ABSTRACT

In this digital era, the exchange of information in the form of data often occurs on the internet. This raises the problem of copyright theft in data on the internet. The solution is watermarking, which is an attempt to insert information in secret on a data to give a sign of ownership.

This final project focus on audio as the host of the watermark and analyzes the quality of the audio watermarking system scheme designed using the Quantization Index Modulation (QIM) method based on Discrete Wavelet Transform (DWT), Discrete Cosine Transform (DCT), Singular Value Decomposition (SVD), and Cartesian to Polar Transformation (CPT), which is implemented on Raspberry Pi. In this final project, the author uses the DWT method to decompose the host audio signal by the frequency. Then, the DCT method will transform the host signal into the frequency domain. Afterwards, the host signal will be decomposed into 3 submatrices, namely the U, V, and S submatrices using the SVD method. Next, the S submatrix is chosen by the author to be transformed into polar coordinate values using the CPT method, so the values do not change by the amplitude scaling. Finally, the host signal is inserted with the watermark using the QIM method, so that the audio signal is resistant to attacks. The audio watermarking system scheme is implemented on the Raspberry Pi to make it more portable and practical.

The designed system, using 16×16 binary image as the watermark on 5 types of audio files while activing the attack-procedure, produced watermarked audio with BER as 0,1687 and SNR ≥ 20 dB. Data Payload with 1336,36 bps, and MOS ≥ 4. The designed audio watermarking system robust against attacks such as LPF, BPF, Resampling, Time Scale Modification (TSM), Linear Speed Change, Equalizer, MP3 and MP4 compression, Delay. For these reasons, the audio watermarking system is robust, imperceptible, and also has high capacity.

Keywords *: Audio Watermarking*, *DWT*, *DCT*, *SVD*, *CPT*, *QIM*, *Raspberry Pi*.