Potential Analysis for the use of Enterprise GPT in Process Engineering

Degree programme : BSc in Industrial Engineering and Management Science
Thesis advisor : Patrik Marti
Expert : Moritz Maier
Industrial partner : Schweizer Zucker AG, Aarberg

In response to the increasing need for efficient processes and rapid knowledge transfer within industries, this bachelor thesis explores the potential application of Enterprise Generative Pre-trained Transformer (GPT) systems in the process engineering sector of Schweizer Zucker AG. The primary goal is to analyze how such AI-driven systems can improve the training and knowledge transfer of new shift supervisors into the production processes.

Introduction and Objectives

The digital transformation presents opportunities and challenges for traditional industries like Schweizer Zucker AG. This study was motivated by the need to streamline the onboarding of new shift leaders (Figure 1) and to maintain high operational efficiency despite the complexity of production processes. Initially, the idea of using a digital twin was considered but was deemed impractical due to constant changes and the complexity of plant operations. Consequently, the focus shifted to implementing an Enterprise GPT system (Figure 2) capable of understanding production processes and providing real-time support to employees through natural language queries.

Methods

A comprehensive analysis was conducted involving literature reviews, data analysis, and the development of test cases in collaboration with shift leaders. These test cases were designed to simulate production disruptions and evaluate the GPT system's effectiveness in providing relevant information and decision-making support. Additionally, a risk analysis was performed to identify potential hazards associated with relying on AI-generated instructions.

Results

The analysis revealed that many of the actions performed by the shift supervisors are not documented and are instead memorized through experience. Testing a particular test case with two different chatbots showed that interpreting the data from the existing manuals is a challenge to provide clear action steps for the shift supervisors. The chatbots heavily relied on the troubleshooting documentation provided to them, as these documentation contained detailed step-by-step instructions. Without these specific troubleshooting documentation, it was difficult for the chatbots to provide meaningful instructions, highlighting the need for comprehensive documentation to support effective AI assistance.

Recommendations

To enhance the potential implementation of an Enterprise GPT system, it is recommended to first systematically document all critical actions and disruption scenarios. This data is essential to train an effective GPT model. Additionally, integrating real-time and historical data will provide better context for the system. Starting with a pilot phase for real-world feedback and actively involving shift leaders in the system's development and refinement will further ensure its effectiveness.

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Figure 1; Left: Actual situation during the training of new supervisors / Right: Future situation with a chatbot as support

Figure 2; Possible situation in the future when the new shift supervisors get support from a chatbot