

Building MONA, a Measurement Device for Random Arm Movement Capture

Internship for Master Student

Contacts

Please, reach out to both of the following people if you are interested in joining us as an intern at the *Chair of Healthcare and Rehabilitation Robotics* (Department of Informatics):

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Project Abstract

As part of a data collection effort for upper limb movements of motor-neuron impaired subjects (e.g., certain multiple sclerosis patients, stroke patients, and patients with ALS), our group seeks to build a device, called MONA, designed to capture experimental participants' upper limb movements in a random controlled manner, by predetermining starting and ending points of the movement, as well as an isometric hand position (excl. wrist) held during the movement. The device can be set up in the X-Y plane (i.e. a "wall"), as well as the X-Z plane (i.e. a "table").

Background and Motivation

While several assessments provide measurements about hand functionality and manual dexterity, a device that could track upper limb movements, while still providing a physical constrain to the movement, doesn't yet exist. MONA's design is based on the observation that during Activities of Daily Living (ADL) the hand often remains in an isometric contracted position (excl. wrist) while the other degrees of freedom of the upper limb are used to execute a movement with isotonic contraction.

Task Description

Part of your internship will be to closely collaborate with the other team members, as all of your works have many interdependencies. We will provide co-location spaces and amenities for an optimal collaboration. The tasks for this project are to (1) optimize the CAD design of MONA, based on interviews with rehabilitation robotics experts, physicians and production cycle iterations; (2) Rapidly prototype MONA at the MakerSpace in Garching (using e.g. 3D printers, CNC wood milling machines after an introduction), (3) program the software of MONA in the Arduino IDE and establish a link to a data lake at the LRZ for long-term storage of data; (4) Validate MONA's functionality through tests with able-bodied subjects at TUM. *Optional step: develop and integrate a visual motion tracking module.*

Technical Requirements

The intern needs to be familiar with the Arduino IDE, ideally having worked with inertial measurement units (IMUs) as part of it. She/he must also demonstrate experience using CAD software, such as SolidWorks or Fusion360. Experience in building and validating medical equipment is of benefit.