

ABSTRACT

In medical expertise, Wireless Body Sensor Network (WBSN) technology is evolving. Electroencephalography or EEG is a device for monitoring humans' brain. In general, EEG has five channels; alpha, beta, delta, gamma, and theta. The channels on EEG are might yield a large data size hence compressed data is needed to ease data transmission while maintaining sufficient quality. Therefore, compressing is needed to transmit signal with finest quality. The research objective is to implement compression in order to implemented on micro-controller and also low error rate. This undergraduate thesis do not examine devices calibration, medical in detail, detail signals classification, and network.

In this undergraduate research is done by designing system with Compressive Sensing method. Compression Sensing has two steps, those are data acquisition and data reconstruction. In acquisition step, Toeplitz matrix is used as projection matrix and Fast Fourier Transform (FFT) is used as dictionary matrix. Within the reconstruction step Stagewise Orthogonal matching Pursuit is (StOMP) is used. In this research simulation is done first then implemented on Arduino Uno R3 and Raspberry Pi 3.

Signal reconstruction that has passed Compressive Sensing method is analysed with MAPE and MSE. The simulation shows with sample size 16, the lowest measurement rate with satisfactory result is in measurement rate 80% with score of MAPE 6.67% and MSE 3.49 with time computation 0.23 second . Next, the sample size 32, the lowest measurement rate with satisfactory result is in measurement rate 75% with MAPE 9.526% dand MSE 10.28 with time computation 0.3 second. The sample size 64 shows that with 80% measurement rate, appeared the MSE 9.0 and MAPE 8.81% with time computation 0.36 second. Following scenario (instrument simulation) at sample size 16 and measurement rate 80% shows score of MAPE 6.67% and MSE 3.49 with time computation 22.29 second. The next sample size 32 with measurement rate 75% shows MAPE 9.52% and MSE 3.8 with time computation 45.6 second. With sample size 64 and measurement rate 80%, the MSE 19.49 and MAPE 14.12% with time computation 225.81 second.

Key Word : Compressive sensing, electroencephalography, Fast Fourier Transform, Toeplitz matrix.