Collection and analysis of healthy control data with the ETH MIKE

Semester Project / Internship

What are the healthy norms for the robotic outcome measures?

Abstract

ETH MIKE is a robotic device for somatosensory, motor and sensorimotor assessment of hand function in stroke patients, developed at RELab. The aim of this project is collect and analyse the control data from neurologically intact participants. This will allow us to determine the healthy norms for the device and compare them to the patient data, collected by our clinical collaborators.

Description

Background

Stroke is one of the leading causes of disability worldwide. Stroke survivors often suffer from impaired motor and/or somatosensory hand functions, affecting their independence and quality of life. The severity of these impairments is typically quantified with clinical assessments, which are subjective and imprecise [1]. We are proposing a robotic solution for rapid and quantitative assessment of hand sensorimotor function. Such technology-driven approach will help to better track patient’s progress during recovery and design patient-specific therapies.

Two versions of the robot are currently undergoing clinical trials in several neurological clinics in Europe. We would like to collect and analyse the control data with age-matched neurologically intact controls here in Zurich. This is very important for us to understand the healthy norms and compare them to the patient data.

Robotic proprioceptive, motor and sensorimotor functions assessment

ETH MIKE is a robot for the assessment of the metacarpophalangeal (MCP) joint of the index finger. It can assess proprioceptive functions through a gauge position matching task [2]. It can also assess motor and sensorimotor function through tasks such as range of motion and trajectory following.
Goal

The first part of the project will involve preparation and execution of the data collection with healthy participant. That will mean preparation of all documents (study protocol, agreement forms), recruitment of participants and conducting the experiments.

The second part of the project will involve analysis of the collected data in order to establish healthy norms. They will then be compared with the data of the stroke subjects in order to understand the differences between the two groups.

Tasks

- 20% Literature review on state of the art hand sensorimotor assessment (comparison of clinical and robot-assisted methods)
- 40% Experiment preparation and data collection
- 30% Data analysis
- 10% Report, Presentation

Requirements

- Interest in data analysis and statistics
- Enthusiasm for clinical applications of robotics
- Experience in MATLAB programming

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References
