Bachelor's / Master's Thesis (m/w/d)
Sim-to-Real Imitation Learning for the Shadow Hand:
Bridging the Gap with the Simulation Environment Issac Sim

Problem formulation

Imitation learning for dexterous robotic hands, such as the Shadow Hand, faces significant challenges in transferring skills learned in simulation to real-world applications. Discrepancies between simulated and real environments can lead to performance degradation when deploying models trained in simulation. Developing a robust sim-to-real framework, supported by a tailored simulation environment, is essential for improving the transferability of learned manipulation skills to the real Shadow Hand.

Task definition

This thesis will focus on creating a sim-to-real imitation learning framework for the Shadow Hand, utilizing a simulation environment based on Nividia Isaac Sim designed to closely replicate real-world conditions. The research will involve designing and implementing a simulation setup that mimics the physical properties and constraints of the real Shadow Hand, followed by training imitation learning models within this environment. The effectiveness of the sim-to-real transfer will be evaluated by comparing the performance of the Shadow Hand in both simulated and real-world manipulation tasks, with a focus on accuracy, adaptability, and robustness.

You shall offer

- Solid knowledge base and experience in deep learning, and robotics.
- Coding skills in Python and C++.
- Experience with ROS
- Experience with Simulation is 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**.

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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.