# ACHIEVING CONFIDENTIALITY THROUGH VIDEO USING INFORMATION HIDING TECHNIQUE

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**ABSTRACT**

*A kind of Information hiding process is proposed with reversible texture synthesis process. A new texture image with a similar appearance and size is synthesized by modifying a smaller texture image. Inorder to secure messages embedded in video or an image , texture synthesis process is included in Steganographic technique. Besides using an existing cover image to conceal secret messages, steganalytic algorithm hides the source texture image and embeds secret messages through synthesizing process. Thus it permits us to obtain the secret messages and source texture from a stego synthetic texture. This approach has major three merits. First,the size of the stego texture image is proportional to the embedding capacity of the message. Second, Steganographic approach is not defeated by this steganalytic algorithm. Third, the recovery of source texture and its functionality is inherited effectively using the reversible nature. The main applications of this project is in the field of medical areas , military purposes and other security purposes. By this we verified that our proposed algorithm can provide many number of embedding capacity of messages into an image or video to produce plausible texture images and recover the source texture.*

**Keyword :** - *Encryption Key Algorithm, Texture Synthesis, Discrete Cosine Transform, Steganography*

## 1. INTRODUCTION

In the precedent year or so, you may have noticed an increased interest in steganography (also called stego). After the September 11 attacks, there were news reports that the hackers used it to hide their attack plans, maps and activities in chat rooms, bulletin boards and net sites. Since then more people have been fas cinated in this technology. The word steganography means covered or secret writing. It is the technique of embedding data into something else for the singular purpose of hiding that information from the casual onlooker. Steganography is mainly for concealing a file, message, image, or video within another file, message, image, or video. This combines the two Greek words steganos meaning covered, concealed, or protected, and graphein meaning writing. In digital steganography, electronic relations may include steganographic coding within of a transport layer, such as a document file, image file, program or protocol. Current steganography entered the world in 1985 with the arrival of personal computers being applied to classical steganography troubles. Steganography allowing a user to hide large amounts of information within picture and audio files. These forms of steganography frequently used in concurrence with cryptography so that the information is doubly sheltered; first it is encrypted and then hidden so that an opposition has to first find the information and *then* decrypt it. There are a number of uses for steganography in addition the meager originality. One of the most widely used applications is for so-called *digital watermarking*. A watermark, traditionally, is the imitation of an image, logo, or text on paper stock so that the source of the document

can be at least to some extent authenticated. Watermarking -- a method of hiding brand information in images, music and software. Watermarking is not measured a accurate form of steganography. In stego the information is veiled in the image whereas watermarking truly adds something to the image and therefore becomes element of the image.

The following procedure provides a very common explanation of the pieces of the steganographic process:**cover_medium + hidden_data + stego_key = stego_medium**In this context, the cover medium is the file in which we will hide the hidden data, which may also be encrypted using the stego key. The resulting file is the stego medium (be the same type of file as the cover medium). The cover medium ( stego medium) are naturally image or audio files. Before discussing how information is secreted in an image file; it is worth a fast evaluation of how images are stored in the first place. An image file is simply a binary file containing a binary depiction of the color or light intensity of each picture element (pixel) comprising the image.

Thus Steganography is the art and science of hiding information by embedding messages within other, outwardly risk-free messages. Steganography works by replacing bits of useless or vacant data in usual computer files ( graphics, sound, text, **HTML, floppy disks** ) with bits of special, invisible information. This hidden information can be **plain text, cipher text**, or even images. Steganography is used when encryption is not acceptable. Or,universally, steganography is used to increment encryption. An encrypted file may hide information using steganography, if the encrypted file is deciphered, the hidden message is not seen.

Some people may believe stego to be associated to encryption, but they aren't the identical thing. We apply encryption -- the technology to decode something readable to something unreadable -- to guard sensitive or confidential data. In stego the information is not necessarily encrypted, just hidden from plain viewAlthough this technology was used mainly for military operations, it is now gaining reputation in the money-making marketplace. Stego can also be used to allow communication within an subversive community.

Steganalysis is the technique of discovering and improving the hidden message. Shielding against steganography isn't trouble-free. If the hidden text is embedded in an image and you have the original (unaltered) image, a file assessment could be ready to see if the images are unlike. This association wouldn't be to resolve if the size of image has changed -- remember in many cases the image size doesn't alter. However, the data (and the pixel level) do change. The human eye usually can't easily monitor fine changes.

In this paper, Steganography is included with Texture Synthesis process. Texture synthesis is the method of algorithmically constructing a large digital image from a tiny digital sample image by taking improvement of its structural content. It is an object of research in computer graphics and is used in many areas, amid digital image editing, 3D computer graphics and post-production of films. Texture synthesis can be used to plug in holes in images (as in inpainting), generate large non-repetitive background images and enlarge small pictures. There are two types of algorithms used in texture synthesis. They are Pixel-based and Patch-based algorithms. Pixel-based algorithms usually manufacture a texture in scan-line order by finding and photocopying pixels with the most similar local locality as the synthetic texture. These methods are very useful for image completion. They can be humiliated, as in image analogies, to execute many interesting tasks. Patch-based texture synthesis creates a new texture by doubling and edging together textures at a mixture of offsets, alike to the use of the **clone tool** to physically produce a texture. Patch-based texture synthesis algorithms. These algorithms be liable to be more successful and faster than pixel-based texture synthesis methods.

Textures are commonly employed when exposé synthetic images. These textures can be obtained from a variety of sources such as hand-drawn pictures or scanned photographs. Hand-drawn pictures can be aesthetically pleasant, but it is rigid to make them photo-realistic. Most scanned images, however, are of insufficient size and can direct to visible seams or repetition if they are directly used for texture mapping. Texture synthesis is an substitute way to create textures. Because synthetic textures can be made of any size, visual repetition is avoided. Our goal is to build up a new texture synthesis algorithm that is proficient, universal, user-friendly, and able to manufacture high quality textures. In addition, we would like to make longer the scope of texture synthesis by exploring a variety of new applications based on our algorithm.

In this paper, we present a new approach for achieving confidentiality using information hiding technique. A texture synthesis process re-samples a small texture image with a similar local appearance and arbitrary size drawn by an artist or captured in a photograph in order to synthesize a new texture image. We merge the texture synthesis process into steganography concealing covert messages as well as the source texture. In contrast to using an offered cover image to wrap messages, our algorithm conceals the source texture image and embeds secret messages through the process of texture synthesis. This allows us to extract the secret messages and the source texture from a stego synthetic texture. To the finest of our acquaintance, steganography taking benefit of the reversibility has ever been offered within the copy of texture synthesis. Our approach offers three advantages. First, the embedding capacity is proportional to the size of the stego texture image. Secondly, a steganalytic algorithm is not likely to conquer this steganographic approach since the stego texture image is self-possessed of a source texture rather than by modifying the existing image filling. Third, the reversible capability inherited from our scheme provides functionality to make progress that the recovered source texture is exactly the same as the original source texture. Experimental results have confirmed that our projected algorithm can provide diverse numbers of embedding capacities, make visually believable texture images, and recuperate the source texture. Theoretical analysis indicates that there is of no consequence probability of breaking down our steganographic approach.

## 2. RELATED WORK

**Reenu Mariam Cherian and R.Sanoj** presented a exclusive way for Steganography using Reversible Texture Synthesis based on edge adaptive and tree based parity check methods. This is primarily to progress the embedding capacity. Here we have to construct a large stego synthetic texture hiding the covert message. Using conventional patch-based method, textures are synthesized. This allows the source texture to be extracted in a message giving the idea of reversibility. The planned method exploits the lofty contrast regions of an image as embedding locations. Hence, it mixes up the strengths of edge adaptive and TBPC. Edge adaptive and TBPC algorithms thus amplify the consignment and to lessen the probable deformation and resulting high embedding capacity is projected in the paper **"Enhancing the Capacity of Steganography Using Reversible Texture Synthesis with Edge Adaptive and Tree-Based Parity Check (TBPC) Methods -A Detailed Survey (2015)".**

**Shan-Chun Lui and Wen-Hsiang Tsai** proposed a latest method of combining art image invention and data hiding. They improved the concealment effect for various information hiding applications.Here data hiding with negligible deformation is approved during recoloring process in the image.A new type of computer art, called line-based Cubism art abstraction by well-known lines and regions from several viewpoints. Three algorithms used here are line-based cubism-like image creation,in embedding a data string from the image and extracting the concealed data. Based on rounding-off property, the projected technique is much valuable for lossless healing of image from a stego image. Also four safekeeping development randomization actions are adapted to put off hackers extracting data is efficiently publicized in this paper **"Line-Based Cubism-Like the Image --A New Type of Art Image and its Application to Lossless Data Hiding (2012)".**

**Maninder Singh Rana, Bhupender Singh Sandman and Jitendra Singh Jangir** proposed an general idea of Image Steganography to make out the necessities of a good Steganography. We can notice that there exists a hefty selection of approaches to cover information in images. It focuses on maintaining the survival of a message secret. The power of Steganography can be amplified by combining it with Cryptography. This paper intends to suggest a state of the art overview of the diverse algorithms used for Image Steganography to demonstrate the safety potential. Steganography is closely related to two technologies such as Water marking and Finger printing. The patchwork approach has a elevated stage of sturdiness against most type of attacks, but can hide only a very minute amount of information. Thus to make certain the security of information, we anticipated **"Art of Hiding :An Introduction to Steganography (2012)".**

**R.Neeraja and M.Gnana Priya** proposed a narrative method of Steganography to reach Reversible Data Hiding (RDH) using Histogram Modification (HM).The undisclosed image is implanted inside the cover image using changing of pixels with an order. In this paper,it is established that according to some predefined rules the data is embedded in the Original Image or host image by choosing an finest value. Here the host image is separated into compartment of small size images. Atlast the secret image is retrieved without any defeat in data. By defining the shifting and embedding functions, we can attain Reversible Data Hiding algorithm to realize a better concert. Thus

by revisiting the Histogram Modification technique to make HM-Based RDH algorithm, we present the paper **"A Framework to Reversible Data Hiding Using Histogram Modification (2014)".**

**Jatinder Kaur and Ira Gabba** offered a new come up of Image Steganography based on LSB (Least Significant Bit) inclusion and RSA encryption technique. A policy of attaining highest embedding capacity in an image essentially for lossless jpeg images has been planned. Steganography applications that hide data in images normally use a disparity of least significant bit embedding. In LSB embedding, the data is buried in the least significant bit of each byte in the image. To evade corrupting the image reliability we discuss in this paper the embedding of text into image through changeable size follows a indiscriminate order based on random algorithm. Inorder to conclude the amount of information added in each pixel and to offer flawless inclusion of data in foundation image and to reduce the error, we choose this technique. Thus Steganography using visual cryptography is proposed in the paper **"Steganography Using RSA Algorithm (2013)".**

**Payal T. chaskar and Arati Dandarate** presented a case study to demonstrate the application of their approach. They proposed a survey on capable mechanism of data embedding using reversible texture synthesis a texture synthesis mechanism re-samples a smaller texture image which synthesize a new texture image with a similar local apperarence and arbitrary size here texture image recovery and data extraction cause no error. steganography is to hide the secrete information and data within the cover image and safety and valuable information is hidden in cover image. but it still remains a challenging problem to discovered high quality synthesis result. It is very difficult to find the continuous changing frames in video texture synthesis **"A survey on efficient mechanism of data embedding using reversible texture synthesis(2015)".**

**R.Nivedhitha and Dr.T.Meyyappan** presented a case study to demonstrate the application of their approach. They proposed image safety using steganography and cryptographic techniques here steganography is the art of hiding the fact communication is taking place by hiding information in other information. both DES algorithm and LSB algorithm this paper introduce two new methods cryptographic and steganography here cryptographic scrambles a message so it cannot be understand. steganography hides the message so it cannot be seen so both provides security.but the steganography fails when the enemy is able to access the content of the cipher message. cryptography fails when the enemy detects that there is a secrete message present in the steganographic medium "**Image security using steganography and cryptography techniques(2012)".**

**Arvind Kumar and Km.Pooja** presented a case study to demonstrate the application of their approach. They proposed a data hiding technique and an effort to conceal the existence of the embedded information, It serves as a better way of safety message than cryptography which only hiding the content of the message not the existence of the message. It is that it can be used to secretly sends messages without the fact of the transmission being discovered. Both Mp3 steganography algorithm and LSB algorithm is used. here the hidden image is difficult to detect without retrivel. It can be a solution which makes it possible to transmit news and all details without being hiding and without the fear of the messages being intercepted and traced back to us steganography **"steganography -A Data Hiding Technique(2010)".**

**Shamim Ahmed Laskar and Kattamanchi Hemachandren** presented a case study to demonstrate the application of their approach. They proposed high capacity data conceals using LSB steganograhy and encryption the network provides a method of communication to distribute information to the masses.data hiding techniques provides an intresting challenge for digital forensic investigators data is the backbone of todays communication to ensures data is secured and does not go to unintended destination. If the key that is used in the encryption method does not match the ciphertext will not be retrived . use LSB algorithm, spatial steganography algorithm,data hiding algorithm and data extraction algorithm.**"High capacity data hiding using LSB steganography and encryption(2012)".**

**Mohammed salem atoum,Subariah Ibrahim,Ghazali sulong,Ali M-Ahmad** Presented a case study to demonstrate the application of their approach They proposed MP3 steganography art for hiding information in a way that the secret message cannot be deciphered by others, except the sender and receiver. both noise based steganography algorithm and steganography algorithm here audio file can provide a good hiding medium because of its high data transmission rate. steganography technique protects both information contents and identity of apersons transmitting the information. during data exchange.it cannot be accessed by unauthorized person. it cannot tolerate any form of delay **"Mp3 steganography-Review(2012)".**

**R.Poornima,R.J.Ishwarya** provided an effective method for high capacity image steganography schemes for different file formats. hiding capacity plays a vital role for efficient covert communication.covert communication taking place by encrypting the password for information to keep secured. The intended receiver will decrypt the information using that password. this method people can find the variety of methods to protect the information with help of the technique called LSB to conceal information particularly inside a BMP file format . However in LSB technique scaling rotation and cropping adds extra noise which destroys the secret message and it is extremely sensitive to any kind of filtering that are to be considered in the paper.**"An Overview Of Digital Image Steganography(2015)".**

**Geetha.P,Priya.K,N.Abirami** provided an effective method for improving data embedding without any disortion and also increases embedding efficiency. Embedding is a process to embed the secret images into cover images. Histogram shifting using reversible data hiding for embedding the data.where pixel based algorithm and patch based algorithm is used. The ideal transfer mechanism proposed in this work is independent from the generation of available cover values. However it is difficult to find the continuous frames in video texture analysis and it still remain challenging problem to generate high quality synthesis results.**"Steganalytic Algorithm Using Reversible Texture synthesis For Embedding Data(2015)".**

**Praneeta Dehare,Padma Bonde** proposed LSB method and five modules method. where FMM is used to provide the security and it also provide good image quality without any disimilarity between the original image and the constructed image and LSB provides less data computation complexity. To provide more security a private stego-key is also used with FMM algorithm so that finding of secret image from the cover image. However in LSB technique scaling,rotation and cropping Adds extra noise which destroys the secret message and it is extremely sensitive to any kind of filtering that are to be considered in the paper. **"Hiding Image In Image By Using FMM with LSB Substitution In Image Steganography(2014)".**

**Munshidha K K,Anju Augustine** proposed a new steganographic method using reversible texture analysis. Most image steganographic calculations get a current picture as a spread medium. We weave the comparison blend process into steganography covering secret messages and in addition the source image. This method it samples a smaller texture image which synthesis a new texture image with a same local appearance and arbitrary size. It is also used for reserving room method which is used to embed additional data.It achieves performance without loss of perfect secrecy. However it is difficult to find the continuous changing frames in the video texture analysis **"An Efficient Steganographic Method Using Reversible Texture Synthesis(2015)".**

**Shamly Elizabeth Thomas , S. Sathyamoorthy,** proposed a reversible watermarking method. There are three major approaches have already been improvised for image reversible watermarking. They were reversible watermarking supported loss less compression,on bar chart shifting and distinction enlargement. The loss less compression based mostly approach substitutes half a neighbourhood an area of the host with the compressed code of the substiuted part and also the watermark. clearly outperforms the progressive schemes supported the classical counterparts. where for every pixel a least square predictor is computed and also the corresponding prediction error is distended. However one computes one distinct predictor for every component **"Local Prediction Based Difference Expansion Reversible Watermarking(2015)".**

## 3. ENCRYPTION / DECRYPTION KEY ALGORITHM

In this section we discuss about the implementation of the paper. We use Encryption /Decryption Key algorithm such that it is used to hide the information embedded in a digital medium like video. We propose three algorithms to hide an image or an information. They are DES (Data Encryption Standard ),Triple DES (Triple Data Encryption Standard ), RSA (Rivest Shamir Adleman ).

**DES** is mainly a Symmetric Key Algorithm which works by using the same key to encrypt and decrypt a message, so both the sender and the receiver must know and use the same private key. The Data Encryption Standard is a block cipher to encrypt a plain text message, DES groups it into 64-bit blocks. Each block is enciphered using the secret key into a 64-bit ciphertext by means of permutation and substitution Decryption is simply the inverse of encryption, following the same steps but reversing the order in which the keys are applied. .

**Triple DES** is based on the DES (Data Encryption Standard) algorithm, therefore it is very easy to modify existing software to use Triple DES. It takes three 64-bit keys, for an overall key length of 192 bits. The Triple DES breaks the user-provided key into three subkeys, padding the keys if necessary so they are each 64 bits long. The procedure for encryption is exactly the same as regular DES, but it is repeated three times, hence the name Triple DES. The data is encrypted with the first key, decrypted with the second key, and finally encrypted again with the third key. The procedure for decrypting something is the same as the procedure for encryption. Like DES, data is encrypted and decrypted in 64-bit chunks.

**RSA** algorithm is a cryptosystem for public-key encryption which uses two different but mathematically linked keys, one public and one private. The public key can be shared with everyone, whereas the private key must be kept secret. In RSA cryptography, both the public and the private keys can encrypt a message; the opposite key from the one used to encrypt a message is used to decrypt it. RSA derives its security from factoring large integers that are the product of two large prime numbers, *p* and q. A modulus *n* is calculated by multiplying *p* and *q*. This number is used by both the public and private keys and the public key consists of the modulus *n*, and a public exponent *e*. The private key consists of the modulus *n* and the private exponent *d*. The below diagram (fig 3.1) depicts the architecture diagram of our proposed work.

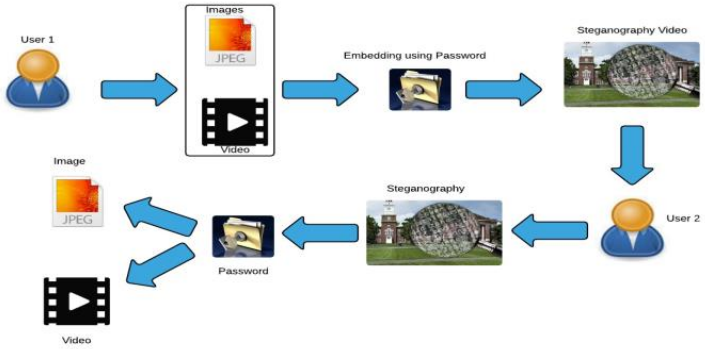


**Fig 3.1 SYSTEM ARCHITECTURE**

Initially, the cover file which is a video file is selected and the sender selects the secret image and it is embedded inside the cover file. Using Encryption Key Algorithm, video with hidden image is concealed. This video is otherwise called as Steganographic video. This is a encoding process. At the receiver side, the decoding process is considered. First , the Steganographicvideo embedded with hidden image is extracted using Decryption Key Algorithm. And then to unhide an image proper destination is selected. At last using the reversible nature we can isolate the video from the image.

**Modules of the proposed work:**

**1.Secret Message Formulation:** In Secret Message Formulation, secret message which is an image is considered. Pixel values of first 8x8 of 128x128 sized image is taken in. Each pixel intensity is then converted into equivalent binary values. As the size of the image is 128x128 we got 128x128x8=131072 bit (the secret message bits to be hidden).

**2.Frame Extraction and Embedding Secret Message:** In this module, we have taken a AVI video file as a cover or host video and all frames are extracted (here consider 28 frames). The R-channel is used for encoding secret message after performing block DCT on those frames. Here we embed 16 bits per 8x8 DCT higher order coefficient of each block. After encoding the R-channels of frames we combine those to get the video AVI file with secret message embedded.

**3. Decoding and Reconstruction of Secret Message:** Decoding is done in reverse way of encoding. First video frames are extracted. R-channel frames are processed by 8x8 block DCT.8x8 block processed R-Channel original frame values are subtracted to get secret message. From extracted secret message the image is reconstructed.

**4. Key Encryption:** In this module, when the user wanted to hide the image in video can have password key Encryption. So that the image will get hide in video by Encryption password. Besides, If the user wanted to unhide the image from the video, need to put the Encryption password to get the image from video.

## 4. EXPERIMENTAL RESULTS

In this section we discuss about the experimental results as follows.

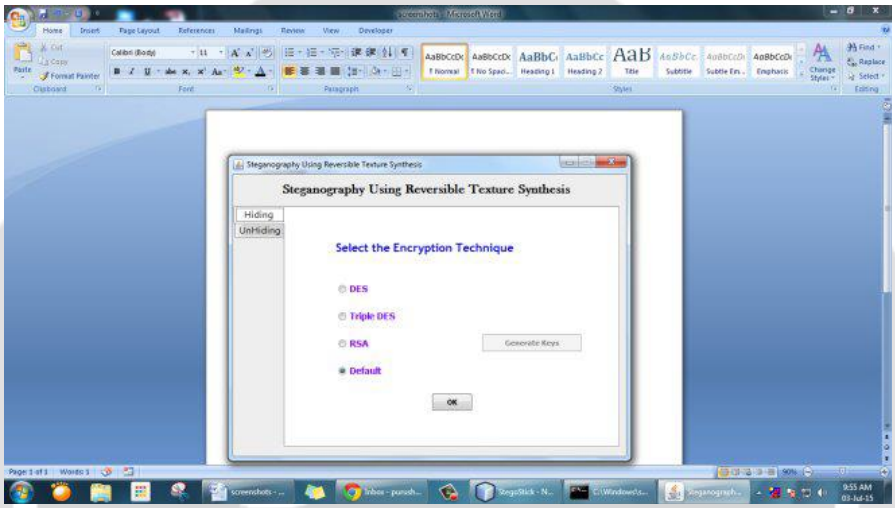


**Fig 4.1**

In the above fig 4.1 , initially we select the encryption technique to be used. Here there are 4 encryption techniques which are DES, Triple DES, RSA algorithm and at last the default which is DES.

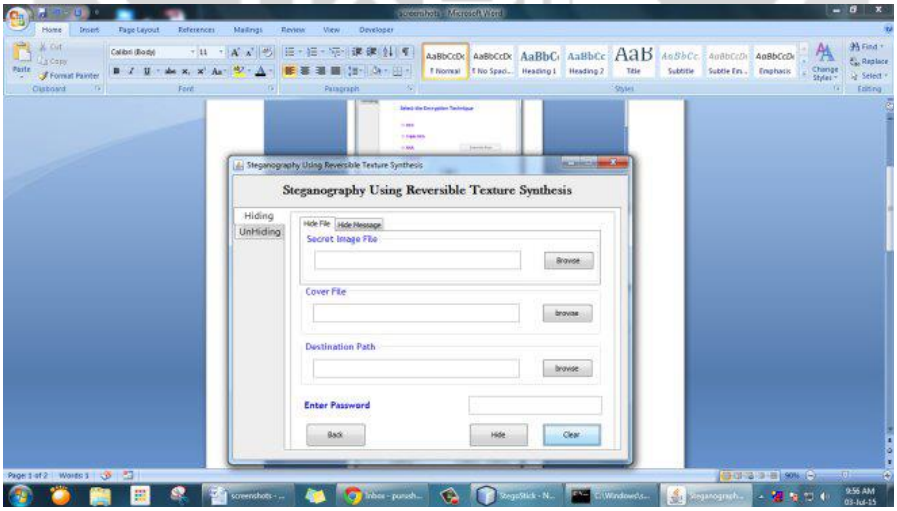


**Fig 4.2**

Here in fig 4.2 we are going to hide an image or text message in a video file. Both of this is possible in our paper. The hiding and unhiding options are available. At first we have to select an image file to be embedded in a video. And the cover file which is a video file path is to be given. The destination path for the image is provided. To conceal our image or text we have to encrypt our hiding information using Encryption Key algorithm and set a password for it.

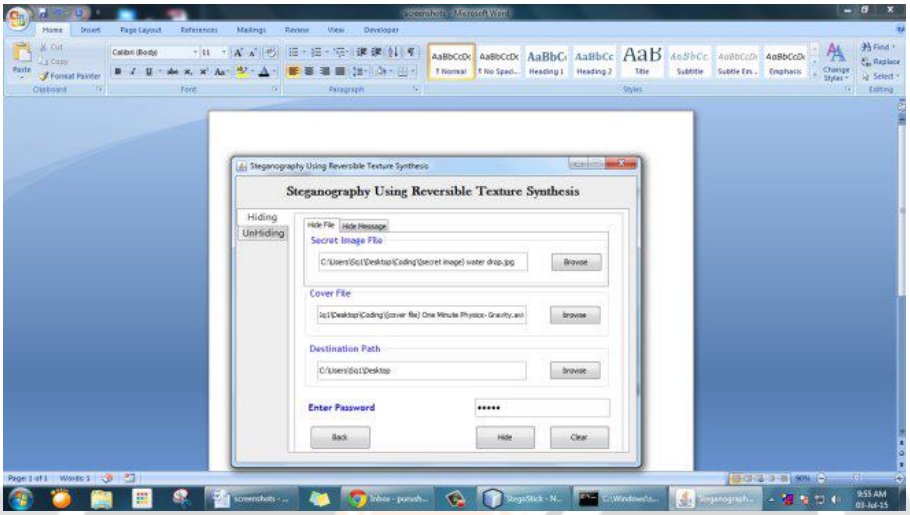


**Fig 4.3**

In fig 4.3,To hide a message we have to put the bits accordingly after extracting the frames of equal size. The encoding process is started and the frames gets attached with the message bits.

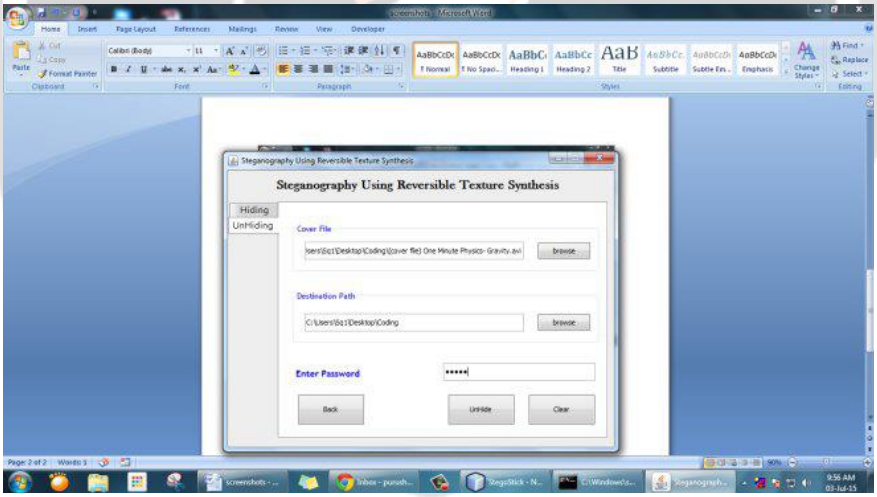


**Fig 4.4**

In this fig 4.4,To unhide a message or image we have to use decryption algorithm to extract the proper bits from the corresponding video file.

## 5.CONCLUSIONS

In the present world, the data transfers using internet is rapidly growing because it is so easier and faster to transfer data to destination. Hence security is an important issue while transferring the data using internet because any unauthorized individual can hack the data and make it useless. Our proposed algorithm using steganography provides reversibility to retrieve the original source texture from the stego synthetic texture.

Thus the proposed paper produces a large stego synthetic texture concealing secret messages which is secure and robust against any hackers.

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