Call for Master Thesis

Framework Architecture for Causal Analysis and Physics-Based Diagnostics in Manufacturing

We are looking for a motivated Master's student to undertake research on integrating data-driven and physics-based diagnostic approaches to enhance condition-based monitoring and diagnostics in manufacturing. This thesis aims to develop a framework architecture that leverages multimodal data to improve Remaining Useful Life (RUL) estimation and ensure higher asset availability.

Research Hypotheses:

- The quality of diagnostics and condition-based monitoring can be enhanced through the combined consideration of data-driven (black box approach) and knowledge-based (domain and physical knowledge, white box approach) strategies.
- A framework integrating these approaches should effectively leverage multimodal data to maximize benefits.

Guiding Research Question:

To what extent and how can the state of the art in data-driven and physics-based diagnostics be integrated to improve the Remaining Useful Life (RUL) of assets, thereby ensuring higher availability?

Expected Outcome:

- Development of a framework architecture for integrating causal analysis and physics-based diagnostics.
- Implementation of a Proof-of-Concept (PoC) demonstrator utilizing real or synthetic data.

Methodology:

- Literature survey on existing diagnostics and monitoring methodologies.
- Design Science approach to framework development.
- Software development for PoC implementation.
- Systematic evaluation of the framework's performance.

Expected Competence of a Candidate:

- Proficiency in programming, particularly in Python.
- Strong understanding of maintenance and diagnostics.
- Good knowledge of research methodology.

Target Study Programs:

- Business Informatics
- Data Science
- Mechanical-Industrial Engineering (with strong programming skills)

This thesis offers an excellent opportunity for students interested in the intersection of data science, diagnostics, and industrial maintenance. If you are interested, please reach out with your CV, transcripts and a short motivation letter outlining your interest and relevant experience.

We look forward to your applications!

Contact

Univ.-Prof. Dr.-Ing. Fazel Ansari
Email: fazel.ansari@tuwien.ac.at

Univ.-Prof. Dr.-Ing. Carsten Gachot
Email: carsten.gachot@tuwien.ac.at