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REVIEW ARTICLE

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RFID BASED E-PASSPORT

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ABSTRACT

An e-Passport contains an electronic chip. The chip holds the same information that is printed on the passport's data page: the holder's name, date of birth, and other biographic information. An e-Passport also contains a biometric identifier. The United States requires that the chip contain a digital photograph of the holder. All e-Passports issued by Visa Waiver Program (VWP) countries and the United States have security features to prevent the unauthorized reading or "skimming" of data stored on the e-Passport chip.

Keywords: RFID, E-PASSPORT, BIOMETRIC

I. INTRODUCTION TO FINGERPRINT RECOGNITION

Fingerprint identification is the automated method of verifying a match between two human fingerprints. Fingerprints are one of many forms of biometrics used to identify individuals and verify their identity. The analysis of fingerprints for matching purposes generally requires the comparison of several features of the print pattern. These include patterns, which are aggregate characteristics of ridges, and minutia points, which are unique features found within the patterns. It is also necessary to know the structure and properties of human skin in order to successfully employ some of the imaging technologies.

A. Patterns

The three basic patterns of fingerprint ridges are the arch, loop, and whorl:

- arch: The ridges enter from one side of the finger, rise in the center forming an arc, and then exit the other side of the finger.
- loop: The ridges enter from one side of a finger, form a curve, and then exit on that same side.
- whorl: Ridges form circularly around a central point on the finger.

Matching algorithms are used to compare previously stored templates of fingerprints against candidate fingerprints for authentication purposes. In order to do this either the original image must be directly compared with the candidate image or certain features must be compared.

B. Pattern-based (or image-based) algorithms

Pattern based algorithms compare the basic fingerprint patterns (arch, whorl, and loop) between a previously stored template and a candidate fingerprint. This requires that the images can be aligned in the same orientation. To do this, the algorithm finds a central point in the fingerprint image and centres on that. In a pattern-based algorithm, the template contains the type, size, and orientation of patterns within the aligned fingerprint image. The candidate fingerprint image is graphically compared with the template to determine the degree to which they match.

C. Fingerprint Enrolling

- Taking image of a fingerprint and storing it into the image buffer.
- Converting this image from the image buffer into an array of 256 bytes each that is stored onto a character buffer.
- Using two such arrays and making a template file of 512 bytes.
- Storing this template file onto the flash of scanner itself and assigning an ID to each of the template stored.

Fig 1: R305 Module

D. Fingerprint Matching

- Taking an image of the finger pressed against the scanner and storing it on the image buffer**.**
- Converting the image from the buffer into an array and matching it against the templates stored onto the device.
- On finding a match, the device returns the ID of the fingerprint template that the finger matches against. Otherwise it returns an acknowledgment package indicating that no match was found.

E. Features

- Power DC : 3.6V-6.0V
- Interface : UART(TTL logical level) / USB 1.1
- Working current : 100mA
- Peak Current : 150mA
- Matching Mode : 1:1 and 1:N
- Baud rate(9600*N)bps N=1～12 (default N=6）
- Character file size : 256 bytes
- Image acquiring time : <0.5s
- Template size : 512 bytes
- Storage capacity : 120
- Security level : 5 (1, 2, 3, 4, 5(highest))
- FAR : <0.001%
- FRR : <0.1%
- Avg searching time : < 0.8s (1:880)
- Window dimension : 18mm*22mm

F. Working Temperatures

- Temperature : -10℃- +40℃
- Storage environment Temp : -40℃- +85℃

G. Dimensions

- Split type Module : 42*38*7mm
- Sensor : 56*20*21.5mm
- Integral type : 54.5*20.6*23.8mm
- RH : 40%-85%
- RH : <85%

II. INTERFACING BIOMETRIC MODULE TO 8051 MICROCONTROLLER

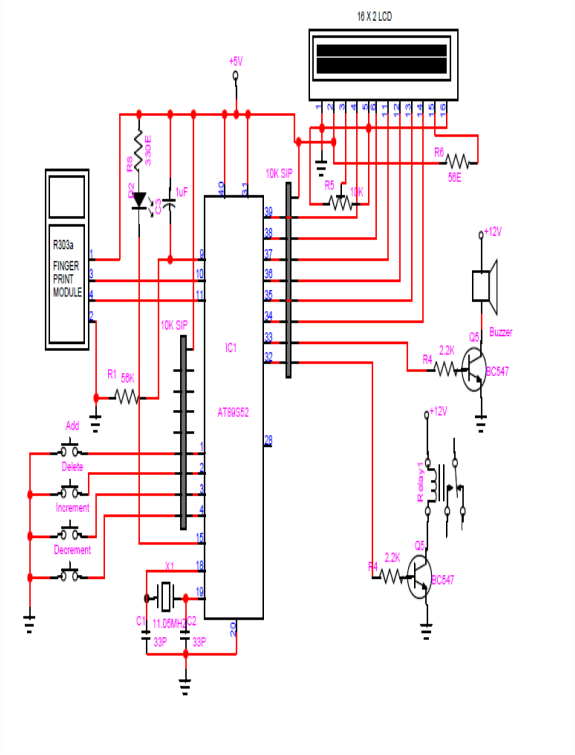


Fig 2: Biometric Module Interfacing

- There are 4 buttons on the circuit. Button 1 is for adding new finger, Button 2 is for Deleting a finger. Other 2 buttons for selecting the ID for the finger.
- To add a finger, press the ADD button and the display will show the ID to add. Press the but3 and but4 to change the ID, then place the finger to AFD.
- To delete a finger, press delete button and select the ID using but3 and but4. Then press the Delete button again to delete the finger from the module.

III. WORKING

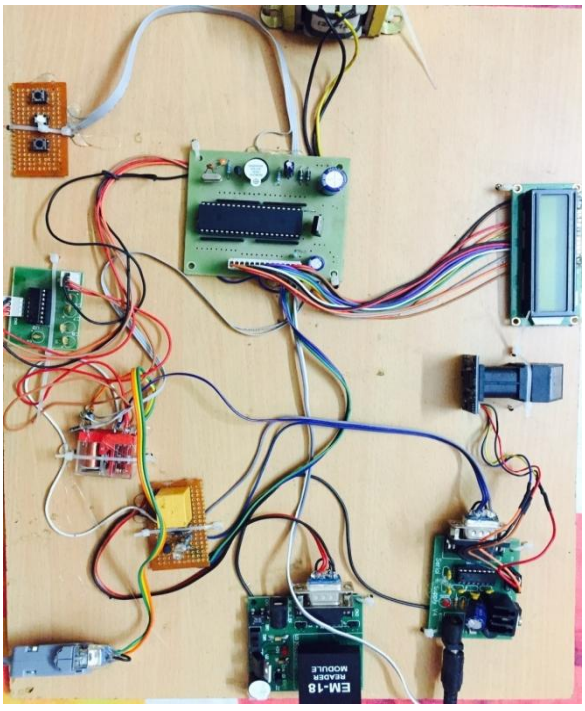
- This project is done with the help of 8051 microcontroller. As a microcontroller needs 5V DC we consider the respective circuit for the conversion of AC to DC.
- Then we interface LCD display to the microcontroller through serial port communication.
- In a passport we have many details like name, age, dob etc., These are stored as a database in the respective tag number.
- The tag is brought near the RFID reader where the card number is read by the reader and then displayed in the LCD display with the database being displayed on the computer screen.
- For the database to be displayed on the computer screen, a software code is written in KEIL micro vision and then dumped into the microcontroller.
- Then a biometric finger module is used where the database and the biometric are verified.
- R305 biometric finger module is used.
- Initially when we switch on the kit, LCD displays "Show your card". Then the card is placed near the reader.
- CASE 1: The reader reads the card and displays the details in the PC using Flash Magic software. Then the biometric module asks for the finger print.

If a new fingerprint has to be enrolled there are three switches namely ERASE, ENROLL, SUBMIT, assigned for this purpose.

So, if both the database and the fingerprint stored previously are matched then it displays that the person is valid, else invalid.

- CASE 2: If the card number does not exist then it displays that the person is invalid.

IV. RESULT



V. CONCLUSION AND FUTURE SCOPE

So, the system developed can be used to prevent forgery of the passports by verifying database and the biometric identity of a person with the help of RFID technology. The above developed system is quit versatile in nature. So many applications can be added with the same system by just little modification required. It can be used in modules like attendance system module can also be interfaced with the same existing system which keeps the record (Identity, Time, Date etc.) of that person and corresponding data base can be maintained. IC 74LS244 can be used for multiplexing RxD and TxD to creating the hardware for attendance system.

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