Failure Diagnosis in Stochastic Discrete-Event and Cyber-physical Systems

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Abstract: Many cyber-physical systems, such as building automation systems, automotive vehicles and smart power grids, can be modeled as stochastic systems with mixed continuous and discrete dynamics subject to disturbance and noise, whose behaviors are monitored and controlled by networked (digital) control systems. The dissertation focuses on the fault detection of cyber-physical systems. In the first part of the talk, the system is modeled as stochastic discrete-event systems (DESs) where the continuous dynamics are abstracted into discrete ones and hence the system is event-driven, and the normal behavior of a stochastic DES is specified by its sublanguage. In the second part of the talk, a comprehensive model, i.e., I/O-SHA, will be used to captured the overall system dynamics, where the normal behavior is considered to be specified by a temporal logic formula. We provide algorithms for both modeling paradigms. The work will be illustrated by practical examples.