Fingerprint Based Patient Information System

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Abstract—Fingerprint Based Medical System introduces the efficient way to store patient's clinical records. It is used to determine the patient's past health record quickly and easily by using the fingerprint recognition technology. The medical information system which will enable a reliable electronic medical record system stored in the database. To provide security to the information many cryptography algorithms are introduced. The sensitive medical information is protected by using watermark stenographic techniques and thus sending the confirmation message to the patient. This system replaces the conventional paper-based medical records with electronic medical record system.

Keywords*:- Biometrics, AES/MD5*

I. INTRODUCTION

Biometrics is a method of recognizing a person's unique physiological characteristic or behavioral characteristic. It is used for providing data privacy as well as the privacy of the confidential financial transactions. The different biometric techniques include the face, iris, retina, fingerprints, hand geometry, handwriting, and voice. Fingerprint scanning technology is one of the oldest biometric sciences and uses different fingerprint features to identify and verify the identity of the individuals. Every fingerprint has unique patterns and characteristics. Fingerprint pattern consists of lines and spaces. The lines are known as ridges whereas the space between the ridges is called the valley. This pattern of the ridges and valleys are used for the verification and the authorization of the fingerprints.

II. FINGERPRINT SCAN TECHNOLOGY

There are five vital stages of the fingerprint scan technology which are the fingerprint image acquisition, image processing, and location of distinctive characteristics, template creation, and template matching. The main aim of fingerprint-scanning technology is to acquire the good quality of fingerprint which can be further used. Fingerprint images having 500 dots per inch (DPI) is the standard forensic-quality.

- Image acquisition is the process of acquiring the fingerprint images of the person which is unique and differs from person to person.
- Image processing is the method of converting the fingerprint image into a specific usable format. Image enhancement plays a vital role to reduce distortions like cuts, scars and dirt.
- Location of distinctive characteristics is the next step. Fingerprint has many different patterns like swirls, loops and arches which is used by the fingerprint technology.
- Fingerprint template is used to remove distortions from the image such as scars or dirt. This is done by using specific algorithms.
- The last step is the template verification and authentication.

A. Fingerprint as a Biometric

Fingerprints are considered to be the best and fastest method for biometric identification. Fingerprints are unique to everyone and do not change with time. Fingerprint recognition is widely used nowadays everywhere. Fingerprint biometrics is the most commonly used biometric technique used. Not only it is faster than other techniques but also the energy consumption by such systems is too less.
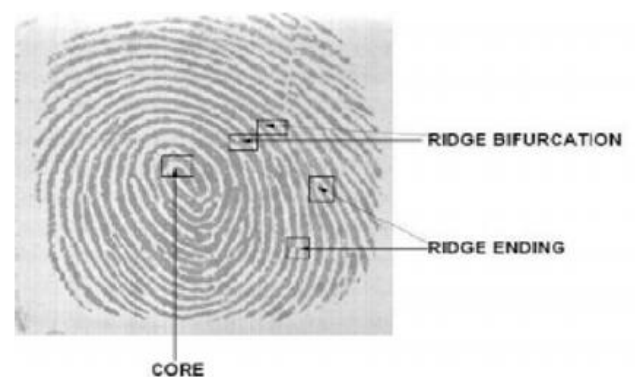

Fig. 1 Finger Print Image

Everyone has unique fingerprints across individuals, and across fingers of the same individual. Traditionally, fingerprint patterns were taken by the ink impression on the paper which was then matched and verified. The electronic era has ushered in a range of compact sensors that provide digital images of these patterns. Mouse and keyboards computer peripherals act like the sensor which is used to incorporate the data into the computer, thus making the mode of identification a very attractive proposition thus authenticating the fingerprint based system.

B. Techniques of Matching Fingerprints

The different techniques of fingerprint matching include:
1) Correlation-based matching: Two fingerprint images are superimposed and the relationship among consequent pixels is computed for different alignments like different displacements and rotations.
2) Minutiae-based matching: It is one of the most used techniques. Minutiae is taken from two different fingerprints and is then stored in the 2-D plane in the form of different sets of points. This technique is to match the candidate fingerprint with the template fingerprint image template.
3) Pattern-based matching: It is used to match the patterns such as whorl, loop, and arch from the previously stored fingerprint templates. Pattern-based matching algorithms use the central point from the image and compare the stored image with the fingerprint image of the candidate. We have implemented a minutiae-based matching technique. This approach has been intensively studied, also is the backbone of the currently available fingerprint recognition products.

III. SYSTEM ARCHITECTURE

To develop an ease system in the medical field, we are developing such a system. In this, there will be a doctor and a patient. When the patient visits the doctor for the 1st time, the doctor will make registration of the patient by using his fingerprint. The registration form contains the basic details of the patients and along with that some other details like blood group, sugar level, applying for medical claim allergies present or absent, etc. Next time when the patient visits the doctor, the doctor will scan his fingerprint, based on his fingerprint his details will be retrieved from the system. The doctor can view the patient previous reports, upload new reports to the system, these report details will be sent in the email of the patient. The data which is stored in the database stored in encrypted format. For the encryption of data, we will be using AES/MD5 ALGORITHM. The doctor can generate the analysis graph of the patient based on the report of the patient.

Fig. 2 System Architecture

IV. ALGORITHM USED

A. AES Algorithm

Nowadays, Advanced Encryption Standard (AES) is the most popularly used symmetric encryption algorithm. It is about six times faster than triple DES.

A replacement for DES was needed as its key size was too small. Triple DES was designed to overcome this drawback but it was found slow.

The features of AES are as follows −

- Symmetric key symmetric block cipher
- 128-bit data, 128/192/256-bit keys
- Stronger and faster than Triple-DES
- Provide full specification and design details
- Software implementable in C and Java

B. MD5 Algorithm

The MD5 is a one-way hashing cryptographic algorithm. The MD5 algorithm was designed to authenticate the digital signatures. It takes the message of any length as input and returns a fixed 128-bit message as the output. In order to authenticate the digital signature, the algorithm compresses the large files before encrypting it with the private key.MD5 is used to protect the errors from the data.

V. FEASIBILITY STUDY

The very first phase of any system developing life cycle is the preliminary investigation. The feasibility study is a major part of this phase. A measure of how beneficial or practical the development of the information system would be to the organization is the feasibility study.
The feasibility of the development software can be studied in terms of the following aspects:
- Operational Feasibility.
- Technical Feasibility.
- Economical Feasibility.

A. Operational Feasibility

The Application will reduce the time consumed to maintain manual records and is not tiresome and cumbersome to maintain the records. Hence operational feasibility is assured.

B. Technical Feasibility

Hardware Requirements:
- 1.66 GHz Pentium Processor or Intel compatible processor
- 1 GB RAM.
- Internet Connectivity
- 80 MB hard disk space

C. Economical Feasibility

Economic feasibility of the application will be determined by:
- The Application will reduce a lot of labor work. Hence the Efforts will be reduced.
- Our Application will reduce the time that is wasted in manual processes.
- The storage and handling problems of the registers will be solved.

VI.   FINGERPRINT MODULE SPECIFICATION

This is a fingerprint sensor module with TTL UART interface. The user can store the fingerprint data in the module and can configure it in 1:1 or 1: N mode for identifying the person. The fingerprint module can directly interface with 3v3 or 5v Microcontroller. A level converter (like MAX232) is required for interfacing with PC.

Fig.3 Fingerprint Senor

VII.   FUNCTIONAL AND NON-FUNCTIONAL REQUIREMENTS

A. Functional Requirement:

- Administrator should have access to all details of the system.
- Administrator will train the system and generate rules-set.
- Administrator will doctor into the system.
- User can register into the system.
- User can login into system anytime and give input to system as symptoms
- The system will check the symptoms in the rules-set generated by the administrator during the time of training.
- After that, the system will predict the disease and give the result to the user. Along with disease, the system will also predict the medicines for that particular disease and precautions for that disease which are necessary to be taken by the user.

B. Non-Functional Requirements
- The system should provide the accurately estimated output to the user.
- The system should be able to increase the efficiency and performance of prediction results.
- The system should allow the user to access information anywhere and anytime.

VIII.   ADVANTAGES AND DISADVANTAGES

A.   Advantages:

- **Unique**- Everyone has the different and unique fingerprint. Fingerprints have loops and arches which vary from person to person.
- **Accurate**- The information obtained from the fingerprints is accurate as it different to every person and is easily comparable with the candidate fingerprint images stored in the database.
- **Small storage space**- The memory required to store the fingerprint template is small and requires less memory space.

B.   Disadvantages:

- **False Readings**- Lower cost biometric systems leads to errors thus hampering the authorized person from accessing the personal confidential data.
- **Costly-** Biometric system is costly which is not easily affordable and eliminate many from using it.

IX. CONCLUSION

The Fingerprint Based Patient System was specifically developed for storing, monitoring and analysing the patient medical reports. The system uses the fingerprint scanner for retrieving the patient details from the system. This system will allow users to access hospital's information anytime. The integrated database, single it TEAM all means lower cost of operation, maintenance and upgrade and a significant reduction in total cost of ownership. This also makes expanding to a new location a breeze as the additional IT investment is minimal.

X. ACKNOWLEDGMENT

REFERENCES

[1]. Nikhil Patil, Girish Kulkarni and Dhiraj Patil "Fingerprint Recognition For Library Management" Ijcem International Journal of Computational Engineering & Management, Vol. 16 Issue 1, January 2013 ISSN (Online): 2230-7893.

[2]. A. Aditya Shankar, P.R.K.Sastry, A. L.Vishnu Ram, A.Vamsidhar "Finger Print Based Door Locking System" International Journal of Engineering and Computer Science ISSN: 2319-7242 Volume 4 Issue 3 March 2015, Page No. 10810-10814.

[3]. Dhiraj Sunehra "Fingerprint Based Biometric ATM Authentication System" International Journal of Engineering Inventions e-ISSN: 2278-7461, p-ISSN: 2319-6491 Volume 3, Issue 11 (June 2014) PP: 22-28.

[4]. Shivam Gupta, Shivam Kashaudhan, Devesh Chandra Pandey, Prakhar Pratap Singh Gaur "IOT based Patient Health Monitoring System" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 04 Issue: 03 | Mar -2017 .

[5]. Edmund Spinella, "Biometric Scanning Technologies: Finger, Facial and Retinal Scanning", SANS Institute, San Francisco, CA, 2003.

[6]. Peatman, John B., "Design with PIC Microcontrollers", Pearson Education, India, 1998.

[7]. Microchip Technology Inc., "PIC16F87XA data sheet, DS39582C, 2013.