Informatik-Kolloquium

Rheinisch-Westfälische Technische Hochschule Aachen
Lehrstuhl für Informatik 11

RWTH

EINLADUNG

Zeit: Mittwoch, 13. Juli 2016, 16.00 Uhr

Ort: Hörsaal AH IV, Ahornstr. 55

Referent: Univ.-Prof. Dr.-Ing. Alexander Fay
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Thema: Learning Behaviour Models of Discrete Event Production Systems from Observing Input/Output Signals to support the Evolution Management by Semi-Automated Requirement Verification

Production plants are usually kept in operation for several decades. During this long operational phase, operation requirements and other production conditions change frequently. Accordingly, the plants have to be adjusted in behavior and/or structure by adapting software and physics of the plant to avoid degeneration. Unfortunately, in industrial practice, changes, especially smaller ones, are often performed ad-hoc without appropriate adaptation of formal models or documentation. As a consequence, knowledge about the process is only implicitly available and an evaluation of performed changes is often omitted, resulting in sub-optimal production performance. The approach presented here is based on learning models from observation of input / output signals of the production plant's control system. Semantics are added by using a priori information modelling which is less tedious compared to modelling the process itself. Learning behavior models out of event traces has been tackled in a wide variety of scientific projects and publications. Usually the resulting models are used for fault detection, reengineering, and analysis. But in practical applications, like monitoring, learned models can show high complexity

and permissivity which makes it difficult to use these models and results tend to be ambiguous. In our approach, we focused on the automatic creation of so-called Machine State Petri Nets (MSPN) and Material Flow Petri Nets (MFPN). In combination, these two can reveal interesting properties of the monitored production system. The learned models are used to automatically detect changes by continuously comparing their behavior with real plant behavior during operation (and, thus, to continuously verify the fulfillment of (non-functional) requirements) as well as to evaluate performed changes. An analysis of the models results in high-level property values such as key performance indicators or flexibility measures of the production system. In an example application to a Pick and Place unit, the concept has been applied together with an anomaly detection method to support the operator during the evolution process by constantly providing information regarding requirement fulfillment.

Es laden ein: Die Dozenten der Informatik