Bachelor's / Master's Thesis (m/w/d)
Imitation Learning for Dexterous Manipulation:
Utilizing Latent Space Representations in Dynamic Movement Primitives

Problem formulation

Dexterous manipulation in robotics requires learning complex motor skills, which is challenging in open-loop systems due to the lack of feedback mechanisms. Traditional methods, like Dynamic Movement Primitives (DMPs), are effective for encoding movement patterns but often struggle with high-dimensional action spaces. Leveraging latent space representations could address these challenges by simplifying the action space, making it more manageable for open-loop imitation learning.

Task definition

This thesis will focus on developing an open-loop imitation learning framework that integrates Dynamic Movement Primitives (DMPs) with latent space representations for dexterous manipulation tasks. The research will involve designing and implementing algorithms that encode high-dimensional action spaces into more compact latent representations, improving the system's ability to generalize and execute complex manipulation tasks. The performance of this approach will be evaluated through a series of experiments, measuring the effectiveness in terms of accuracy, robustness, and adaptability to different manipulation scenarios.

You shall offer

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

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.