We are offering a

Master's Thesis on Task-Parameterized Probabilistic Velocity Policies

at the Chair of Prof. Alin Albu-Schäffer (Sensorbased Robotic Systems and Intelligent Assistance Systems) in the *TUM School of Computation, Information and Technology.*

Velocity policies, i.e. probabilistic mappings from state to a velocity command allow to model a wide variety of robot motions. They can encode multimodal behaviors, e.g. to move around an object on both sides. Usually, they, however, depend on one fixed coordinate system which makes their adaptation to different problems with varying object positions complicated.

Task-parameterized methods allowing to model such coordinate system dependence are widely used with position-based fixtures. By explicitly taking task coordinate systems into account, trajectories can be modified to suit the current task. The aim of this thesis is to leverage this theory to create task-parameterized velocity fixtures which can be adapted based on these task parameters.

Your tasks:
- Literature research on task-parameterized models,
- adaptation of the approach to probabilistic velocity policies,
- integration of the approach into the existing teleoperation framework,
- extensions of the method, e.g. improving the fusion with position-based fixtures,
- evaluation of the method.

Requirements:
- Master's student in Robotics, Informatics or closely related
- Good knowledge about foundations of robotics (Rigid body transformations, kinematics, etc.)
- Good knowledge of Probabilistic Machine Learning methods
- Strong programming skills in Python 3 and C++
- Familiar with development on Linux operating systems
- Experience with Git, CI/CD pipelines

Helpful Skills:
- Experience with robotic systems
- Knowledge of real-time programming

The thesis will be carried out at the Institute of Robotics and Mechatronics at the German Aerospace Center (DLR).

If you are interested, please send your complete application (CV, letter of motivation, transcript of records) to Maximilian Mühlbauer (maximilian.muehlbauer@tum.de). Please do not hesitate to contact us in case of questions.