FACE RECOGNITION BASED AUTOMATIC ATM MACHINE

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ABSTRACT

In order to provide reliable security solution to the people, the concept of smart ATM security system based on Embedded Linux platform is suggested in this paper. The study is focused on Design and Implementation of Face Detection based ATM Security System using Embedded Linux Platform. The system is implemented on the credit card size Raspberry Pi board with extended capability of open source Computer Vision (OpenCV) software which is used for Image processing operation. High level security mechanism is provided by the consecutive actions such as initially system captures the human face and check whether the human face is detected properly or not. If the face is not detected properly, it warns the user to adjust him/her properly to detect the face. Still the face is not detected properly the system will lock the door of the ATM cabin for security purpose. As soon as the door is lock, the system will automatic generates 3 digit OTP code. The OTP code will be sent to the watchman's registered mobile number through SMS using GSM module which is connected with the raspberry Pi. Watchman will enter the generated OTP through keypad which is interfaced with the Pi Board. The OTP will be verified and if it is correct then door will be unlock otherwise it will remain lock.

Keywords: *ATM, Open CV, OTP, Face Detection*

I INTRODUCTION

An Automatic Teller Machine (ATM) is a computerized machine that uses to withdraw the cash from customer's respective bank account. As financial user prefer ATM for cash withdrawals, cash deposits & many other transaction, the banks are focusing a lot over the security of ATMs. ATM should be protected properly from the criminal activities or from any unwanted things. Some of the current existing ATM securities are discussed as follows:

In the **Alert-Based Monitoring System,** when anyone enters the ATM room, it triggers the sensor which sends an alert to the monitoring station. In case of any unwanted activities, sensor send alarm alert signal to monitoring station. After this the monitoring centre will have the immediate access of voice and video of the ATM room. Video verification is done and if any unwanted activity is confirmed a strong signal is send to the ATM and security is send to the ATM room to bust the thieves.

In **Motion Based Monitoring System**, special watch is kept during the night hours as chances of any burglary attempt is more at that time. . When anyone enters the room during this time an alert signal is send to the monitoring station and the control system will have the access to the video and audio of the room. They will check for the activities in the ATM. If it is a customer the alert will be closed and in case of unwanted activities two way communication channels are created to warn the person in the room to stop them from stealing.

In **Live Site Monitoring System**, The ATM room is kept under surveillance as whole time. In case of any unwanted activities, sirens are deployed and two way audio is used to warn the user. The security is send to the place immediately.

The current existing system cannot be deployed as:

- It is very time consuming.
- Lots of people need to be deployed for constant monitoring purpose.
- The cost for setting up this system is high. x In case the internet is down and then the whole system will be dead, which will be a total waste.

The Projected System is focusing on to detect the face of the user properly before accessing the ATM machine. If any motion is detected inside the ATM cabin, it will start detecting face. If the face of the user is not detected properly the person will not be allowed to access the ATM. If the face of the person is not detected, the warning will be given to the user, still if no face is detected the user will be locked inside the room. The system will generate an OTP which will be sent to the security personnel who is the only one who can unlock the door to take any further actions. In this way the face of the user is captured properly for the future reference. This will help to improve the security of the ATM machine and protect the ATM room from unwanted activities. The projected system is easy to implement and the cost for setting up the system is not so high.

II LITERATURE SURVEY

1. S.Sumathi , Dr. S.Karthik , Mr. J.Alfred Daniel &2019 introduced Anti-Theft Mechanisms in ATM Centres Using Different Sensors

2. PNB Swamy, A. Sathi Babu, S. Sravanthi, P. Sasidhar, MD.Mobin ul haq, P.Narendra 2020 Introduced Smart ATM Security Using IoT. Based on the results obtained, the objective of implementing ATM security system using GSM & vibration sensor has been achieved. This project is used to provide security to ATM.

3. K. Santosh Kumar , G.Vinay Kumar 2018 introduced RFID and GSM Based ATM Money Transfer Prototype system. This whole implementation ensures us a secured and authenticated transaction through rfid and gsm technique with lowest cost and minimum maintenanc

III PROPOSED BLOCK DIAGRAM

The whole system is implemented on the embedded Linux platform using Raspberry Pi board [2]. The proposed block diagram of the system is shown in the Fig.1
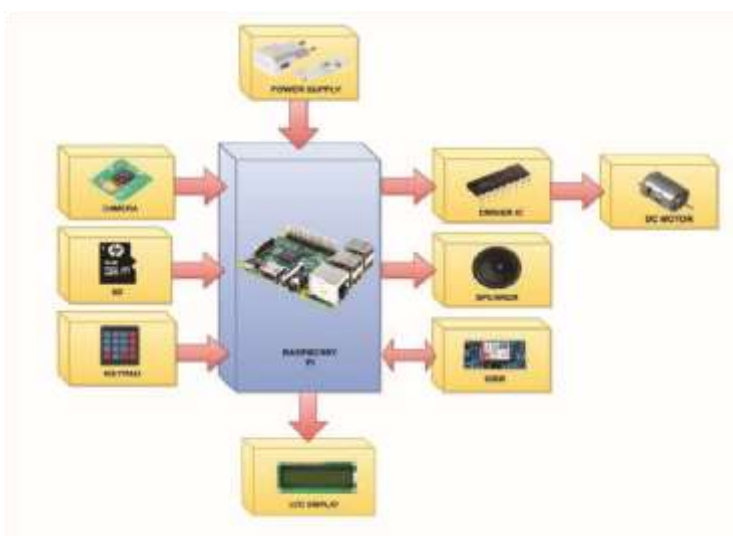

Fig 1: Block diagram

The system contains **Raspberry Pi board** as the main processor. The **SD card** is used to contain the dedicated operating system which is compatible with the raspberry pi board. The Human face is captured by the **picamera** which can be directly interfaced with the Raspberry Pi board. The **16 * 2 LCD** is used to display the validation message. To make the validation process more sophisticated, the **Speaker** is also

interfaced with the raspberry pi board. The speaker is used to announce alert messages. **GSM module** can be directly interfaced with the pi board using serial communication protocol. GSM module is used for OTP mechanism. The **Matrix keypad** is interfaced with the pi board which is used to input the OTP to the system. The door locks and unlocks mechanism is implemented using the **Stepper motor**. The whole system will work as follows:

- User will enter into the ATM cabin for withdrawal of money.
- Camera will capture the face of the person and system will try to detect the face of the human face.
- If the face will not detect properly, the system will validate the warning message to user for adjusting his/her face in proper manner.
- Still if the person's face is not detected, the door of the ATM cabin is locked.
- The system will generate OTP and send it to the security personnel outside the ATM cabin.
- The security personnel who can only unlock the door will enter the OTP code from Matrix keypad.
- The system will verify the OTP code and take the necessary action weather door remains lock or going to unlock.

IV FACE DETECTION METHODOLOGY

The face detection algorithm contains different methodology for detecting the face. The primary methods for face detection are Haar based algorithm and Local Binary Pattern based algorithm (LBP). In the projected system, the detection window that acts like a bounding box to the target object (the face in this case). face is detected from the image using Haar cascade feature. Face Detection using Haar is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. Viola and Jones are the one who originated the idea of using Haar wavelets and developed the so-called Haar-like features [1]. A Haar-like feature considers adjacent rectangular regions at a specific location in a detection window, sums up the pixel intensities in each region and calculates the difference between these sums. This difference is then used to categorize subsections of an image. For example, let us say we have an image database with human faces. It is a common observation that among all faces the region of the eyes is darker than the region of the cheeks. Therefore a common Haar feature for face detection is a set of two adjacent rectangles that lie above the eye and the cheek region. The position of these rectangles is defined relative to a detection window that acts like a bounding box to the target object (the face in this case). The Haar cascade files are supported in the OpenCV. OpenCV comes with a trainer as well as detector. Here we will deal with detection [3]. The

XML files are stored and used to compare for detection using inbuilt functions (cv2.cascadeclassifier)

V EXPERIMENTAL SETUP

The Experimental Setup with all the interfaced components is shown in Fig. 2.
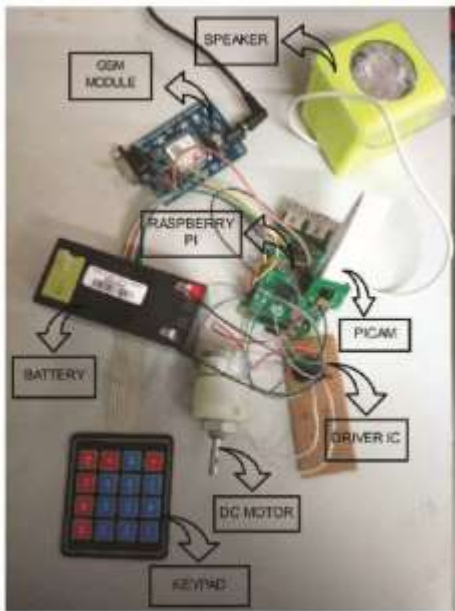

Fig 2: Experimental Setup

VI SOFTWARE FLOW DIAGRAM:

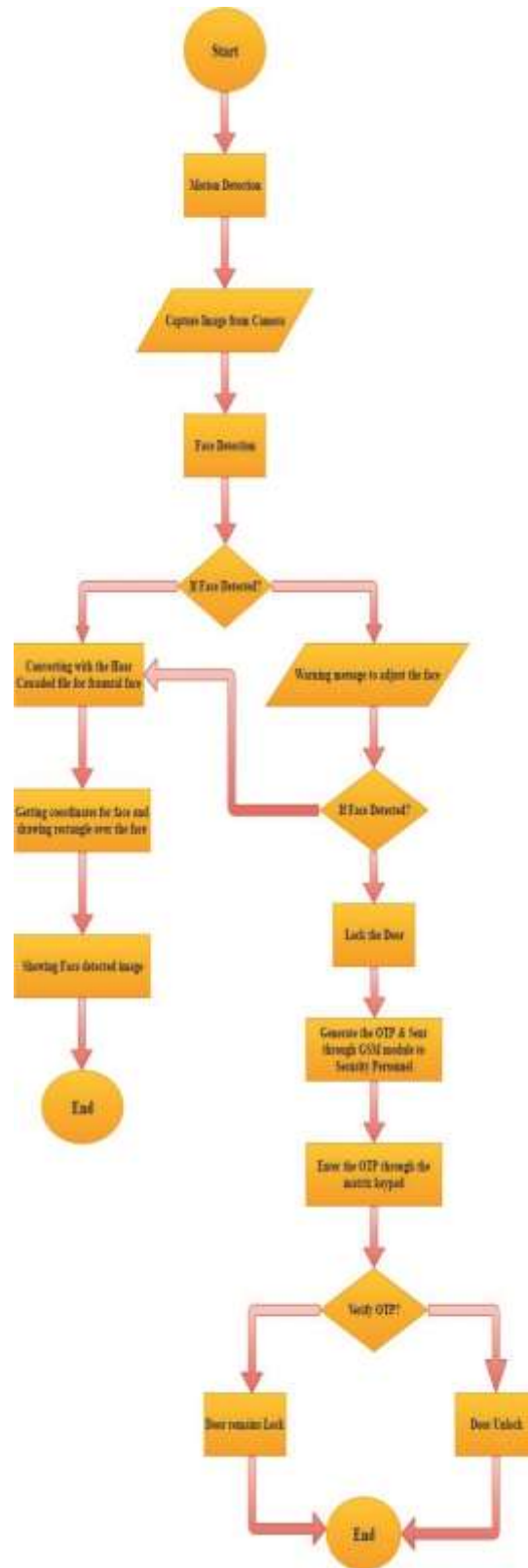The Software Flow Diagram of the system is shown in Fig. 3.

Fig 3: **Software Flow Diagram**

VII TEST RESULTS & DISCUSSION

The Test results are divided into two phase. One when a person access the ATM and his/her face is detected. Another case when the face is not detected, the door lock & unlock mechanism.

A. When Person's Face is detected

In this phase, initially the motion is detected in the ATM room. If there is any motion it will start the process of face detection and after face detection output is shown in the terminal and the user is allowed to access the ATM. The process wise results are shown in following figures from Fig. 4 to Fig. 7.

B. When Person's Face is not Faces detected

In this phase, when person's face is not detected the system will give two times warning message through display and speaker and even after that no face is detected the door of the ATM will be locked and OTP will be generated which can unlock the door. If correct OTP is entered, the door will unlock else it will remain lock. The process wise results are shown in following figures from Fig. 8 to Fig. 13.

Fig. 4 First Validation Message

Fig. 5 Motion Detected in ATM Room

Fig. 6 Output of Detected Face

Fig. 7 End of Program

Fig. 8 No Face is detected

Fig. 9 Door locked using DC Motor

Fig. 10 Generated OTP received

Fig. 11 Waiting for the OTP Input

Fig. 12 False OTP entered
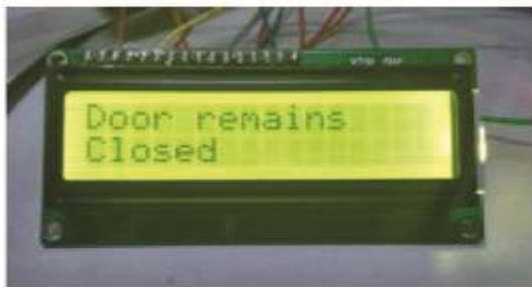
Fig.13 Door remains closed

VIII CONCLUSION

The smart ATM security system based on embedded Linux platform is suggested here. Security is provided by detecting the face of the person in a systematic way. The system is smart in the way that if the person tries to cover his / her face, it gives warning message for proper detection of face. Still the face of a person is not detected properly; the main door of ATM cabin will be locked till corrected OTP is not given by the person outside the cabin. The whole system is safe, reliable, less human interactive & easy to use. High level security is provided by sending any malfunctioning activity based information to the server and set high level protective environment to the existing system. System is easy to construct on the embedded Linux platform as Raspberry Pi board because, the raspberry pi board is highly compatible for image processing based application.

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