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Gait analysis assisted by robotic walker in patients with post-stroke hemiparesis

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Stroke is the leading cause of motor dysfunction in adults worldwide. The motor impairment, characteristic of a post-stroke patient, is the hemiparetic gait. This paper proposes a gait analysis assisted by a robotic walker in patients with post-stroke hemiparesis. The test group will have two categories: the first consisting of healthy subjects, and the second one by subjects with post-stroke hemiparesis. Both groups will perform an initial trajectory without the aid of a walker, and another one with its assistance. This route is a straight line, in a flat ground. After training with the walker, volunteers participating repeat the trajectory using the device. The robotic walker is equipped with 3D force sensors in the forearm support, which can confirm the correct weight applied to it. It also can deduce the subject's movement intentions, through the efforts made by his/her upper limbs. Spatio-temporal parameters of gait using inertial sensors will be analyzed. These sensors will be placed in specific points of the subject's legs, and a laser scanning sensor will be located in the center of the walker in order to get distances to the legs. Electromyography (EMG) electrodes will be also placed on the subject's legs to evaluate the muscle activity and energy consumption during the gaits. After analyzing the data, the results will be compared between the two groups and between the gaits before and after the training. The results might be useful for the process of rehabilitation of post-stroke patients, and in normal and hemiparetic gait.