

Semester/Masterthesis:

## Structured Literature Review on Biomechanics in Power Tool Use as a Basis for Data-Driven Posture Prediction

Working with hand-held electric tools (e.g., hammer drills) often exposes users to considerable biomechanical strain. This strain results from non-ergonomic postures,



vibration, and the need to apply external forces. Over prolonged periods, such exposures can negatively affect the musculoskeletal system, potentially leading to overload and work-related musculoskeletal disorders.

Previous research indicates that human posture significantly varies depending on key boundary conditions such as working height (e.g., drilling height), tool design (e.g., handle configuration, weight), and applied force. However, these relationships have not yet been systematically consolidated and analyzed—particularly with regard to their potential use in data-driven models and machine learning approaches for posture prediction.

### Objective

The primary objective of this master thesis is to conduct a **Structured Literature Review** on the biomechanics of tasks involving hand-held power tools.

The work aims to:

- identify relevant biomechanical factors influencing human posture
- systematically analyze relationships between task parameters and **joint kinematics, muscle activity, and physical strain**
- review existing studies in terms of their **data structures, measurement methods, and modeling approaches**

A key outcome will be the development of a **structured data framework or taxonomy** that can serve as a foundation for future **machine learning models for posture prediction**.

#### **Contact:**

M. Sc. Rebecca Rack

[rebecca.rack@tum.de](mailto:rebecca.rack@tum.de); Mob: +49173 6896903

Room: MW3307