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Vortragsankündigung

Seminar Regelungssysteme LV 0430L654

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"Corrective control of asynchronous sequential machines"

Corrective control of asynchronous sequential machines is to design a feedback controller so that the stable-state behavior of the closed-loop system matches that of a prescribed model. In this seminar, we present novel corrective control schemes for achieving the following two objectives: fault-tolerance and model matching with uncontrollable inputs. First, we address fault-tolerant control of asynchronous machines subject to adversarial inputs. An unobservable adversarial input, or disturbance, can attempt to interfere with the normal operation of the asynchronous machine. We present the existence condition and the design procedure for a corrective controller that automatically counteracts the effects of adversarial inputs and restores a desirable behavior to the controlled machine. Secondly, we address model matching of asynchronous machines with uncontrollable inputs. The considered asynchronous machine may receive uncontrollable external inputs, i.e., of which values the controller cannot change or disable. A characterization of feasible control laws and its design algorithm are derived for realizing model matching with uncontrollable inputs. To show applicability of proposed methodologies, the hardware implementation is presented on the architecture of asynchronous triple modular redundancy (TMR) and single-event-upset (SEU) error counters. Other ongoing and future researches on corrective control are also briefly addressed.