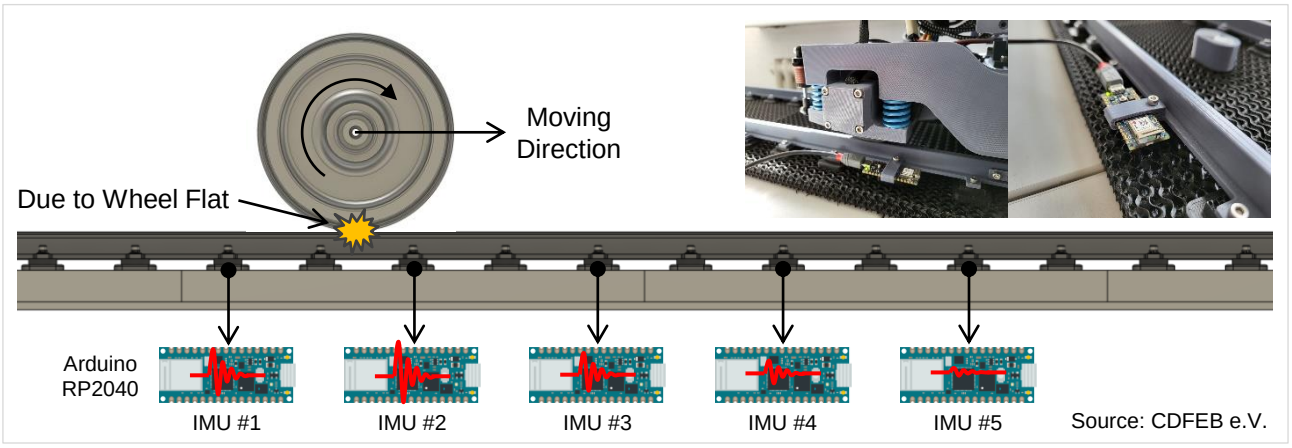
Masterarbeit zu vergeben

Vibration-based Detection of Wheel Flats using Multiple Wayside Accelerometers in the Downscaled Railway Test Rig

Schwingungsbasierte Erkennung von Flachstellen mittels mehrerer Beschleunigungssensoren an der Gleisseite in einem verkleinerten Eisenbahnprüfstand

The structural integrity of railway wheelsets has been monitored and maintained by onboard, wayside, and workshop inspections, considering the advantages and disadvantages of each method. Otherwise, this could potentially lead to significant accidents when trains are running at high speeds. In field testing, artificially inducing wheel faults or waiting for them to occur naturally makes it difficult to obtain a sufficient volume and variety of datasets in a short period of time. As an alternative, a 1:10 scale railway test rig was constructed to generate onboard and wayside vibration signals caused by vehicle and infrastructure faults in a laboratory environment. At this study, several sizes of wheel flats were applied to wheelsets.

This study aims to detect wheel flats using tri-axial acceleration and tri-axial angular velocity obtained from multiple wayside accelerometers positioned along on the railway track. The main task is to develop simple fault detection algorithms and assess their performance in terms of accuracy and computational load. Additionally, to make them more lightweight, the dimensionality of a dataset needs to be reduced without losing information. Strategies to minimize the number of required accelerometers also need to be explored and implemented.



Knowledge of the following lectures is advantageous:
„Vehicle Dynamics“, „Vibration“, „Machine Learning“

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