

Special Issue

Symmetry-Aware Embodied Intelligence: Foundations and Applications

Message from the Guest Editors

Embodied intelligence represents a transformative paradigm in artificial intelligence and robotics, focusing on the integration of physical entities with advanced cognitive capabilities to create robotic systems that can perceive, learn from, and interact with their environment in real-time. Embodied intelligence emphasises the connections between physical and cyber systems, enabling machines to adaptively respond to complex real-world challenges through environmental interactions. Symmetry is a fundamental principle of efficiency, generalisation, and robustness in embodied systems. From the bilateral symmetry of humanoid robots enabling balanced locomotion to the mirror-symmetric action–reward structures in reinforcement learning, from time-reversal symmetry in dynamics modelling to the rotational invariance in visual perception, symmetry underpins the scalability and adaptability of intelligent agents. This Special Issue explores the scientific foundation and practical applications of embodied intelligence, with a focus on how embodied intelligence evolves from simple automated tools to sophisticated collaborative systems capable of complex reasoning...

Guest Editors

Dr. Jie Li

School of Mechanical Engineering, Donghua University, Shanghai 201620, China

Dr. Yongjing Wang

Department of Mechanical Engineering, School of Engineering, University of Birmingham, Birmingham B15 2TT, UK

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Symmetry
Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
symmetry@mdpi.com

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Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

Editor-in-Chief

Prof. Dr. Sergei Odintsov

1. ICREA, 08010 Barcelona, Spain

2. Institute of Space Sciences (IEEC-CSIC), C. Can Magrans s/n, 08193 Barcelona, Spain

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