



Development of a Mobile Mini-Robot

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In this project, a mobile mini-robot will be designed, built, and tested as a development and training platform. Starting from an existing robot concept, an independent, mechanically and electrically robust variant will be created that can be reproduced cost-effectively – with material costs under €1,000 per unit. The robot features an omnidirectional drive with four Mecanum wheels, a rechargeable power supply with multiple on-board voltages, and a powerful single-board controller with active cooling. A 360° LiDAR is integrated for environment sensing; a depth camera can optionally be added. The robot is operated either via Bluetooth controller or a browser-based web interface on a tablet.

Work Packages

- Design of the mechanical structure (multi-deck aluminum frame, component mounting with low center of gravity)
- Selection, procurement, and electrical integration of components (drive, power supply with DC-DC conversion, charging concept)
- Commissioning of the motor controller and omnidirectional drive (Mecanum wheels, modular driver boards)
- Integration and testing of sensors and output devices (360° LiDAR, display, speaker, optional depth camera)
- Implementation of user interfaces (Bluetooth controller, web interface, data recording to external storage)
- Documentation for reproduction and cost analysis for later series production

Requirements

- Interest in mobile robotics and hands-on system integration
- Basic knowledge of electrical engineering (circuit design, power supply)
- Basic CAD knowledge
- Basic programming skills (Python or C++ helpful)

This topic can be completed as a **project work** (4 students, approx. 4 months) subject to agreement.

Mobile Robotics Lab

Supervisor: Prof. Dr. Christian Pfitzner

E-Mail: christian.pfitzner@th-nuernberg.de