CONTROL OF INDUSTRIAL SYSTEMS TO AVOID FAILURES: APPLICATION TO ELECTRICAL SYSTEM.

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Abstract:

With the large spread of automatic and Industrial systems in our lives, comes a new challenge which consists in how to avoid failure and error occurrence. And, since Human intervention requires important time which may slow down the business performance and have negative impact on the quality of provided services, it is important to find a mechanism witch can be able to avoid mistakes and control the workflow in a way that ensures system safety.

This research sets out to present a new approach based on the control theory using formal models such as Finite Automata and Petri nets. Many model extensions can capture some salient properties of these systems. We concentrate in this project essentially on the hybrid automata (HAs) that model able to handle both continuous and discrete aspects. Such modelling frameworks contain differential equations and enable capturing the details of complex systems such as the electrical networks. In this work, we are looking to find a suitable characterization of complex systems having various malfunctions scenarios, and then create a systematic method through general algorithms offering the possibility to circumvent any unsafe state of the system. This can be successfully attained since HAs work correctly with all possible scenarios. Therefore, control algorithm should estimate all future trajectories of the current state, and then, be able to avoid those who lead to defended states.

Index terms: Automatic Control, Automatic Errors Avoidance, Electric Networks, Hybrid Automata, Differential Equations