ProdMonitor

Development and Integration of a Simulation Model for Analysis and Optimization of Production Flow

Graduate

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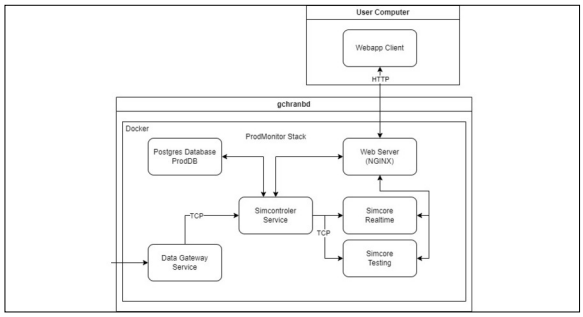
Introduction: The Geberit Produktions AG facility in Rapperswil-Jona manufactures actuator plates for toilet flush systems. These panels are moved by a conveyor system to intermediate storage, packaging or further processing. The current transport system lacks real-time visibility due to the sparse that is collected during transportation trough the production site. To optimize the production process, Geberit requires a more detailed understanding of the transport system, including the real-time state of the plates in transit. This absence of real-time visibility, makes it difficult to monitor the process and identify bottlenecks. Furthermore the lack of a simulation environment, makes it challenging to evaluate new transport strategies without disrupting production.

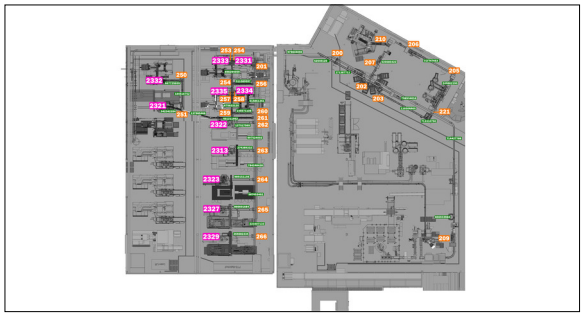
Approach / Technology: This thesis introduces ProdMonitor, a modular software stack designed to simulate and monitor the production transport system. ProdMonitor integrates sparse data from QR code readers and components like handling systems and item lifts to create a digital twin of the facility. This facilitates real-time tracking, analysis, and optimization of the transport process. The system uses discrete-time simulation to represent the transport process, filling the gaps between the discrete data points collected from the components installed at the production site. Statistics are then calculated on the generated simulation data, providing more detailed insight into the performance of the transport system. A multi-container architecture ensures scalability and maintainability, while a React-based frontend provides an intuitive interface for visualizing simulations and editing layouts. The frontend also provides a view of statistics for the current simulation as well as detailed insights into previous simulation runs.

Result: This project demonstrates a full-stack implementation, combining backend services, real-time data integration, and a frontend interface. By enabling virtual testing of new transport strategies, ProdMonitor allows Geberit Produktions AG to experiment with different strategies to optimize transport processes without disrupting the production process.

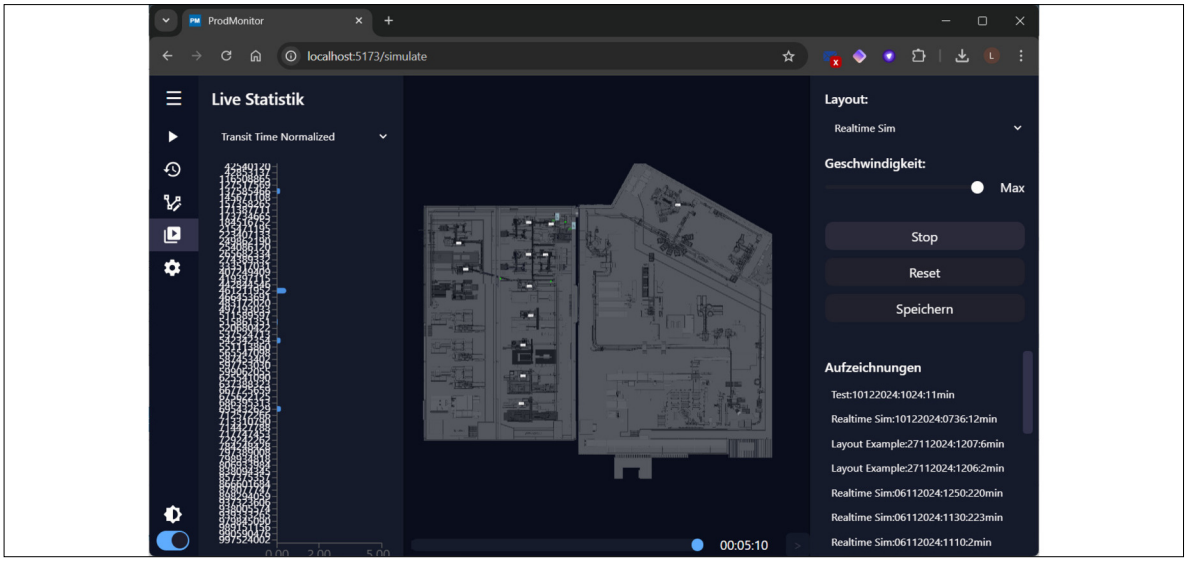
High-Level Overview of Software Stack
Own presentment



Production Site with Relevant Components for the Simulation
Own presentment



Simulation View in the Web App
Own presentment



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