

Creating a trajectory control for an ULW robot

Make the robot move fast

Robot Systems Group
Laboratory for Product Development and Lightweight Design



Figure 1 The ULW-Robot Doro

Project Description: This project focuses on the development and implementation of a low-level cascaded control architecture for an ultra-lightweight robotic system. The objective is to design a robust and efficient control framework that enables accurate motion execution by combining nested velocity, position, and trajectory control loops. Starting from the dynamic characteristics of the robot, the student will investigate suitable control strategies, derive the required models, and implement the controllers within the existing software and hardware environment. Particular attention will be given to the interaction between the individual control layers, trajectory tracking performance, system stability, and real-time execution constraints. The work includes the design, implementation, and validation of the control system through simulation and experimental evaluation on the physical robot. Depending on the candidate's background and interests, the thesis may also explore advanced topics such as feedforward compensation, disturbance rejection, trajectory generation, or optimization of controller parameters. The project offers the opportunity to gain hands-on experience in robotics, motion control, embedded systems, and mechatronic system development while contributing to the performance and capabilities of a novel ultra-lightweight robotic platform.

Desired Skills: The project is well suited for students with a background in mechanical engineering, electrical engineering, robotics, mechatronics, or a related field. Basic knowledge of control engineering and programming is expected, while prior experience with embedded systems and microcontroller programming is highly desirable. Experience with C/C++ or similar development environments is beneficial. Since the work involves implementation and testing on a physical robotic system, an interest in practical engineering tasks and hands-on experimentation is essential.

Application Process: Interested candidates should submit their application via email, including a detailed CV and a current transcript of records. Please send your applications to the Email mentioned below. We look forward to reviewing your background and discussing how you can contribute to this innovative project.