

ABSTRACT

An unhealthy lifestyle and an unbalanced diet are the main factors for stroke, which is the main cause of death in almost all hospitals in Indonesia. The purpose of this study is to develop a low-cost, open-source exoskeleton arms using a servo motor based on electromyography (EMG) signal control with the elbow joint angle estimation. The main advantages of this proposed method are the low-cost, lightweight and simplicity of controlling the exoskeleton arms using only single channel. The development of exoskeleton arms consists of the mechanical design of the exoskeleton arm, active electrodes, microcontroller, servo motor and GY-521. This is achieved by collecting an electromyography signal (EMG) from the triceps to evaluate the DC motor resulting in an estimated angle reading by the GY-521. Furthermore, the A / D converter on the ESP32 microcontroller converts the analog signal to digital. The servo motor controls each arm movement for motion flexion and extension and the GY-521 will automatically read the estimated angle of the elbow joint. The largest RMSE value is 10,16°. In addition, the RMSE value gets the lowest value of 4,93° and the average RMSE value is 6,88°. This research has demonstrated the design of an exoskeleton field that is low cost and open source at an affordable and low cost. This proposed method is able to compensate for the angular correlation to the EMG signal.

Keyword: *EMG, Myoware, Elbow joint angle estimation, ESP32*