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Research Project EMILIE

HSB Hochschule Bremen City University of Applied Sciences

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Embedding Machine Intelligence Logic and IT Security into Edge Devices

Goal of the project

EMILIE aims to improve the electronics and sensor technology of decentralised industrial plants. For this purpose, secure data acquisition with an edge gateway and AI-based information (pre-)processing are going to be implemented. These ideas aim at improved energy efficiency as well as cost savings through improved monitoring of operating conditions and predictive maintenance. In addition, locally executed AI algorithms will be used to efficiently identify condition patterns and thus contribute to efficiency improvements. Data pre-processing will enable resource-efficient data transmission for relevant data out of large data volumes to remote locations without transmitting all of the raw data. Secure transmission of data is to be ensured throughout the process.

Focus of the Hochschule Bremen (HSB)

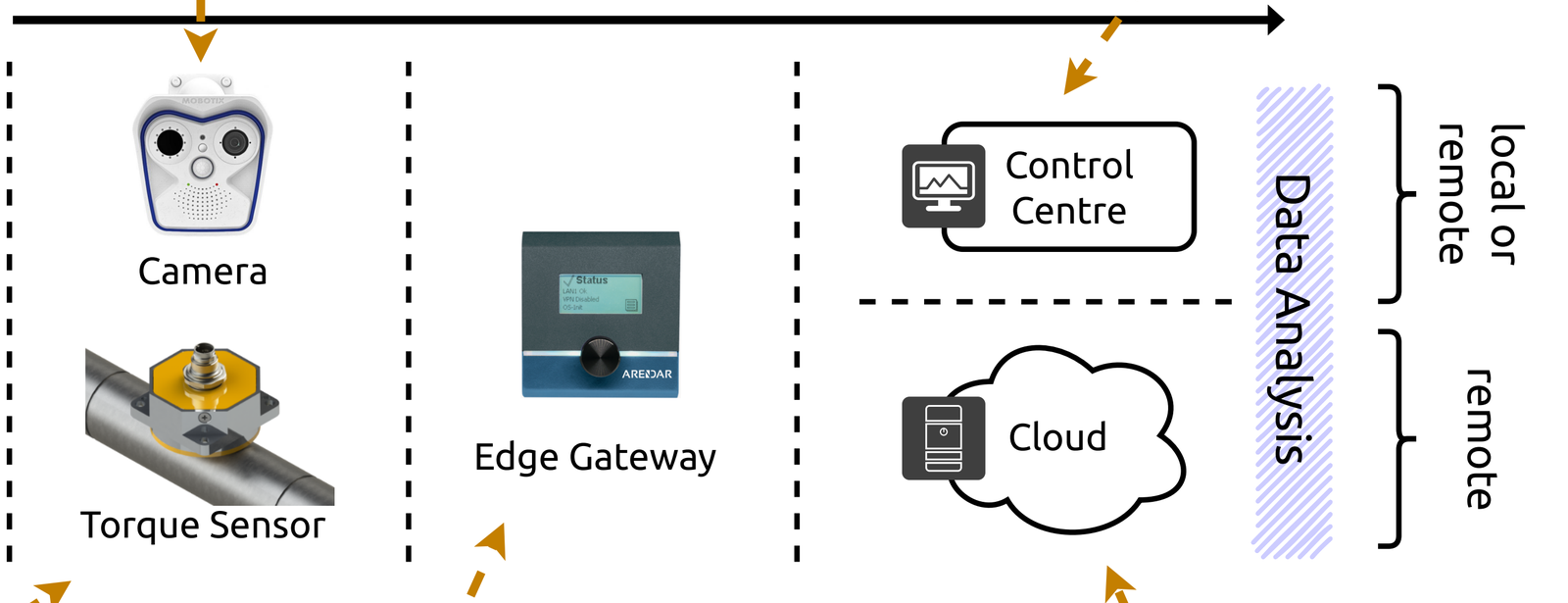
In EMILIE, the research group computer networks and information security (FRI) at HSB is working with the project partners to ensure that sensors and actuators connected to the edge gateway and possible expansion cards have not been compromised. A TPM chip is used in the development, which can provide digital signatures, trusted boot, attestation and keys for encryption techniques to protect the edge gateway between the sensor and the control centre from compromised malicious code, so that the transmission of secured information can be classified as trustworthy. The aim of our research group is to ensure the secure and trustworthy communication from sensor to cloud which can be seen as end-to-end security.

Continuous protection of the data flow between the individual stages to ensure the integrity of data and components

Cement mill by Gebr. Pfeiffer

High-resolution (thermal imaging) camera from Mobotix for vibration monitoring

Control centre from which the industrial plant is controlled. It monitors and controls the production processes and can be located on site or further away.



Magnetostrictive sensor from Magnetic Sense for force measurement

ARENDAR edge gateway from Real-Time Systems GmbH with edge computing functionality for local data pre-processing on site

Using cloud computing power to train and improve AI models using data collected on-site

FRI
Forschungsgruppe Rechnernetze und Informationssicherheit

Project Partners:

Fraunhofer ITWM · MOBOTIX · ARENDAR · MagneticSense · GEBR. PFEIFFER