ABSTRACT

Electrocardiogram (ECG) is a disease that results from the electrical activity of the heart muscle. ECG signals have unique information on cardiovascular health. Measurements using an ECG may inhibit cardiac symptoms. However, measurement results using an ECG are often characterized by noise interference and can not be removed by simple filter methods.

In the denoising test in this final project, the authors used the method between *adaptive filter* and *empirical mode of decomposition* (EMD), and serial II method. The test was performed using matlab, the ECG signal dataset and some *noise* was taken from the MIT-BIH arrhythmia database with a 30 dB SNR input to be added to the ECG signal. Where adaptive filters use *KALMAN, Least Mean Square* (LMS), and *Recursive Least Square* (RLS) methods. While the *noisy* signal in the filter using EMD obtained the best results to-4, because if it is forwarded to the next iteration the output of the denoised result will be a flat signal. The test is done by giving 4 different noise that is *Additive White Gaussian Noise* (AWGN), *Baseline Wander Noise* (BWN), *Electrode Movement Noise* (EMN) and *Muscle Artifact Noise* (MAN) for each EMD method and *adaptive filter*.

Based on the test results, the best denoising performed by the *Empirical Decomposition* method for *Additive White Gaussian Noise* (AWGN) is with the value of MSE = 0.0015 and SNR = 25.1578 dB. As for best denoising done by *Adaptive Filter* method for *Additive White Gaussian Noise* (AWGN) is by LMS method with value of MSE = 0.000275 and SNR = 31.591166 dB.

Keywords: *Electrocardiogram* (ECG), *Empirical Mode of Decomposition* (EMD), *Adaptive Filter*