Modelling and AI for Integration of Cyber and Physical World

Design of Data-driven Hierarchical Supervisor Using Formal Methods

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Summary :

Design specifications for supervision of large-scale complex physical systems are heterogeneous in a spatio-temporal scale. To satisfy the design specifications, we introduce a hierarchical and distributed supervisor.

A design approach using mathematical models of the systems is called a formal method, which guarantees safety, but needs much computational time and is conservative for uncertainty of the systems. On the other hand, machine learning is useful for realizing a system that satisfies users' preferences since we can learn an optimal system from data of exemplary conduct. But, safety in learning process is not always guaranteed. We will realize a supervisor with safety and security by cooperating the formal method and the machine learning. Moreover, we will also reduce its design cost.