

## **ABSTRACT**

*The development of an increasingly rapid era creates the dissemination of data on the internet in the form of multimedia especially images which will be very easy to retrieve. Such multimedia data can be easily copied and misused by fraudsters without copyright. Robust watermarking technique is a solution to secure and maintain multimedia data information, especially images so that the embedded watermark will be difficult to remove and can be recovered even though it is changed by various types of attacks.*

*The designed system has two processes, the embedding process and the extraction process. Fast Discrete Curvelet Transform and Redundant Discrete Wavelet Transform methods are embed into the host image. Then the watermark is embed into the image by applying a Discrete Cosine Transform to the watermark, then the singular watermark value is entered into the singular value of the host image using the Singular Value Decomposition method. While in the extraction process, the watermark will be extracted to restore the image without damaging the host image.*

*In this research, the host image is grayscale with a size of  $512 \times 512$  pixels and a watermark in the form of binary data with a size of  $128 \times 128$  pixels. The results of the research obtained a maximum Peak Signal to Noise Ratio value of 71,7630 dB, a maximum Structural Similarity Index Metric 1, a maximum Normalized Correlation 1, a Bit Error Rate 0, and Capacity 0,0313 which means this scheme has good imperceptibility and robust. The proposed watermarking scheme can withstand JPEG compression attacks, Gaussian noise with variance under 0,001, salt & pepper with variance 0,001, speckle noise with variance below 0,003, Gaussian filtering, and rotation.*

**Keywords:** *Discrete Cosine Transform (DCT), Fast Discrete Curvelet Transform (FDCuT), Redundant Discrete Wavelet Transform (RDWT), Singular Value Decomposition (SVD), Watermarking*