ABSTRACT

To achieve efficient watermark parameters in the embedding process there are three important characteristics, namely imperceptibility, robustness and capacity. However, there is a trade-off between these characteristics. In order to reduce the weaknesses and get benefit from each method requires the incorporation of techniques of the method.

In this final project, Watermarked Audio analysis has been done using wavelet transformation method Lifting Wavelet Transform (LWT), Discrete Sine Transform (DST), Empirical Mode Decomposition (EMD) and Compressive Sampling (CS) in watermark image. The embedding process is by Quantization Index Modulation (QIM) method and Statistical Mean Manipulation (SMM). In this method, CS has a function to compress the watermark image in order to have a simpler form before it is embedded into the audio host. LWT is a technique for deciphering signals into 2 sub-bands, namely low sub-band and high sub-band. After the LWT then performed DST process on sub-band 1 and EMD process on other sub-band. DST is used to convert audio signals from time domain to frequency domain. EMD serves to decompose an audio signal into a component of Intrinsic Mode Function (IMF) and residue. The process of inserting the watermark data into the audio host is done using QIM and SMM methods.

From this final project, has been obtained the result of audio watermarking system which produces good imperceptibility level from optimum parameter with mean value SNR = 26 dB, average value ODG = -3.127 and Capacity = 34.453 bps. This method also has robustness level is good enough with resistance to LPF attack, BPF, Resampling, Linear Speed Change and MP3 compression with the average value BER = 0.101. The average MOS value obtained from the survey of 30 respondents was 4.26.

***Keyword:** Audio Watermarking, Discrete Sine Transform (DST), Lifting Wavelet Transform (LWT), Empirical Mode Decomposition (EMD), Compressive Sampling, Quantization Index Modulation (QIM), Statistical Mean Manipulation (SMM)*