Iris as Biometrics for Security System

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Abstract—*The value of biometrics is realized by security systems in order to verify or to identify the users. In the restricted areas only authorized people can enter and in that situation in order to identify the person who is entering into the restricted areas like R& D, Bank Lockers etc. is needed to identify and permit the person. If this process is performed manually by security guards, it will take too much time to identify each person and thus errors may occur in this process. To avoid this time consumption and errors we are proposing a security system using iris as biometrics which will recognize the person based on his or her iris pattern and this security system used to control the entry in the restricted areas.The proposed system will provide information of recognized person on Liquid Crystal Display (LCD) & thus controlling the access of the people entering into the restricted area.*
Keywords—***Biometrics, Security, Recognition, LCD***

I. INTRODUCTION

One of the most effective methods for the sake of security is biometrics. The term biometrics is the combination of two words Bio & Metric. It is an emerging technology for recognizing the individuals based on their physical or behavioral attributes. The physical attributes are more reliable than behavioral attributes and has no risk of being used by anyone else or forgetting it or losing it and these attributes includefingerprint, hand geometry, handwriting, face, iris, voice, retina, vein etc. As far as security importance is considered, there is a need to guaranty that only authorized persons can enter to the restricted areas like bank, R&D etc. and this need is satisfied by the use of biometric technologies.

Biometric identification systems are valid alternatives to traditional identification systems such as showing identity cards, use of passwords, making signatures etc. The disadvantage of traditional identification systems can be avoided by adapting the biometric methods and with the help of these biometric methods, it is possible to recognize an individual's based on who they are rather than what they possess or what they remember. Various biometric techniques that deal with automatic recognition of a person are hand geometry, face recognition fingerprint recognition, retina scanning and iris recognition. The iris recognition is based on iris biometrics. The existence of human iris is in between and dark pupil and white sclera of an eye as shown in following fig.
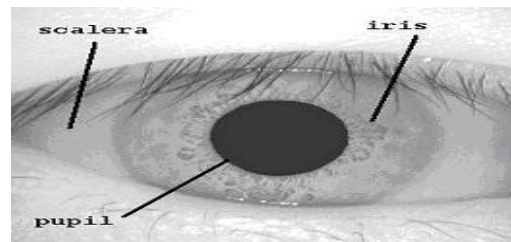

Fig 1: The human iris

The human iris is considered as highly universal since two different irises are extremely unlike to be equal even in case of genetically identical twins or in case of single individual. Thus among all the biometrics, iris biometrics is gaining increased attention for its stability, reliability, uniqueness.

Generally, the iris recognition system is carried out in five major steps, they are: iris segmentation, iris normalization, feature encoding, template matching & human identification.

The aim of the project is to develop a high level security system in restricted areas with the help of iris recognition system and integrating this iris recognition system with microcontroller to display the information of recognized person on Liquid Crystal Display (LCD) and to control the access of the person. Security system using iris as biometric will mainly identify each person with no error and will reduce the time consumed by security guards for identifying person and will also avoid the errors occurred while identifying each person in restricted areas.

II. PROPOSED APPROACH

The proposed approach is based on image processing and is composed of two the main steps
1. Iris recognition system to recognize the person.
2. Iris recognition system integrated with microcontroller & LCD.
Iris recognition system is as shown below.
The iris recognition system is basically a five steps process as follows.
 1. Iris Segmentation
 2. Iris Normalization
 3. Feature Encoding
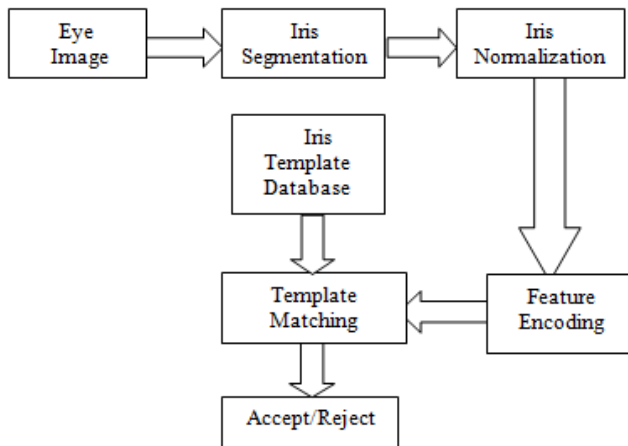 4. Template Matching
 5. Human Identification

Fig 2: Block diagram of iris recognition system

1. Iris Segmentation:

Captured eye image will act as an input for this stage. Iris segmentation is related to segment the iris part from the eye image for further processing. Thus the iris region will be extracted by finding the boundary between the pupil and iris, and the boundary between the iris and the sclera.
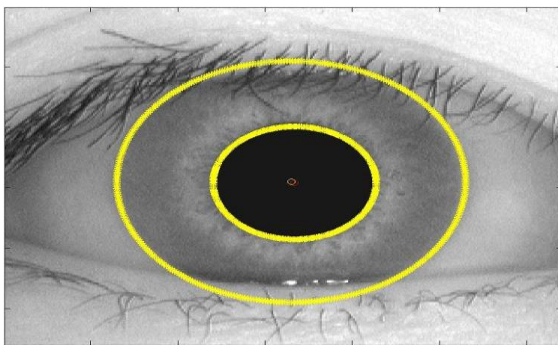

Fig 3: Iris Segmentation

2. Iris normalization:

Iris normalization process deals with transforming the segmented iris image into fixed size rectangular image so that all the images of same size are processed for better comparison .
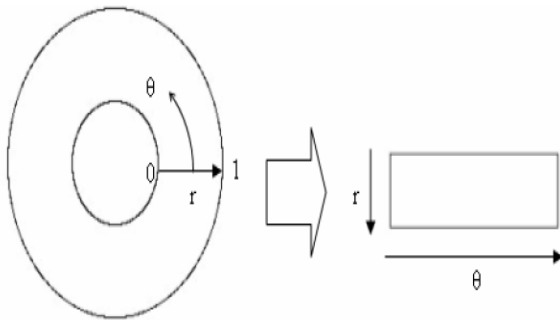

Fig 4: Iris Normalization

Thus this process gives the iris images of constant dimensions so that two images of same iris will have features at same spatial location. Iris normalization is carried out by using Daugman's rubber sheet model as shown in figure.

3. Feature Encoding:

An iris code or template is generated with the help of feature encoding process. Basically a template in the recognition process represents the information of a biometric sample in the binary form.

4. Template Matching:

In this step, comparison of two iris codes or two templates is carried out using Hamming distance. Depending upon the value of hamming distance the system takes the decision of template matching process.

5. Accept/Reject Decision:

In this step, if templates are matched with each other, then human identification will be accepted otherwise it will be rejected.

The iris recognition system integrated with microcontroller is as shown in following figure.
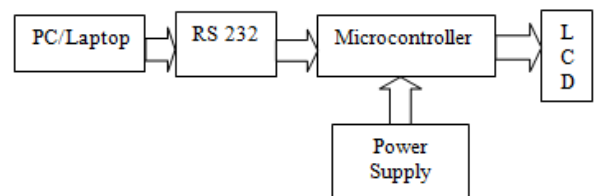

Fig 5: Block Diagram of Iris based security system using microcontroller

The block diagram consists of the following blocks.
- Personal computer/Laptop
- RS 232 - Serial communication
- Micro controller
- Power Supply
- LCD (Liquid Crystal Display)

Personal computer/Laptop:

The personal computer /Laptop will contain the iris recognition data of the persons which will be given to microcontroller via serial interface RS232.

RS 232 - Serial communication:

It is used for serial communication between personal computer and microcontroller.

Microcontroller:

The microcontroller will receive the serial data from PC & will control the system.

Power supply:

The DC power supply requirement for the system will depend on selection of microcontroller.

Liquid Crystal Display (LCD):

LCD is used to display the status of the persons.If comparison is true then micro controller will switch on the relay. If the person is recognized then the LCD will display "AUTHENTICATION SUCCESSFUL". If some other person tries to enter, the micro controller checks with database& if it is wrong it displays in the LCD as "AUTHENTICATION FAILED".

III. OVERVIEW OF THE SYSTEM

Security System using iris as biometrics consist of iris recognition system integrated with microcontroller and LCD. The iris recognition system will recognize the person. . If the person is recognized then the the LCD will display "AUTHENTICATION SUCCESSFUL". If some other person tries to enter, the micro controller checks with database& if it is wrong it displays in the LCD as "AUTHENTICATION FAILED".

IV. RESULTS AND DISCUSSION

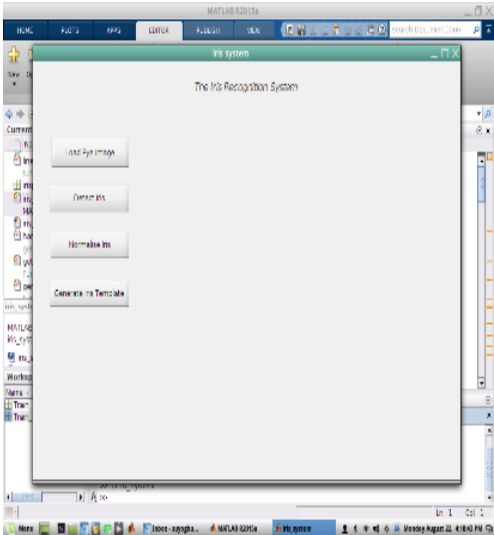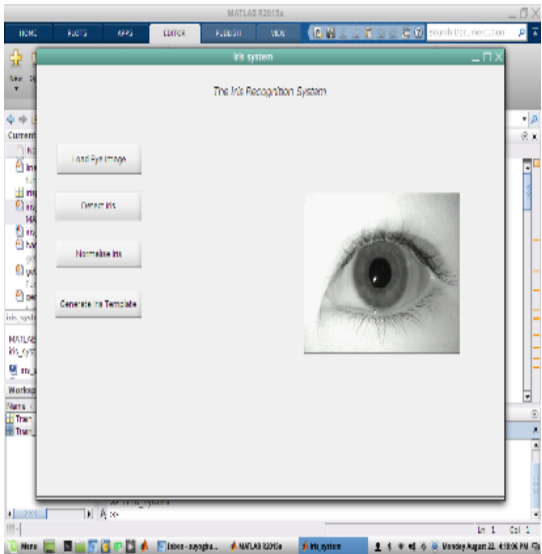Fig 6. Iris Recognition System
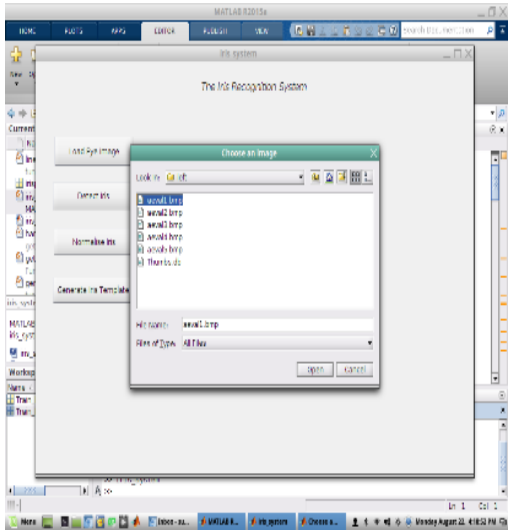
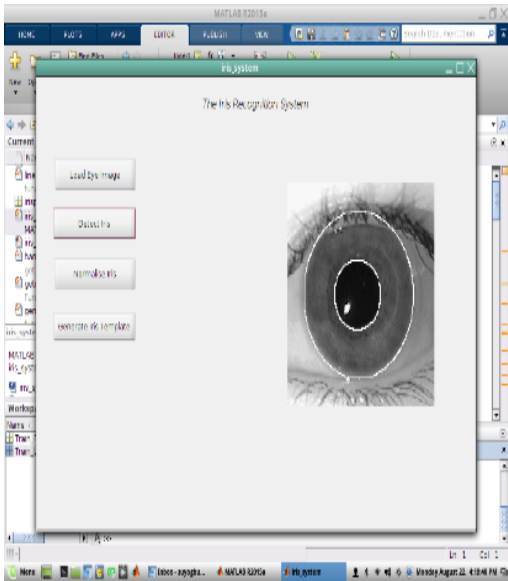

Fig.7 Eye image as an input
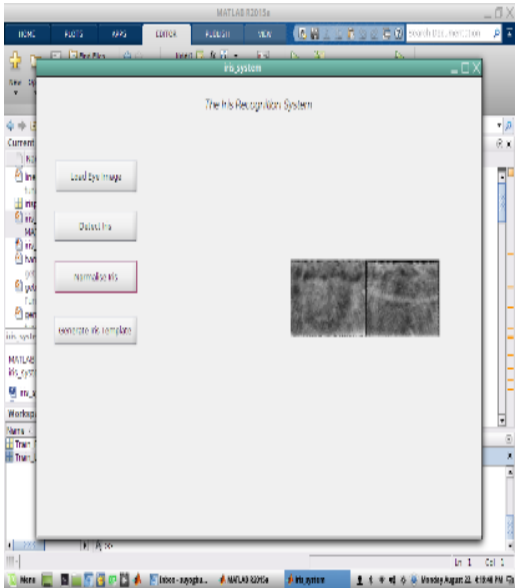

Fig.8 Loading of eye image

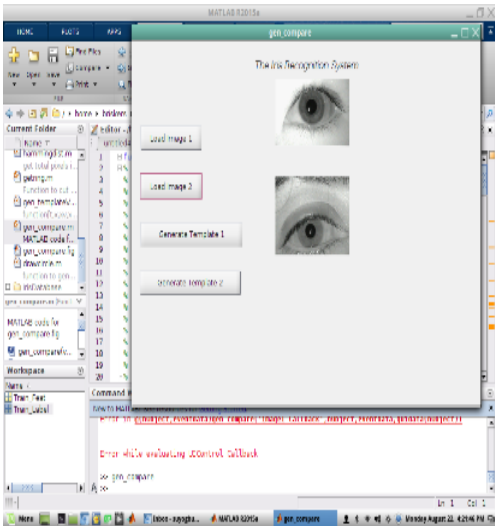Fig. 9 Iris Segmentation

Fig. 10 Iris Normalization

Fig. 12 Template Generation
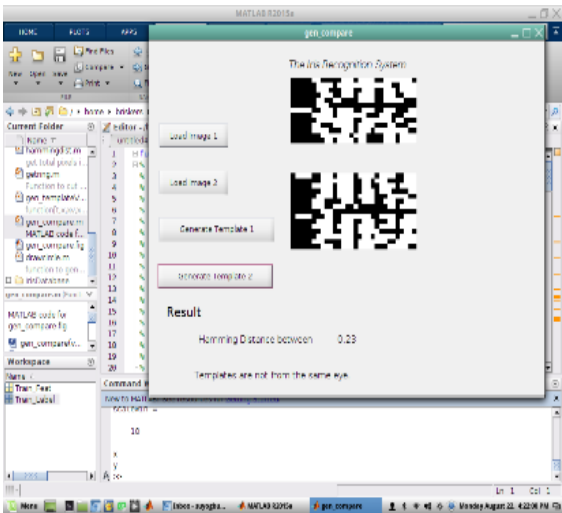

Fig. 11 Loaded eye images

Fig.13 Comparison of templates

Fig. 14 Final result on LCD for successful authentication

Fig. 15 Final result on LCD for failed authentication

V. CONCLUSION

The proposed system will be able to prevent the access of unauthorized persons in the restricted areas by displaying the information of recognized person on Liquid Crystal Display & it will also provide error free recognition of the persons.

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