Friedrich-Alexander-Universität
Institute of Autonomous Systems
and Mechatronics | ASM

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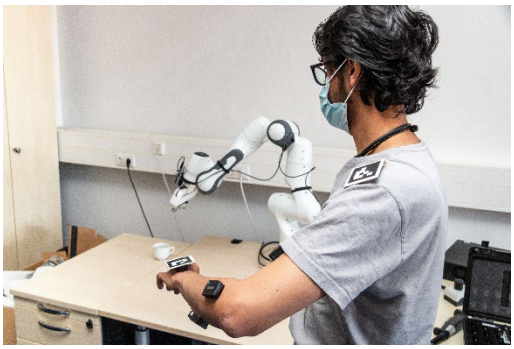
Masterarbeit

Design and development of a real-time electromyography-based framework for telemanipulation of robotic arm-hand systems



In recent years, the number of robotic devices used in service and clinical applications has drastically increased. As a result, there is a need for new human machine interfaces that will allow the users to operate such devices in a more intuitive manner. Traditional interfaces like joysticks and mechanical buttons have been widely used, but they offer limited functionality. An alternative is to control such devices using Electromyography (EMG) based interfaces that offer an intuitive operation (Artemiadis, 2012) (Dwivedi, 2021). EMG-based systems can also allow for hand-free interaction with robotic devices or computer applications. In this work, we propose development of data acquisition framework for real-time processing of EMG signals for the control of a robot arm-hand system.

Arbeitsauftrag

- Implement real-time EMG data acquisition with ROS
- Setup the robotic arm to be controlled through ArUco markers
- Modify the neural network for hand gesture classification to control the robotic arm gripper in real-time
- Execute initial tests to prove the functionality of the system.

Anforderungen

- Studium der Mechatronik, Medizintechnik, Elektrotechnik oder Computational Engineering
- Programming experience with Python
- Knowledge in ROS would be beneficial

Verweise

Artemiadis, P. (2012). EMG-based robot control interfaces: past, present and future. *Advances in Robotics & Automation*, S. 1-3.

Dwivedi, A. S. (May 2021). A Shared Control Framework for Robotic Telemanipulation Combining Electromyography Based Motion Estimation and Compliance Control. *2021 IEEE International Conference on Robotics and Automation (ICRA)* , S. 9467-9473.

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