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Smart Automated Teller Machine Using Multi-Biometric Technology

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ABSTRACT: Automated Teller Machines are useful for providing cash at any instant of time and ensure safety of money. As many people use ATM, it is important to satisfy customer's necessity with the help of widespread technology. We face many security issues in daily life. At present, we authenticate our account only through password. It provides low security so that the hackers can easily get our passwords and misuse it hence for this purpose we use biometrics which provides safety and high security for the authentication of the customer. The aim of this work is to increase the security level of ATM with Multi-biometrics by the way of creating a 4 digit number and making an alert by SMS or mobile call only to PIN admin. It is done with the help of GSM(two level security systems).

KEYWORDS: ATM (Automated Teller Machine), Multi-biometrics, Face recognition, Iris recognition, GSM.

I. INTRODUCTION

In the insecure world and fast moving, time management is a major issue to every individual and realizing the fact of self-service in banking system or any other security system is a mandatory one. ATMs machines help authorized users to take cash quickly. Now a days the need for the money is drastically increased so transaction process must be quite faster. In this world ATM plays a major role for transactions. To safeguard customer ATM card and related its security there is a single (PIN) password but now a day it is no safer one [1]. Because the password can be easily steal by hackers and misuse it. By using Biometrics, we can secure the customer's password, protecting from fraudsters. It is a secure system because its data are maintained in a confidential manner. Noise, absence of originality, spoofing, variations in classes is some of the problems faced in single model biometrics. Along with some of the advantages single model is replaced by multi-biometrics.

A multi-biometric system are more reliable and gives good efficiency in security applications. Multi-biometrics is mainly used to provide security in the user side [2]. The Iris and Face recognition is used to provide security. In this paper we discuss some multi-biometric uses to prevent the fraud at the time of ATM transaction a biometric measure as a means of enhancing the security for banking system for both customers & bankers also. By using multi-biometric recognition users are more comfortable with the knowledge of saving their money with the bank because they recognize that if they lose their ATM card, no one can imitate their biometric clone and take their money.

II. SYSTEM DESIGN

The embedded ATM user authentication system is based on face and iris recognition which is based on after examining the existed ATM systems. The ATmega16 chip is used as the central part of this embedded system which is associated with the technologies of face and iris recognition [3].

The primary function is shown as follows:

- IRIS recognition: it is used to scan the iris code template generated from a live image and then it is compared to formerly registered ones to see if it matches to any of them.
- Face recognition: Face recognition is a method of biometric authentication that uses viola jones face detection techniques based on high-resolution images of the faces of an individual's.

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- Message alarming: different 4-digit code as a message to the mobile of the authorized user without any disturbance, in order to access the Terminal.
- Remote authentication: System can compare current user's biometric information with remote biometric data server.

III.SYSTEM ARCHITECTURE

This system can be implemented by means of both software and hardware. Embedded system makes the hardware design and the software using viola jones algorithm.

A. Hardware Design:

In hardware ATmega16 chip plays a major role. The main chip consists of GSM, keypad, iris and face recognition, LCD, alarm, etc.

The modules are as follows:

Module 1(LCD): A 16x2 LCD display is very basic module. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix

Module 2(Keypad): Keypad is used for loading numeric's into the microcontroller.

UART: Universal Asynchronous Receiver Transmitter (UART). A UART is an individual (or a part of) integrated circuit used for serial communication over a computer or peripheral device.

GSM modem: Global System for Mobile communication (GSM) is used to send the message to the user and to the police through police network [4].

Face recognition: Face recognition systems are created on computer programs that estimate images of human faces for the perseverance of identifying them. The programs take a facial image, and measure features such as the distance between the eyes, the length of the nose, and the angle of the jaw, then produce an exclusive file called a "template." Using templates, the software then relates that image with another image and yields a mark that event how analogous the images are to each other [5].

Iris recognition: The iris is the colored portion of the eye that surrounds the pupil. It controls light levels inside the eye similar to the aperture of a controls light levels inside the eye similar to the aperture of a camera. The round opening in the center of the iris is called the pupil. The iris is surrounded with tiny muscles that dilate and constrict the pupil size. It is full of richly textured patterns that are distinct from person to person, and in actually are distinct from left eye to right eye of the same person. The iris patterns are extracted based on the texture analysis. Finally, the person is identified by comparing his/her features with an iris feature database [6].

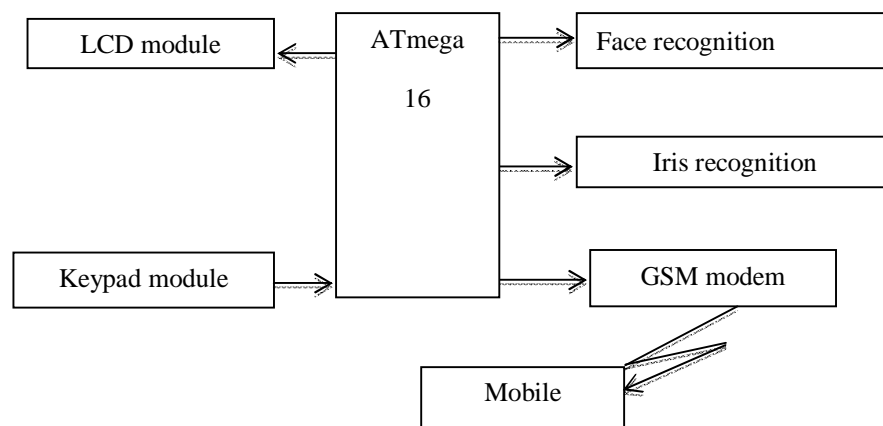


Fig.1 Block Diagram of the Hardware System

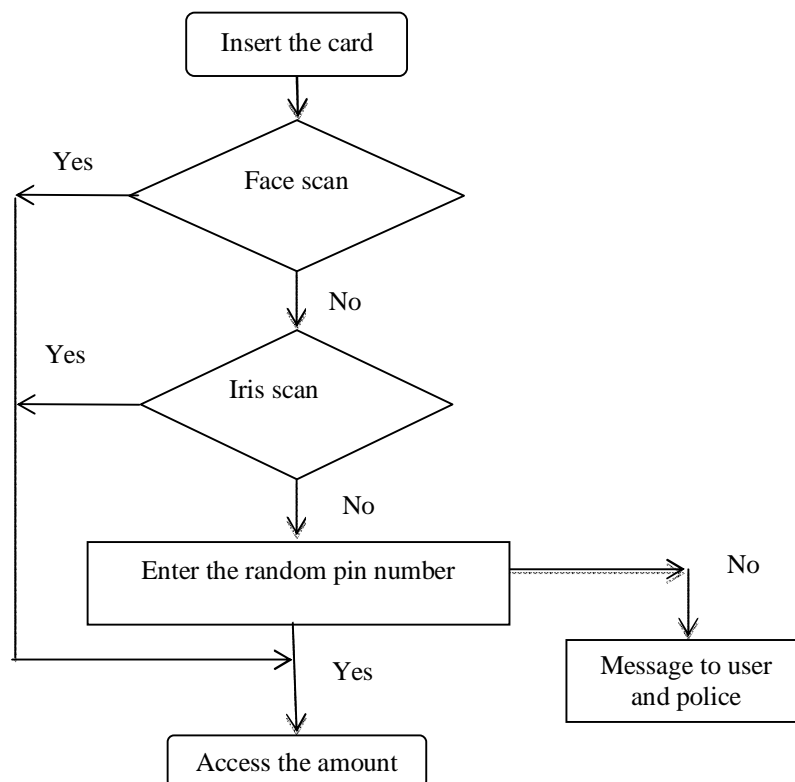
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B. Software Design

The design of software plays an important role for this embedded system. The design was implemented using two parts included the design of main program flowchart and the algorithm of face recognition flowchart. This system of software is implemented by the steps as follows: The Operating System and the file system are loaded into the main chip. The system is replaced to implement important task, such as checking ATM system, GSM communication and so on, and then each method reset for ready to run commands. First entering into the ATM, insert the card and check the condition for iris recognition. If recognized then access granted else go to face recognition and if the face scan is recognized then access granted to access the money from the terminal.



Flow chart .1 Overall flowchart of the Software

If not it is processed to the 3 method. In that 4-digit pin is generated randomly. The authorized user will enter the pin. If the pin entered through the keypad module is correct then the access is granted. If the above three conditions are failed to access the money it will send a message to the user and to police over the police network through the GSM modem. In addition, an extra switch is kept in the ATM terminal if the switch is pressed (user in trouble with someone) it will send a message to police through the police network.

In the case of this face recognition system Infrared Facial Recognition seems to be the greatest system. This means an Infrared light camera is placed purposefully to see the human face without moving the lens and getting a 3D geometry of the face and authenticating it while the person is inside the ATM terminal. Infrared Light cameras are used because they are less prone to deflection due to light and can be used in complete darkness; this gives the system an edge over other biometric systems as they require intense quality control [7].

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C. The design of face recognition algorithm

The design of algorithm based on face recognition is important for the whole system. We would approach two steps to process the images of face. The face recognition process has the following steps.

1) The feature of face recognition process: The first step was the acquisition of face image by viola jones face detection algorithm, and the results could be sent to the following process. After obtain the face image, it must be pre-processing. Generally, pre-processing of ones is filtering, image enrichment and image confirmation. Lastly, the characteristic value was extracted and the results of the above measures would be compared with the information of owner's face in the database so as to verify whether the character is matched, and then the system returned the results matched or not.

2) The design of face image improvement: Face recognition module is the important part of the system, the high-quality images was the major factors of influencing the performance in the system. The algorithm of facerecognition based on the algorithm of viola jones face detection.

D. Algorithm and Workflow of the Face Recognition System

1) Algorithm of the Face Recognition System

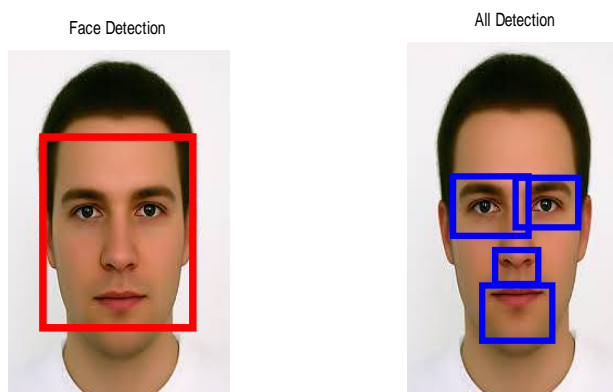
- Start the program.
- Read the input image.
- Detect the patterns of eyes, nose and face by Viola-Jones Algorithm.
- If the image is matched then access is granted else access is denied.
- Stop the program

2) Workflow of the Face Recognition System

- Read the image
- Nose pattern detection
- Eyes pattern detection
- Face pattern detection
- Match the image
- Access granted / Access denied

IV.SIMULATION RESULT OF FACE RECOGNITION SYSTEM

In this paper, a face image is taken as input image and the output of the face image using viola jones face detection algorithm is shown below.

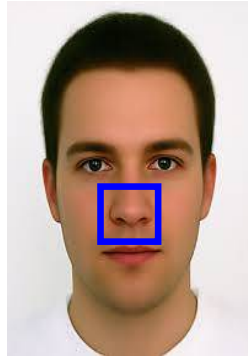


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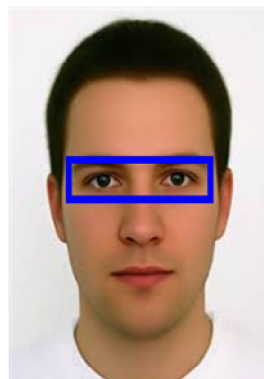
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Nose Detection



Eyes Detection



Access granted



Access denied



Fig. 2 Face detection using viola jones algorithm



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V. CONCLUSION

This technique gets over the boundaries that are presented in the other techniques and gives a good secured place to save the user's saving money. Therefore the process can access their amount through iris, face or mobile verification format. Along with these methods there is a special fixed in the ATM, the person who is in trouble or pressing the switch a message will be sent to police via police network. There is greater stability and reliability on user's recognition as a security feature. As this method has been designed on the embedded system technology this system is more reliable safe and easy to use.

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