

ABSTRACT

Compressive Sensing (CS) is a new sampling method where signal acquisition and compression can be done at one time. CS introduces a sampling scheme in a lower number of required samples, where the sampling represents the original or newer sparse signal than the Nyquist sampling technique. CS can be applied to several forms of signals including one-dimensional signals such as the EMG sensor.

This final project implements CS on Electromyography (EMG) signal which consists of several types of sensors. The EMG signal acquisition process on the ESP32 and the reconstruction process on the Raspberry Pi. Compressed Sensing acquisition process for projection transformation using Gaussian distribution, sparsification transformation using Fast Fourier Transform (FFT) and for reconstruction using Orthogonal Matching Pursuit (OMP) technique. The reconstruction of the compressed signal takes into account the value, Mean Absolute Error (MAE), Mean Squared Error (MSE), and Signal to Noise Ratio (SNR).

The expected result from this research is that the compressed signal reconstruction can resemble the original signal by reducing the number of signal samples sent which are divided into several scenarios and can compare the EMG sensor on CS. The results obtained in the form of sending data by 40% of the sampling data can be used to return the data back to its original state with an MAE accuracy of 2.74 or 0.2% and SNR value of 70,120 dB obtained using a normalized Myoware sensor with the half-multiplication Gaussian value method.

Keywords: Electromyography, Compressed Sensing, Fast Fourier Transform, Orthogonal Matching Pursuit