference
- Explainable and trustworthy AI for robotic applications
- Applications in industrial, medical, agricultural, and service robotics

## IMPORTANT DATES

Full paper submission: 15th January 2026

Notification of acceptance: 10<sup>th</sup> February 2026

Camera ready and registration: 20<sup>th</sup> February 2026

## 3. Biographies

**Sahar Cherif** is an assistant professor at the higher institute of management of Sousse, university of Sousse, Tunisia. She received her Engineering degree in 2005. She received the Master and PhD degrees in 2006 and

2021, respectively from the National school of engineers of Sfax (ENIS). His research interests include fuzzy models, knowledge representation, computing with words, similarity measures and healthcare systems.

**El-Hadi Guechi** is currently a full Professor at the University of 20th August 1955 - Skikda, Algeria. He received his Engineering degree in 2001 and the Magister degree (in Automatic Control) in 2005 from the University of Annaba, Algeria. He received the Master and the PhD degrees in 2006 and 2010, respectively, from the University of Valenciennes, France. His research interests include model predictive control, fuzzy control, delay systems, robotic systems and nonlinear control.

**Hajer Brahmi** was born in Gafsa, Tunisia. She earned her degree in Electrical Engineering in 2009 and subsequently received a master's degree in Automatic and Industrial Computing from the National School of Engineers of Sfax, University of Sfax, in 2011. She completed her PhD in Electrical Engineering in 2017 at the National School of Engineers of Sfax (ENIS), where her doctoral research within the REGIM research group focused on innovative computational learning methodologies and the architectural design of recurrent neural networks (RNNs). Her research integrates rigorous theoretical modeling and the analysis of neural network dynamics with applied investigations in robotics, signal processing, and intelligent systems. She is currently a contractual assistant at the National School of Engineers of Carthage (ENICarthage).