

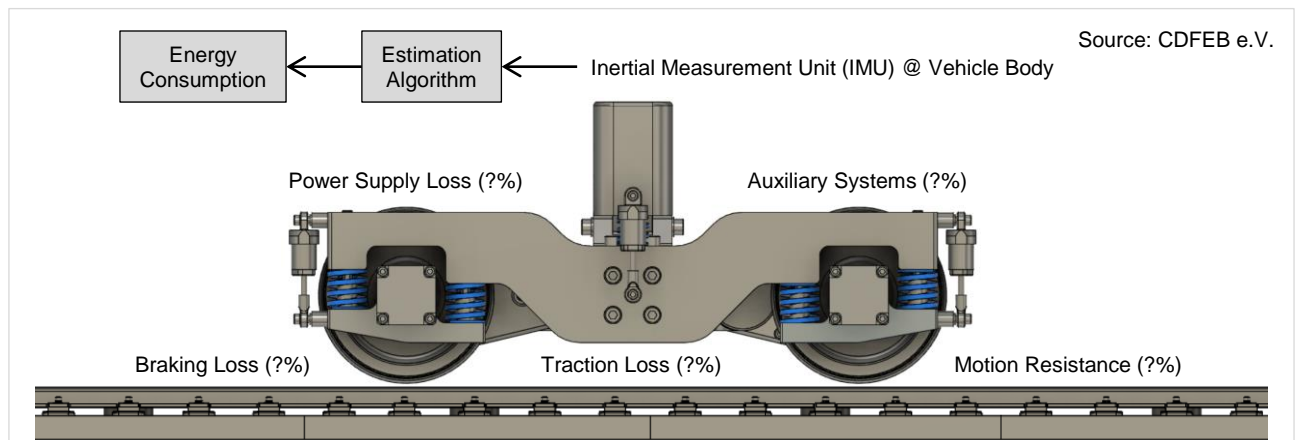
## Masterarbeit zu vergeben

### Energy Consumption and IMU-based Indirect Measurement in a Downscaled Railway Test Rig

### Energieverbrauch und IMU-basierte indirekte Messung in einem herunterskalierten Eisenbahn Prüfstand

In the railway field, energy consumption is one of the key issues in terms of energy efficiency and environmental sustainability. From 2020, Directive (EU) 2016/797 requires all new, renewed, and upgraded railway vehicles to be equipped with the onboard energy measurement system (EMS) and the data collecting system (DCS). Similarly, based on a downscaled test rig built using additive manufacturing, systems and algorithms for the measurement and optimization of energy consumption will be implemented and studied.

This study aims to indirectly estimate the energy consumption of a downscaled vehicle running on an oval-type track by using an inertial measurement unit (IMU) mounted on the vehicle body. The first task is to build an analytical energy consumption model based on a literature review and to make rough estimates. The second task is to develop algorithms for indirect estimation of energy consumption based on 6-DoF vehicle motion information obtained numerically and experimentally from IMU. The third task is to calibrate the analytical model and the developed algorithms by comparing their estimates with directly measured energy consumption. These tasks basically require an understanding of vehicle dynamics and signal processing with basic programming skills in Python.



Knowledge of the following lectures is advantageous:  
„Vehicle Dynamics“, „Signal Processing“

If you are interested, please contact:

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