

Robotic Rehabilitation System for Recovery of Lower Extremity

Taisuke Sakaki

Faculty of Engineering, Kyushu Sangyo University

In Japan, over 1,400,000 people have rehabilitation of stroke. Gait training for stroke patients with severe gait disturbance is a difficult problem and the cause of much physical labor for a physical therapist. In order to solve those problems, Yaskawa Electric Corporation has developed a rehabilitation system for recovery of lower extremity as a gait training robot, under support of the New Energy and Industrial Technology Development Organization (NEDO) and the co-operation of University of Occupational and Environmental Health, (right figure, below) with an experience of development of the basic training robot. (left figure, below) The NEDO robot provides training to patients with assisting motion by four robotic manipulators which drive patient's lower extremities, simulating walking motion pattern.

The research aim was to confirm whether the gait training robot is applicable for stroke patients with severe gait disturbance, and to reveal its advantages and disadvantages in clinical use. In the experiments, three stroke hemiplegic patients with severe gait disturbance trained with the robot 20 minutes a day, 5 times a week for 4 weeks, and other training except gait was performed routinely. Severity of hemiplegia, muscle strength of the quadriceps, gait speed, and state of gait were subjectively and objectively evaluated. The experimental results show that the gait training by use of the robot accelerates the recovery of muscle strength, gait speed and so on of stroke patients with severe disability. However, the robotic system needs more development on some usability such as transfer and set up of patient.

Although the rehabilitation robot needs further study and evaluations, we believe that it is applicable for gait training of stroke patients with severe gait disturbance.

Keywords:

Manipulator: mechanical arm.

Hemiplegia: disease caused by stroke with the half part of the patient's body paralyzed.



Basic training robot, Yaskawa Electric Co. Gait training Robot, NEDO