Karlsruher Institut für Technologie

INNOVATIONSCAMPUS MOBILITÄT DER ZUKUNFT

Institut für Fördertechnik und Logistiksysteme

Bachelor's / Master's Thesis (m/w/d)

Comparative Analysis of Teleoperation Interfaces

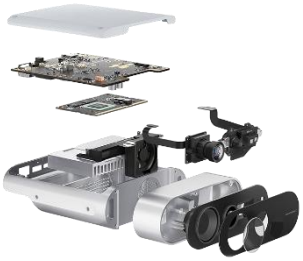
Evaluating the Performance and Usability of Gloves, Motion Capture, VR, RGB(D) Cameras for dexterous manipulation tasks

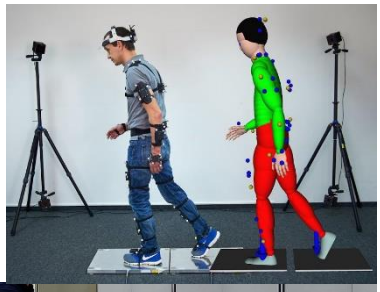
Problem formulation

Teleoperation systems are increasingly vital in various fields, such as robotics, healthcare, and remote operations. However, the effectiveness of different interfaces, especially for dexterous robot hands, remains largely unexplored. This research, which aims to systematically compare the performance, usability, and application potential of a diverse range of interfaces—from gloves and motion capture systems to VR setups and RGB cameras—is at the forefront of innovation in this field.

Task definition

This thesis will involve designing and conducting experiments to evaluate and compare the performance metrics of various teleoperation interfaces for dexterous multi-finger robotic hands, including glove-based systems, motion capture setups, VR environments, ORBBEC pose tracking, and RGB cameras. The goal is to assess these interfaces based on accuracy, latency, user comfort, and ease of integration, providing actionable insights for selecting the optimal interface for applications with dexterous robotic hands.





You shall offer

- Solid knowledge base and experience in computer vision, deep learning, and robotics.
- Coding skills in Python and C++.
- Experience with ROS beneficial

We will offer

- The most state-of-the-art technologies in deep learning and computer vision.
- Working in a lab with a Germany-wide unique Shadow Teleoperation System
- Tight support from supervisors, including a workshop on scientific writing.

Research area:
AI & Robotics

Focus:
☒ Experimental
☒ Theoretical
☒ Practical
☐ Simulation
☐ Construction (CAD)

Study program:
☒ Maschinenbau
☒ Mechatronik
☒ Elektrotechnik
☒ Informatik
☐ Informationswirtschaft
☐ Wirtschaftsingenieurwesen

Begin: From now on

If you are interested, please send us an e-mail with your **curriculum vitae** and a current **transcript of records**.

Contact person:
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Please note that your data will be treated in accordance with the applicable data protection regulations as part of the application process.