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VIRTUAL EVENT

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TOPIC: Breaking down barriers to clinical uptake of VR

An Affordable, Wearable Virtual Rehabilitation Setup

Sierotowicz, Marek, 1,2, Castellini, Claudio, 1,2
1: Friedrich Alexander University, Erlangen, Germany; 2: German Aerospace Center, Wessling, Germany

IImmersion in a Virtual Reality (VR) environment has recently been proposed as a possible way to treat phantom limb pain by showing amputees an avatar of their missing limb. Most notably, sEMG-based machine learning has successfully been used to implement a VR-simulation showing an amputee a virtual hand, which can be controlled by performing muscle contractions. Such setups often use off-the-shelf hardware, which can still be relatively expensive for an average consumer, and the use of which is typically limited to a restricted space determined by optical equipment used to track the user's position in space.

However, the diffusion of cheap and accurate MEMS IMUs presents us with the possibility of reliably monitoring the user's body pose without the need for any optical equipment. Furthermore, self-contained sEMG sensors, together with computationally efficient intention-predicting algorithms can run hand motion prediction on a smartphone, which can also work as a VR display.

In this study, we introduce an Android-based prototype virtual rehabilitation setup, consisting of a few wearable sensors, allowing a user to experience most of the functionalities offered by other such simulations, while being completely wearable and self-contained thanks to IMU-based body tracking. The overall hardware cost is considerably lower than the average VR setup thanks to the usage of a commercial smartphone.

Such a prototype goes in the direction of making virtual rehabilitation, especially for amputees, broadly available, both within a domestic environment as well as outdoors.