

# Chapter 11

## Biometric Secured Electronic Health Record

**Suresh Sankaranarayanan**  
SRM University Chennai, India

**Vigneshwaran Udayasuriyan**  
SRM University Chennai, India

### ABSTRACT

*Lot of Hospitals around the world are going through transformation from paper based to Electronic Health record system which can be accessed from anywhere. But with such Electronic health record, security is very much needed towards avoiding hackers and unauthorized personnel to access the medical record pretending as doctor or patient. Lot of research been conducted in regards to an authentication of the biometric system and security on the digital electronic health records of the health care organization. In such biometric system, there has been an increase in the false rejection ratio due to a slight difference in the positioning of the finger on the biometric scanner. The small wounds and scratches on the fingers may also lead to the false rejection of the legitimate user. So accordingly the authors in this research have developed innovative and enhanced technology of the frame based biometric authentication system by segmenting the fingerprint image towards authenticating the medical personnel. This method reduces the False Rejection Ratio (FRR) and False Acceptance Ratio (FAR) compared to neighbouring nodal and data centric method. In addition, with the frame based biometric authentication, the authors have also developed level of strictness for doctor's and patient's based on placement of finger in biometric scanner. Lastly, the authors have also developed an application which integrates Frame based biometric methodology along with RFID and GSM for access of records in a secured way and also to provide a better treatment and medicines for incoming patients.*

### 1. INTRODUCTION

In many of the developed and developing countries, it is necessary to transform the medical health records ((Piliouras et al., 2015; Castiglione, 2013) from the paper based work to an electronic health records (EHR) which are managed by many different administrative and complex levels. While getting into the

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concept of transforming the paper based works into an electronic digital medical record, there might be some possibilities of misusing medical and sensitive information of the patients. Hence it is important and necessary to protect the sensitive and confidential information of the digital electronic medical records

Even though there are many benefits of going to digital records of information, but these benefits may be overshadowed by the threat of hackers. In the past to gain access to healthcare record of patients, you need to break into doctor's office and rummage through the vast number of patient files to find respective file. While going into digital data, all our personal data's will get stored in the hospital database system. In order to break through the digital information, now a day's many hackers are finding ways to gain access to the medical records though lot of security methodologies been implemented towards securing them.

So towards securing Digital health record, biometrics seems promising approach to secure them. Now in terms of biometrics, authentication systems based on keystroke dynamics are particularly interesting for usability reasons (Idrus et al., 2013). Many researchers proposed in the last decades some algorithms to increase the efficiency of this biometric modality. In another research work, the fingerprint verification is embedded in a smart card (Isa et al., 2010). The smart card plays a data storage for storing the cardholder's fingerprint data. The card holder is required to scan fingerprint on a sensor. The scanned fingerprint image is then sent to the card for matching. Lastly there has also been research carried out in securing the digital health record stored in cloud and also remotely monitoring the health of patient using Public Key Infrastructure and so forth.

In current scenario, there has been an increase in the false rejection ratio due to a slight difference in the positioning of the finger on the biometric scanner (Kaizhi and Aquin, 2011; Cheng et al., 2013; Bifari and Elrefaei, 2014; Choi et al., 2013; Ivanov and Baras, 2011). The small wounds and scratches on the fingers may also lead to the false rejection of the legitimate user due to the continuous joint measurement of nodal points on the biometric authentication. Even if we reduce the authentication factor level of the biometric authentication system, it may have possibilities which lead to the false acceptance ratio.

So looking into drawbacks of the existing biometric system pertaining to fingerprint, we have provided some better level of authentication factors on innovative methodology of "Frame Based Biometric Authentication" (Vignesh and Suresh, 2016) where the fingerprint image has been segmented in-order to provide an enhanced authentication level to reduce an increase in the false rejection ratio and false acceptance ratio. The simulation analysis of frame based biometric authentication is compared against pixel method using Matlab in our secured hospital management system.

In the Frame based biometric system, we have also included the level of strictness based on positioning of finger on biometric scanner or noise in fingerprint towards having some level of leniency in authenticating doctors and patients for access of records thereby reducing the false rejection ratio and false acceptance ratio. In addition to frame based biometric i.e., fingerprint also used along with passive RFID card to scan the fingerprint of the patients & doctors for retrieving the details of the health records. Also our system allows patients or doctor to access the health record without Card by using one time password sent to patient's or doctor's mobile and fingerprint. These been developed using visual basic and hardware like ARM 7 Microcontroller, RFID Reader, GSM Modem, SIM 900, and Passive RFID Card. The rest of paper organised as follows. Section 2 talks on Literature survey pertaining to Biometric system. Section 3 talks on system design pertaining to Frame based Biometric system and Secured Electronic Health Record system in detail. Section 4 talks on implementation results and analysis with screenshots. Section 5 is conclusion and Future work.

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