Technische Universität München – Fakultät Maschinenwesen – Bioseparation Engineering Group

Bachelor/Master thesis:

Digitalization & Automation: Magnetic separation on a pilot scale

Keywords: Digitalization, Automation, Industry 4.0, Big-Data, Downstream Processing, Process development

Project description
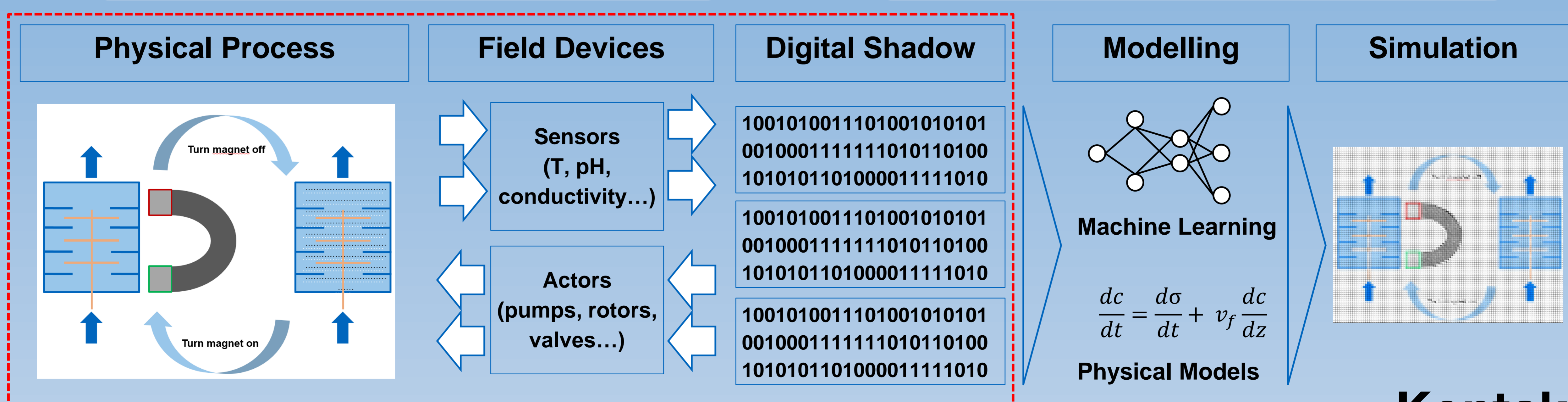### - From data to process monitoring, -control & -optimization -

The connection of production plants as well as the use of existing and real-time data is a central aspect of the Industry 4.0 concept and necessary to stay globally competitive. In this context, the innovative magnetic separation for the purification of various valuable substances will be automated and digitalized. This novel process is intended to be a more cost-effective alternative to chromatography in the future. However, a prerequisite for this is optimal process control through the use of real-time data. The existing concepts for data storage and processing will be further developed and implemented. Subsequently, these data will be used for optimal process control. For this, the degrees of freedom with high optimization potential must be identified on the basis of process understanding. Finally, suitable control concepts will be implemented and evaluated on the control system of the plant.

Tasks

- Network architecture: concept and implementation
- Concept for data storage and processing
- Process understanding
- Implementation: process control and regulation

Requirements

- Structured workflow
- Interest in new technologies
- Knowledge of: automation, Siemens PLC programming, TIA STEP 7, data processing, SQL, InfluxDB, Docker Container, NodeRED etc.

| Physical Process | Field Devices | Digital Shadow | Modelling | Simulation |

Turn magnet off
Turn magnet on

Sensors (T, pH, conductivity…)

Actors (pumps, rotors, valves…)

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Machine Learning

$$\frac{dc}{dt} = \frac{d\sigma}{dt} + v_f \frac{dc}{dz}$$

Physical Models

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