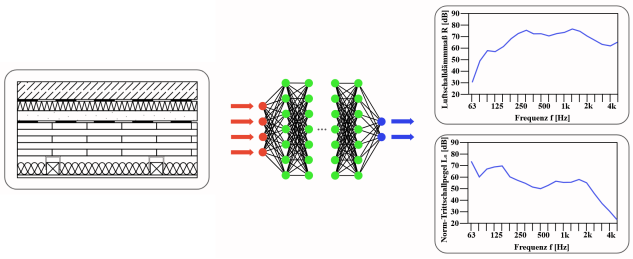
Chair of Vibroacoustics of Vehicles and Machines
School of Engineering and Design
Technical University of Munich

Semester Thesis

Data-Driven Prediction of Impact Sound Insulation of Mass-Timber Floors

While timber construction is gaining popularity, predicting its acoustic performance remains a significant challenge. Wooden floor systems typically consist of multiple layers, whose interactions yield complex sound insulation properties. In particular, impact sound represents a major source of annoyance in residential buildings, motivating the development of accurate and robust prediction methods. At present, reliable assessment often requires costly experimental validation. To address this limitation, a data-driven prediction tool is being developed that employs machine learning techniques to estimate the sound insulation characteristics of wooden floor systems based on laboratory measurement data.



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

Your Task

A comprehensive set of measurement data has been collected and integrated into a MySQL database. On this basis, feed-forward neural networks and tree-ensemble models have been trained in an initial comparative study to predict airborne sound insulation.
In this thesis, you will optimize the existing models and transfer them to predict the impact sound insulation of wooden floor systems. Subsequently, the approaches will be extended to account for uncertainties inherent in the experimental training data, resulting in a robust and interpretable predictive design tool.
Your contribution will play a crucial role in refining the existing predictive models and enabling reliable assessment of impact sound insulation in timber floor constructions.

The thesis is structured as follows. Details are open to discussion:

- WP1 – Improvement of current embedding strategy
- WP2 – Transfer to impact sound insulation measurements
- WP3 – Incorporation of measurement uncertainties
- WP4 – Evaluation and validation of the prediction accuracy

Please submit your application, including a brief statement of interest, your CV, and a transcript of records, to the contact listed below.

Your Skills

- Knowledge of Python/PyTorch
- High motivation and a structured working style
- Beneficial: Experience in probabilistic modeling and hyperparameter optimization

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
www.vib.mw.tum.de