International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075 (Online), Volume-12 Issue-11, October 2023

Iris Scan with 3 Blinks Plus Emotion Recognition for Secure Payment Method for POS using Cloud Computing

Sudhanshu Jain

Abstract: ***Financial transactions are becoming increasingly unsecured day by day due to phishing, stolen identity or stolen credentials. It is the need of the hour to innovate convenient and secure payment methods. Bearing this in mind, we propose in this paper a system that is complex to develop but achieves the target of providing convenient and safe financial payment services. To facilitate economic transactions, we now suggest using Face Recognition as the primary parameter, followed by Emotion Recognition as the second parameter, and then a 3-blink Iris scan as the third parameter. Once all three are positive, thetransaction will be successful.***

Keywords: POS based on three IRIS eye scans, 3D blink and emotion recognition, secure payment method, AI-based, cloud-based POS, consumer deviceless payment method.

I. INTRODUCTION

Financial transactions are primarily a combination of hardware and software solutions, with human actions required to make payments at a shop counter. Today, POS systems can accept payments through various methods, including credit or debit cards, e-wallets, cash, UPI, and more. Some countries have advanced artificial intelligence-based information systems. However, security concerns remain with those solutions. A significant security problem with current AI-based POS systems is that a compromised biometric identity poses a considerable threat. However, these systems are advanced in terms of convenience, but a step is required to make them robust and secure. We have recommended multiple measures of Artificial Intelligence (AI) combined with biometrics to achieve this goal of safe and convenient payment systems. The solution combines two research areas in the field of AI. That is, Face identification with two measures of emotions and actions. Once the Emotion of a safe presence is identified, then a combination of three blinks of the eye is required to complete the transaction. To ensure high security, three major rules must be enforced. One being face identification. Second, out of the five emotions (Happy, Angry, Sad, Disgust, Surprise), two are considered valid for transaction success: happiness and sadness. Third, this involves three blinks of the eyes within the optimum time frame of 15 seconds.

Manuscript received on 04 September 2023 | Revised Manuscript received on 09 September 2023 | Manuscript Accepted on 15 October 2023 | Manuscript published on 30 October 2023.

*Correspondence Author(s)
Mr. Sudhanshu Jain*, Research Scholar, Nandyavart Consultancy Services, Chandigarh, India. E-mail: sudhanshu@nandyavart.in, ORCID ID:0000-0001-8865-0072

Furthermore, we can make it more robust in terms of security by adding a single eye blink as a sign or notificationfrom the payer that something insecure is observed during the transaction, which should lead to the blocking of transactions until activation is processed through mobile authentication on banking apps.

II. LITERATURE SURVEY

Numerous papers and works have been accomplished in Artificial Intelligence using cloud computing. Some famous works utilise face recognition for attendance systems. Then there are systems of payments using Artificial intelligence, etc.

We have gone a step ahead and learnt about emotion recognition systems through the work of [1] research paper 'Emotion Detection Algorithm Using Frontal Face Image'. The work is already in progress, identifying five emotions of a person with an accuracy level of 95%. However, the accuracy here maynot be perfect, but it does not overlap with two emotions simultaneously. Recognition accuracy of five emotions: Happy 79.7%, Sad 69.9%, Angry 72.3%, Disgust 69.9%, Surprise 78.5%.

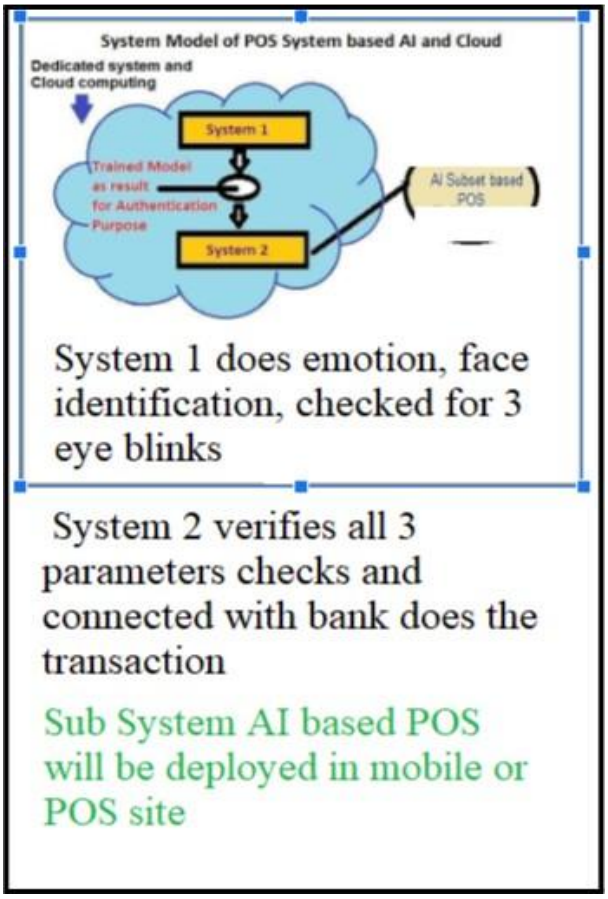
There is another work well accomplished in the field of POS through AI that recommends payments through Face Recognition using Artificial Intelligence and password [2]. This system requires the user to input a password that they must remember and enter. The password can be seen by the camera's focus or by a person standing nearby. Again, a security issue arises.

The Facial Recognition Cash Register (FRCR), viz. The Telpo System 650 features face matching in its self-service payment system. This utilises the 'pay with your face' methodology, and this technique is also exact. The system recommended in another paper cited at [3] is designed to be secure, allowing it to enclose three-dimensional masks that could lead to the theft of information while still passing security verification. This device is powerful and uses an efficient method for Face authentication. It also features a touch-screen numeric keyboard interface for inputting values [3]. During a thorough review of previous work, we also encountered a system known as PayEye, which is implemented in Poland. This system also proposes eye scans as a means of payment. However, it lacks the security parameters that we recommend and propose in this paper. That involves emotion recognition, Face detection, and three blinks of an eye, combined with a secure alert method that utilises a single eye blink to immediately block access or account transactions until unlocked through a banking

application on a mobile device or by visiting a bank.
Payeye, in comparison to our solution, has just a single IRIS scan as a method of financial transaction.

III. SYSTEM MODEL OF PROPOSED SOLUTION

Based on the solution, we have a 3-tier architecture System Model that comprises System 1 and System 2 at the back-end
server, while System 3, namely the AI Subset-based Point of Sale (POS), is used at the front end at the customer location.
Fig. 1 Three-tier architecture of the proposed system.



In Fig. 1, the following systems and POS terminals with cloud implementation are as mentioned.

System 1 is where all the cloud computing work is to be done. An artificial intelligence-based trained model is to be placed on the System 1 cloud. It will comprise three major tasks.

1. Face identification - Identity first that a face is present in front of it to make the transaction.
2. Then it will automatically process the face inputsto do emotion recognition. Positive recognition of parameters will prompt it to ask for three steps. Positive recognitions include happy or sad faces. Negative signs will convey disgust, anger, or surprise.
3. During the third step, the customer or payer is requested to make three blinks to complete the transaction successfully.

System 2 will have business logic defined comprehensively to detect and prevent fraud. Should the customer, at any time, feel that they have been notified of a fraudulent or unjustified transaction, they can perform a single eye blink at any point during the transaction when three blinks are requested.
Doing so will immediately block the transaction and account. To enable or unlock the account, the customer or payer can immediately request the bank to do so or use the bank's mobile application to unlock it. It is System 3 that will interact with the Banking System to debit money from customer accounts, making the transaction successful.
System 3 will be the point-of-sale terminal that requires manual activation through human input to initiate face identification after entering the amount or having the transaction amount auto-populated in the software system. Once the successful clearing of all three authentication points is confirmed, a success message will be displayed on the screen. Thus, the payment is closed.

IV. PROBLEM STATEMENT

Impersonation, credential identification, and the lack of an immediate method for reporting fraud or unauthorised transactions are some of the problems with current payment systems that we have studied in the context of making financial transactions. Through this paper, we propose to solve these problems with increased convenience through an Artificial Intelligence-based system that performs 3 IRIS scans with blinks, Face recognition, and positive emotion recognition.All of this is made possible by cloud computing, which can be provided by companies such as Google, Microsoft, or Amazon.
The proposed solution not only addresses the problem of fraud but also provides convenience over other methods, such as carrying a device, a card, or cash.

A. Problem analysis and comparison to existing system:

Some of the research-proposed and implemented systems do provide convenience similar to making payments through a single IRIS scan or Face Recognition with a password, but are comparatively insecure.

1. A problem with Face Recognition and Password solutions for making payments is that someone can note Passwords. Then, from another device, a miscreant or fraudster may scan the face and enter the seen or stolen password of the customer, even when the customer is present.
2. The problem with a single Iris scan is that it is too convenient for miscreants or fraudsters to process transactions while facing a person who is being victimised.

Other existing systems, such as cash on hand, also have known security issues and are well known for being lost or stolen, with the burden of carrying them every time.
The system we recommend is more secure and features an inbuilt alert functionality that notifies banks or police of fraud, unwanted, or forced transactions, utilising emotion recognition measures.
We present a comparison table of AI-based systems,

Published By:
Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP)

including IRIS scan and Face Recognition, alongside the password method, with the proposed system presented in this paper.
3 blinks of an IRIS scan, including emotion recognition and face recognition, on cloud computing.

Table 1. Showing a comparison between existing AI systems and a recommended solution in this paper.

Particular	Existing System	Proposed System
Instant Fraud Alert System	no	yes
Number of eye blinks	0-1	3 or 3+ within 15 seconds
System Complexity	Less	More
Convenience	More	Less
Secure	Less	More

V. PROCEDURE

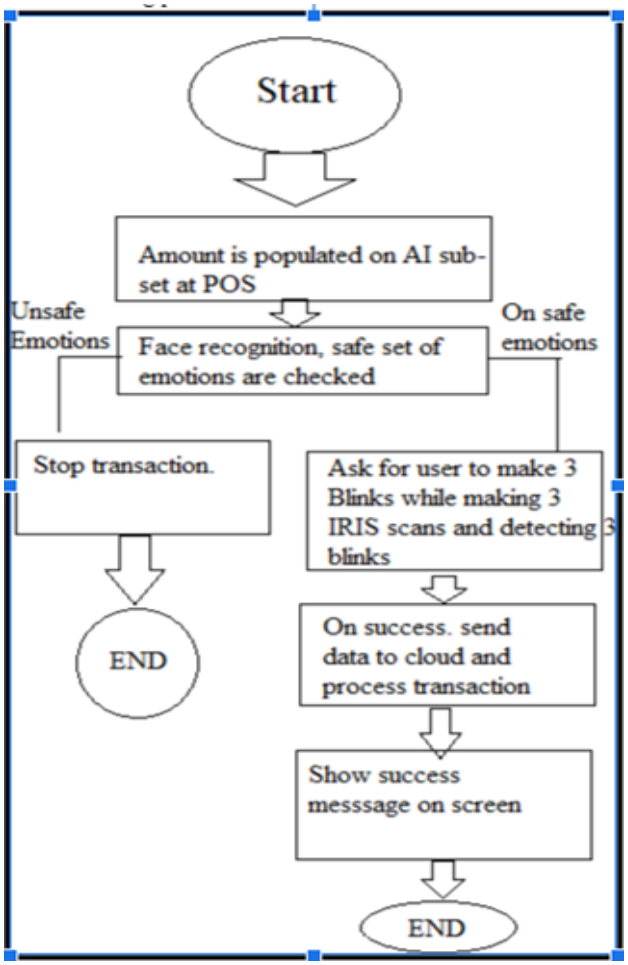


Fig 2. A step-by-step procedure for a successful transaction based on the proposed system in this paper.

Initially, the system will need to be trained with images of a person to recognise customer faces. The second step will be emotional recognition. If it is Sad or Happy, then we can proceed with the transaction; otherwise, we will deny the transaction. Repeat attempts are allowed in this scenario. The third step is to perform three IRIS scans with blinks to ensure the user is present and wants the transaction to proceed.

There will also be an alert or notification system in place to notify the bank or police when a customer makes a single eye blink, indicating that an unwanted transaction is taking place. This leads to blocking the account until it is unlocked again.

A. Actions to be done by the shopkeeper or through the automated software application are as follows:

1. The automatic software application or Shopkeeper will enter the amount of the purchase by the customer.
2. The system will become active to recognise faces. Emotional recognition co-occurs in the background.
3. Three blinks with the IRIS scan are required within 15 seconds of activation. With three successful blinks and IRIS scans by the AI system on the Cloud, the transaction will proceed.
4. The successful message is published on the Subsystems at the POS centre or on the mobile device, wherever the transaction took place.

Artificial intelligence, implemented in a Subset-Based POS, will have a camera that sends data to cloud computing for transaction processing. The purpose of face recognition for customers at POS is to match the bank account of the person in question andhave the transaction done corresponding to the same person.It will be through FACENET that a pre-trained model exists in cloud computing. Once face recognition is done, then the emotion of the face will be verified. If the emotion falls under the SAFE category, which includes SAD or HAPPINESS, then customers will be asked to perform three blinks to complete the transaction within 15 seconds. With each blink, the count of success will be shown as 1, 2, 3. When three is displayed, it will also show a “Success Message” and close the transaction. If at any time unsafe emotions, such as anger, disgust, or surprise, are present on the same person's face during the transaction, then another attempt is allowed. The primary security concern is that if a single IRIS eye scan occurs during three blinks, it means an unwanted transaction is taking place. The system will be halted for the person whose face recognition was successful at STEP1.

VI. RESULT AND DISCUSSION

Iris scan plus emotion recognition for a secure payment method over the counter on Cloud Computing makes the system's face reliable and secure. The result is that it may beless convenient compared to a single IRIS scan method. Still, it is more secure and robust, as the primary focus is on having a safe and secure system that does not compromise customer data in any way. Four major advantages:

1. No passwords to be remembered.
2. Customer devices are independent.
3. Robust, secure, and convenient.
4. An alert or notification system in the event of an unwanted or forced transaction occurring.

Practical implementation to better the advancement of technology for humanity.

FUTURE WORK

We have made an effort to secure the system by adding emotions and three blinks with an IRIS scan in place. We aim to make systems faster in the future and explore ways to

Published By:
Blue Eyes Intelligence Engineering
and Sciences Publication (BEIESP)

bring more convenience to our customers. Fraud notification or alert systems can be further enhanced.

ACKNOWLEDGEMENT

I would like to acknowledge the time, resources, and previous work shared by the research department at Nandyavart Consultancy Services in Chandigarh, India. We look forwardto seeing the implementation of the proposed system in this paper and suggest further improvements in the future. Optimising face recognition may be skipped during implementation, and IRIS scans can be used to identify people associated with their bank accounts, making transactions more efficient.

DECLARATION STATEMENT

Funding/ Grants/ Financial Support	No, I did not receive.
Conflicts of Interest/ Competing Interests	No conflicts of interest to the best of our knowledge.
Ethical Approval and Consent to Participate	No, the article does not require ethical approval or consent to participate, as it presents evidence that is already publicly available.
Availability of Data and Material/ Data Access Statement	Not relevant.
Authors Contributions	I am the sole author of the article.

REFERENCES

1. Kim, Young Hoon, & Park, Jin. (2015). EmotionDetection Algorithm Using Frontal Face Image.
2. A. Dey, S. Jain and S. Nandi, "New Method of POS based onArtificial Intelligence and Cloud Computing," 2019 International Conference on Recent Advances in Energy-efficient Computing and Communication (ICRAECC), Nagercoil, India, 2019, pp. 1-6, doi: 10.1109/ICRAECC43874.2019.8995078. https://doi.org/10.1109/ICRAECC43874.2019.8995078
3. Telepower Communication Corporation Ltd., “System with Cash Register through Face Recognition only”, TPS650-FACE.

AUTHOR PROFILE

Sudhanshu Jain is a postgraduate researcher. He qualified as a Master of Computer Applications from Chitkara Institute of Engineering and Technology (CIET) in 2010. After working at Companies such as Infosys and IBM, he started a business in the field of Information Technology in Chandigarh. With over 13 years of experience following the completion of his postgraduate studies, he is also qualified to be a Senior Member of IEEE. Sudhanshu Jain has three research works published in the field of User Experience/User Interface. Expanding his Scope of Work, artificial intelligence-based innovations are his current area of interest. He also looks to implement these solutions through