

Title: **VVITA – Validation of the Virtual Therapy Arm**

Authors: M. Nowak, C. Nissler, B. Weber, M. Schäfer, C. Castellini

Presenter: M. Nowak

Affiliation: German Aerospace Center, Institute of Robotics and Mechatronics

E-mail: Markus.Nowak@dlr.de

### **Abstract**

Phantom Limb Pain (PLP) occurs in 60-85% of cases [1] where people suffer from upper-limb impairment. To treat PLP we developed the Virtual Therapy Arm (VITA). The system has been tested with able-bodied and impaired subjects and is based on our experience and research in prosthetic hand control [2-4]. We have transferred our machine learning based control algorithm to Virtual Reality (VR) in order to control a virtual hand. A prerequisite for successful PLP treatment is a high level of immersion. To achieve this we deem the following properties important: intuitivity, proportionality (the ability to modulate the force level) and interactivity (the ability to updating the control algorithm at any given time). Furthermore, we believe the same methods can be transferred to stroke patients, e.g. people suffering from neglect.

In this work we propose the validation of the functionality of the VITA System. We planned and developed a multicentre study involving rehabilitation centres specialised in treating amputees and stroke survivors. We will provide each centre with a VITA setup, which will be used in rehabilitation sessions. The specific scenarios in VR will be developed in close cooperation with rehabilitation experts and VR designers to ensure a purposeful implementation. Over the period of one year we will monitor the rehabilitation progress of the patients comparing it to the progress using conventional approaches. Through the

feedback from not only the rehabilitation expert and physician, but also the patients we expect a successful and effective treatment for manifold applications.



**Figure 1** The VITA Prototype; used by an able-bodied person

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