Abstract

For many years, self-measurement and constant monitoring of health condition is very important for people with cerebral embolism or Parkinson's disease. With the increasing cases reported on people with stroke due to cerebrovascular disease, there is still no device available to provide a simple and rapid screening whether patients have symptoms of cerebral embolism. This study presents a fast assessment method that integrated microcontrollers, inertial measurement units, Bluetooth and mobile APP for users to self-examine their cerebral embolism. We design a rehabilitation monitoring system based on the sensor devices which comprise of a self-detecting device for cerebral embolism and rehabilitation system for measuring Parkinson's disease. Self-detecting device for cerebral embolism has three effective examination modes. Currently, Lee Silverman Voice Treatment Big (LSVT BIG) method is most commonly used to help patients with Parkinson's disease, which has a set of exercises with the intention of improving quality of life. However, there is no digital system in place to evaluate the effectiveness of the rehabilitation.

To solve these problems, we developed a set of nine-axis sensors with an innovative APP system to effectively record, track and assist patients with rehabilitation. The sensors are placed on ten body parts to measure posture and to calculate angles of various movements. The measured data will be integrated onto Unity 3D gaming platform. The 3D character will instantly show the patient's gestures, allowing all personnel involved (the patient, the physician, family members, and professional therapists) to gauge the effectiveness of the proposed treatments and to make adjustments accordingly.

Conclusions: 1. A sensor-based rehabilitation system for PD was developed. 2. The system combined with Unity 3D animation to enhance amusement, to promptly remind the next course, to adjust the exercise, to record the rehabilitation progress, time, angles and other information. 3. An APP replaces the paper-based method, alerts patients rehabilitation time, etc.