

'NetAccess': Networked Access to Computerized-System Using Iris

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Abstract— Based on the available secured files and information in the companies; they need to be secured by a very high system. Currently, most of companies are accessed by normal keys in order to access the offices. But, those keys might be lost or stolen. In addition, those doors can be hacked easily by thieves. This raises a need to improve security of such information by limiting access only to those who have authorization to do so. The traditional means, as well as biometric traits other than iris, do provide such control; yet they still have several limitations in verifying the identity of individuals. In this presents the design of an Iris Recognition System for accessing Building and Control System

Index Terms— Iris Recognition System; TCP/IP Network; Image Processing.

I. INTRODUCTION

Based on the available secured files and information in the companies, they need to be secured by a very high system. Currently, all companies are accessed by normal keys in order to access the offices. But, those keys might be lost or stolen. In addition, those doors can be hacked easily by thieves. This raises a need to improve security of such information by limiting access only to those who have authorization to do so. The traditional means, as well as biometric traits other than iris, do provide such control; yet they still have several limitations in verifying the identity of individuals.

The importance of the work in this paper lies in the fact that it serves the security for offices, hospitals, businesses or institutional buildings. The system allows people to access buildings after they pass the iris check. Using biometrics approach for security ensures the secured area from spongers. It provides an alternative to password, smart card, and finger print as well. Biometrics seeks to tie identity much more tightly to a person's unique features. Biometrics could be anatomical, physiological, or even behavioral. The sounds of a person's voice, or the way in which they sign their name, are examples of behavioral biometrics. People blood type or

marks in their tissue or fluid samples (including DNA itself) are examples of physiological biometrics that are typically used in forensic applications. Among all biometrics, anatomical is the most currently used, i.e. facial appearance, hand geometry, fingerprints, retinal vein patterns, and iris patterns [2].

Iris recognition identifies different persons and things in the daily life. It is based on the most mathematically unique biometric, i.e. the iris of the eye. As shown in Figure 1 below, the iris surrounds the pupil, and is located behind the cornea of the eye and the aqueous humor, but in front of the lens. Its purpose is to control the amount of light that enters the eye through the pupil, by the action of its dilator and sphincter muscles that control pupil size, but its construction from elastic connective tissue gives it a complex, fibrillose pattern [1].

Table 1. Comparison of biometric systems

Characteristic	Fingerprints	Hand Geometry	Retina	Iris	Face	Voice
Ease of Use	High	High	Low	Medium	Medium	High
Error incidence	Dryness, dirt, age	Hand injury, age	Glasses	Poor Lighting	Lighting, age, glasses, hair	Noise, colds, weather
Accuracy	High	High	Very High	Very High	High	High
User acceptance	Medium	Medium	Medium	Medium	Medium	High
Required security level	High	Medium	High	Very High	Medium	Medium
Long-term stable	High	Medium	High	High	Medium	Medium

The aim of the work in this paper is to improve and manage building security and access. The objectives of this project, therefore, are as follows:

- External security review recommended integrated system that included access control, intruder detection and camera, and that it could support perimeter level anti-pass back.
- To identify recognition system requirements that is related to iris recognition.
- To develop and test the neural network model used in iris recognition prototype.

- To increase the security of accessing companies' offices. Any person has to pass the main door in order to pass any internal door.
- Reduce (or eliminate) the need for security staff to lock buildings.

II. DESIGN OF NETACCESS

The project is basically a Microcontroller based system. Microchip PIC16F877 microcontroller was selected (Figure1).

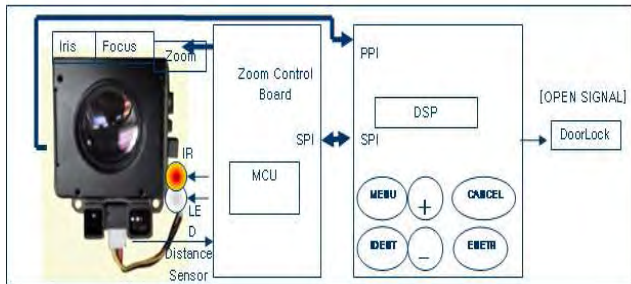


Figure 1: Design of NetAccess

The different components of the system are controlled by microcontroller.

A. The system consists of the following major components:

- Digital camera-laser technology
- Lock door
- Private Network
- Liquid Crystal Display (LCD).
- MATLAB program which preprocess the captured image with the digital camera, convert the image into code and compare the picture code with the stored database.
- Microcontrollers and other chips.
- Sensors (Opto-Switches).
- Stepper motor.

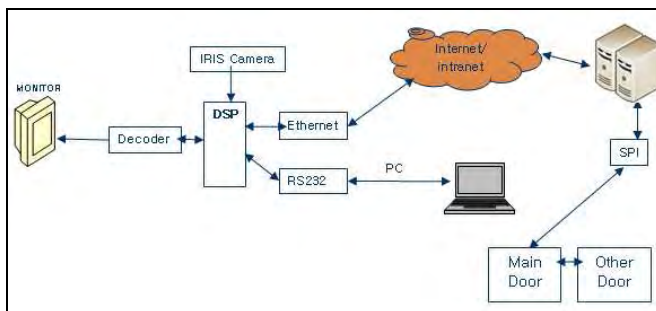


Figure 2. NetAccess Operation

B. Microcontrollers

- There are many companies which provide series of microcontrollers [8] such as Atmel, Motorola and Microchip Technology.
- The PIC16F877 microcontroller was selected
- The PIC microcontroller series are produced by Microchip Technology
- The PIC microcontroller has many powerful features.

- It has low cost compared to other products
- It is available in the Electrical Engineering Department with its programming tools

1) Main Features:

- 256 Bytes EEPROM data memory.
- Interrupt capability (up to 14 sources).
- Three different built-in timers.
- 8 channels 10-bit analog-to-digital converter.
- Universal Synchronous Asynchronous Receiver Transmitter (USART) [6].

C. Stepper Motor

The stepper motor is used to open and close the door, and it moves one step at a time. In order to rotate the stepper motor specific sequence of voltages should be applied to the stator coils [9]. Unipolar stepper motor is used in NetAccess system since it's easy to control. A program was written in assembly language to control the speed and the direction of rotation of the stepper motor.



D. Liquid Crystal Display (LCD)

LCD can operate in one of the two modes, 8 bits data interface mode or 4 bits data interface mode. 8 bits mode is easier to implement because it requires less memory size but it also requires more additional I/O lines. The LCD has 11 data and control pins. D0-D7 is the bi-directional data bus. R/W determines if we read from or write to the LCD. According to RS pin, the data on the data bus is treated either as a command or character data.



E. Power Supply

The power supply is needed to operate the microcontroller and the other components [7]:

- 5 Vdc is needed to operate the microcontroller, LCD, and sensors
- 12 Vdc is needed to operate the stepper motor

III. SYSTEM INTEGRATION

The microcontroller supports five ports with a width of 8 bits each except for the ports A and E. The first four pins of PORTA (RA0:RA3) are configured as output ports to control the stepper motor by setting the corresponding register TRISA to ones. The keypad is connected to seven pins of PORTB (RB1:RB7). RB0 is reserved to be used as an interrupt pin to open the door directly from the computer. The three sensors used in the system are connected to PORTC (RC0:RC2). RC6 (TX) and RC7 (RX) are configured to send/receive data

to/from the microcontroller at a baud rate of 9600. PORTD and PORTE are reserved for the LCD display module. PORTD is connected to the bi-directional data bus (D0-D7) of the LCD [10]. The three pins of PORTE(RE0:RE2) are connected to RS, RW and EN, respectively

IV. NETACCESS DESCRIPTION

The LCD shows a message to the user, asking him to look into the camera, capturing the eye image then it will show a wait message while the data will be transmitted to the PC via RS-232 interface (use Remote Access Service (RAS), and Virtual Private Network (VPN)). The PC compares the data with the database. If the data match the entry record in the data base, the person is allowed to enter. Then, the LCD will show an acceptance message, the stepper motor will start rotating and open the door to give the person the permission to enter the building, Otherwise, if the entered iris was not valid, another message will be displayed showing "INVALID" on the LCD and the system will produce a peep sound for five seconds for warning. Figure 2 shows NetAccess system in operation.

V. CONCLUSION

In this paper, we present a new technology for managing building security and access using iris recognition. The system allows authorized people to access a specific building while totally preventing unauthorized ones. This enhances security service provided to buildings and reduces the need for security staff to lock buildings.

In addition, the system provides accurate information of unauthorized access attempts. The system is effective in terms of cost, use and integration. We are going to implement the system and evaluate its performance.

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