Measuring Muscle Activation with the HRX-1 Wrist Manipulation Robot

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There is a clear need for an affordable, research-grade torque feedback robot with high torque output, precise data logging, and easy integration with biosensors.

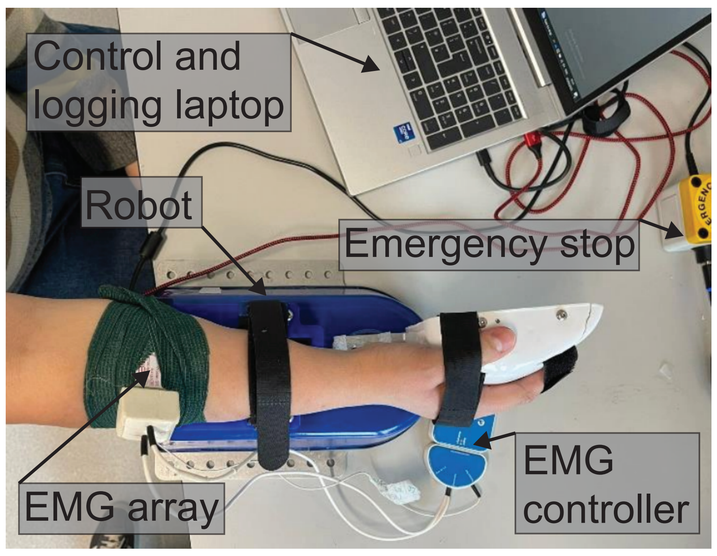
The HRX-1 is a sub-$12,000 1-DoF robot which has been demonstrated in a variety of research contexts.

Here, it is integtrated with sEMG to measure muscle activation under torque feedback.

Measuring Muscle Activation

The HRX-1 and a pair of 32-channel HD surface EMG electrodes were connected via MATLAB.

15 adults flexed and extended their wrists under torque resistance from the robot.



Affordable Haptic Robots

Haptic force/torque feedback robots have uses ranging from biomechanics research to teleoperation. A typical haptic robot can cost >$50,000.



The HRX-1 is a single-DoF haptic robot with 4Nm peak torque output, 0.05° positioning resolution and an 11.3Nm capacity torque sensor costing less than $11,500.

Results

When integrated with the surface EMG system, the HRX-1 provided reliable data acquisition during a typical biomechanics/ nerromechanics task.



Applications



FES/EMG



Clinical neuromechanics

Haptic rendering

Ankle / elbow

Funding and Support

REHYB

FHealth

Links

Read the full paper

Robot datasheet