This project is being conducted within PROTOTOUCH, a European Commission Seventh Framework Project. The project aims to develop a new generation of tactile displays that will re-create the perception of touching shapes and textures. In order to achieve that goal, knowledge of the how texture information is transmitted and coded by the mechanoreceptors and the nervous system is essential. In the physiological part of the project, we will modulate tactile stimuli in order to extract the most relevant features of the sensation of touch (active touch, passive touch, normal force modulation, proprioceptive modulation). We will start by evaluating everyday textures. At a later stage of the project, the stimuli will be generated by TDs developed by the partners. Our aim is to understand how physical characteristics influence the perception of textures and to evaluate the performance of TDs at replicating these characteristics. Central neural coding will be investigated through new approaches that isolate and characterize the cortical activity elicited by the mechanical interaction between the contacting finger pad and textured surfaces. Specifically, we examine whether the sustained cortical activity generated by the mechanical interaction between the finger pad and a grating texture can be captured in the form of a steady-state evoked potential (SS-EP) in the EEG signal. During the recording, passive scanning of the right index fingertip across three aluminum gratings whose spatial period (SP) is between 0.4 mm (smooth surface) and 1.6 mm (rough surface). The movement of the gratings is achieved using a robot with feedback force sensors (Figure 7). A constant normal force (1.5 N) and two constant exploration velocities were used (v1 = 1.76 cm/s, v2 = 4.80 cm/s). Depending on the SP, we expect that these dynamic stimuli will elicit SS-EPs at frequencies ranging between 11 and 120 Hz and, possibly, their harmonics.

SELECTED PUBLICATIONS


