Bank Locker System Using Iris

Chetna R. Koli, Nikita S. Kheratkar, Pooja S. Ganganalli, T. G. Shirsat

Abstract— **The fundamental rods and cons structure of iris for an individual remains unique till life ends. The important thing is its feature which has a unique pattern. In our project we are using three algorithms: Least square algorithm, Cross-correlation algorithm and Feature extraction algorithm. This paper proposes a method to integrate iris recognition with the RFID card to develop a high security access environment. Using iris recognition in Bank Locker System a customer simply has to enter the account number through GUI and gets access to the locker room door when account number and iris image is matched with the record stored database. The mail is sent to the manager as well as to the customer ones get accessed and with the help of the RFID card the customer can access his locker. This project is more accurate and robust with less elapsed time compared with most existing methods.**

Key Words— Biometrics, Cross-correlation, GUI, Iris recognition, Least Square Match, RFID.

I. INTRODUCTION

The latest menaces of security have led to the increased awareness of biometric technologies. Various biometric techniques that deals with automated methods of recognizing a person are face, fingerprints, hand geometry, iris, retinal, and vein.. Biometric identification provides a valid alternative to traditional authentication mechanisms such as ID cards and passwords, signature to avoid most of the disadvantages of these methods; it is possible to identify an individual based on who they are rather than what they possess or what they remember. The human Iris is an internal organ of the eye, protected by the eyelid, cornea. The two eyes of one person have independent and uncorrelated iris patterns, as do the four eyes of monozygotic twins, because the detailed iris patterns (unlike color) are epigenetic: they develop during gestation without genetic specification. As the technology is iris pattern-dependent, not sight dependent .moreover it does not require physical contact with the camera in this way, the health issues are minimized [1]. The objective of this paper was to produce a working prototype application that uses an iris recognition tool using the algorithms in order to implement in an accurate and useful way.

Iris recognition systems are available that implement similar algorithms. Generally, there are four major processes for a particular iris recognition system they are image acquisition, iris preprocessing, feature extraction and matching. The project aims at developing a high level security in bank locker systems by using three levels of security such as something you have RFID card, something you know: password, something you are: biometrics. It mainly reduces the accessing time, when compared with manual based banking system.

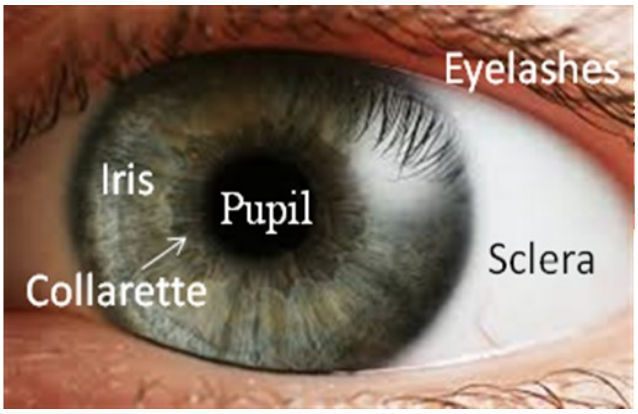

Figure 1: A front-on view of the human eye

A. Something you are: Iris

The first step of our project is that the customer should scan his iris

And if the match is found in the stored database then he crosses half the barrier of getting access to the locker door.

B. Something you know: Account Number

Once the customer scan his iris he should enter the account number through Graphical User Interface and when both his iris and account number matches in the stored database he gets access to the locker door. After getting entry mail is send to both the manager as well as to the customer for security purpose as well as the in time of the customer starts.

C. Something you have Radio Frequency Identification: RFID card

The RFID card module is placed on the customer's locker and is interfaced to the AVR microcontroller board. The customer use this RFID card to get an access to the main locker.

II. SYSTEM DESIGN

In this project combination of hardware and software is used to build an application such as bank locker system.

Manuscript received March, 2014.

***Chetna R. Koli**, of Electronics And Telecommunication Engineering, Padmabooshan Vasantdada Patil Institute of Technology, Pune, India.*
Mobile No .7738747335

***Nikita S. Kheratkar**, of Electronics And Telecommunication Engineering, Padmabooshan Vasantdada Patil Institute of Technology, Pune,India*
Mobile No. 9762113044.

***Pooja S. Ganganalli**, of Electronics And Telecommunication Engineering, Padmabooshan Vasantdada Patil Institute of Technology, Pune, India*
Mobile No. 8888294540.

***T. G. Shirsat**, Professor of Electronics And Telecommunication Engineering, Padmabooshan Vasantdada Patil Institute of Technology, Pune, India.*
Mobile No. 8087074808.

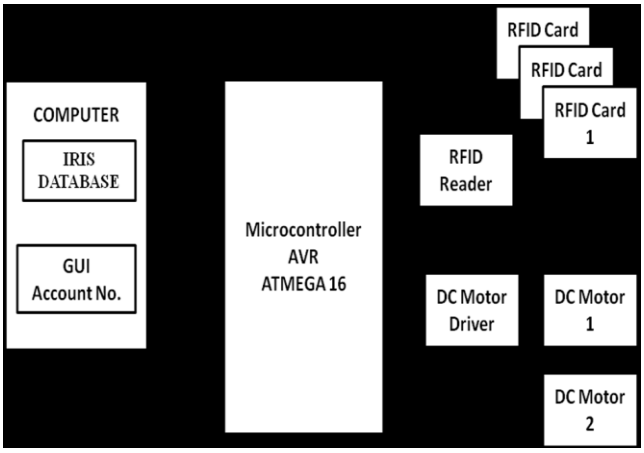

Figure 2: Functional Block Diagram

MICROCONTROLLER:

In this project AVR(ATMEGA 16) microcontroller which is High Performance, Low power 8 bit microcontroller has been used to interface RFID module for getting an access to the customers locker, motors for the automation of opening and closing the locker doors and LCD which will be at managers room for displaying specific details of customer for security.

DC motors are used to provide automatic open and close the door. To drive the motor L293D driver IC is used to drive the motor.

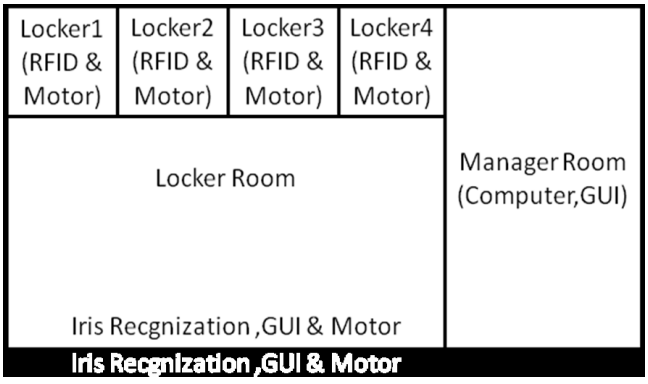

Figure 3: Three Level Securities at different location

To improve the performance and security more number of ideas are implemented at different location of locker room.

1) **First Level Security:** Iris at locker room door
2) **Second Level Security:** Account number
3) **Third Level Security:** RFID card

Graphical User Interface:

To easily manipulate the images in our database we built an interface that allows the user to choose between different options[2]. The first one is to enter the account number. The second allows choosing the algorithms for matching his iris image in the stored database. The third allows the verification of the correspondence between the account number entered and a eye image. The other Graphical User Interface will be in managers room which will contain customers database like account number, in time, out time and iris database.

Figure 4: GUI for data entry

Radio Frequency Identification (RFID card):

RFID (radio frequency identification) systems use data strings stored inside RFID tags or transponders) to uniquely identify people or objects when they are scanned by an RFID reader. These types of systems are found in many applications such as passport protection, animal identification, inventory control systems, and secure access control systems, robotics, navigation, inventory tracking, payment systems, and car immobilization. Because passive tags require a strong RF field to operate, their effective range is limited to an area in close proximity to the RFID reader. The distance over which the RFID tag is usable is affected by such things as the tag shape and size, materials being used in the area near the reader, and the orientation of the reader and tag in respect to each other and in their operating environment. The smaller a tag, the closer it must be to the reader to operate. Each transponder tag contains a unique identifier that is read by the RFID Reader Module and transmitted to the host via a simple serial interface. Each tag has a specific range that is within 10% of the given distance for each type of tag. The reason for the 10% is due to environmental conditions and RFID modules. We have used RFID cads having following features: passive RFID EM4100 family transponder tags ,Reading Distance 10-15CM of the reader , 125kHz read frequency,9600 baud RS232 serial interface ,standard 2.54mm Pitch Berg strip connector, bread board compatible ,low power Requirement 7-9V, 100mA ,built in Antenna which will be interfaced to the AVR microcontroller board and the module will be placed on the customers locker.[3]

Figure 5: Message box in GUI

Verification occurs when the biometric system attempts to confirm an individual's claimed identity by comparing a submitted sample to one or more previously enrolled templates.

Identification the biometric system searches a database for a reference matching a submitted biometric sample and if found, returns a corresponding identity. A biometric is collected and compared to all the references in a database, Identification is "closed -set" if the person is known to exist in the database. In "open-set" identification, the person is not guaranteed to exist in the database. The system must determine if the person is in the database.

Recognition is a generic term and does not necessarily imply either verification or identification .All biometric systems perform "recognition"[4]

III. IRIS

The human Iris is an internal organ of the eye, protected by the eyelid, cornea. The iris is a muscle within the eye that regulates the size of the pupil, controlling the amount of light that enters the eye. It is the colored portion of the eye with coloring based on the amount of melatonin pigment within the muscle. The iris is the only internal organ of the human body that is normally externally visible. By the time a human is about eight months old, the iris' structures are complete, and they do not change in later life. The iris cannot be surgically altered without damage to a person's vision, and its physical response to light provides one test that prevents artificial duplication of the organ.[5]

IRIS RECOGNITION

Iris recognition is a method of recognizing a person by analyzing the random pattern of iris. Iris recognition has unique, stable and distinctive features for authentication that uses pattern recognition techniques based on high-resolution impersonal identification over age. The difference eve exists between identical twins and between the left and right eye of the same person. Iris systems have a very low False Accept Rate (FAR) compared to other biometric traits; the False Reject Rate (FRR) of these systems can be rather high [6].Image processing techniques can be used to extract the unique iris pattern from a digitized image of the eye, and encode it into a biometric template, which can be stored in a database. This biometric template contains an objective mathematical representation of the unique information stored in the iris, and allows comparisons to be made between templates.

A typical iris recognition system in involves three main modules:

i. Preprocessing Stage
ii. Feature extraction and Encoding

i. Preprocessing Stage

It contains determining the boundary of the iris within the eye image, and selects the iris portion from the image to make easy for processing. It includes various stages such as:

a. Iris Segmentation
d. Iris Normalization
e. Image Enhancement

ii. Feature extraction and Encoding

This is the key component of an iris recognition system and controls the system's performance to a large extent. Iris recognition produces the correct result by extracting features of the input images and matching these features with known patterns in the feature database.[7]

Figure 6: Block diagram of Iris recognition system.

IV. IRIS ALGORITHMS

Iris Database

Iris images are obtained from the Chinese Academy of Sciences Institute of Automation CASIA database The database contains 3 x 128 iris images (i.e. 3 x 64 left and 3 x 64right).The images are: 24 bit - RGB, 576 x 768 pixels, file format: PNG. Experimental evaluation using the CASIA iris image database clearly demonstrates an efficient performance of the proposed algorithm.[8]

In our project we are going to compare the input iris image with database which is available with the manager. When the customer wants to own the locker in the bank will need to store the iris image in the manager's database. Here we are going to implement three algorithms and are going to use one of the best suitable.

To match iris mages different type of algorithms are used that are:

A. Least Square Algorithm
B. Cross correlation
C. Feature Extraction

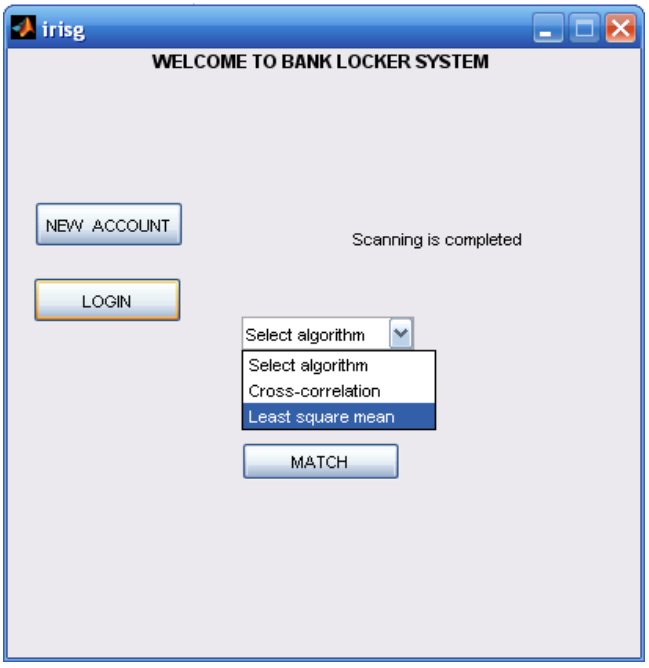

Figure 7:Selection of matching algorithm in GUI

A. Least Square Algorithm

The method of least square is standard approach to the approximate solution to find the match. Least square algorithm gives sum of square of errors having the pixel value into images. By applying the least square algorithm on each current directory images we are going to find maximum difference value in each two images and the threshold value is set by taking average of all maximum value. This threshold value is set as a compare point to detect the match or unmatched image. If the sum of squared difference is greater than threshold value then it shows that image is matched and if the squared difference is less than threshold value then it shows image is unmatched.

B .Cross correlation

Cross-correlation is a measure of similarity of two signals as function of a time-lag applied to one of them. This is also known as a sliding dot product or sliding inner-product. It is commonly used for searching a long signal for a shorter, known feature. It has applications in pattern recognition. Cross correlation is a standard method of estimating the degree to which two series are correlated. In many signal processing applications the series is assumed to be circular in which case the out of range indexes are wrapped back within range of 1 to -1. A high negative correlation indicates a high correlation but of the inverse of one of the series. Correlation is a metric for similarity between two different signals. When normalized, so that each of the two signals to be correlated have unitary power and null mean value, the correlation operation shifts to the computation of the correlation coefficient, of the two signals you are comparing. The correlation coefficient, for a given time lag t between the two signals, is always between -1 and +1, clearly giving a measure of the similarity of the shapes of the two signals at that time lag.

C. Feature Extraction

Feature extraction is a key process where the two dimensional image is converted to a set of mathematical parameters. The iris contains important unique features, such as stripes, freckles, coronas, etc. These features are collectively referred to as the texture of the iris. These features were extracted using following algorithms.

1) Find the center of pupil
2) Find the proper iris by finding inner and outer circle
3) Edge detection
4) Segmentation
5) Match

If the sample iris is match with iris saved in database as well as the account number of that perso is match then door at the lcker room will be open with activating perticular RFID reader activation.

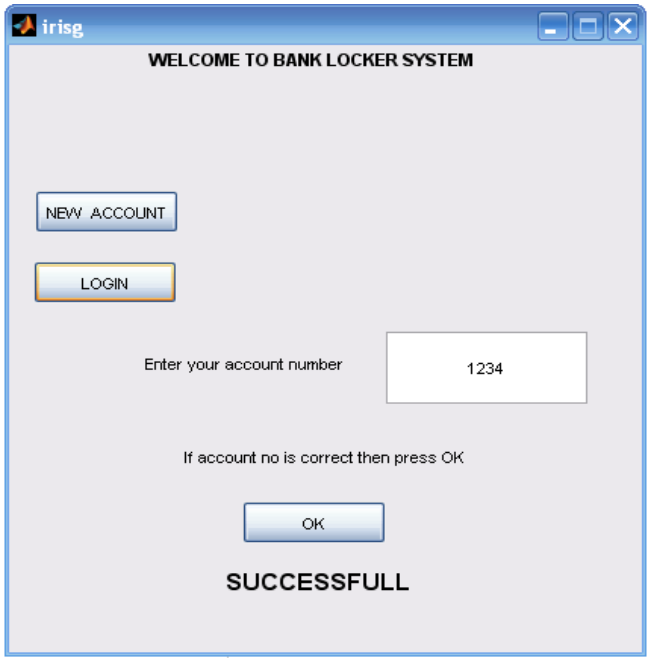

Figure 8: To match account number in GUI

V. RESUILT

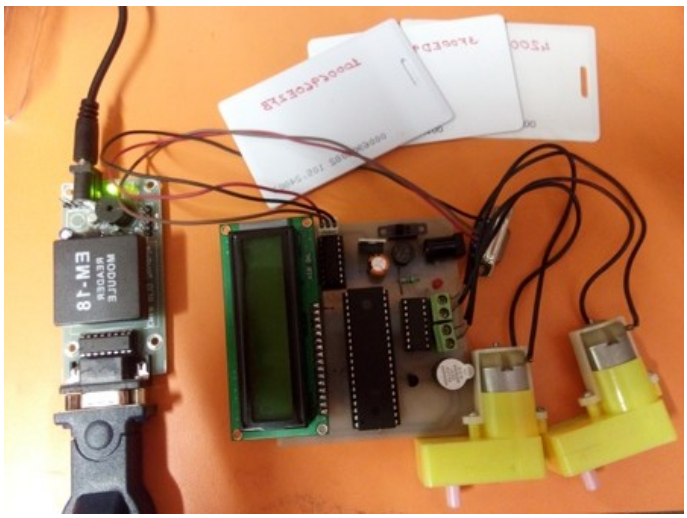

Figure 9: Simulation Of Hardware

VI. CONCLUSION

We observed that the features of iris are unique as it never changes. The system that requires identity check and security as well as accuracy this system is very simple, efficient and requires few components . .

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Chetna R. Koli, pursuing B.E. (Electronics And Telecommunication Engineering) Padmabooshan Vasantdada Patil Institute of Technology (Bavdhan), University of Pune. Her area of interests are Image Processing, Embedded.

Nikita S. Kheratkar, pursuing B.E. (Electronics And Telecommunication Engineering) Padmabooshan Vasantdada Patil Institute of Technology (Bavdhan), University of Pune. Her area of interests are Image Processing, Embedded.

Pooja S. Ganganalli, pursuing B.E. (Electronics And Telecommunication Engineering) Padmabooshan Vasantdada Patil Institute of Technology (Bavdhan), University of Pune. Her area of interests are Image Processing, Embedded.

Prof. T. G. Shirsat, (Electronics And Telecommunication Engineering) Padmabooshan Vasantdada Patil Institute of Technology (Bavdhan), University of Pune. Her area of interests are Image Processing.

