

Special Issue

Symmetry and Asymmetry in Cyber-Physical Systems

Message from the Guest Editors

Cyber-Physical Systems are characterized by the intricate interplay between computational algorithms and physical processes. This research area explores the fundamental roles of symmetry and asymmetry within these complex architectures. While symmetrical structures often facilitate distributed control, consensus and balanced resource allocation in multi-agent systems, asymmetrical phenomena are equally critical—particularly regarding system security and dynamic interactions. Information asymmetry between attackers and defenders frequently exposes vulnerabilities, making systems susceptible to False Data Injection Attacks and covert malicious activities. Resolving these imbalances requires advanced methodologies, including secure state estimation strategies under unknown disturbances, bounded-error filtering techniques and the application of non-cooperative game theory to model asymmetric decision-making. By investigating both the equilibrium of symmetric designs and the disruptions of asymmetric threats, this topic aims to advance the resilience, precision and foundational stability of next-generation Cyber-Physical Systems.

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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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