

**Final Year Project Report**  
**Digital Image Fortification with Digital Watermarking**



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## Dedication

**“Read in the name of your Lord who created,  
Created man, out of a (mere) clot of congealed  
blood, Read, and your Lord is the most Generous,  
Who taught by the pen, Taught man that which he  
knew not.”(Holy Qur’an 96:1-5)**

**“The most learned of men is the one who gathers  
knowledge from others on his own; the most worthy of  
men is the most knowing and the meanest is the most  
ignorant”. Holy Prophet (ﷺ) Sallallaho Alaihi Wa’Sallam)**

**This dissertation is dedicated to our parents and  
teachers who have supported us throughout our life in  
order to build our moral, ethical and cultural personality.  
They stood by us in good and bad times. With their  
motivations we are now effective enough to put forward  
new solutions in order to serve our nation and humanity.**

**In other words nothing was possible without the  
help of our family and guidance of our beloved teachers.**

## Final Approval

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## **ABSTRACT**

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This Research is a survey of techniques of Digital Watermarking which can be used in order to protect the proof of ownership. The purpose was to find out secured and robust digital watermarking algorithm which can embed the image watermark into a squared host image, bear the attacks and later, can be extracted from the host image. The method used for watermarking is supported by Discrete Wavelet Transformation, with various combinations of other available techniques, the interesting point is only the watermarked image is required in order to extract the watermark.

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## DEFINITIONS AND ACRONYMS

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**Watermarking:-** A digital watermark is a kind of marker covertly embedded in a noise-tolerant signal such as an audio, video or image data. It typically used to identify ownership of the copyright of such signal.

**Digital Watermarking:-** A digital watermark is a kind of marker covertly embedded in a noise-tolerant signal such as an audio, video or image data. It is typically used to identify ownership of the copyright of such signal.

**Steganography:-** Steganography (pronounced STEHG-uh-NAH-gruhf-ee, froGreek steganos, or "covered," and graphie, or "writing") is the hiding of a secret message within an ordinary message and the extraction of it at its destination.

**Cryptography:-** Cryptography means sender convert plaintext to cipher text by using Encryption key and other side receiver decrypt cipher text to plain text by using the area of research emphasize on which technique is best suited as individual or together for data hiding.

**DCT:-** A discrete cosine transform (DCT) expresses a finite sequence of data points in terms of a sum of cosine functions oscillating at different frequencies. In particular, a DCT is a Fourier-related transform similar to the discrete Fourier transform (DFT), but using only real numbers

**DWT:-** The discrete wavelet transform (DWT) is an implementation of the wavelet transform using a discrete set of the wavelet scales and translations obeying some defined rules. The wavelet can be constructed from a scaling function which describes its scaling properties.

**IDWT:-** Inverse discrete wavelet transform (IDWT) of input or reconstruct signals from sub-bands with smaller bandwidths and slower sample rates

**DFT:-** DFT is discrete Fourier transform which transform the discrete signal into frequency domain and the coefficient of this DFT is then used to hide watermark image

**LSB:-** Least significant bit (LSB) is the bit position in a binary integer giving the units value, that is, determining whether the number is even or odd. It is analogous to the least significant digit of a decimal integer, which is the digit in the ones (right-most) position.

**MSB:-** The bit in a binary number which is of the greatest numerical value.

**HVS:-** A human visual system model (HVS model) is used by image processing, video processing and computer vision experts to deal with biological and psychological processes that are not yet fully understood.

**SSM:-** Single-sideband modulation (SSB) or single-sideband suppressed-carrier modulation (SSB-SC) is a type of modulation, used to transmit information, an audio signal, by radio waves. It is a refinement of amplitude modulation which uses transmitter power and bandwidth more efficiently.

**JPEG:-** In JPEG compression information which is considered irrelevant to the visual perception of human viewers is directly discarded. As a consequence, the compressed image cannot be perfectly reconstructed and certain distortion is introduced in this process.

**SVD:-** SVD is the singular value decomposition watermarking technique which is apart from all other transform domain technique it is very robust and resistive to the attacks like histogram equalization, Compression, cropping, noise and median filtering.

**Embedding:-** An embedding is one instance of some mathematical structure contained within another instance, such as a group that is a subgroup.

**Extracting:-** To get out some information or remove or take out, especially by effort or force.

**Wavelet:-** A wavelet is a mathematical function useful in digital signal processing and image compression. A small wave of water; a ripple

**Frequency:-** The rate at which something occurs over a particular period of time or in a given sample.

**Coefficients:-** A coefficient is a multiplicative factor in some term of a polynomial, a series or any expression. A numerical or constant quantity placed before and multiplying the variable in an algebraic expression.

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# 1 INTRODUCTION

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The term digital watermarking was first introduced by Tirkel in 1993. “Digital watermarking is defined as a process of inserting a piece of digital data called watermark into another digital data that is to be protected” [1].

Old-style watermarks are applied to visible media (images or video), but in digital watermarking, the hint may be audio, pictures, video, texts or 3D models.

The need of a watermark arises with the growing theft of content globally .The issue arises whether the content is original or fake. To overcome this issue the idea of watermarking was introduced to protect the ownership and copy rights. In traditional watermarking some kind of text or image was embedded into the content. Although it has been used for many years but it has various drawbacks such as, a traditional watermark leaves a visible mark on the content which causes readability issues and sometimes it adds noise to the content which lower down the quality of the content. And most importantly it can't be used to protect digital data.

With passage of time the data has become smarter due to the growing technology and latest digital way of transmission of data. As the data has changed its properties and reshaped itself to the digital data, digital watermark come into place to protect the digital data. At the moment digital image privacy or image protection has become gradually important, as most of the systems are connected to the internet. And all the data flow through internet is also digital data.

The information collected to understand digital watermarking and the current solution was mainly studied from the research papers. Various types of digital watermarks have been studied e.g. Text, image audio etc.

It is imported to solve this problem to increase the digital image ownership protection and to make the digital watermark more robust and usable. It will protect the digital image ownership which was under JPG compression and screen sizing legal attacks.