ABSTRACT

The human hand is one of the most frequently used parts of the body's anatomy. For some jobs, hands are valuable assets. The good and bad performance of human hands is heavily influenced by the good control and coordination of the nerves and muscles. In other words, without good control and coordination between the nervous system and the muscles, the hands cannot be controlled as they should. Unfortunately, not all humans are blessed with healthy hands. Various things ranging from diseases such as strokes, paralysis, to the results of amputations due to disease also cause human hands to lose their main function or even totally unusable.

This research aims to make an artificial arm that can be controlled based on EMG signals for people with disabilities. EMG signal readings are done by attaching electrodes to specific points of the pronator teres muscle in the forearm area. The results of the obtained muscle activity will be captured in the form of an EMG signal to then be processed until it reaches a certain reading frequency range for the captured signal. After reading, the signals will then extract characteristics that are used as parameters to conclude the movement obtained using the K Nearest Neighbor (KNN) algorithm in MATLAB and then continued by serial communication with the microcontroller to move the prosthetic arm.

Through this research, the writer obtained 76.7% accuracy on the value of K = 3 based on the results of KNN training with Classification Learner in MATLAB. However, through predictions with the new test data the writer could only get 50% accuracy. This can be caused by various things such as the hidden muscle location, the area of muscle detection, and the measurement for Euclidian Distance on KNN in MATLAB which also carried out evenly against fellow training data, causing the calculation of the distance between the neighboring data to be too close.

Keywords*: nervous system, signal, EMG, prosthetic arm, serial communication, disabilities, KNN, Euclidian Distance.*