“Regulation of Adaptive Human-Machine System with Fuzzy Inference Petri Nets”

This talk proposed a new kind of Petri net which might be used in regulation of human-machine (HM) systems. In HM systems, human operators and machines cooperate to achieve a system goal. Accordingly, the operators’ task load should be dynamically adjusted in accordance with their physiological and psychological status, so-called operator functional state (OFS). In this sense, the HM system behavior becomes hybrid. We use a fuzzy inference Petri net (FIPN) to model the HM system and then realize adaptive task allocation between human operator and machine. FIPN is equivalent to fuzzy inference system to some extent, thus we can represent the hybrid HM system in a unified semantics. The model can predict the performance of the operator, based on which the workload can be reallocated (i.e., increased or reduced somehow) between the operator and machine in an adaptive fashion the tasks. The simulation results demonstrate that the approach of fuzzy inference Petri nets proposed is an effective way in modeling and control of HM hybrid systems.