Morse Code Based Authentication System

Chandrashekhar [1], Charan G R[1], Jeevan M M[1], Jhenkar H G[1], Shyam Sundar Bhushan[2]

[1]*Student, Department of Computer Science and Engineering, Global Academy of Technology, Bangalore, Karnataka, India.*

[2]*Assistant Professor, Department of Computer Science and Engineering, Global Academy of Technology, Bangalore, Karnataka, India.*

Corresponding Author: charan1ga18cs047@gmail.com

Abstract: - Face recognition has been one of the most exciting and essential research disciplines in the last two decades. Data science is a multidisciplinary blend of data inference, algorithm development, and technology in order to tackle analytically challenging issues. In this project, we'll go over general ideas and structures of recognition, important issues and factors of human faces, critical techniques and algorithms. PINs (Personal Identification Numbers) are commonly used for user identification and security. PIN-based password authentication requires users to enter a physical PIN, which might be vulnerable to password cracking or hacking. This model contains a real-time programme for gaze-based PIN entering, eye detection and tracking, and a smart camera for Morse code PIN identification. We presented a security solution with two features: one is PIN authentication utilising eye blinks PIN entry with Morse code, and the other is giving a safer password entry option. Bottom of Form Eye blinks-based authentication is the process of determining the eye blinks using Morse code, in which numbers are represented in points and dashes, and then using that information to create the password and PIN. The goal of this project is to improve traditional PIN input by incorporating eye-blink based PIN entry with Morse code to add an extra layer of protection.

Key Words: -*Morse code, Face recognition, Pin Entry, Eye Blinks, AI.*

I. INTRODUCTION

Throughout history, technology has acted as a catalyst for change. Technology has been welcomed and interwoven into our daily lives, from moveable type to television to the Internet. The immense benefits of technological breakthroughs have far surpassed the downsides within the frameworks of civilized civilization. To handle massive volumes of data, practically every industry, including educational institutions, finance, healthcare, and business, uses data science. The practical applications span from stock market prediction to cancer prediction; they're used in image processing, identity recognition, speech processing, and text prediction. The necessity for automatic recognition and surveillance systems, as well as interest in human visual systems for face recognition and the creation of human-computer interfaces, are among the causes.

Manuscript revised June 21, 2022; accepted June 22, 2022. Date of publication June 23, 2022.

This paper available online at www.ijprse.com

ISSN (Online): 2582-7898; SJIF: 5.59

These studies bring together experts and academics from a variety of fields, including neurology, psychology, computer vision, pattern recognition, image processing, and machine learning, among others. With advancements in technology, we now have more options for making our lives better and more efficient. This spawned a slew of new branches, one of which being Data Science. To put it another way, data science is the study of where data originates from, what it represents, and how it may be turned into a useful resource in company production. Large amounts of organized and unstructured data can be mined to find patterns that can help a company cut costs, improve efficiencies, identify new market opportunities, and boost its competitive advantage. Machine learning is a branch of computer science that employs statistical techniques to enable computers to "learn" (i.e., improve their performance over time) from data without having to be explicitly programmed. Machine learning is used in a variety of computing jobs where creating and programming high-performing explicit algorithms is difficult or impossible. Machine learning is a way for developing complicated models and algorithms that lend themselves to prediction in the field of data analytics. Through learning from previous linkages and trends in the data, these analytical models enable researchers, data scientists, engineers,

and analysts to "create accurate decisions and results" and find "hidden insights."

Morse code was one of the first techniques of communication, although it is now rarely used due to mobile communications. Perhaps none of us are more conscious of this gaze-based technique than someone who can tap Morse codes with his fingers. In this project, we create a prototype that combines Morse code and PIN in the military to guarantee the highest level of security. Despite the fact that Morse code is an antiquated inventory, sophisticated communications cannot yet replace it. Morse code can be utilized in both visual and auditory circumstances. Because the approach proposed in this paper combines communication techniques with modern computer vision technologies, eye blink recognition output must be sufficient before the computer can achieve 100% PIN recognition accuracy.

Any machine-learning algorithm can be used to measure the performance of neural networks, and any machine-learning algorithm can overcome the challenges given by more difficult data sets. Because individuals are most experienced with face authentication techniques through traditional knowledge ways such as passwords, one of the security requirements for general terminal authentication systems is that they be simple, quick, and dependable. However, because malevolent spectators can see these tactics, this system has been presented as a two-layered safety security framework to safeguard PIN numbers, where users can enter the password using Morse code with the necessary eye points.

II. Related Work

Many researchers have worked with Morse code eye blink authentication, but only a handful have come up with a good addition to these security features. Password Authentication Using Real-Time Eye Tracking [1] Proposes a method for using a smart camera to validate a gazing PIN entering, eye detection, and pin identification tracking application in real time. Tennis Experts' Eye Movement Skill: A Quantitative Analysis [2] A measurement of eye movements is proposed by both an expert tennis player and a beginner tennis player. The players compare and analyze the eye movements that have been recorded. The major point of this paper is that beginners unconsciously pursue the tennis ball for a brief period of time. For disabled and elderly people, the Smart-Eye Tracking System [3] presents an intelligent eye tracking system.

The imaging processing module, wheelchair module, appliance-controlled module, and SMS management module are the four components of this study's survey. The goal is to have eye movement used to control appliances, wheelchairs, and communicate with coworkers. It proposes accessibility issues that should eliminate, or at least reduce, the distance between people with disabilities and technology. Extension of Desktop Control to Robot Control by Eye Blinks Using SVM [4] proposes accessibility issues that should eliminate, or at least reduce, the distance between people with disabilities and technology. For severely disabled people, there are still countless obstacles to overcome. We offer eye tracking as a valuable handicap assistance in performing tasks that do not require the use of hands. We also discuss how eye-based interfaces have the potential to improve the user-machine interaction process in "conventional" keyboard and mouse operations. A Novel Approach for Detection and Decoding of Morse Code from Eye Blinks Using OpenCV [5] Medical illnesses including locked in syndrome and Amyotrophic Lateral Sclerosis cause paralysis or motor speech disorders, according to this paper. AAC devices provide a lifeline for them, but they are costly and unavailable to the majority of individuals. They proposed software that was inexpensive. EEG Potential Pattern Recognition for Real-Time BMI [6] based on Eye Movement Suggestion for a study that intends to quickly identify the pattern for BMI (Brain Machine Interface) that has been erased by an EEG factor. This research provides three ways for extracting characteristic patterns that can be identified as a selective ERP pattern using different directional ocular motions. A Mixed Reality Eye Contact Game for the Treatment of Attention Deficit Hyperactivity Disorder in Children [7] Propose an experiment in which many children with ADHD perform academically. Furthermore, they struggle with their social lives due to a lack of attention and interpersonal skills, and they frequently remain in adulthood. This research offers a solution to the problem by introducing and demonstrating the benefits of a new sort of treatment, an eye contact game that successfully employs mixed reality technology.

III. Proposed System

The process of establishing the architecture, components, modules, interfaces, and data for a system in order to meet specific criteria is known as system design. It may also be defined as the process of developing a new business system or replacing an old one by defining its components or modules to meet the user's specific needs. It concentrates on how to achieve the system's goal. It covers the

decomposition and organization of software into components, as well as the interfaces between those components.

Architectural design (describes the system's structure, behavior, and viewpoints), logical design (abstract representation of the system's data flows, inputs, and outputs), and physical design are all part of system design (describes how data is input, processed and displayed in a system).

One of the most crucial stages of the software development process is system design. A data schema, function hierarchy diagram, and a prototype for the proposed system are outputs of system design, which takes a problem statement, requirements determination strategy, present situation analysis, and proposed system requirements as inputs. It is an essential component of system development without which the suggested system would not be possible to create.

Our research essentially provides two-way authentication factors. Two authentication factors essentially provide two layers of security for an account or system. We boost security by using gaze-based authentication and clicking the mouse to convert numbers or alphabets to source code. Providing a platform for physically challenged and disabled people to build their own private, secure account. Our method would allow persons with motor limitations to communicate with devices, and this authentication would increase the number of codes entered by keyboard. This technique generates a key phrase while reducing the utilization of today's hardware sensors. A smart camera-based eye-blink technology has been combined into a new application for eye blink-based PIN identification with Morse code.

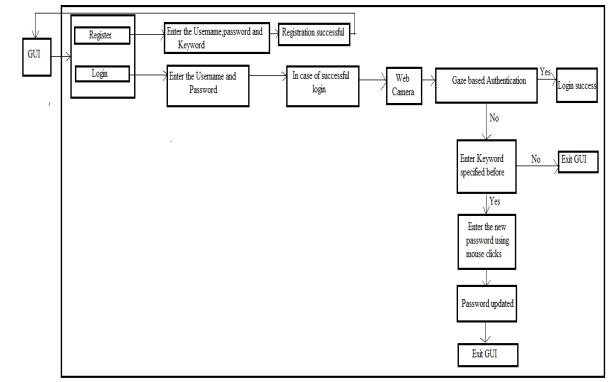

Fig 3.1: Complete Flow of the model

Figure 3.1 depicts the architecture, or the basic design, that is required for the model's execution. A user interface and a backend database make up the model.

The user interface is designed so that the user can interact with the system.

The user must first register in the frontend by entering a user id, a password (PIN), and a keyword. After completing the registration process, the user can log in using their credentials, which include their user id and password. The PIN is taken as input in the form of Morse code via a web camera.

The entered PIN is compared to the stored PIN that was entered into the database by the user during registration in the backend. It exits the screen if the entered PIN is incorrect. It displays successful authentication if the entered PIN is correct. If the user forgets his password, he can use the keyword to authenticate and replace the old one with a new one.

3.1 ALGORITHMS

Step1: A user interface is included in the model. The user interface (GUI) is designed to allow the user to interact with the system. It's what Pygame and OpenCV are made of.

Step2: The user must first create an account on the frontend by entering a user ID, password, and keyword.

After registering, you can log in using your user ID and password. With the use of a web camera, the PIN is captured as Morse code.

Step3: The stored PIN entered by the user upon registration is used to check the entered PIN in the backend. It exits the monitor if the PIN you entered is incorrect.

Step4: It exits the monitor if the PIN you entered is incorrect. The authentication will appear to be successful if the entering PIN is accurate. If the user forgets his password, he can use the keyword to authenticate his existing password with a new password.

IV. RESULTS AND DISCUSSION

The screens of the "Morse code based Secured Authentication System utilizing Eye Blink" are described in this section.

Snapshot 1: Home terminal of the system

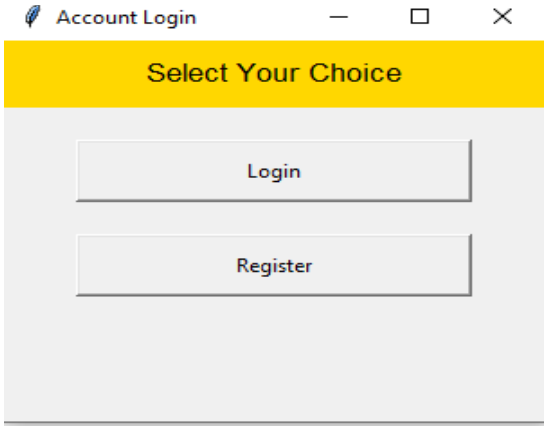

Fig 4.1. Home terminal of the system.

This is the Morse code-based Secured Authentication System with Eye Blink's home terminal with the registration tool.

Fig 4.2: Home Terminal of the system with Register terminal and registration success terminal.

Snapshot 2: Login terminal. This is the Eye Blink login terminal for the Morse code-based Secured Authentication System.

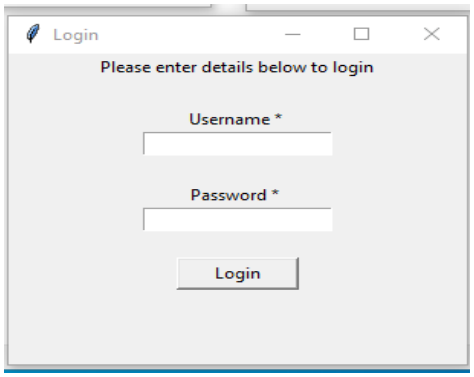

Fig 4.3 Login terminal.

Snapshot 3: Logging in with an eye blink and a virtual Morse code keyboard will only monitor 12 of the 68 coordinates of the eye portion. It will choose a dash or dot Mors code based on the closing portion of the 12 locations in the eye.

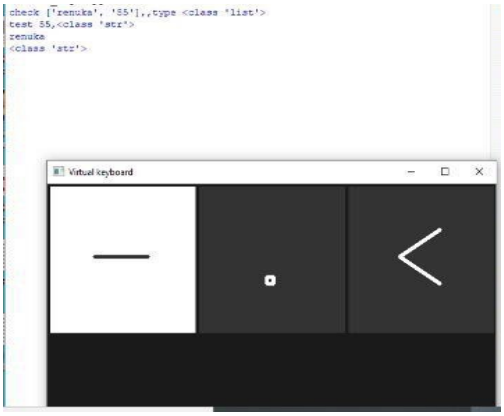

Fig 4.4: Eye blink with virtual Morse code keyboard.

Snapshot 4: Eye blink login and success terminal

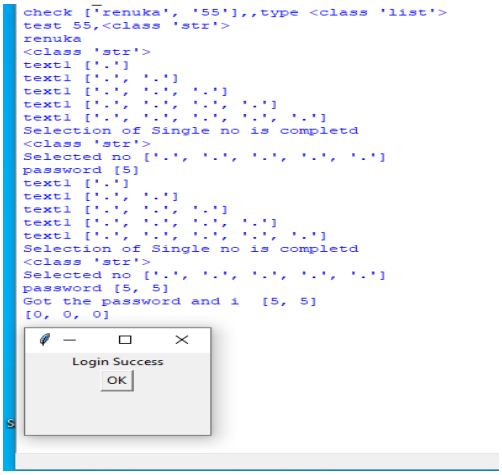

Fig 4.5: Eye blink with virtual Morse code keyboard.

Snapshot 5: Incorrect password terminal. This is the wrong password screen for the Secure Authentication System with Eye Blink that uses Morse code.

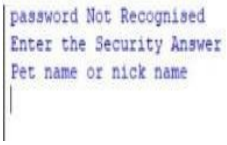

Fig 4.6: Incorrect password terminal

Snapshot 6: Mouse click page. This is the mouse click page for the Secured Authentication System with Eye Blink based on Morse code.

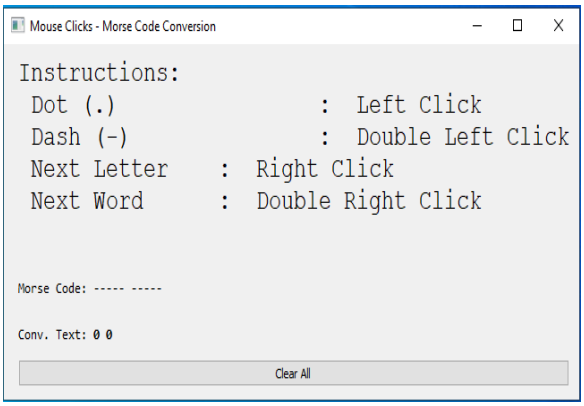

Fig 4.7: Mouse Click Morse Code Page.

The correctness of the Morse code based on the above work is shown in the table below, which is based on the literature survey. The accuracy table shows the average accuracy of the alphabet and numbers for the various testers.

Table 2.1: Results of the Accuracy of Morse code.

Testers	Average Accuracy for Alphabet	Average Accuracy for numbers
A	65.4%	72%
B	66.2%	70.8%
C	59.6%	67.6%
D	30.5%	42.2%

V. CONCLUSION

Essentially, our project supports two types of authentications. Two authentication factors, in essence, provide two layers of protection to safeguard an account or system. To strengthen security, we employ gaze-based authentication and click the mouse to transform numbers or alphabets to source code. This project also assists people with disabilities in establishing their identity.

This concept can be utilized by everyone who understands Morse code as a basic element, from children to the elderly.

In terms of future enhancements, we are attempting to incorporate face recognition for each user using the Morse Virtual Keyboard eye-blink to enter the password. We strive to apply this paradigm in government areas as well, because it requires fewer authentication processes.

REFERENCES

[1]. Dr. Kranthi Kumar, V. Sai Srikar, Y. Swapnika, V. Sai Sravani, N. Aditya, “A Novel Approach for Morse Code Detection from Eye Blinks and Decoding using OpenCV” Associate Professor, Department of Information Technology, Sreenidhi Institute of Science and Technology, International Journal for Research in Applied Science & Engineering Technology, India, May 2020.

[2]. Seongki Kim, JinHo Ryu, Youngchyul, Choi, YooSeokKang, HongleLi, Kibum Kim, “Eye-Contact Game Using Mixed Reality for the Treatment of Children with Attention Deficit Hyperactivity.

[3]. Disorder”, South Korea, IEEE, March 2020. G. Rassadin, A. S. Gruzdev, and A. V. Savchenko, “Group-level emotion recognition using transfer learning from face identification,” arXiv preprint arXiv:1709.01688, 2017.

[4]. J. Liu, Y. Deng, T. Bai, Z. Wei, and C. Huang, “Targeting ultimate accuracy: Face recognition via deep embedding,” arXiv preprint arXiv:1506.07310,2015.

[5]. F. Schroff, D. Kalenichenko, and J. Philbin, “Facenet: A unified embedding for face recognition and clustering,” in Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition, 2015, pp. 815–823.

[6]. D. Wang, C. Otto, and A. K. Jain, “Face search at scale,” IEEE transactions on pattern analysis and machine intelligence, vol. 39, no. 6, 2017, pp. 1122–1136.

[7]. C. H. Yang, L.-Y. Chuang, C.-H. Yang, and C.-H. Luo, “Morse code application for wireless environmental control systems for severely disabled individuals,” IEEE Transactions on Neural Systems and Rehabilitation Engineering, vol. 11, no. 4, pp. 463–469, Dec 2003.

[8]. J. Weaver, k. Mock and b. Hoanca, “gaze-based password authentication through automatic clustering of gaze points,” proc. 2011 IEEE conf. On systems, man and cybernetics, oct.2011.

[9]. C. H. Luo and C.-H. Shih, “Adaptive morse-coded single-switch communication system for the disabled,” International Journal of Bio-Medical Computing, vol. 41, no. 2, pp. 99–106, 1996.