

SURVEY PAPER ON NFC BASED SECURE MOBILE HEALTHCARE SYSTEM

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Abstract :-

Today, every nation wants to be fully digitalized that will empower society in a better manner. The motive behind the concept is to build participative, transparent and responsive system and to reduce the paper work. Digital India will provide all services electronically and promote digital literacy. With the recent increase in usage of mobile devices especially in developing countries , it will be helpful to use it in healthcare system, Criminal Records and public records to make the data easy to carry, accessible, manageable and will increase the efficiency. For this android based mobile device with NFC technology can be used for storing credentials and securing the data. To reduce paper work we have proposed a system which will make available any document at any time for any person with the help of NFC.

This can be achieved using the system including -

- i) Secure Medical Tags for reducing medical errors
- ii) Secure Criminal record reducing police errors
- iii)Secure public record reducing document problems

This system can be a paperless system and it can benefit the patient , the doctors and the public by providing a robust and secure data. In this system secure authentication can be obtained by means of anonymous credentials, implemented on a NFC chip to provide the functionality with minimal data disclosure. It can also provide portability of devices and usability for health management in emergency situation, overpopulated hospitals and remote locations.

Keywords :-

NFC chip, smart phone, NFC reader, Medical record, Criminal Record, People record, Educational record, Cloud server

Introduction

Nowadays, life is too fast. Each and everyone is having some documents related to us that includes Adhar Card, PAN Card, Ration Card, Vehicle License, Medical Reports and many more. It is very difficult to carry all these documents at everyplace which causes a lot of inconvenience. So we have proposed a system with NFC chip which if will be mounted in a human body which will uniquely identify that person. There would be a centralized system where all the documents are scanned and are uploaded on to the cloud after verification by the respected authority. Now when the reader scans for the particular chip it will get unique value for which it will give us the documents of that particular person in our android application.

Considering this large functionality of mobile phones, it will be helpful to use it in healthcare system to make the medical data easy to carry, efficient, accessible, and manageable. So that the patients can use mobile phones for self-help or communication with a doctors. Or doctors can use it to monitor the health of the patient with the use of portability of health records. For this NFC (Near Field Communication), which is an upcoming technology that has proven to be reliable and secure can be used for storing health credentials and securing the data [1]. This can be achieved using the system which includes) Secure Health card for storing patient id and ii) Server which stores Electronic Health Record. This system can benefit both the patient and the doctors by providing a robust and secure health flow. It can also provide portability to devices and provide usability for health management in emergency situation, to overpopulated hospitals and remote locations.

1. WHAT IS NFC?

NFC (Near Field Communication) is a short range wireless RFID technology. NFC makes use of interacting electromagnetic radio fields in mobile phones. Near Field Communication (NFC) is a set of standards for portable devices. It allows establishing the peer-to-peer radio communications [3]. If your phone has NFC then it could be used to transfer data to other phones or to NFC readers [2].

2. Difference between RFID and NFC:

RFID	NFC
Frequency range 13.56 MHz (High freq) and 902-928 MHz ultra-high frequency.	Operates at frequency 13.56 MHz.
One way communication	Two way communication.
Can be used for communication between devices at a distance upto 1m.	Limited to close proximity communication (10 cm).
Tags can be scanned simultaneously	Tags cannot be scanned simultaneously.
Are not available in mobile phones	This are available in mobile phones.

Related work :-

NFC tag store all information about people like Aadhar card number, driving license, pan card number, Educational document ,medical report, and criminal records etc. This application is use for Doctor, RTO, Public. we give one time authority to user to update its information. Doctor has also authority to change medical data only .

The credentials and a much stronger security requirement since it is accessed by number of people and the quantity of data could be large. if any criminal record will be create then RTO have writes to change information. NFCTage is inbuilt of human body . NFC tag is human can carry all information any where or any time .

NFC reader also used to read all information. Mobile devices are personal; they always remain with the patient and they are location aware. The patient can use mobile devices for self-help or communicate with a professional or to monitor the health of the patient . This makes the cell phone a much more appropriate device for handle healthcare than any other media. When the number of patients is large, difficulty is to

reliably maintain the patient records and also have simple automated mobile phone applications for healthcare helpers to use. Therefore an automated healthcare architecture can be used in NFC-enabled mobile phones[6] and patients having their patient ID .NFC-enabled mobile phones can read the patient's ID, followed by automated gathering of healthcare important health parameters, analysis of the information and transmission of it for expert feedback. This automation in health records processing can provide time efficient and reliable health consultation anytime anywhere[8] .

Proposed System :

Here in this process we going to see NFC(Near Field Communication) based mobile healthcare system using NFC chip which we are going to implement in human body sending the details to monitor in android application. The key would be present only with the person ; until and unless person does not tap the NFC chip nobody can access and view the person details regarding the medical reports , criminal records , Personal information . We propose here each person will be provided with a NFC chip inside the human body and Doctors , Police and person can view the previous records by tapping the Smartphone that is enabled with a NFC reader over the NFC Chip. In the same way they can read/write the information. The NFC chip will be implemented in human body. We have discussed with the medical team so that there will be no any side effect of that chip inside the body. Whenever Android application can tap the chip , it can display only necessary data i.e for a doctor needed a medical records only . Its doesn't necessary any criminal records . Figure shows that Data can be saved on server .



NFC Based Healthcare System

Comparison between Existing system and Proposed System:

Existing system includes paper work and documentation. Here user has to keep each and every document related to him, which is always may not possible. It becomes a headache if any document is lost or misplaced or any document is required at any time. Keeping the hardcopy of every record becomes very irritating task. So in proposed system there is no need to keep each and every document or record with user. Here each and every document is stored on cloud after verification by the respected authority. Hence there is no need to keep hard copy also even if any document is lost that will be not the problem. Also no one can use fake documents as a proof. And every document is available at every place. Also there is no any chance to misuse someone's documents since NFC tag is planted inside the human body.

Literature Survey :

1] NFC based secure healthcare monitoring system:-

It present a system using NFC-enable mob phone for facilitating the patient in a low-source environment. The patient can use them for self-help. Doctor can use this for monitoring patient health.

With the recent emerging technologies in mobile devices involving secure credential storage, larger storage capability, wireless communication interfaces they can be used in the healthcare for gathering health parameters and also for healthcare. The very important aspect of health care is Privacy and security . We propose that the patient should retain only primary part of the record in EHR electronically. A Health card retained on a mobile device can retain the entire EHR including reports and tests. An authorized medical provider can access securely the permitted portion by a simple tap of mobile device.

2] NFC based profiling of smart home lighting system:-

This paper demonstrate simple version of lighting control that can be used in home. A technological advanced studio can be made using a similar setup for controlling background and side lighting can be done using NFC enable smart phone. The smart lighting control in the new commercial studios and smart homes not only provides the user with better control but also enhances the aesthetic value of the place. This control is achieved by profiling and controlling the lights by using user defined lighting conditions. One possible and a neat way is by using NFC Tags loaded with the user profile details and also the intensity or color details and interface it with the control board that adjust the intensity and color by a simple pulse width modulation and using RGB led matrix panels as lighting elements.

3] Mobile healthcare system using NFC technology:-

This paper has presented a solution to improve the quality assurance in healthcare system. This is reaching reducing clinical error caused by interaction dose. A Health card retained on a mobile device can retain the entire EHR including reports and tests. An authorized medical provider can access securely the permitted portion by a simple tap of mobile device.

4] Encrypted NFC emergency tags based on the German Telematics Infrastructure:-

The German electronic health card (eHC) is suppose to hold emergency data. This smartcard will not always be available to caregivers in emergency situation .so they can proposed the same tag prototype which utilizes NFC technology to provide secure and quick access to medical information.

Mathematical Model :-

1) Description:-

Problem Description and System

Let S be Closed system defined as, $S = \{ Ip, Op, Ss, Su, Fi, A \}$

To select the training documents and give the path of the folder and perform various actions from the set of actions A so that Su state can be attained.

Observation:- System

2) Description:-

$S = \{Ip, Op, Ss, Su, Fi, A\}$

Where,

$Ip1 = \{\text{username, password}\}$

Observation:- Set of available documents for training and testing

3) Description:-

Set of actions $= A = \{F1, F2, F3, F4, F5\}$ Where,

F1 = Preprocessing

F2 = Document Storage

F3 = NFC Scanning

F4 = retrieve information

F5 = display document

S- Set of User's states

$Ss = \{\text{rest state, login state, selection of documents, Scanning NFC, classification of documents, displaying the category as the result}\}$

Su- success state is when documents are displayed

Fi- failure state is when No document is displayed.

Observation:- System goes through a set of different states

Definitions:

P, NP, NP-Hard, NP-Complete Problems:

P Class of problems: Solutions to P class of problems have deterministic algorithms running in polynomial.

NP Class of problems: Solutions to NP class of problems have non-deterministic algorithms running in polynomial.

NP-Hard class of problems: A problem is in NP-Hard class if an already proved NP-Hard problem reduces to it.

NP-Complete class of problems: A problem is NP-Complete if it is NP-Hard and it is NP (i.e. there exists a non-deterministic algorithm running in polynomial time which solves it).

Therefore, our system is NP-Complete.

$S = \{Ip, Op, Ss, Su, A\}$

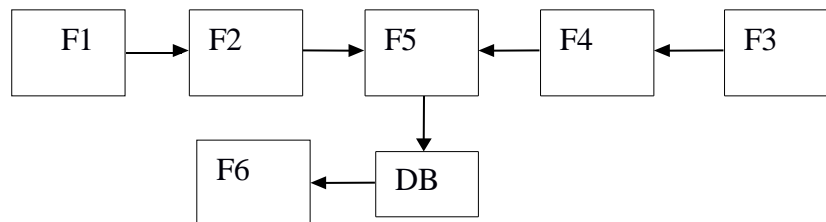
Mapping Functionsf(x)	X	Y
F2(Ip1) →Op1	Ip1	Op1
F3(Ip2) →Op2	Ip2	Op2
F4(Op2) →Op3	Op2	Op3
F6(Ip2) →Su	Op2	Su

Objects:

- 1) Input1: Ip1 = {Username, Password}
- 2) Input2 : Ip2= {login }
- 3) Input3 : Ip3={scan Scan NFC }

- 1) Output1 : Op1 ={retrieve Documents}
- 2) Output2 : Op2 = {display documents}
- 3) Output3 : Op3 = { Update Info If required }

Functional Dependency Graph:



- 1) Function 1 = F1 =Registration
- 2) Function 2 = F2 =Login
- 3) Function 3 = F3 =scan NFC
- 4) Function 4 = F4 =retrieve documents
- 5) Function 5 = F5 = display documents
- 6) Function 6 = F6 =Logout

Conclusion:-

In this work, we have proposed applications based on NFC enabled Android mobile devices for improving healthcare and criminal system process for secure object identification on an external tag or mobile device itself. The applications are simple to use with a simple touch of NFC for secure communication. This will improve the health flow in crowded hospitals of developing countries like India as well as of developed nations. This also supports digitalization of India. With the help of this system paper work is reduced also there will be also reduced rate in fake documents and criminal activities which occurs through fake documentation. As NFC is inside a body there is no need to handle it every time so that there is no any chance to loose it. Overall this system is user friendly, efficient and secure.

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