Message Sharing System Using Cryptography And Steganography

K. Kavya[1], G. Niharika[2], K. Naveena[3], M. Keerthi Deepika[4], B. V. Sathish Kumar[5]

[1, 2, 3, 4, 5] Dept of Electronics and Communication Engineering
[1, 2, 3, 4, 5] Vasireddy Venkatadri Institute Of Technology, Guntur, Andhra Pradesh, India.

Abstract- *In India, with the development and advancement in technology information sharing has been very easy and handy. Digital communication witnesses a noticeable and continuous development in many application in the internet. Many cryptography algorithms has been used to provide security recently. But cryptography algorithm alone doesn't provide enough security. So, the confidentiality and the integrity of data are needed to prevent eavesdroppers from accessing and using transmitted data to overcome this problem we proposed a method where we used both cryptography and steganography techniques to provide more security. QR codes have been used due to their special features such as reliability, robustness, etc. We proposed a 3 stair architecture for secure message sharing by using QR code in one layer. This proposed system will provide a higher level security than the current existing systems on the basis of both qualitative and quantitative results*

Keywords- Cryptography, Image Steganography, RSA, QR Codes.

I. INTRODUCTION

In this technological era, digital information is considered as the convenient way to exchange information. Information sharing may be between two companies, individuals, military and navy applications where the location of enemies should be opaque. With the increasing reliance on technology, it is becoming more and more essential to secure every aspect of shared online information and data. As the internet grows computer network becomes bigger, data integrity has become one of the most important aspect for organizations to consider. In order to provide security many algorithms have been proposed by time. While there is no network that is immune to attacks, a stable and efficient network security system is necessary to protect information.

One of the main reasons that intruders are successful is that most of the information they acquire from the system is in the form that they can read and comprehend. Intruders may reveal the information to others, modify to misrepresent an individual or organization, or use it to launch an attack. One solution to this problem is to use Steganography which is

nothing but hiding information in digital media like images, video, audio, etc using specific algorithm. In contrast to cryptography, it is not to keep others from knowing the hidden data but it is to keep others from thinking that information even exists. camera so the hardware failure of the system will be less. QR codes are one of the steganography technique which are well known for their correction capability unlike the traditional 1-D barcodes. As Steganography and cryptography can alone cannot provide enough security researchers all over the world are trying to combine both the techniques to provide enough security. This proposed system is a strategic combination of both steganography and cryptography with QR Code in one layer.

QR code is a two dimensional code which means it contains data not only in one dimension but also in second dimension. The QR code uses Reed Solomon algorithm which ensures that data can be read still correctly even with small scratches on the surface to add error detection and correction information to input content. The amount of data that a QR Code contain depends on the data type, version and error correction level. The maximum storage capability is available for version 40 and error correction level L(low), denoted by 40-L. There are four error correction levels L(low), M(Medium), Q(Quartile), H(High) with error correction capability 7, 15, 25, 30 respectively. They can be generate din any form and size as well as staying in legible form when partially destroyed or dirty.

In this paper a level security approach is described. In the first stage the given secret text is converted into cipher text using RSA algorithm. In the second step QR Code is generated from the generated cipher text. And finally the generated QR code is masked with a random mask image using proposed steganography algorithm. And at receiver reverse engineering takes place to extract the secret message.

The rest of the paper is organised as follows. The following section II contains the relevant work and comparisons and discussions about the work. In the succeeding section III we discussed about the proposed method and compare it with existing methods. And in the

section IV we presented the results and in the final part V we presented the conclusions and references.

II. RELEVANT WORK

The development of new transmission technologies forces a specific strategy of security mechanisms especially in state of the data communication. Ahmed AL-Shaaby, Talal Al Kharobi proposed a method by taking the advantages of benefits of combining cryptography and steganography proposed a two layer security system. This novel work proposed by the authors, gives the idea to resist the print and scan operation and make our system more flexible. Here authors proves that there is no data loss when QR code tags uses and mask it with other visual graphics. This is a similar kind of approach where we used image steganography by hiding code behind mask image.

III. METHODOLOGY

The proposed system basically consists of three steps both at sender side and receiver side . They are a) RSA algorithm which has two keys i.e, private key and public key this comes under cryptography technique. b) QR code generation for the generated cipher text which is a popular steganography technique. c) image masking using proposed steganography algorithm. By following these steps the encoded image is generated at the sender side which is send to the receiver side and at the receiver side the same algorithms are used to decode the original text.
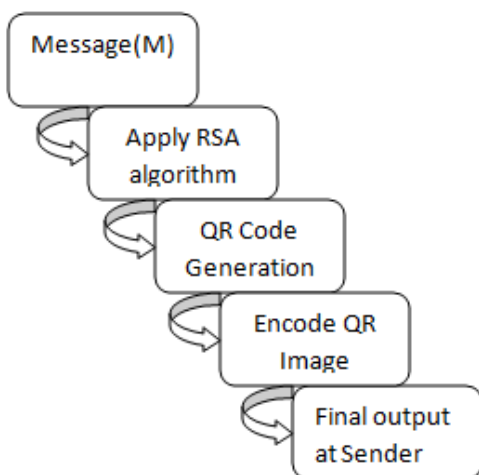

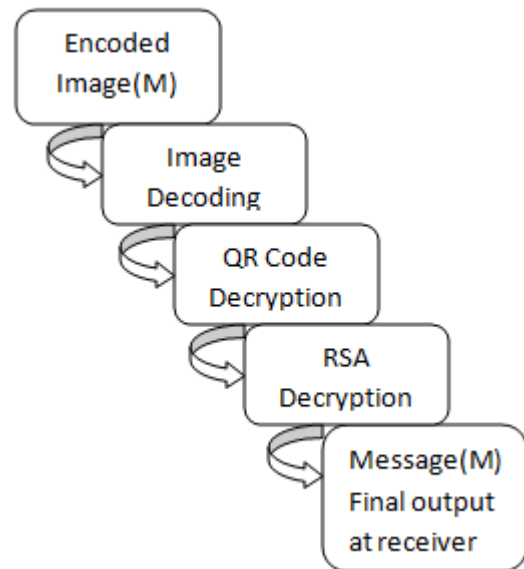**Fig.1 Block diagram at Sender Side**

Fig.2 Block diagram at Sender Side.

Following represents the general methodology of the proposed algorithm..

- The process starts with providing plain text to the proposed system.
- In the next step RSA Encryption algorithm is applied to the given text which provides cipher text as the output.
- The unreadable cipher text is given to the next section which in turn generates the QR code by using the pyqrcode module available in python.
- The generated QR code image is masked with a random image using proposed image encoding technique.

Following algorithm Image_Encode(QR code) describes the image steganography. This algorithm is used to encode the generated QR code with the random mask image

A. Encoding

Let img1[i][j][l] and img2[i][j][l] be some pixel value of each image. Let v1 be 8 bits binary representation of img1[i][j][l] and v2 be 8 bits binary representation of img2[i][j][l]. Therefore, v3=v1[:4]+v2[:4], where v3 is the first 4 bits of v1 and v2. Then we assign img1[i][j][l] to v3.

Here img1 is the final image produced after encoding.

B. Decoding

Let img[i][j][l] be the pixel value of the image. Let v1 be 8 bits binary representation of img[i][j][l]. Let v2=v1[:4]+4 random bits and v3=v1[4:]+4 random bits. Then we assign img1[i][j][l] to v2 and img2[i][j][l] to v3.

Here img1 and img2 are the final images produces after decoding.

IV. RESULTS

The proposed work is successfully simulated. The entire implementation is coded using python programming language and compile using python IDLE version 3.8 because of its vast resources and libraries.

(a) Original QR image

(b) Mask Image

(c) Encoded Image

Fig.3 (a) shows the Original QR image. (b) shows the random image. (c) shows the encoded image after encoding

V. CONCLUSION

Technique that we proposed overcomes all the constraints. Here we have used RSA algorithm which is asymmetric so it proves to be better when compared to other cryptographic techniques in terms of Security,Flexibility and Encryption performance. The main objective was to provide security to information by combining both steganography and cryptography technique which is accomplished and simulated successfully. This can be used in areas where security is the major concern rather than time. This can also be done using MATLAB but we had done using python. The entire project is cost effective and does not require any hardware component it requires only python software.

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