Special Issue

Intelligent Control and Optimization in Transportation and Grid Systems: Symmetry-Guided Approaches

Message from the Guest Editors

This Special Issue aims to explore the latest advancements in intelligent technologies applied to critical infrastructure systems, with attention to symmetry-related principles where applicable. As the world faces increasing challenges related to urbanization, energy efficiency, and sustainability, the integration of artificial intelligence, machine learning, and pattern recognition techniques has become essential for developing next-generation infrastructure solutions. Many neural network architectures inherently leverage symmetry properties through weight sharing, convolutional layers, and equivariant designs. Similarly, machine learning algorithms often exploit symmetry in data for dimensionality reduction, feature extraction, and pattern recognition. Emerging areas such as intelligent control systems, optimization algorithms, smart grids, and intelligent transportation systems are revolutionizing how we design, operate, and maintain our infrastructure. This Special Issue will provide a platform for researchers and practitioners to share innovative approaches, methodologies, and applications that address these challenges while promoting sustainable development.

Guest Editors

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About the Journal

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.

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