

Bachelor-/Master-Thesis

Internet of Production

Development of a Domain-specific Language for Sensor Integration

Laboratory of Machine Tools and Production Engineering (WZL)

Chair of Production Metrology and Quality Management

Department Model-based Systems
Group Large-Scale Metrology

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Current Situation

The field of metrological assisted manufacturing processes is characterized by high heterogeneity of the integrated devices and sensors. Due to manufacturer-dependent interfaces and individual, plant-specific network solutions, integration of a sensor into such production networks implies high effort, requires high interdisciplinary knowledge, and usually results in highly complex cyber-physical components. These cyber-physical components rely on hardware-specific and protocol-specific implementation and thus lack of reusability and maintainability.

To increase reusability by decoupling hardware and communication-specific implementation, a textual domain-specific language shall be developed, which describes a sensor's capabilities. A basic underlying meta-model has already been developed at the WZL within the research project Internet of Production and can be a starting point for the thesis.

Objectives

The thesis's content covers a literature survey on the state-of-the-art data-models for metrological devices and sensors. The central part of the work is

the development of a textual modelling language for defining the service interface of sensors and devices. This includes the grammar definition, development of well-formedness rules, and a translator for generating executable source code in a general-purpose language, e.g., Python, with the MontiCore Language Workbench. The generated implementation must offer a REST-interface and support data streaming, preferably via MQTT. Infrastructure for retrieving task-specific data, and linking it with metadata, as digital calibration certificates of the sensor, will also be developed.

Requirements:

- Study of computer science, Lecture MBSE or SLE
- Independent work and reliability

What you can expect:

- Interesting task
- Comprehensive supervision
- Independent processing of a topic
- Contribution to an interdisciplinary research project

