

# PRESERVING AND SECURING PATIENT ELECTRONIC MEDICAL RECORDS USING BIOMETRIC IDENTIFICATION

P.Rajesh Kanna<sup>1</sup> N.Keerthana<sup>2</sup> K.Monika<sup>3</sup> S.Saranya<sup>4</sup> P.Saraswathi<sup>5</sup>

<sup>1</sup>Assistant professor, <sup>2,3,4,5</sup>Student

<sup>1,2,3,4,5</sup>Department of Computer Science and Engineering

<sup>1,2,3,4,5</sup>M. Kumarasamy College of Engineering, Karur

## **Abstract**

*In recent years most of the emerging technologies are improved to preserve the patient details in an emergency case. This paper aims to provide the preserved identification of the patient medical report in an emergency case using fingerprint based biometric system. This system provides the electronic medical report using fingerprint when the patient is in unconscious stage. Especially when the victim unable to provide their medical reports in an emergency situation this fingerprint based biometric system is helpful for the healthcare professionals to take further treatment for the patient in case of emergency. In this paper feature extraction algorithm plays a major role that is used to secure the medical records of the patient from the unauthorized access when they are in unconscious stage.*

## **1. Introduction**

In earlier days many people lost their lives due to insufficient treatment. These days many technologies have been developed and still developing to safeguard human lives. In the medical field, various advanced treatments are emerging to handle various cases of patients. But every patient's body has different responses to the treatments. In a traditional system, the hospitals used to manage their details in their system and used to give prescription details to the patient in handwritten or as printed documents. There are some cases like if a patient has to do the check-up in another hospital instead of his/her regular hospital. They should have the medical history in their hands. A normal person can't remember their tablet's names because they are not aware of those medical terms of the tablets even if they are an educated person.

In an emergency case the patient will be unconscious, so, they cannot reveal their medical history, and it is not possible to contact their regular hospitals on time. The doctor starts their treatment only after knowing the medical history of the patient. At that time preserved details of the patient in the database will be useful for the doctors to take future treatment for the patient. Consider the scenario if a person is affected by an accident, and so, they go to an unconscious stage. At that time he/she has to be admitted to the nearby hospital where the doctors are not aware of his/her past medical records. In such cases, healthcare professional is not able to provide their initial treatment to recover the patient. They will start their treatment after taking full- body reports. Delay in starting the treatment may also lead to patient death. To reduce this complexity initially if patient's medical records such as blood group, diabetic information, diseases they are affected

in the past, tablets that are prescribed by doctors and their allergy- related information can be stored and retrieved using the fingerprint.

Even though to save patient lives is important, the patients fingerprint details also must be kept secure from the unauthorized access. Hence, here we use feature extraction algorithm to secure the patient medical records. Fingerprint details can also be theft and facilitated by several attacks. To keep the information more secure, feature extraction algorithm was proposed in this paper.

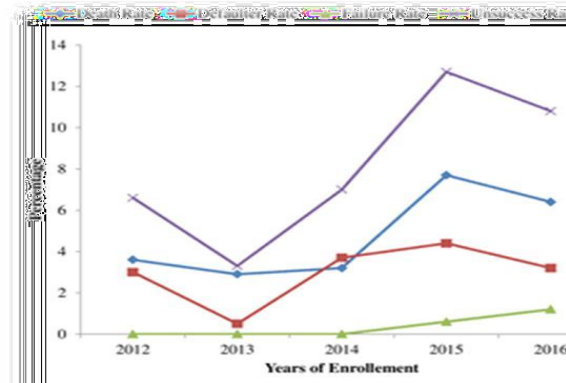


Fig. 1. Poor Treatment Outcomes

Fig.1. shows the death rate of the patient due to poor treatments. This is mainly because of the doctors who did not know the patient’s entire body reports, and the initial tests are taking time to diagnose the problem. That may lead to patient death. Such problems are eliminated by the use of biometric based fingerprint system. Here all the initial prescriptions about a patient have been entered the as an electronic medical report in the database. At the time of emergency doctors can use the patients biometric to retrieve the medical records of the patient.

## 2. Literature Survey

Alvee Rahman and Tahsinur Rahman [1] proposed that automatically monitor the patient’s health condition using various sensors. By using raspberry pi the data can be processed and maintained through Iot cloud. In that healthcare professionals can monitor the patient regularly and sends the message to the patient’s relatives in case of emergency. The patient can press the switch when they feel uncomfortable about their health condition. This system benefits the doctors to view a patient’s condition through video streaming. Fig.2. shows the body temperature level of the patient.

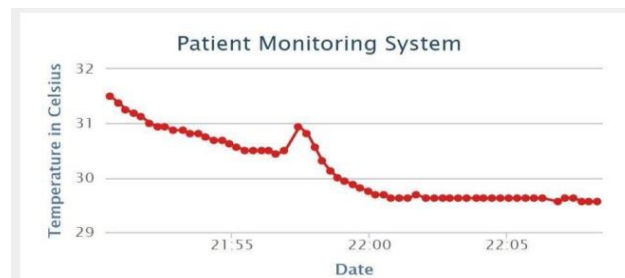


Fig.2.Result Dataset of Patient Monitoring System

Mohammad Salah Uddin, Jannat Binta Alam and Suraiya Banu [2] proposed the paper about real-time patient monitoring system using a various sensor that monitors the patient's health conditions. The sensors detect the critical conditions of the patient and instantly deliver the notification to the healthcare professional as well as a hospital in charge. This system helps healthcare professionals to supervise the patients remotely without visiting them. The software design provides biological information about the patient supports through mobile or desktop application. Fig.3. shows the patient's condition in normal and emergency situation.

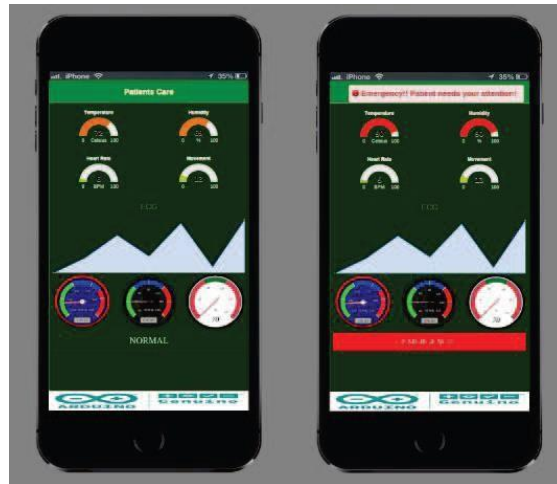


Fig.3. Mobile application for Normal and emergency situation

Ebenezer Okoh1 and Ali Ismail Awad [3] focused on Biometrics applications in electronic health security. Moreover, e-Health gives more precedence to health services but it suffers from security. The goal is to improve security, privacy protection and provides authentication to the user. This paper introduced the biometric technique to provide consistent security solution and it takes consideration of the complexity, processing time and it overcomes the problems in traditional methodology of username, password usage. This system supports both the identification and verification of authentication based on the application. Identification recognizes the individual from a database of users based on biometric traits of unimodal and multimodal. An individual mode ensured the authenticity and identity by biometric Verification.

Ravi Subban and Dattatreya P. Mankame [4] introduced a paper about a biometric approach using fingerprint recognition. That aimed to identify the person and summarize the fingerprint matching techniques, recognition methods, and performance analysis. This paper using the feature extraction method to matching the fingerprint image with the old captured image. It involves several stages of image capturing, feature extraction, pattern matching Fig.4..

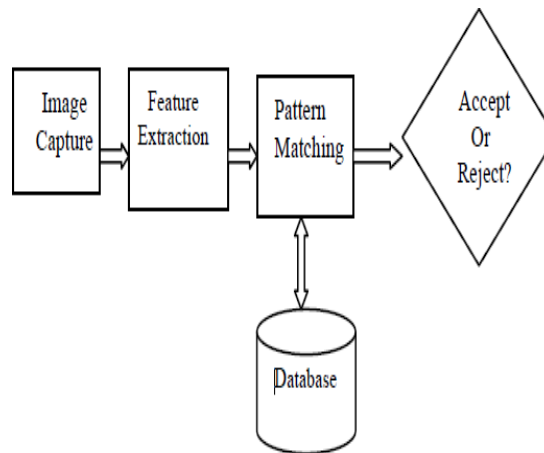


Fig.4. Stages of Fingerprint Matching

Hyunwoo Jung and Sunghyun yun [5] proposed a biometric based emergency rescue system. In emergency cases it is essential to minimize the time waste to initiate the first aid treatment. This system aimed to reduce the time waste by locating emergency spot automatically. The patient and the reporter will be identified with the help of biometric data. Proper first aid instruction will be given to the reporter via telecommunication. They aimed to enable best medical treatment with the help of smart phone and biometric. This system involves four steps such as user registration, reporter call, identifying the patient and first aid via mobile.

Alejandro Enrique Flores Zuniga & Khin Than Win & Willy Susilo [6] had proposed the paper about Biometrics for Electronic Health Records. This provides the analysis of the biometric used in healthcare. That makes the comparison with traditional identification issues and considering the global security issues, the contemplation of share care environment. System improves security, discourages and detects fraudulent accessing accounts, and prevents impersonation. The sensitive information is secured and discouraging the unauthorized access. Biometric features cannot be shared or delegated. Biometrically transactions are difficult to confute.

L.R. Palmer, M.S. Al-Tarawneh, S.S. Dlay and W.L. Woo [7] focused on Efficient Fingerprint Feature Extraction. This system converts the fingerprint image to digital grey scale image and it extracts fingerprint minutiae from grey scale image. The image was represented by 2D grey scale intensity level. By using binarisation the original grey scale image was converted into binary image. This methodology was implemented in Matlab and it shows the performance of the analysis results. The proposed system includes the stages of binarisation, thinning, cleaning, pixel value, and minutiae extraction. After the cleanup process it removes the redundant fingerprint resulting in few false minutiae and it can be detected and increase the computational level.

The main difference between traditional minutiae fingerprint matching with ridge fingerprint matching is that first does the point matching and latter does the curve matching. Fig.5. shows the execution time of the extraction process.

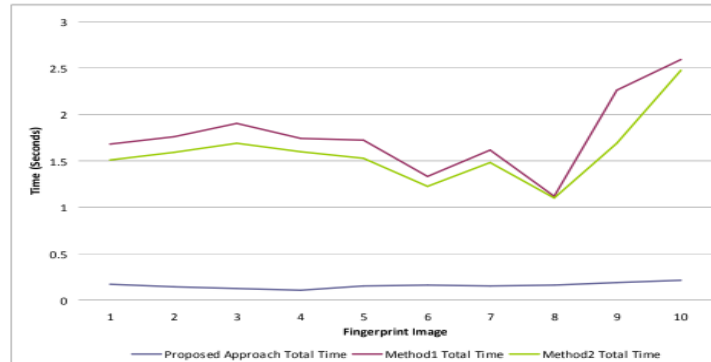


Fig.5. Total execution time of the extraction process

**Table 1 Comparison of Survey**

Paper	Advantage	Disadvantage
IoT Based Patient Monitoring System Using ECG Sensor	Provides a constant health monitoring facilities for the patients who are in the ICU	Need a skill operator for constant monitoring
Real Time Patient Monitoring System based on Internet of Things	Remotely accessible and automated	Low maintenance
Biometrics Applications in e-Health Security	supports for mobile or desktop application	Robust authentication

Biometric approach using fingerprint recognition	Pattern matching	Redundancy in database
Biometric based emergency rescue system	Tele visual communication	Lagging to provide the first aid
Biometrics for electronic Health Records	Security and privacy protection	High level of initial investment
Efficient Fingerprint Feature Extraction	High distinctiveness, high permanence	

### 3. Proposed System

In proposed system this can be easily used by the patient who is in emergency conditions to retrieve personal medical reports. This is also helpful for doctors to see patient's medical reports in an emergency, so that they can provide the correct medicine at the correct time. By using the fingerprint sensor doctors can easily retrieve the personal medical report of a person and provide the appropriate medicine this may decrease the death rate in hospitals, and also many lives became safe. This can be used worldwide. Sometimes a person who go for the regular check-ups in one hospital can take the treatment in another hospital in emergency cases at that the fingerprint based biometric system is more useful for the healthcare professionals to take care of the patients in an emergency situation. So this is a centralized system from anywhere at any time we can use this system.

In a digital world, Biometric plays a major role in personal authentication for the people. This system uses a biometric to secure the medical record of the patient and is also used for the doctors to

check the health records of a patient in an emergency case. In this system, a fingerprint extraction algorithm is used to identify the fingerprint image of the person. To identify automatic fingerprint recognition successfully, the topology of the fingerprint is more important. The ridges, valleys from the fingerprint surface also serve as a friction surface. Once the fingerprint image is captured by the device it can comprise either as global, or local features. Ridge orientation, spacing and singular points such as core and delta are considered as a feature. In our paper, we mainly focus on local features for robustness purposes.

In a fingerprint image, the minutiae point ranges from 60 to 100, and that is recognized by the digital persona device. Minutiae are the local features that are characterized by ridge discontinuities and many types of minutiae may include features like ridge endings, bifurcations, spurs, and islands. In the fingerprint system, the fingerprint image will be recognized using two important features such as bifurcation and ridge ending. In ridge flow a fork is used to identify the ridge bifurcation. Whenever the ridge flow terminates the ridge ending occurs. Usually comparison of the local ridge characteristics and its relation is base for the identification of automatic fingerprint to make a personal identification.

#### **4. Conclusion & Future work**

This paper, we have proposed a system to extract the patient electronic medical details using fingerprint technology and demonstrate the use of biometric in the medical field and how the fingerprint system will provide better healthcare services in the medical environment. Here we conclude that biometric technology offers several security advantages and preservation over traditional methodologies. By using this technology there will be no death due to delay in starting the treatments. In future we can use the finger vein for the e-Health record.

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