

Real-time Auditory Biofeedback System for Learning a Novel Arm Trajectory: A Usability Study

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There is increasing interest in employing immersive virtual reality or augmented reality and wearable technology to provide real-time motor performance feedback during rehabilitative arm exercises. Biofeedback systems have been shown to improve motor error, fluidity and speed, whilst increasing patient engagement and motivation to persevere. Preliminary research on using sound to provide performance feedback has shown it can provide spatiotemporal information in a motivating and engaging way. This research presents a proof-of concept auditory biofeedback system that provides error corrective sonification of the arms spatial orientation and acceleration throughout a reaching task in order for users to learn and follow a novel trajectory. Evaluation Method: 7 healthy participants (3 Male, 4 Female) from a healthcare background completed the reaching task whilst using the auditory biofeedback system, both blindfolded and with full vision. Using a System Usability Scale (SUS) study, a quantitative score on the systems usability was calculated. Results: The mean SUS score was 74.64 (standard deviation = 12.28), indicating that the prototype provides an above average usability score (Avg. across 5000 surveys = 68). This research concludes that further investigation into the concept within a clinical environment as a tool for upper arm stroke rehabilitation, is recommended.

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