

Agentenbasierte Automatisierung des Betriebs industrieller Produkt-Service Systeme

Abstract

This thesis presents a concept for the automated operation of industrial product-service systems (IPS²). In order to reach the goal, the state of the art in the fields of services, industrial product-service systems and automation technology is presented. Subsequently, requirements are defined and the concept for a multi agent system for IPS² automation is designed. Characteristic parameters of an IPS² are determined and cause-effect-relationships specific to IPS² business models are identified for influencing the IPS² during operation with according measures.

The Gaia method is applied for an analysis of the IPS² and an architecture for an agent-based IPS² automation is designed. Based on the agent model, different layers are introduced in the subsequent detail design phase. Agent types on different layers feature different behaviours and functions. The proposed concept is prototypically realized.

A customer-provider relationship in the field of micro production technology serves as an application example for the developed system. Two concrete use cases are considered. The advantage of the proposed approach lies in the flexibility of the IPS² provider, which is achieved through the modularization of all required functions through agents and services as well as the separation of delivery processes and their implementation. This enables the IPS² provider to equally integrate mechatronic resources as well as human stakeholders into the delivery processes.