



# Master Thesis/Diplomarbeit Bachelor Thesis/Studienarbeit

## Predictive Maintenance/ Anomaly Detection on the Edge

Anomaly detection plays an important role in many applications 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 deep learning-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.).
- Analysis and identification of deep learning-based models suitable for the deployment on resource-constrained devices (micro-controllers). Possible starting point: “One-Class Adversarial Nets for Fraud Detection” (Zheng et al.). GitHub: <https://github.com/PanpanZheng/OCAN>.
- 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:

- Solid background in machine learning and probability theory, as well as Python and common deep learning libraries such as TensorFlow or PyTorch.
- Self-motivation.

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