

Health Tracking with NFC

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Abstract— Today healthcare is using information and communication technologies approach for early detection, prevention of disease and long-term management of healthcare in many developed countries to improve quality of life. With the increasing number of health issues across different parts of the world, there is a need of management system with efficient patient and doctor identification, to store and retrieve patient records to ensure a proper context between the patient and the correct medical documentation. NFC tag can be employed for automation of identification of patient and doctors in hospital using smart phones and tablet computers that use the Android platform NFC can be used to explore new ways of real-time hospital workflows and data processing in the medical world. Using NFC technology, physicians can easily view recent ward round results and update information without manually paper works.

Key words: Near Field Communication, Java Script Object Notation, PHP- Web Designing, XML - Extensive Markup Language

I. INTRODUCTION

To develop a system which would help to make a hospital's management paperless. With the help of Near Field Communication bring more safety in payments and all the information of the patient and help the patient to track all his treatment records. Existing system makes the use of paper as much as it can, there are a lot of cases when the records are lost as well as the patient had complaints about the management had altered the records of payments and medication. By the use of NFC there are less chances of data getting lost and exchange of data in between the patients. The patient's will be able to check the records of their medication and prescription when necessary.

II. PROJECT IDEA

Maintaining hard copies of the data and to retrieve it from a large heap is a very difficult task. To make sure the data is available and easily accessible, we maintain it as softcopies. To make the Healthcare sector more secure and efficient, NFC technology is used to store & retrieve the data of the patients with much ease and comfort. The idea is to make sure that each activity can be seen by the patients and they are not kept in the dark. Our idea is to make sure the all the patients data e.g. Blood test, sugar level, personal information are stored into the NFC tags so that one doctors can easily get all the information about the patient.

There are conditions where the patient has met serious accident and he is unconscious to get the information about his personal details and blood group the doctor can access his NFC tags. This ease the work of documentation and further procedure can start quickly. The bills and medicines details are constantly updated on the NFC tags so the patients can easily calculate and manage where he is spending money. Patients will be provided with an account (application) which provides them with unique identification

and password. This application contains all the details of the particular patient his expenses, his prescription, doctor contact no. for emergency, his test results etc.

In all, the idea is to make the Healthcare system digital and to make doctors and patients work easy by using NFC technology. Mobile devices as carried by everyone can be used to read the tags and retrieve information from the tags.

III. RELATED WORK

A. Healthcare

People are continuously trying to improve their quality of life and technology plays an important role in it. Technologies like mobile devices can be use in health care application which will enhance the Healthcare sector .Mobile devices are personal, always on, always with the patient and are location aware, the patient can use it for self-help or to communicate with a professional and or to monitor the health of the patient. This makes the NFC enable mobile phone an appropriate device for remote healthcare than any other technology. NFC-enable mobile phone is tapped to the NFC-TAGs. NFC tags contain personal information about the patient, Patient has provided with a unique NFC-tags. By tapping the TAG with an NFC-enabled phone, the patient can be identified and important information can be transmitted to the doctor, however it not only provide medical professionals with information about what treatments a patient should receive or has got earlier, but they can also keep track of when nurses and doctors have checked in with that patient. These tags are reusable, programmable, and portable and transmit data of the patient. The tags contains patient's blood group, earlier records so that the doctor can find his past injuries and diseases.NFC can work off-line with automated recordings of visits, Visiting doctor can be monitored by having them check in and out during a patient visit. Execution of all planned visits can be monitored and the amount of working hours can be properly recorded.

B. Mobile Health Monitoring Applications

Patients are located at a distance or mobile. NFC enabled Mobile phones are used for collecting and processing health information. Transmission technologies such as NFC, Bluetooth, USB, Global System for Mobile Communication (GSM), General Packet Radio Service (GPRS) and Radio Frequency Identification (RFID) tags are used to communicate information between patients and healthcare providers.

IV. DATA DESIGN

A. Global Data Structure

The database manager which will help in al database related activity will be singleton in nature. The singleton pattern is a design pattern that restricts the instantiation of a class to

one object. This is useful when exactly one object is needed to coordinate actions across the system.

B. Database Description

MySQL database will be used to save patients and doctor credentials and selected daily update documents for each. Here we are not using any files TO SAVE ANY DATA. ONLY DATABASE WILL BE USED FOR saving all types of data. Database will be stored on various servers. Apache tomcat server will be used as a main server for storing the database. Hence we will require 2 tables to save above listed data.

- 1) Patient Data table
- 2) Doctor Data Table

V. COMPONENT DESIGN

A. NFC (Near Field Communication) Tags

Each NFC technology consists mainly of a low power smart tag and a reader. The tag consists of a small antenna and a microchip. The NFC enabled Smartphone transmits radio-waves of about frequency of 13.56 MHz that are received by antenna in the smart tag and, which allows the reader to identify the information in the smart tag by converting the radio waves reflected by the smart tag into digital information. This information is stored mainly in the Hospital backend server.

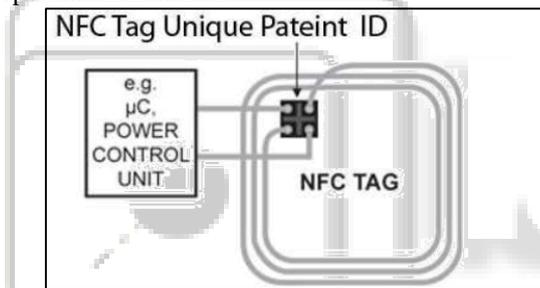


Fig. 1: NFC Tag

VI. SYSTEM FEATURE

The Health Care is one of the key use cases for NFC technology. The idea is that an individual health record can be made “smart”, and paperless i.e., it is capable of storing additional information in the form of an NFC Tag. By tapping an NFC Device to the tag, this information can be read and displayed to the doctor and users itself. NFC requires less than 4 centimetres of close proximity for interactions. At this close range, doctor will have foreknowledge of the person or device that they are interacting with. NFC interactions are based on a “tapping” consumer gesture, where both NFC devices either touch or are within a few centimetres of each other in order to initiate an NFC interaction.

We have provided following features into our system:

- 1) Admin side authentication and client registration
- 2) Password Secure database
- 3) Database connection polling technique used to efficiently used database connections
- 4) Client side android application to access user & his prescription details
- 5) REST over HTTP Standard communication technique is used for Client-Server communication

- 6) Data is encrypted using standard base64 algorithms
- 7) NFC based touch communication
- 8) Modular software design approach so that system can be updated easily
- 9) SMS notification on every important event
- 10) HTML 5 based server side GUI
- 11) Proper error messages to user in case of system failure

VII. MODULES

A. Web based GUI

Server will be web based application and this module will be responsible to take inputs from admin. The GUI developed in HTML and Java-script our server input will be taken through this GUI. This includes new patient registration, new prescriptions etc.

B. Database Manager

This will help to handle all database related activity. All the SQL queries will be taken care in this module. A database connection pooling system will be present to avoid repeatedly opening and closing database connection. The JDBC driver manager ensures that the correct driver is used to access each data source. The driver manager is capable of supporting multiple concurrent drivers connected to multiple heterogeneous databases.

C. Communication Manager

Communication Manager will handle the client server communication part. We have used REST over HTTP Standard communication technique for communication. REST stands for Representational State Transfer. (It is sometimes spelled "Rest".) It relies on a stateless, client-server, cacheable communications protocol -- and in virtually all cases, the HTTP protocol is used. REST is an architecture style for designing networked applications. The idea is that, rather than using complex mechanisms such as CORBA, RPC or SOAP to connect between machines, simple HTTP is used to make calls between machines.

D. Health Record Logic

This module handles all prescription related logic of a user. It also uniquely maintains each transaction sessions so that it can differentiate each patient. Unique identification tags are provided to the patients which distinguish one from another. It takes help of database manager to complete all its transaction related database commits. Doctor is allowed to enter prescription of any patient in the form of image or text. Patient will be able to view his medical history any time using android app.

E. System Configuration

The configuration manager which will be holding IP address of the entire client will be singleton in nature. The singleton pattern is a design pattern that restricts the instantiation of a class to one object. This is useful when exactly one object is needed to coordinate actions across the system.

F. Encryption/Decryption Module

Base64 encryption/decryption technique has been implemented in system. This module will handle all encryption and decryption logic of all types. This encryption is applied on database where each user's password is stored.

VIII. CONCLUSION

In this project report, we described the implementation of a Working of Health related activities through NFC technology.

We successfully implemented & executed activities that are required in Health care sector using NFC technology. We were successful in retrieving information from the NFC tags & were able to constantly update the data.

Hence NFC can be successfully used in future for healthcare sector which would definitely reduce a lot of manual work and increase the efficiency. It will be timesaving & as the data gets stored digitally it prevents from storing and maintaining (hardcopy) records of patients.

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