Introduction

Philips Drachten plays an important role in driving innovation in the Personal Health industry. With over 2000 employees from over 35 different nationalities, Philips Drachten is a global hub for consumer product innovation, employing experts who design products with outstanding end-user experience.

Problem Description

Understanding and predicting the physical behavior of hair interacting with (rotary) cutting systems (e.g., electric shavers, trimmers) is essential to improve cutting performance, comfort, and reliability. This assignment focuses on simulating hair cutting using multibody dynamics and comparing simulated behavior with experimental measurements from real cutting systems.

Relevance

Validating and improving the hair-cutting model against real-hair experiments is important for both product performance and engineering science. High-fidelity validation reduces reliance on costly and time-consuming physical prototyping by increasing confidence in simulation-driven design decisions for (rotary) cutting systems (e.g., shavers, trimmers). Traditional validation approaches—manual tuning of model parameters and ad-hoc comparisons—are slow and can miss systematic errors caused by contact, friction or cutting physics. A rigorous, data-driven validation workflow (paired experiments and simulations, quantitative metrics, and sensitivity analysis) enables automated, repeatable assessment of model accuracy and reveals which physical assumptions or parameters cause the largest discrepancies.

Aimed output

- Validate the existing hair-cutting model against real-hair experiments.
- Collect, preprocess, and store experimental and simulation data in analysis-ready formats.
- Run sensitivity and simple calibration analyses to identify key model parameters.
- Detailed technical report.

Student Profile

- Bachelor or Master student in (Bio)Mechanical Engineering, Applied Physics,

Data Science, Computer Science, or a related discipline.
- Strong analytical, research, and problem-solving skills.
- Able to plan and execute experiments and simulations within an agreed scope and timeframe.
- Familiar with Matlab and/or Python programming langueage.
- Familiarity with multibody dynamics concepts and some CAD literacy is desirable.
- Basic knowledge of system identification, regression, or calibration techniques and statistical analysis.
- Team player, contributing to effective teamwork and offering a point of view.

For more information, please contact:

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