Library Management System Using Fingerprint Recognition

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***Abstract*— Fingerprint Recognition is one among the leading and widely used biometric technologies. This could be effectively implemented for various security purposes. This paper purposes secure library transaction supported on fingerprint recognition. The academic libraries can make use of the advantage of the fingerprint recognition technology. This is often to make sure better safety and security to their invaluable information resources base and human resource furthermore. The registered person is identified by matching their fingerprint ridge and transaction details along with the due dates are sent to the registered mobile number. This system is developed using Arduino Mega.**

***Index Terms*— Fingerprint Recognition, Thinning, Binarisation, Library Transaction, GSM modem.**

I.INTRODUCTION

Library plays a significant role within the development of an institute and society. Library is not always safe and secure place. Books are found on the library shelves with pages from the spine. Sometimes books are damaged beyond repair and the majority libraries are tormented by book or document theft by its member. So, librarian need to aware from theft, desecration of library material and other unethical losses. The duty of the librarian is to stay the library free without losing items to create available or putting individuals at unacceptable risk from the nasty, greedy, and senseless act of others. It is important to secure and secure environment for library staff, library resources and equipment, and library users. By concentrating on the above issues, the system is intended and developed for library management using fingerprint. The performance is achieved by automatic fingerprint recognition. In our design the fingerprint scanner is employed the fingerprint is recognized and it check for the ridge matching, Arduino Mega is employed as core controller. The fingerprint is recorded using the scanner presently it may be processed for further library transaction part.

II. LITERATURE SURVEY

Beck, Young-Hyun [1] have presented an algorithm of mixture false minutiae elimination for properly matching of low-down quality fingerprints. Well-Organized security systems are used this algorithm. It does not only remove the fake minutiae like other algorithms, it also contains the statistical information from the thinned binary image. Our projected algorithm mainly entails of two combination processes like boundary elimination and false minutiae removal. The Projected algorithm successfully eradicates false or untrue minutia like bridges and spikes. The algorithm has been functional on both FVC2002 and FVC2004 files. Numerous experiments show that after equate with several other algorithms, removal of all false minutiae going down in an exceedingly dark, dirty, oily, or dry image.

Sharma and Rajput [6] have presented that fingerprints are primarily used as biometric. It is widely used. Most AFIS are mainly on minutiae, colorization of truly minutiae and eliminate false minutiae.

Ravi.J.[7] projected Fingerprint Recognition using Minutia Score Matching method (FRMSM). For Fingerprint thinning, the Block Filter is employed, which scans the image at the boundary to preserves the standards of the image and extract the minutiae from the thinned image. The false matching ratio is healthier compared to the prevailing algorithm. presented Fingerprint matching using FRMSM. The pre-processing the initial fingerprint involves image binarization, ridge thinning, and noise removal. Fingerprint Recognition using, Minutia Score Matching method is employed for matching the

minutia points. The proposed method FRMSM gives better FMR values compared to the prevailing method. Tico and Kuosmanen [8] have presented the various attributes of minutiae in fingerprints mainly bifurcation and termination.

III. PROPOSED SYSTEM

In this section, we present the theory on library management using fingerprint. The primary step within the finger recognition is known as "image acquisition" and determination of minutiae. The second step in fingerprint recognition is that the location and therefore the determination of the unique characteristics of the processed fingerprint image. The fingerprint is consists of various "ridges" and "valleys" which form the premise for the loops, arches, and swirls. The ridges and valleys contain different styles of break and discontinuities. These are called "minutiae", and it is form these "minutiae"
Various components are interfaced, and the programming language C is used for the software section. The combined usage of hardware and software protocols enables to produce the desired output after the interfacing.

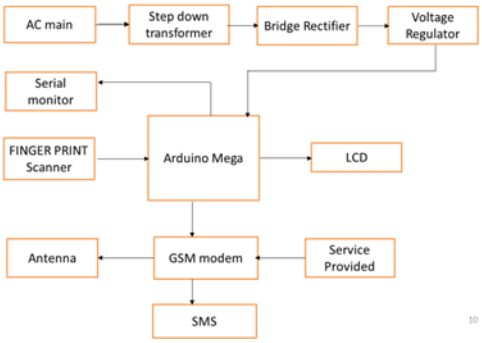

Fig.1 Block diagram of overall system

The Arduino Mega microcontroller is employed within the section, step down transformer and bridge rectifier is employed to step down the power supply as needed for the components. The serial monitor and the fingerprint scanner are interfaced with microcontroller. GSM is utilised to intimate the user about the transaction details. The LCD display is interfaced with controller to display the small print namely the student's name, the overall number of books taken together with the due dates.

IV. COMPONENTS USED

Taking about this proposed system, it is clearly shown that it has several components which help to build a library management system.

A. Arduino Mega Microcontroller

Arduino boards carries with it an Atmel 8-bit AVR microcontroller (ATmega8, ATmega168, ATmega328, ATmega1280, ATmega2560) with varying amounts of non-volatile storage, pins, and features. The 32-bit Arduino Due, supported the Atmel SAM3X8E was introduced in 2012. The boards use single or double-row pins or female headers that facilitate connections for programming and incorporation into other circuits. These may connect with add-on modules termed shields. Multiple and possibly stacked shields could also be individually addressable via an I²C serial bus. Most boards include a 5 V linear regulator and a 16 MHz crystal. Some designs, like Lily Pad, run at 8 MHz and dispense with the onboard transformer because of specific form-factor restrictions. Arduino microcontrollers are pre-programmed with a boot loader that simplifies uploading of programs to the on-chip non-volatile storage. The default bootloader of the Arduino UNO is that the Opti boot bootloader. Boards are loaded with program code via a serial connection to different computer.

Fig. 2 ARDUINO MEGA microcontroller

B. GSM module

GSM modem sends the full consumption to the patron via SMS. GSM stands for Global System for Mobile Communication. A GSM modem may be a device accustomed make a computer or other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator.

Fig. 3 GSM module

C. Fingerprint Module

There are four types of fingerprint scanner the optical scanner, the capacitance scanner, the ultrasonic scanner, and also the thermal scanner. The essential function of these three kinds of scanners is to get an image of a human fingerprint and find a match for this print within the database. The capacitance scanner is better, because the images are more exact and precise. Scanners are used for scanning.

1. Optical scanners take a visible image the fingerprint employing a digital camera.
2. Capacitive or CMOS scanners use capacitors and thus electrical current to create a picture of the fingerprint.
3. Ultrasound fingerprint scanners use high frequency sound waves to penetrate the epidermal (outer) layer of the skin.
4. Thermal scanners sense the temperature differences on the contact surface, in between fingerprint ridges and valleys.

Fig. 4 Fingerprint Scanner

D. LCD

A liquid-crystal display (LCD) is a flat panel display, that uses the light-modulating properties of liquid crystals combined with polarisers. Liquid crystals do not emit light directly, instead employing a reflector to supply images in colour or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which may be displayed or hidden, like pre-set words, digits, and seven-segment displays, as in a digital clock. They use the identical basic technology, except that arbitrary images are made up of a matrix of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement.

Fig. 5 LCD

V. METHODOLOGY

The fingerprint is recorded using the fingerprint scanner, along with the register number. This is often interfaced with the microcontroller. Student whose fingerprint ridges matches with the registered one has the authority to access the books from the library.

The details of the student's displayed in the figure5.

The fingerprint matching is finished by matching of the minutiae. If the fingerprint not matching with the registered fingerprint, then the person cannot access the library books. The results of the transaction are seen on the LCD, mobile phones by using the GSM modem.

VI. EXPERIMENTAL RESULTS

In this section, we present the results of proposed system it can monitor the status of the library transaction. The LCD displays the student detail together with the due dates for secure library transaction.

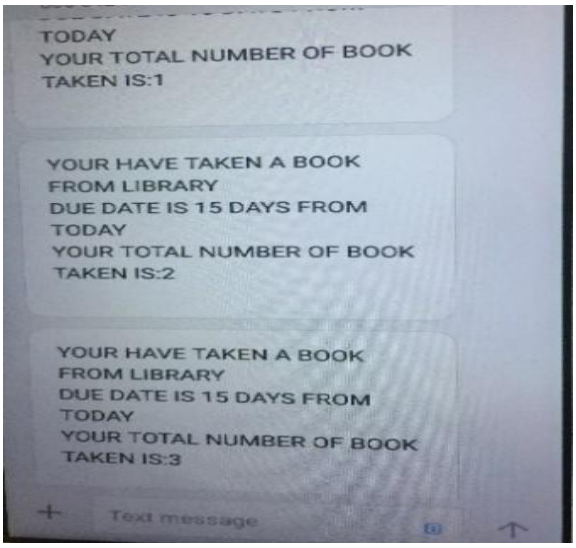

Fig. 6 Message received from GSM

VII. CONCLUSION

In this paper, a prototype for library management system using fingerprint. Arduino Mega microcontroller is used for this purpose. The processed fingerprints are stored.

The prevention of unnecessary access of library is restricted. This paper provides an efficient method to stop the library access with timely notifications sent to the user. This ensures that the user is well informed about his library transaction and if reaches the foremost count further withdrawing books are going to be restricted.

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