WIRTSCHAFTS INFORMATIK

Study- / Masterthesis

TECHNISCHE UNIVERSITÄT DARMSTADT

STOCHASTIC SUPERVISORY CONTROL OF SINGLE-LOOP MANUFACTURING TRANSFER SYSTEMS

The push towards new key technologies, i.e. Cloud Computing (CC), Internet of Things (IoT), Data Science technologies etc., in the recent years is followed by a period of big impact on the development of industrial services and systems. Global mega trends lead to a higher product variety, increasingly complex manufacturing systems and higher dynamics and complexity on the market side in the field of production and Industry 4.0. Products and production systems have to move towards Cyber-physical systems for self-control and self-optimization to manage.

Since 1967, WEISS GmbH has specialized in the development and manufacture of components for automation technology. Today, the company with over 400 employees is one of the world's leading manufacturers of automation solutions - from rotary indexing tables and linear transfer systems to handling systems.

In this thesis a stochastic supervisory control of single-loop manufacturing transfer systems shall be designed, tested and implemented. The aim is to model different single loop transport systems as Petri nets with consideration of time-delayed monitoring control algorithms and uncertainties with respect to uncontrollable delays. Finally, a Python Framework for modular transport system constructions conveying the priorly derived performance calculation and controller synthesis results to a system configurator shall be implemented.

After conclusion of the research project, the resulting sizing logic shall be used in the context of automated application engineering offered online as a REST microservice. This shall be deployed in the Heroku execution Environment which is integrated to ERP and CRM systems. As such, the results of the research work are almost immediately applicable to actual industrial use cases.

GOALS

- Obtain a reasoning system for analytically optimizing time delays in single-loop manufacturing transport systems.
- Evaluate the impact of uncertainties in uncontrollable time delays, adding stochastic calculus to the sizing algorithm if necessary.

Supervisor / Coach

Begin immediately. If you are interested, please contact:

Peter Buxmann

(buxmann@is.tu-darmstadt.de, S1|02 / 242)

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