O50 Attribution of somatosensory properties to an upper limb prosthesis

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Abstract

The nervous system is a complex network composed by cells, tissue, and organs that have the ability of receiving, transmit, regulate, and send information and stimuli, not only within our body but from our surroundings[1]. This information is produced by a complex system of neurochemical and electrical reactions that produce the perceptions of heat, smell, taste, proprioception, and touch that lead to physical reactions (movement)[2]. When that transmission of information is lost due to malformations or accident, there are several physiological responses that will either be lost or try to find new pathways to function and make sense out the current situation. Bringing the division of this work into three phases. The first phase, the production of the prosthetic model by 3D printing (Fig. 1a), reducing the time-consuming production of the different parts by changing production characteristics like infill, layer height, surface quality, ironing and type of material used. The second phase, the instrumentalization of the prosthetic (Fig. 1b) focussing on allowing it to function by controlled and regulated force execution, with low-cost servomotors and components, with easy access to replacement. The third phase, the construction of the sensing mimicking, add-on sensory system using piezoresistive sensors attached to the palm side of a glove on specific regions that allowed not only the location and detection of the forces being exerted, but also their quantification (Fig. 1c). The type of instrumentalization planning used on the sensory glove, allow an easier access to the sensors and other components, making it quite to replace or to adapt . Overall, the results produced were very promising, and better than expected, allowing not only the localization and measurement of force, and analog read for each sensor without too much signal interference, but also a better access and cost reduction prototype.

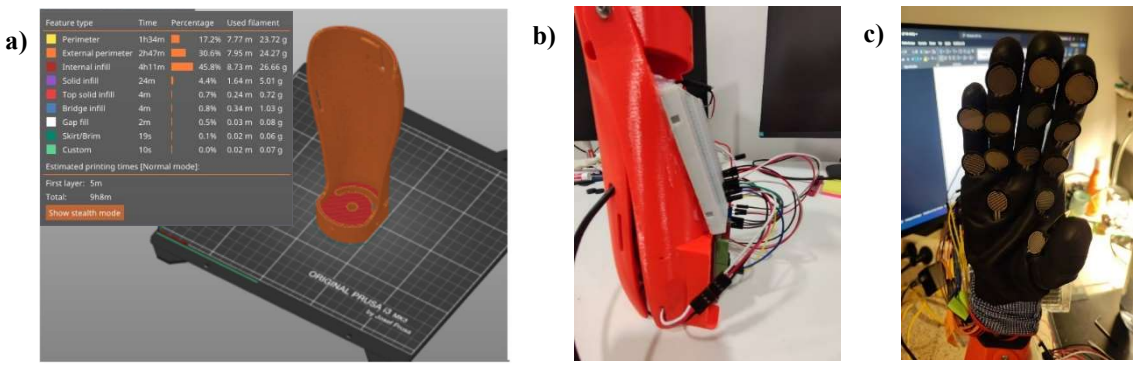

Figure 1. a) Visualization of the 3D model and the production settings; b) Model produced with prosthetics instrumentalization; c) Instrumentation of sensory glove with sensors assembly in strategic positions.

References

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