

UNIVERSITI TEKNOLOGI MARA

**CLASSIFICATION OF HAND
GESTURES FROM EMG SIGNALS**

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ABSTRACT

The quality of life has greatly improved in the recent years due to the use of robotics. Amputees require smart prosthetic devices that are easy to use in everyday life. To make these prosthetic devices one has to interface with the end user seamlessly in a reliable yet reducing cost. Hand gesture recognition is the process of detecting the gestures performed by hand at any given time. Surface EMG signals are used to detect hand gestures and signal them as input module in developing prosthetics for rehabilitation and human machine interaction. This study is to develop classification model to classify six hand gestures using Artificial Intelligent algorithm. Data signal for different hand gestures such as wave-in, wave-out, fist, fingers spread, double pinch as well as relax, from 30 subjects age between 20 to 35 years old are obtained using Myo armband sensors. There are two hundred forty-eight features that are extracted from time domain and the frequency domain. Neighbourhood Component Analysis (NCA) are used as features selection technique has reduced the features to fourteen. The features are for developing classification models using three algorithms that include k-Nearest Neighbour (K-NN), Support Vector Machine (SVM), and Convolution Neural Network (CNN). 80% of the data used by the classifier is used for training while the rest 20% is used for testing. The outcome shows that classification model using K-NN algorithm with 14 features has the highest classification accuracy, sensitivity and predictivity of 97.99%, 94.77% and 92.95% respectively compared to other models from SVM and CNN. This developed model can be used in the future to integrate the EMG signals of amputees with the prosthetic hand. This integration will help on the development of control strategy of the prosthetic hand.

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