Title (tentative): Development and testing of a low-cost and wearable tactile stimulation system to train and enhance proprioception

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Description

Motivation and application domain
Neurological diseases often result in somatosensory deficits and motor impairment. Somatosensory deficits include impaired sensations of limb position and movement; cutaneous and deep mechanical pressure and vibration; muscular effort. Most current research and clinical efforts related to stroke rehabilitation focus on motor retraining despite recent literature suggesting that somatosensory retraining is a viable behavioral therapy for improving impaired motor functions.

General objectives and main activities
The thesis project aims at developing and testing a low-cost, wearable tactile stimulation system to train and enhance proprioception.
The project is inspired by the skin stretch technology, but the new system will be designed with the above-mentioned goal. The student will design the mechanical structure, will program the control system, and will test the device with a group of healthy subjects developing the experimental set-up and protocol.
If possible, preliminary data will be collected with chronic stroke survivors.

Training Objectives (technical/analytical tools, experimental methodologies)
The student will learn
1. Designing, building and controlling a robotic system (CAD…)
2. Testing and calibration procedures
3. Mixed software skills (C/C++, matlab, microcontroller programming)
4. Touch sensing applications in haptics and robotics

Place(s) where the thesis work will be carried out: Neurolab, Dibris, Unige Biomedical Robotics Lab, Department of Biomedical Engineering, Ben-Gurion University, Israel (if possible)

Additional information
Pre-requisite abilities/skills: Programming skills in Matlab; Interest in developing microcontroller-based technology. Some basic circuit building skills.

Maximum number of students: 1