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Titel des Beitrags: Constraint-Based Integration of Plan Tracking and Prognosis for Autonomous Production

Abstract: Today’s complex production systems allow to simultaneously build different products following individual production plans. Such plans may fail due to component faults or unforeseen behavior, resulting in flawed products. In this paper, we propose a method to integrate diagnosis with plan assessment to prevent plan failure, and to gain diagnostic information when needed. In our setting, plans are generated from a planner before being executed on the system. If the underlying system drifts due to component faults or unforeseen behavior, plans that are ready for execution or already being executed are uncertain to succeed or fail. Therefore, our approach tracks plan execution using probabilistic hierarchical constraint automata (PHCA) models of the system. This allows to explain past system behavior, such as observed discrepancies, while at the same time it can be used to predict a plan’s remaining chance of success or failure. We propose a formulation of this combined diagnosis/assessment problem as a constraint optimization problem, and present a fast solution algorithm that estimates success or failure probabilities by considering only a limited number k of system trajectories.

Kongresstitel: