Master Thesis/Diplomarbeit
Bachelor Thesis/Studienarbeit

Predictive Maintenance/ Transformer-based Anomaly Detection on the Edge

Anomaly detection plays an important role in many application scenarios. In the Industrial Internet of Things (IIoT), anomaly detection enables permanent monitoring and evaluation of machine and process data. In this way, machine failures can be predicted at an early stage, thus avoiding malfunctions, and making maintenance processes efficient.

Traditionally, the raw data is sent to centralized servers where large-scale systems perform analytics on the data gathered from all devices. However, this often leads to high network traffic, latency, and privacy issues. The goal of this work is to analyze the extent to which transformer-based anomaly detection models can be deployed directly to highly resource-constrained devices (MCUs).

Your work:
- Literature review of state-of-the-art anomaly detection methods, e.g. “Deep Learning for Anomaly Detection: A Review” (Pang et al.).
- Development of a prototype + evaluation thereof and comparison to the current state-of-the-art using both benchmark and real-world datasets.
- Optional: opportunity to contribute to publications.

Requirements:
- Strong (proven) background in machine learning, as well as Python and common deep learning libraries such as TensorFlow or PyTorch.
- Self-motivation.

If you are interested, please contact Körber, Nikolai (nikolai.koerber@tum.de).