Effects of reintroducing haptic feedback to virtual-reality systems on movement profiles when reaching to virtual targets

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ABSTRACT

Virtual Reality (VR) has been shown to have significant impacts on the efficacy of rehabilitation, improving a patient's motivation and participation, as well as improving scores in functional assessments when used to enhance traditional therapy. However, movements in VR have been demonstrated to have significant differences in movement profiles whilst performing simple reaching tasks compared to their real counterparts. The lack of tactile perception in VR systems is often attributed to be one of the causes of these differences. Therefore, to investigate the degree to which the lack of haptic feedback impacts movement profiles in VR, we have reintroduced the sense of touch through vibration motors on the fingertips. Participants were required to reach to virtual targets, both with and without haptic feedback. Their movements were quantified using motion capture, and the virtual targets were rendered using the Oculus Rift. The motions to both targets were compared using a number of measures to characterize the velocity profiles. Preliminary results suggest that the reintroduction of haptic feedback improves performance based indicators in virtual reaching tasks, such as the time to complete a reach, and the stability of the reaching hand whilst touching the virtual target.