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Multi-Factor Authentication Using Cryptography and Steganography

Vishruta Patil[1], Ikshitha Shetty[2], Mukti Jani[3], Sourav Shah[4], Prof. Shweta Sharma[5]
[1, 2, 3, 4]*Student (UG), Department of Computer Engineering, Atharva College of Engineering Mumbai, Maharashtra, India*
[5]*Professor, Department of Computer Engineering, Atharva College of Engineering Mumbai, Maharashtra, India*

Abstract: Authentication, security, and confidentiality are some of the most important topics of cyber security. It is a critical component of any security system and is essential in ensuring that only authorized personnel can access sensitive information or perform specific actions. There is a large amount of data that is confidential and there are lots of threats to the data if it is not secured properly. It involves the protection of networks or data from unauthorized manipulation and destruction.
Keywords: Steganography, Cryptography, Authentication, Digital Security, Data Security, Multifactor Authentication.

I. INTRODUCTION

Authentication is a critical component of any security system that verifies the identity of a user, device, or application attempting to access a resource or system. The purpose of this project is to design and implement a multi-factor authentication system to ensure the security of the system using Cryptography and Steganography.

To ensure the security of the authentication system, the project will implement appropriate security measures, using the complexities of Cryptography and Steganography. The project will also address requirements such as scalability, accessibility, usability, and reliability.

II. REPORT ON THE PRESENT INVESTIGATION

A. Existing System

Today, digitization has successfully permeated every aspect of contemporary society. Authentication is a crucial component for keeping this procedure safe. It includes a wide range of topics related to a hyper-connected environment, such as communications, access rights management, online payments, etc. The progression of authentication systems towards Multi-Factor Authentication (MFA), from Single-Factor Authentication (SFA), is explained in this work. MFA is planned to be used specifically for human-to-everything interactions by facilitating quick, simple, and trustworthy authentication when logging into a service. The existing system right now has biometrics as authentication and password as another factor of authentication. Cracking the password is quite easy in the emerging technology. There various tools available to crack the passwords.

It is essential to add multiple layers of authentication where breaking the layer is difficult and costly. Therefore, layers of Steganography and cryptography has added to the security aspect to store data safely and securely.

III. SCOPE

The scope of the project is in the field of data security and cyber security. This project can be implemented in any company which wants to secure its data with multilayer authentication.

The password crashing system and tools have been able to crack the passwords of big organizations and individuals by the following techniques:-

1) Dictionary attack
2) Phishing
3) Social engineering
4) Malware
5) Brute Force attacks and so on

Hence passwords can be easily cracked these days. But when it comes to steganography and cryptography it is not much popular and it is nearly next to impossible or quite difficult to crack the image steganography as well as the message which is encrypted.

The main aim of the project is to help at the national level to secure the data at a very high level.

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IV. LITERATURE SURVEY

1) "Image Steganography: A Review of the Recent Advances", IEEE [1]. The main goal of this paper is to explore and discuss various deep-learning methods available in the image steganography field.
2) "Information Hiding in Images Using Steganography Techniques", Research Gate [2]. In this paper, we review some techniques of steganography and digital watermarking in both spatial and frequency domains.
3) "Image Steganography Techniques - A Review Paper", IJARCCE [3]. In this paper, a detailed literature review on a variety of different methods, algorithms, and schemes in image steganography is conducted to analyse and investigate them.
4) "Research on Various Cryptography techniques", IJTRE [4]. The objective of this paper is to find reviews and results of various cryptography techniques and to find comparative evaluation on each one using various techniques applied to the algorithms
5) "A RESEARCH PAPER ON CRYPTOGRAPHY", IJTRE [5]. Detailed study of cryptography and the basic study of data encryption and data decryption. Also, the study of asymmetric encryption is explained with the help of diagrams
6) "A Review Paper On Concepts Of Cryptography And Cryptographic Hash Function", EJMCM [6] Detailed study of goals of cryptography and history of cryptography. Analysis of various techniques is also provided. Study of various cryptographic hash functions. This paper also gives comparisons between various cryptographic algorithms and different hash functions which help to understand the crux of cryptography. In various hash functions, attacks were found. More effective attacks can be developed i.e., the security level of newly and effectively develop hash functions can be checked.

V. PROBLEM STATEMENT

This project addresses the security problem of data or networks by providing fundamental cryptographic and steganography mechanisms of authentication for the implementation of a secure infrastructure. The authentication is implemented with layers of steganography and cryptography.

VI. IMPLEMENTATION AND METHODOLOGY

A. *For sign up*
1) Upload an Image
2) Enter a message which will be hidden in the Image using steganography
3) Enter a password to encrypt the above message
4) Press the sign-up button to create the account
5) Download the image which is generated by the system

B. *For Log In*
1) Upload the image which was generated from the sign-up process
2) Enter the password which was used to encrypt the message in the sign-up process
3) The password is used to decrypt the message in the image
4) If the message is same as it was in the sign-up process. Access is granted to the database otherwise access is denied

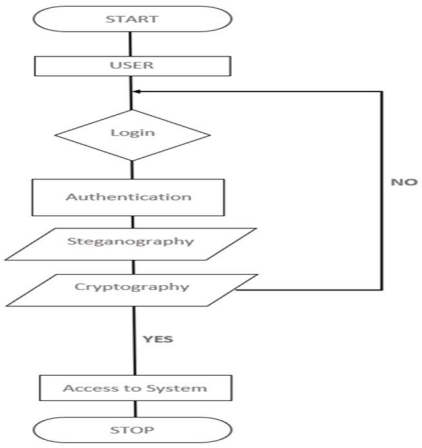


Figure 1: Flowchart of Multifactor Authentication using Steganography and Cryptography

VII. CONCLUSION

Thus, we have used the concept of Steganography and combined it with cryptography to offer strong multi-factor authentication. By implementing appropriate security measures, the authentication system provides a robust and secure authentication mechanism. This is a useful software to have a strong multi-layer authentication system where there is a lot of possibilities for the data to be leaked or the network to get disrupted.

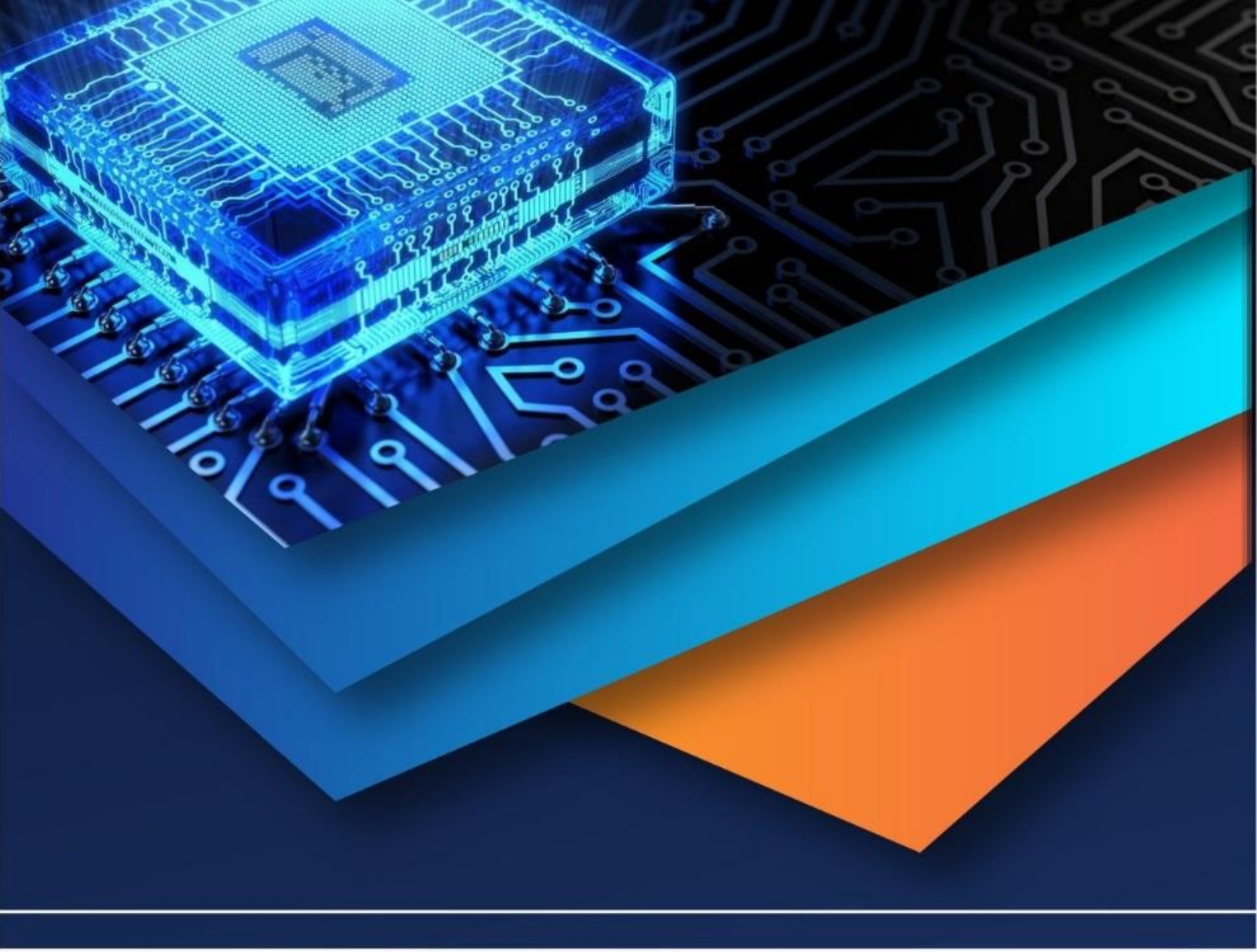
VIII. ACKNOWLEDGMENT

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