Automated Data Validation and Reconstruction, Proactive and Predictive Maintenance of Energy systems and processes

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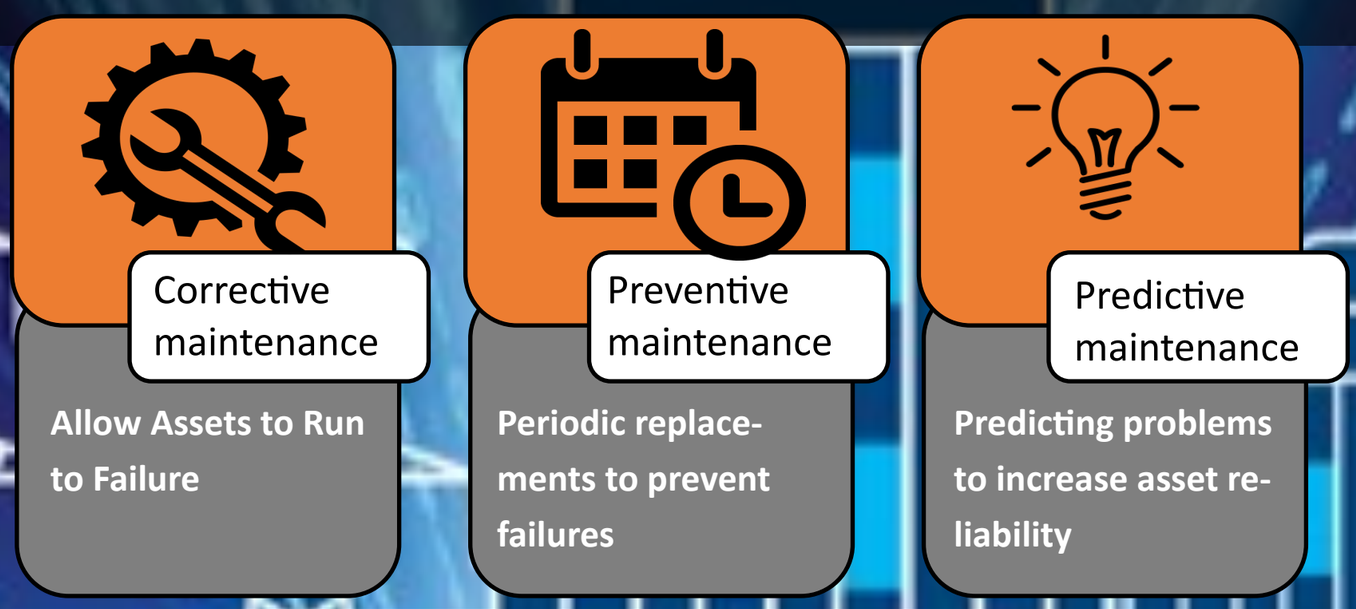
Background

Today's maintenance strategies for energy systems and processes and other critical infrastructures are based on the inefficient "wait till it breaks" or preventive maintenance approaches. However, advances in machine learning and modern deep learning accompanied by the increase in digitalization has made it feasible to use historic operational data for fault and anomaly prediction, detection and diagnosis in digital energy systems [1][2]. The project will enable predictive maintenance, which will increase the reliability of energy systems, increase personnel safety, save on opportunity costs from unforeseen breakdowns, and add value to the increasing digital metering infrastructure.



Aim and objectives

The project aims to enable smarter maintenance approaches by developing a tool for automated data validation and reconstruction, proactive and predictive maintenance of energy systems and processes. As means to that end the following objectives are defined:

- **Studying the applicability of different machine learning algorithms for predictive maintenance**
- **Identifying ways to efficiently create data labels or develop models that does not require labeled data**
- **Implementing and studying data validation and reconstruction methods in predictive maintenance applications**
- **Studying and demonstrating the usefulness of virtual sample generation in predictive maintenance**
- **Creating a software tool that combines data validation and reconstruction, virtual sample generation, and machine learning for predictive maintenance**

Methodology

The project seeks to solve the inhibitory challenges of predictive maintenance and demonstrate solutions in case studies of power and district heating systems. An appropriate research method that complements the use of case studies is the constructive research approach which, explained briefly [3] 1. Identifies problems and challenges, 2. Obtains knowledge, 3. Forms ideas to solve the challenges, 4. Demonstrates the solutions using case studies, 5. Deduces theories and research contribution, 6. Examines the scope of the developed solution in regard to implementation possibilities and limitations.

References

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