

DESIGN OF A RECONFIGURABLE STATE TRANSITION ALGORITHM FOR FUZZY AUTOMATA

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An Ontological Controller, a type of supervisory controller used for complex industrial systems, is usually characterized by a large global state set. Monitoring the global state set of these systems is impractical when the desired goal path is chosen since the decision on the next state depends only on a small section of the total state space. The approach is to operate only in a small moving window of the large state transition path. The Hybrid Fuzzy-Boolean Finite State Machine (HFB-FSM) is part of the solution to implement this scheme. The HFB-FSM models the state graph along with plant data and advises the ontological controller with respect to recovery from faults. The use of reconfigurable hardware is an attractive implementation for this approach. When specified properly, reconfigurable implementation can dramatically reduce the physical hardware in the realization while maintaining the computing power of the design. The objective is to model the ever-changing state graph configurations implementing only the relevant states that affect the state transitions. The author proposes a reconfigurable architecture that will support the remodeling of the state graph. This will allow the supervisory controller to reset the fuzzy automaton in order to model a particular state cluster, as needed. The use of parameterized components in the design provides for flexibility with respect to choosing the number of fuzzy inputs and number of fuzzy states.