

Master Thesis

to assign

Building a Knowledge
Graph for System
Modeling

Background

Canon Production Printing (CPP) develops high-quality and high-speed printing systems in multiple product lines for the commercial printing market worldwide. For an increased R&D efficiency when designing new products, they employ model-driven (system) engineering. To this end, CPP employs various system models, e.g., geometrical, behavioral, chemical & physical, AI models (e.g., ML/DL). These models can be connected at system-level by using a component-based modeling technique like SysML parts, or the structure-part of ROOM. By connecting and composing the components, new products can be developed.

Problem description

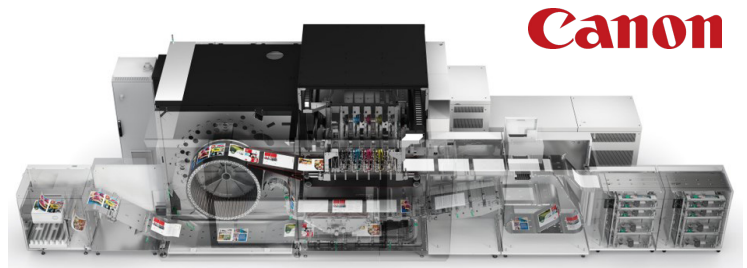
The absence of a standardized approach to seamlessly integrate heterogeneous engineering models limits the creation of their collective capabilities for holistic decision-making at system-level. Knowledge graphs emerge as a promising solution to tackle this problem, by capturing the relevant & critical properties of models and their dependencies. With such a knowledge graph, it becomes possible to select the relevant (parts of) models to be integrated for creating the collective capabilities. Therefore, this thesis should build up a knowledge graph of selected engineering models employed by Canon Production Printing aiming to semi-automatically create models at system level. The system models enable the analysis and validation of product configurations by querying the knowledge graph.

Tasks

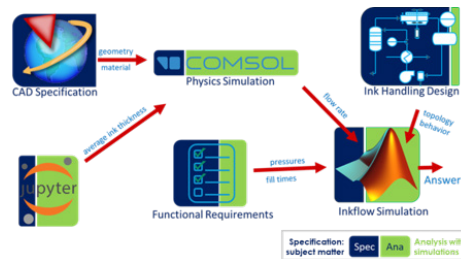
- Analysis of engineering models employed by Canon Production Printing
- Development of a concept for a knowledge graph representing relevant model properties
- Realization of the concept using state of the art graph frameworks, e.g., Neo4J
- Evaluation with real-world use case provided by Canon

Requirements

- Interested in knowledge graphs
- Interested in model-based engineering
- Object-oriented thinking and development



An example: Canon VarioPrint iX printer



An example: multi-disciplinary specifications and models for ink analysis

- First experience with Java or similar object-oriented programming languages
- Independent worker & Proactive attitude
- English

Knowledge gain

- Knowledge graphs
- State-of-the-art graph frameworks
- Real world model-based engineering
- Industrial use cases and cooperation
- Autonomous scientific working and publication
- Applied Machine Learning
- Independent scientific work

