Experiment and Analysis of Computer Vision-Based Wrist Radial and Ulnar Deviation Exercises

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***Abstract*— The exercise and rehabilitation based on computer vision system have many benefits and it has attracted the interest of researchers in the computer vision community. The researchers have kept on improving the existing methods by creating novel method or developing new algorithms in image processing and artificial intelligence. This paper presents the experiment and analysis of wrist radial and ulnar deviation exercises system based on computer vision method. These exercises are a part of the upper limb exercise for the rehabilitation program. The wrist radial and ulnar deviation exercises are benefited to improve the mobility of the hand and to reduce the pain. The hand tracking, center of palm detection and fingertips detection and Kinect sensor are used in this exercise system. This system guides the user to perform the radial and ulnar deviation movements through the user's display window. The deviation angle of each movement is measured and recorded automatically. The experimental result shows that the average deviation angle for five users in wrist radial and ulnar deviation experiment is 23.4° for the radial motion and 35.8° for the ulnar motion. These measurements are almost similar to the reference value of range of motion (ROM) standard.**

***Index Terms*— rehabilitation; hand tracking; 3D data; Kinect sensor; wrist.**

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