

# FINGERPRINT SECURITY USING IMAGE PROCESSING

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**Abstract**—The research aims at developing a fingerprint recognition system which is platform independent. The existing techniques uses MATLAB for its simulation. The main objective is to design a system which uses power source for its working without any PC interfaced to it, hence we use programming like C for its implementation. The data can be retrieved from the system at any desired time using the GUI designed for it. This makes the system portable and convenient for daily operations. A high level of accuracy is obtained from the designed system as the False Rejection Ratio(FRR) of the fingerprint scanner used is less than 0.1%. The proposed system is also fast as the image acquiring time is less than 0.5 secs. Moreover the system can be used as a real time security system.

## I. INTRODUCTION

Biometric systems operate on behavioral and physiological biometric data to identify a person. The behavioral biometric parameters are signature, gait, speech and keystroke, these parameters changes with age and environment. However physiological characteristics such as face, fingerprint, palm print, and iris remains unchanged throughout the lifetime of a person.

The biometric system operates as verification mode or identification mode depending on the requirement of an application. The verification mode validates a person's identity by comparing captured biometric data with readymade template. The identification mode recognizes a person's identity by performing matches against multiple fingerprint biometric templates[1]. Fingerprints are widely used in daily life for more than 100 years due to its feasibility, distinctiveness, permanence, accuracy, reliability, and acceptability[2].

## II. DIFFERENT TECHNIQUES FOR FINGERPRINT MATCHING

- **Correlation-based matching:** Two fingerprint images are superimposed and the correlation between corresponding pixels is computed for different alignments.
- **Minutiae-based matching:** It consists of finding the alignment between the template and the input

minutiae sets that result in the maximum number of minutiae pairings.

- **Ridge feature-based matching:** The approaches belonging to this family compare fingerprints in term of features extracted from the ridge pattern.



Fig. 1. Basic Fingerprint

## III. PROPOSED SYSTEM

In this section, the proposed fingerprint recognition system as described below.

### A. Fingerprint Enrollment

1) On selecting the enroll button the fingerprint scanner R303A acquires a scanned finger image as an input. The image is of 8-bit BMP format.

2) The image generated is 256\*288 pixels. This image acquired is forwarded to the subsequent blocks for further processing.

### B. Template Generation

1) The image generated then undergoes the binarization, thinning and image enhancement process.

2) The system generates a template of the finger image based on processing results. The template size is 512 bytes.

3) The template generated can be transferred to the microcontroller 80C51 via a USB interface. The microcontroller then stores the template in the EEPROM(AT24C08) connected to it.

### C. Real Time System

The system is made real time as we use a RTC(DS1307).The RTC is used to provide a real time security to the entries of the fingerprint. The RTC gives accounts of leap years also of upto 2100.

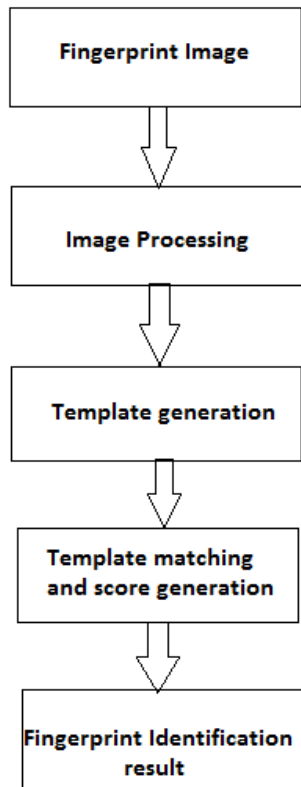


Fig. 2. Block Diagram

### D. Fingerprint Matching

For matching user enters the finger through the optical sensor and system will generate a template of the finger and compare it with the templates of the finger library. For 1:1 matching, system will compare the live figure with specific template designed in the module[3]. For 1:N matching or searching, system will search the whole finger library for the matching figure.

### E. Decision of Match

The decision for the match or failure is displayed by the Microcontroller on the Lcd provided. If match is found then a certain task is given permission or else it is denied.

### F. Retrieving the data

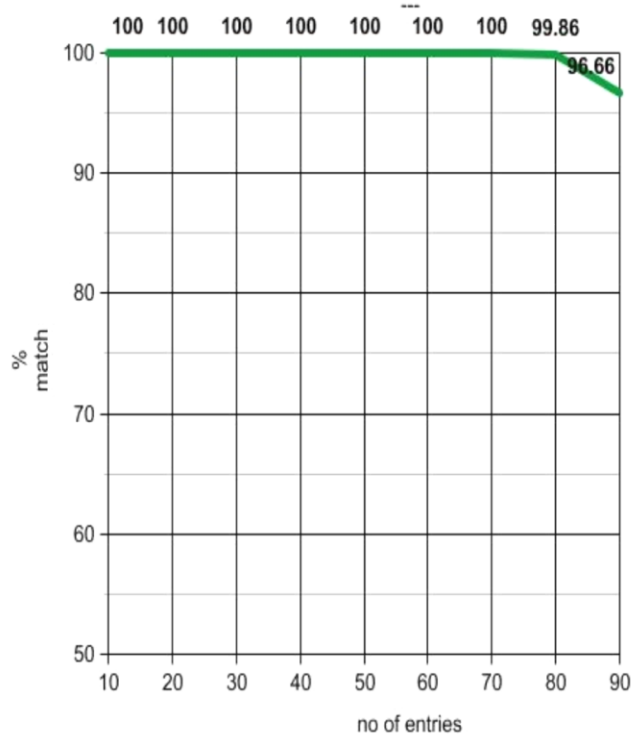
The data of the entries made can be retrieved whenever required by connecting it to a PC. The GUI designed gives the details of the matched and unmatched templates.

## IV. EXPERIMENTAL RESULTS

The fingerprint recognition and identification system has been implemented using microcontroller. This identification of fingerprint is accomplished by matching the templates of the input entry and the database.

### A. Successful Cases

The testing system has been applied to many users and a high level of accuracy is obtained.



## V. CONCLUSION

Our project when compared with the other projects in the field has many additional features. It is platform independent and results are very accurate. It gives a real time security system along with portability and low cost.

## VI. REFERENCES

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## BIOGRAPHY



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