Fabric-based sensors for wearable applications

Recent technological advancements have enabled the creation of portable, low-cost, and unobtrusive sensors with tremendous potential to alter the clinical practice of rehabilitation. **The application of wearable sensors to movement tracking has emerged as a promising paradigm to enhance the care provided to patients with neurological or musculoskeletal conditions.**

The challenge is that these sensors are currently poorly integrated in wearable devices and can cause discomfort to the user. Additionally, the quality of the data has to be improved to extract relevant therapeutic information and actionable data.

A possible solution is to **introduce the sensors directly in elastic fabrics**. This can be done via screen printing, the same technique used to create images on T-shirts.

There are many different sensors that can be integrated into such fabrics, such as near-infrared spectroscopy (NIRS) and electromyography (EMG). The first step in your thesis will be to set a list of desired outcomes and expectations and to analyse which sensor modalities will provide the best solution.

One of the objectives is to achieve good skin to electrode contact and integrate the right mix of sensors. After doing so, you will develop basic machine learning algorithms to translate the raw data from your wearable sensor into relevant therapeutic information, such as, classification of motions performed by the wearer, maximal grip force, range of motion, level of fatigue, etc. Finally, you will evaluate your design on a test audience.

During this project, you will be able to investigate the whole process from sensor design, fabrication to testing in a human-robot interface.

Interested? Do not hesitate to contact us for more information.

Prerequisites: C++, Python, Matlab

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