**M S Ramaiah Institute of Technology**

An Autonomous Institute, Affiliated to

**Visvesvaraya Technological University, Belgaum**

# *INHOUSE PROJECT SYNOPSIS*

# *Bachelor of Engineering in Computer Science & Engineering*

Submitted by

USN: 1MS12CS071 Name: Pallavi Hemmige

USN: 1MS12CS064 Name: Devayani Urs

USN: 1MS12CS123 Name: Udhav Chandel

USN: 1MS12CS107 Name: Shwetha S

Verified By:

(Signature of In charge Faculty)

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**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

**M.S.RAMAIAH INSTITUTE OF TECHNOLOGY**

**(Autonomous Institute, Affiliated to VTU)**

**BANGALORE-560054**

www.msrit.edu

**NFC Based Secure Healthcare System**

**ABSTRACT**

With the recent increase in usage of mobile devices especially in developing countries, they can be used for an efficient healthcare management. In this work, we have proposed a novel architecture for improving healthcare system with the help of Android based mobile devices with NFC and Bluetooth interfaces, smartcard technology on tamper resistant secure element (SE) for storing credentials and secure data, and a HealthSecure service on a hybrid cloud for security and health record management. The main aim of our project is i) Secure Medical Tags for reducing medical errors and ii) Secure Healthcard for storing Electronic Health Record (EHR) based on Secure NFC Tags, mobile device using NFC P2P Mode. We have also briefly mentioned a basic security framework requirement for the applications. Since NFC NDEF (NFC Data Exchange Format) format is prone to security attacks , we have utilized low level APIs on Android based mobile devices, to securely access NFC tags such as MIFARE Classic tags with NFC-A (ISO 1443-3A) properties. Simple touch of NFC enabled mobile devices can benefit both the patient as well as the medical doctors by providing a robust and secure health flow. It can also provide portability of devices and usability for health management in emergency situation, overpopulated hospitals and remote locations. In this we can add some more applications also like Hospital appointment and Medicine scheduling.

The system also possesses prioritized scheduling for appointments and the medicine collection made by NFC card which was purely dependent on nurse rather being automated by software. The NFC based system puts a lot burden towards scheduling of patients based on priority by the nurse who obviously put lot of room for the waiting time and the consequent delay for patient as in the previous system. To obviate these problems we now have developed an intelligent NFC based appointment system towards prioritized appointment scheduling based on age and profile of the patient.

**Working principle**

NFC is an upcoming wireless technology which provides simple interfaces for device to device communications well as access to NFC, RFID and smartcard tags. NFC enabled mobile device can operate in three modes: I) Readermode: in which device can read and write to NFC based passive tags. ii) Peer to Peer (P2P) mode in which NFC devices can interact and exchange information with each other iii) Card emulation mode: in which NFC device can operate as a contactless card. NFC tags are of different types and use NDEF (NFC Data Exchange Format) for storing and sending data.

NFC tags must have a secure read and write access for critical applications such as those related to healthcare. NDEF provides no protection against data manipulation, overwrite protections and digital signature records cannot avoid malicious modification of tags. In this project we are using an AT89S52 controller, which is the heart of our project. We are using temperature sensor and heart beat sensor to monitor the patient. We are connected temperature sensor and accelerometer sensor to the microcontroller with the help of I2C protocol (serial communication). Here we code using embedded C. The programming language is most widely used in embedded system because it is portable and structured programming language. By writing code in C language we can obtain accurate real-time output.

Microcontroller receives the patient’s body temperature and pulse rate from temperature sensor and as well as heart beat sensor continuously. After that, microcontroller will transmit the data to the person who is monitoring the patient through ZigBee. Once we get the data we come to know the position of the patient. If there is an emergency we can take necessary action. In ZigBee we can transmit the data for certain distance only, if we use multi hop system we can send data to a long distance. In multi-hop wireless networks, communication between two end nodes is carried out through a number of intermediate nodes whose function is to relay information from one point to another. So by using personal health device easily and continuously we can update health related parameters to hospital database or using GSM directly to the desired doctor. Mesh topology is multiple connections among users. Benefit of multi-hop technology is, rapid deployment with lower-cost backhaul, easy to provide coverage in hard-to-wire areas under the right circumstances, it may extend coverage due to multi-hop forwarding, enhance throughput due to shorter hops and can extend battery life due to lower power transmission.

We are using an Accelerometer to read the position of the patient, which means we can find out whether the person is sleeping or walking by reading the data.

**Software**

The Minimum software requirements are as follows:

* Asp.Net
* C#
* Keil
* Willer programmer

**Hardware Used**

* NFC card
* Phone: Android Mobile

**Applications usage**

* Hospitals/Patients
* Investigation purposes
* Research and analysis

**Advantages**

* Write data back to the tag without a direct line of sight.
* Usage convenience for the patient as well as for the clinical staff
* NFC does not require a pairing of devices; physicians do not have to perform additional steps than just placing the NFC reader next to the tag.

**Disadvantages**

* This system is quite expensive

**Block Diagram**



