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Bio-metric System to Smartly Monitoring Patient Details

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***Abstract*—** This project focuses on Customized Enterprise Resource Planning and Security. The objective of development strategy is to provide a valued software solution with technology, functionality, ease to implementation, and effective cost.
Here the ERP system is to developed for Hospital, the idea behind this is admission of a patient requires lots of classification work, which in turn is consumption of lot of time and resources like paper work and these time can be utilized in other important things and saving a patient life. ERP is basically integration of information of different department, which can be managed from one system. Reliability, Accuracy, Efficiency and Timely availability of information are the benefits of the ERP system. Redundancy within organization can be eliminated. Some of the features of our proposed system are, it will help in ease of access, it will promote the digital India movement, it will save paperwork, time and effort, security, medical claim inclusion makes saving lives easier.
Keywords- *Planning, Security, ERP, module R305, medical claim, arduino board, fingerprint scan.*

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I. INTRODUCTION

Biometrics is automated methods of recognizing a person based on a physiological or behavioral characteristic. Biometric-based solutions are able to provide for confidential financial transactions and personal data privacy. The various features used are face, fingerprints, hand geometry, handwriting, iris, retina, vein and voice Fingerprinting or finger-scanning technologies are the oldest of the biometric sciences and utilize distinctive features of the fingerprint to identify or verify the identity of individuals. Finger-scan technology is the most commonly deployed biometric technology, used in a broad range of physical access and logical access applications. All fingerprints have unique characteristics and patterns. A normal fingerprint pattern is made up of lines and spaces. These lines are called ridges while the spaces between the ridges are called valleys. It is through the pattern of these ridges and valleys that a unique fingerprint is matched for verification and authorization. These unique fingerprint traits are termed “minutiae” and comparisons are made based on these traits. On average, a typical live scan produces 40 “minutiae”. The Federal Bureau of Investigation (FBI) has reported that no more than 8 common minutiae can be shared by two individuals.

Further the paper is divided in to sections. Section II represents Literature Survey, section III represents Finger Scan Technology, section IV represents Hardware Description, section V represents Requirement Analysis, section VI represents Proposed system, section VII represents Proposed system architecture, section VIII represents Result And Analysis, section IX represents Conclusion, section X represents Reference.

II. LITERATURE SURVEY

In [1], gives us the idea of development of a microcontroller based system for wireless heartbeat and temperature monitoring using Wi-Fi module. By this we can easily provide real time information available for many users and can send them alert in critical conditions over internet. In our proposed system we are not monitoring patient’s health, but we are monitoring patient details.

In [2], a fingerprint based door opening system which provides security which can be used for many banks, institutes and various organizations etc. this project is taking help of two different technologies viz. embedded systems and biometrics. Unauthorized access is prohibited by designing a lock that stores the fingerprints of one or more authorized users.

In [3], a microcontroller based prototype of ATM cashbox access system using fingerprint sensor module is implemented.

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In [4], Fingerprint based library management system is developed. Designing a better authentication system for students so that records are maintained with ease and accuracy is the motivation throughout this work.

Paper [2] – [4] gives an idea regarding how fingerprint scanners can be used for multiple purposes.

Limitations of all the above mentioned papers are as follows - There are some weaknesses to finger-scanning, most of which can be mitigated. There are certain ethnic groups that have lower quality fingerprints than the general populations. Another problem is that over time, sometimes in as short a period as few months, the fingerprint characteristics of an individual can change, making identification and verification difficult. This problem is seen with manual workers who work extensively with their hands. There are also privacy issues attached to finger-scanning technologies. Some fear that finger-scans may be used to track a person's activities. Others fear that data collected may be improperly used for forensic purposes. Paying with a government meal card at checkout instead of with cash would identify the student as a program recipient.

To avoid these limitations in our proposed idea we are trying to take multiple finger scans.

III.FINGER SCAN TECHNOLOGY

There are five stages involved in finger-scan verification and identification. Fingerprint (FP) image acquisition, image processing, and location of distinctive characteristics, template creation and template matching as shown in fig [1]. A scanner takes a mathematical snapshot of a user's unique biological traits. This snapshot is saved in a fingerprint database as a divides into two. A typical finger-scan may produce between 15 and 20 minutiae. A template is then created. This is minutiae file. The first challenge facing a finger-scanning system is to acquire high-quality image of a fingerprint. The standard for forensic-quality fingerprinting is images of 500 dots per inch.

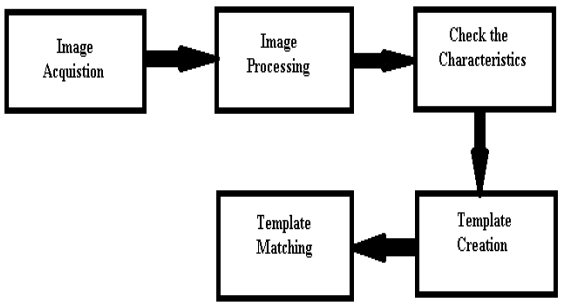

Fig. 1: Finger Scan Technology

Image Acquisition

As shown in the above figure [1] image acquisition can be a major challenge for finger-scan developers, since the quality of print differs from person to person and from finger to finger. Some populations are more likely than others to have faint or difficult-to-acquire fingerprints, whether due to wear or tear or physiological traits. Taking an image in the cold weather also can have an effect. Oils in the finger help produce a better print. In cold weather, these oils naturally dry up. Pressing harder on the platen (the surface on which the finger is placed, also known as a scanner) can help in this case.

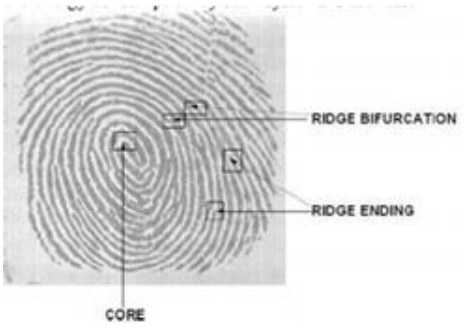

Fig. 2: Image Acquisition

Image Processing

It is the process of converting the finger image into a usable format. This results in a series of thick black ridges (the raised part of the fingerprint) contrasted to white valleys. At this stage, image features are detected and enhanced for verification against the stored minutia file. Image enhancement is used to reduce any distortion of the fingerprint caused by dirt, cuts, scars, sweat and dry skin.

Check the Characteristics

The next stage in the fingerprint process is to locate distinctive characteristics. There is a good deal of information on the average fingerprint and this information tends to remain stable throughout one's life. Fingerprint ridges and valleys form distinctive patterns, such as swirls, loops, and arches. Most fingerprints have a core, a central point around which swirls, loops, or arches are curved. These ridges and valleys are characterized by irregularities known as minutiae, the distinctive feature upon which finger-scanning technologies are based.

Template Creation

Many types of minutiae exits, a common one being ridge endings and bifurcation, which is the point at which one ridge accomplished by mapping minutiae and filtering out distortions and false minutiae. For example, anomalies caused by scars, sweat, or dirt can appear as minutiae. False minutiae must be filtered out before a

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template is created and is supported differently with vendor specific proprietary algorithms.

Template Matching

The tricky part is comparing an enrollment template to a verification template. Positions of a minutia point may change by a few pixels, some minutiae will differ from the enrollment template, and false minutiae may be seen as real. Many finger-scan systems use a smaller portion of the scanned image for matching purposes. One benefit of reducing the comparison area is that there is less chance of false minutiae information, which would confuse the matching process and create errors.

Further part gives the description of fingerprint as bio-metrics -

Fingerprints are considered to be the best and fastest method for biometric identification. They are secure to use, unique for every person and do not change in one's lifetime. Besides these, implementation of fingerprint recognition system is cheap, easy and accurate up to satisfaction. Fingerprint recognition has been widely used in both forensic and civilian applications. Compared with other biometrics features, fingerprint-based biometrics is the most proven technique and has the largest market shares. Not only it is faster than other techniques but also the energy consumption by such systems is too less.

Although not scientifically established, fingerprints are believed to be unique across individuals, and across fingers of the same individual. Even identical twins having similar DNA, are believed to have different fingerprints. Traditionally, fingerprint patterns have been extracted by creating an inked impression of the fingertip on paper. The electronic era has ushered in a range of compact sensors that provide digital images of these patterns. These sensors can be easily incorporated into existing computer peripherals like the mouse or the keyboard, thereby making this mode of identification a very attractive proposition. This has led to the increased use of automatic fingerprint-based authentication systems in both civilian and law enforcement applications.

IV. HARDWARE DESCRIPTION

Fig. [3] shows, a finger print sensor module R305 with TTL UART interface. The user can store the finger print data in the module and can configure it in 1:1 or 1: N mode for identifying the person.

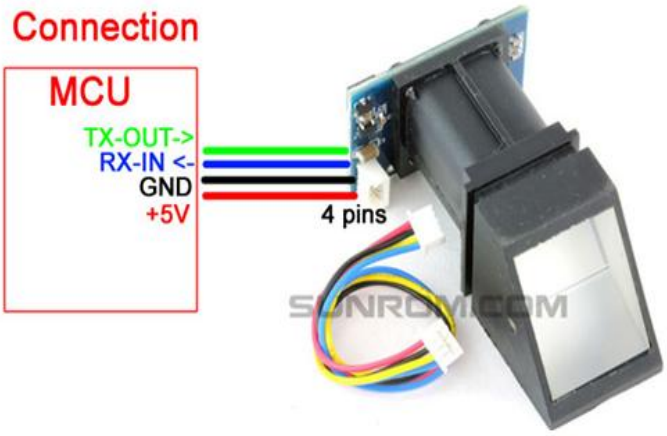

Fig. 3: R305 fingerprint module [5].

R305 fingerprint module is cost efficient than other fingerprint module.

In Fig. [5], it explains us the admin's login into the system. The main purpose of admin is to add or manage doctors into the system. Other than adding doctors into the system they also view patient details and keep updating them if any changes required. The finger print module can directly interface with 3v3 or 5v Microcontroller. A level converter (like MAX232) is required for interfacing with PC.

Fig. 4: R305 fingerprint module interfacing with arduino .

Working temperature for R305 module and arduino board is from [-10] – [+40] and storage temperature is from [-40] – [+85].

V. REQUIREMENT ANALYSIS

Hardware requirements for the proposed system are 1 GB RAM or above, 20 GB HDD or above, Intel 1.66 GHz processor pentinum 4, finger print module R305, arduino board.

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Software requirements for the proposed idea are minimum Windows XP or above, Visual Studio 2010, Microsoft SQL server [C#].

VI. PROPOSED SYSTEM

To develop an ease system in medical field, we are developing such a system. In this there will be a doctor and a patient. When 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, 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 doctor can generate the analysis graph of the patient based on report of the patient.

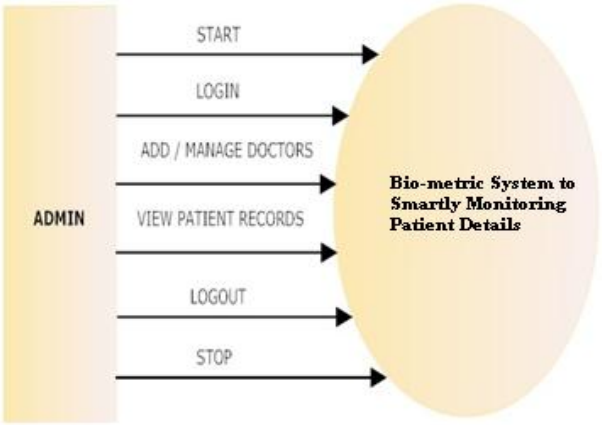

Fig. 5:Admin's Login

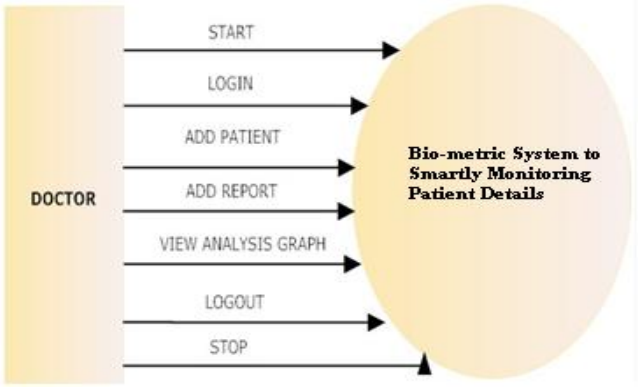

Fig. 6: Doctor's Login

In Fig. [6], it explains us the doctors login into the system. The doctors check the patient and add them to the system. Doctors also maintain the patient records and manage them. A analysis graph of the patient is created by the doctor to keep a track record of a particular patient.

VII. ALGORITHM

Step 1: Admin login's into the system.

Step 2: Admin adds doctor into the system.

Step 3: Admin adds test center in to the system.

Step 4: Admin adds patient into the system.

Step 5: Doctor adds report into the patient account.

Step 6: Test center adds all lab reports of patients into their respective account.

Step 7: All the reports and lab reports are received by the patient through mail.

Step 8: Patients scan is done under emergency case.

Step 9: A set of alert messages is sent to their respective family members.

VIII. RESULT AND ANALYSIS

We have developed an admin module. In this the administrator of the system can add the doctor and the patients. The basic details of the doctor as well as the basic details of patients are taken as input to the system. During registration of the patient, if the patient wants to apply for medical claim he can also apply for it. The administrator can view the list of registered doctors and patients.

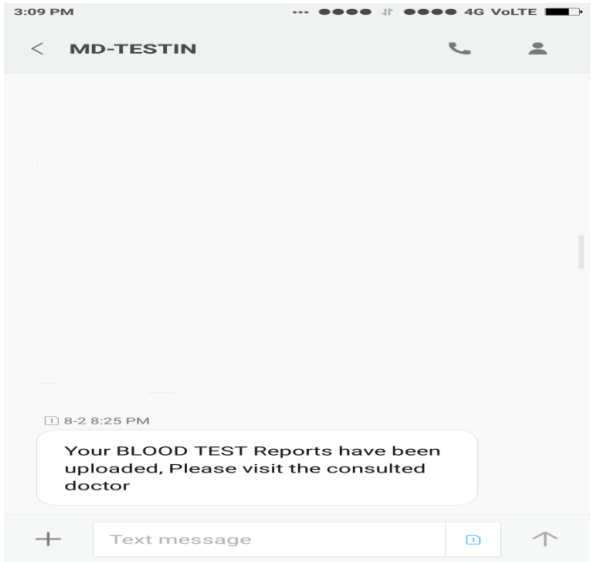

Fig. 7: Test Report Notification

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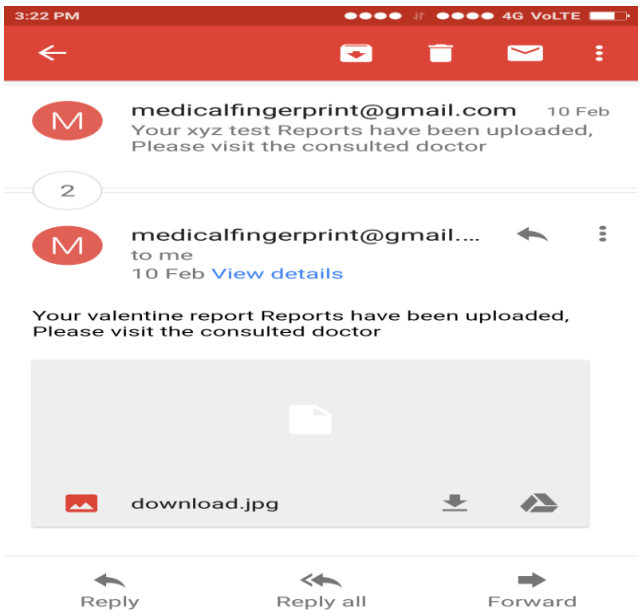

Fig. 8: Test Report E-mail Notification

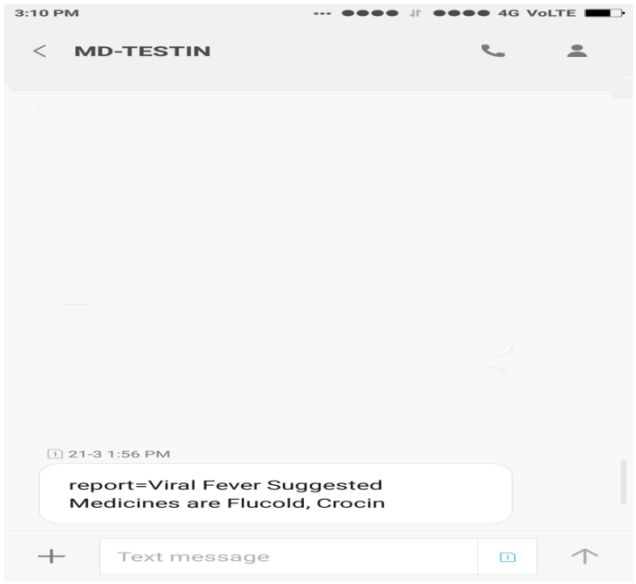

Fig. 9: Doctor Report and Prescription Notification

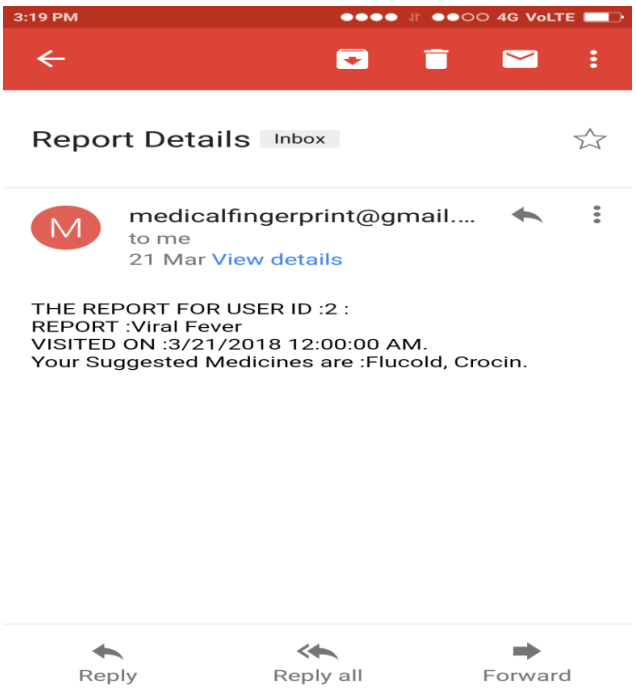

Fig. 10: Doctor Report and Prescription via Mail

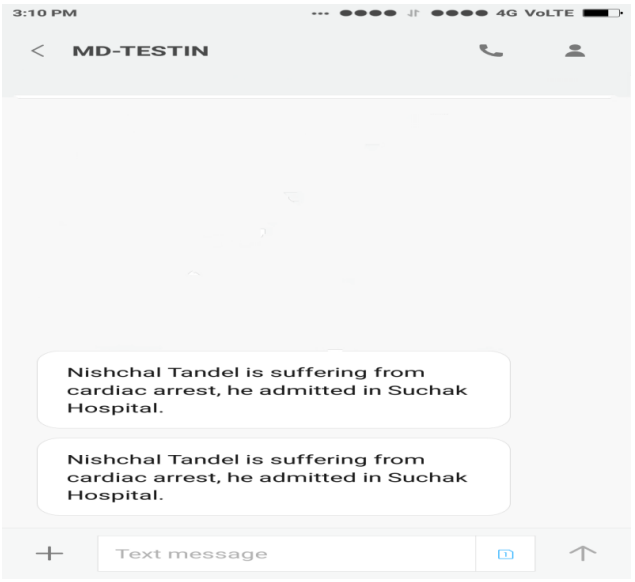

Fig. 11: Alert Notification

X. CONCLUSION

The Finger print 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

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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 in minimal.

XI. REFERENCE

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tbm=isch&sa=X&ved=0ahUKEwjnx53ZxLXWAhWIvo8KHes