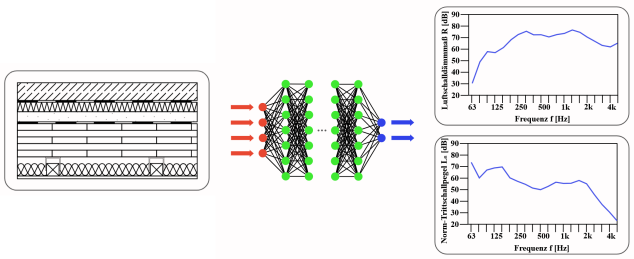
Chair of Vibroacoustics of Vehicles and Machines
School of Engineering and Design
Technical University of Munich

Semester Thesis

Data-Driven Prediction of Sound Insulation of Wooden Floors – A Machine Learning Case Study

Timber construction is gaining increasing relevance due to its ecological and economic advantages. However, one of the key challenges associated with these lightweight structures lies in their acoustic performance. Wooden floors typically consist of multiple layers. The complex interactions within the assembly make it difficult to reliably predict its sound insulation properties. As a result, costly experimental validation is often required. For this reason, a data-driven forecasting tool is being developed that utilizes machine learning methods to predict the sound insulation characteristics of wooden floors based on laboratory measurement data.



Prediction scheme for airborne and impact sound insulation of a mass timber floor assembly.

Your Task

A comprehensive, diverse database is paramount for the forecasting quality of this data-driven approach. Therefore, a substantial volume of laboratory measurement data has already been collected and is now being systematically imported into a database. You will assist in this process to build the basis for your model training. Subsequently, you will develop a strategy to embed the floors' layer structure as an input for machine learning models. Finally, the case study compares different modeling approaches based on your prepared training data.
Your contribution will play a crucial role in this foundational phase, supporting the data integration process and evaluating the performance of the first predictive models.

The thesis could consist of the following work packages. Details are open to discussion:

- WP1 – Data preparation and integration
- WP2 – Feature engineering, development of an embedding strategy
- WP3 – Model training
- WP4 – Evaluation and validation of the prediction accuracy

Your Skills

- Programming skills in Python
- Basic knowledge in Machine Learning
- Preferably first experience in working with PyTorch or Tensorflow

Contact

Markus Mörwald, M.Sc.
Tel. +49 (89) 289-55136
markus.moerwald@tum.de

Chair of Vibroacoustics of Vehicles and Machines
Boltzmannstraße 15
85748 Garching b. München
PersonWebseite