

## **ABSTRACT**

*The development of digital information technology and Internet has provided many convenience and freedom to the users, especially in publishing the works. However, the number of cases of copyright infringement that have occurred reflects that it is need a method that can be used to protect the copyright of the owner. One of method is by using watermarking method.*

*Audio watermarking is a method of hiding confidential data (watermark) into an audio host digital. The process of embedding watermark data is done in various ways so as not to damage audio files and can not be perceived by the sense of human. In this final project proposed an audio watermarking system with synchronization and hybrid transformation method Stationary Wavelet Transform (SWT), Fast Fourier Transform (FFT), and Singular Value Decomposition (SVD) methods with Quantization Index Modulation (QIM) method. First, the audio host signal is decomposed into several sub-bands using the SWT method. The output of the SWT process will be transformed using the FFT method to convert the signal in the time domain to the frequency domain. Furthermore, the selected sub-band is decomposed into a matrix form using the SVD method. To withstand some attacks, synchronization bits are inserted into an audio signal to know the initial position of watermark so that no error occurs when extraction. The process of embedding the watermark data into the audio host using the QIM method.*

*The results of this final project is an audio watermarking system that has a good imperceptibility and capacity with an average value of  $SNR \geq 20$  dB and  $C = 343,5313$  bps. The audio watermarking system using the synchronization method and hybrid of SWT-FFT-SVD also has a pretty good robustness that can withstand of several attacks such as LPF , BPF, resampling, MP3 compression, MP4 compression, AAC compression, speed change and delay with average value of  $BER = 0.159$ .*

*Keywords : Audio Watermarking, Synchronization, Stationary Wavelet Transform (SWT), Fast Fourier Transform (FFT), Singular Value Decomposition (SVD), Quantization Index Modulation (QIM)*