Special Issue

Symmetry Application in the Control Design of Cyber-Physical Systems

Message from the Guest Editors

Control design involves large-scale cyber–physical systems (CPS) such as smart grids, intelligent traffic systems, and industrial processes. The large scale of CPS leads to high dimensional states in control synthesis that requires many computational costs and lacks flexibility and scalability if we treat the CPS as a whole. Moreover, cyber-attacks on CPS induce nonlinearity and complexity, challenging the optimization of the control system. The challenges may be tackled by utilizing the symmetry of CPS. The large complex CPS can be decomposed into many small subsystems with inherent symmetry or equivalent symmetry to simplify the control synthesis, reducing the computational burden and enhancing flexibility/scalability. These promote new theories and structures for symmetry decomposition in control designs of CPS. For those inherent symmetrical CPS, the symmetry decomposition inspires the new structure of the decomposed groups that optimized the control performance. For those inherent asymmetrical CPS, the symmetry decomposition inspires the imposed constraints to make the subsystems equivalent symmetrical.

Guest Editors

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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

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