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Wrist-Mounted Feedback System: Monitoring Force and Torque in Six Degrees of Freedom

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Abstract

This project developed a wrist-mountable, six Degrees of Freedom (DoF) feedback system that monitors force and torque. This system is designed to be used by nontechnical operators to correct movements of a paralyzed arm under the control of a functional electrical stimulation (FES) neuroprosthesis. The resulting corrections are recorded and processed by additional programs so as to improve the accuracy of future movements controlled by the FES system. The feedback system was tested on a robotic arm that is programmed to simulate a paralyzed human's arm. These tests checked the sensor for accuracy, reliability, durability, ease of use, and stability.

After production and testing, the feedback system was found to be durable enough to repeatedly withstand the forces of moving the robotically simulated paralyzed arm. The system was considered easy preform corrections with by testers after having minimal to no prior instruction and can readily record forces and torques input during the correction process, accurate within $\pm 1N$.