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Dual Biometric ATM Authentication System

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Abstract : ATMs (Automatic Teller Machine) are coming widely used in today's world because they are easy to use and offer convenience. However, today's ATM technology comes with some security risks such as the theft and misuse of cards, the possibility of losing a card, and forgetting PIN numbers. A growing number of frauds committed against automatic teller machines over the last decade motivated us to use biometrics to ensure the accuracy and security of personal identification. In this project, we describe a biometric fingerprint and face recognition system that can replace ATM cards and PINs. The transaction is successful when fingerprint and face match. If fingerprint match is found in database then transaction takes place. After verification, if fingerprint does not match transaction will not take place and the next step of verification takes place I .e face recognition. The face image of particular person is compared with the database image. Then the compared output result is sent to the control unit through serial communication. If an unauthorized person is identified, an alert message is sent to the corresponding user. Thus, an ATM model which provides security by using Facial verification software by adding up facial recognition systems can reduce forced transactions to a great extent and provide hard secure authentication.

Keywords **- Biometrics, Facial recognition, Biometric standards, Automatic teller machine, Fingerprint, Raspberry Pi.**

I. INTRODUCTION

Systematic identification of people using their biometric characteristics is known as biometrics. A biometric recognition framework is used in the proposed system to make ATM transactions more secure. For smart ATM access, we are using a raspberry pi microcontroller. The transaction process starts with the capture and matching of a fingerprint and then the user enters a four-digit security code (OTP) sent to their mobile number through twilio. Upon entering a valid OTP (One Time Password), the system proceeds to the further transaction or withdraw. The customer can withdraw the cash after their fingerprint matches with the database. In case the account holder's fingerprint gets injured due to some accident and cannot longer recognize by the system, the face recognition takes place. The face image of particular person is compared with the database image. Then the compared output result is sent to the control unit through serial communication. If an unauthorized person is identified, an alert message is sent to the corresponding user. Thus, an ATM model which provides security by using Facial verification software by adding up facial recognition systems can reduce forced transactions to a great extent and provide hard secure authentication.

II. PROBLEM STATEMENT

In the existing system, we use a debit or ATM card at an ATM, individuals can withdraw cash from accounts, make a deposit or transfer money from one account to another or perform other functions which is not highly secured.

In this proposed system, to replace the existing card system of ATM transaction with biometric Fingerprint. The development of this Technology, it offers a secured and faster ATM services to users through accurate matching of fingerprints.

III. PROPOSED SYSTEM

3.1 Hardware Design

In this proposed system we have proposed a new concept through face recognition and fingerprint to strengthen the security of the conventional ATM model. A block diagram of a proposed ATM security system based on fingerprinting and face recognition is presented in Fig.1. In this system, fingerprint of individuals are used for validation purpose. When a person is enrolled in the program, the fingerprint module captures their fingerprint and compares it to that of an authorized user. As soon as the fingerprint is matched, an account holder receives a code via text message, which is sent by Fast2SMS interfaced to the Raspberry pi. After the OTP is entered correctly, access for that account will be provided. In case the user's finger is damaged and couldn't access the system. In this case, Face image is verified in the database where the other details of the user account will be stored. The raspberry pi microcontroller performs the search operation in the database and sends the necessary information to a display device. Python

face recognition module and Open CV libraries are used for the process of recognition, verification and identification of face images. The fingerprint libraries are used for the above-mentioned process for fingerprints. The program for the process is coded in python.

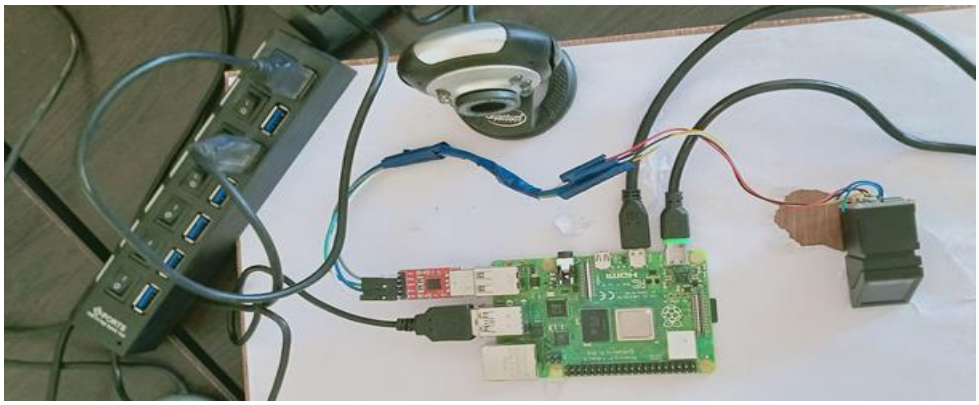

Fig-1: Hardware Representation of Proposed System

1) Raspberry Pi

It is an ATM-card-size single-board computer, which is of low cost. Because of its modularity and open design, it finds widespread use across a number of fields including weather monitoring, security systems, and tracking systems. Its adoption of HDMI and USB devices makes it a common choice for computer and electronic hobbyists.

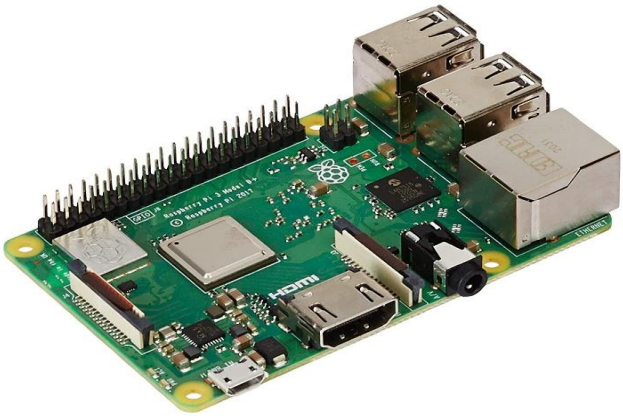

Fig-2: Raspberry Pi

2) USB Camera

A USB webcam is a device which is used to take videos and pictures connected to microcontroller through USB port. It has very high flexibility and low manufacturing cost. These USB cameras offer very good resolution in spite of low cost. In this project USB camera is used to identify an authorized user.

Fig-3: USB Camera

3) Fingerprint Module

This module includes a large number of commands for doing tasks such as enrolling, verifying, and identifying fingerprints, reading and writing fingerprint template files and retrieving fingerprint images among others. In

This project, fingerprint module plays a major role. Although face recognition is part of this proposed system, the fingerprint has a much greater impact.

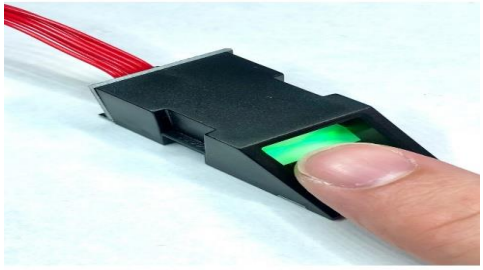

Fig-4: Fingerprint Scanner

3.2 Software Design

1) Raspbian OS
The Raspberry Pi Foundation developed Raspbian OS as an operating system for the raspberry pi. It is designed especially for the raspberry pi models and it delivers excellent performance and stability.

2) Image Processing
To improve the quality of an image or to extract required information from it, digital image processing can be used.

3) Python
In this project, we have written a program code in python language which is a high level, interpreted and general purpose programming language. The dynamic nature of the program enables it to support automated memory management, which is extremely useful for object-oriented programming in real-time.

4) Fast2SMS
Fast2SMS provide platform to send online bulk SMS in India. If any online or offline businesses want to create, schedule and send SMS campaigns for marketing or notification then all those activities can be done from Fast2SMS bulk SMS software. It is designed to help small to large business owner who want to send promotional, marketing, OTP, multimedia & alerts SMS.

IV. IMPLEMENTATION

4.1 Haarcascade Algorithm:

- It is an Object Detection Algorithm used to identify faces in an image or a real time video.
- Haarcascade is a machine learning-based approach where a lot of positive and negative images are used to train the classifier.
- Positive images – These images contain the images which we want our classifier to identify.
- Negative Images – Images of everything else, which do not contain the object we want to detect.

4.2 Mathematical Model:

- Let S be the Whole system S= {I,P,O}
- I-input
- P-procedure
- O-output
- **Input(I)**
- I={ Face Capture and Scan Fingerprint}
- Where,
- Dataset-> Face Images
- face capture
- **Procedure (P),**
- P={I, Using I System perform operations and calculate the prediction }
- **Output(O)**={detect the face and Scan Fingerprint then detect Authentic or unauthentic}

4.3 Results:

Fig-5: Home Page

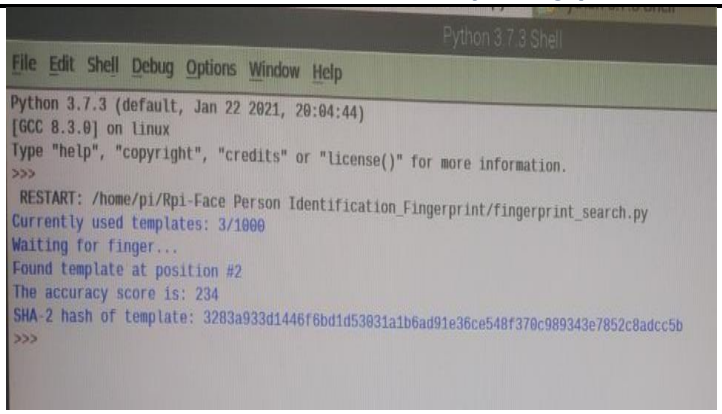

Fig-6: Screen Displaying Accuracy of Fingerprint Matched

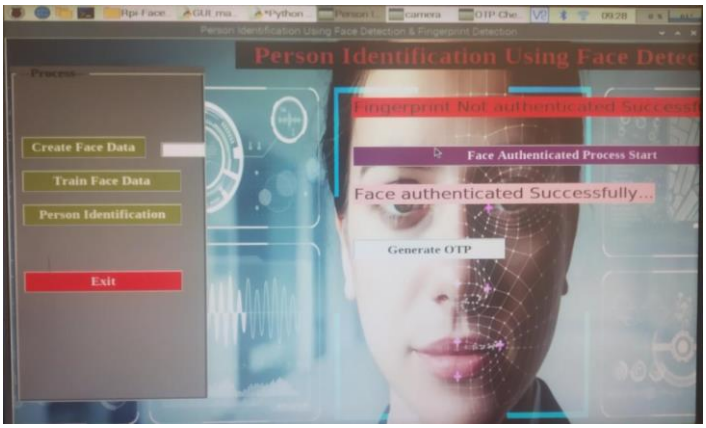

Fig-7: Display Screen of Successful Face Authentication

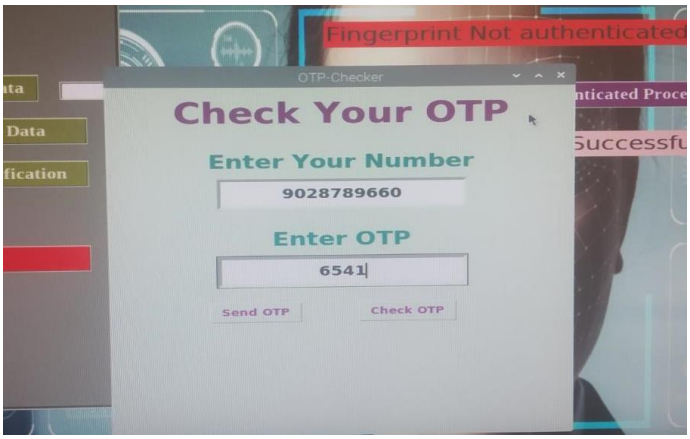

Fig-8: OTP Generation Page

V. CONCLUSIONS

There are many possible misuses for the ATM card using pin. This project uses the fingerprint for authentication. This project aims to provide more security to the ATM users. Using biometric data as a PIN has enhanced the trustworthiness and security of ATM transactions. Fingerprints are unique for every individual and thus provide high authentication. Incorporating OTP into the system increases security and eliminates the need to memorize PINs. In future, compare to other forms of biometric identification facial recognition may be more difficult, so it will be possible to develop a more accurate algorithm. Optimally we can replace facial recognition with iris or retinal recognition if it is less expensive.

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