

Android System for Emergency Medical Data Access using NFC

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Abstract

Implementing an android application to provide digital health capabilities that consumers want the most. Access to electronic medical records (EMR) to provide location of patient in case of emergency, prescription and insurance management. The combination of healthcare and Information Technology has given rise to concepts like e-Health which aim at delivering healthcare services and information by using internet and related technologies. The android application's in-built NFC writer is used to write patient unique id in NFC tag. Doctors using NFC enabled smart phone can retrieve patient information when placed near NFC tag. The system is patient-centric, which means that each action taken, relates to patient's medical history or health care. Each patient is equipped with all-in-one medical card and is identified in the system with it. Patients can view their medical history, and insert prescription and insurance detail. Before taking an action, the patient has to identify himself in the system using the NFC card. The Emergency medical data access using NFC system aims at providing a digital environment for patients to interact with doctors efficiently at day-to-day bases and also in case of emergency.

Keywords: Android, Emergency Data Access, E-Health, Health Care, Medical Records, Near Field Communication, Smart Phone

I. INTRODUCTION

With this system, we aim to provide a user -friendly medical Android application for patients to enter vital information like restrictions in food and drug administration, medications, allergies and sensitivities, current treatment, medical providers, and even emergency contacts. This information will be available to the doctors and medical practitioners through an Android application, which they log in, and then scan the patients NFC tag to refer or make changes in those records in an android application itself.

E-health explains the delivery of health information and services via the Internet, and the technologies provide a virtually limitless set of tools and opportunities for improving users' health, and they are revolutionizing not just how we plan and deliver ordinary health care but even how we think about it[1]. This paper tells us about an android app which uses NFC readers to scan the patient's NFC card which will contain a link of that patient's medical data that is stored in android application. NFC technology is a promising tool to tackle with the mentioned health care challenges by providing automated as well as accurate information either from healthcare resources/ equipment and personnel or from patients for a wider range of people/objects and in shorter timeframe. India has an astounding presence in IT, whose contribution is approximately 8 % to the GDP[4]. Based on these concepts and advantages of e-Health, The Emergency medical data access using NFC system aims at providing a digital environment for patients to interact with doctors efficiently at day-to-day bases and also in case of emergency. By using NFC, healthcare has been able to reduce unnecessary expenses and decrease patient mortality rate due to the human errors not only by real-time and precise information but also through observing right service at right time for the right person and with optimal quality[7].

A. NFC Technology

Near field communication, abbreviated NFC is a type of contactless communication between devices like smart phones or tablets[4]. This type of communication allows a user to wave the smart phone over a NFC compatible device or tap it on a NFC tag to send/receive information without needing to touch the devices together or go through multiple steps setting up a connection.

1) How It Works?

- The technology behind NFC allows a device, known as a reader, interrogator, or active device, to create a radio frequency current that communicates with another NFC compatible device or a small NFC tag holding the information reader wants.

- Passive devices, such as the NFC tag in smart articles, store information and communicate with the reader but do not actively read other devices.
- Peer-to-peer communication through two active devices is also a possibility with NFC.
- This allows both devices to send and receive information [5].

II. RELATED WORK

EMR-Electronic Medical Records are replacing Paper Medical Records which is now considered a key initiative in the Healthcare industry. It is because hard copies of medical records are easily lost and damaged and also disappears in case of emergencies. They are often incomplete with incorrect or missing information. Doctors therefore end up duplicating tests, making uninformed decisions and delaying care [6]. Attempts have been made, using in both RFID and NFC technologies to convert them into digital formats, although little success has been encountered as such because of memory issues. The NFC based system is used to store digital photo copies of the reports generated by the doctor and display them the next time the visit a doctor. Many drawbacks were encountered such as storing images/multimedia information about EMR was difficult since a limited amount of data can be stored in an NFC tag. Whereas, the RFID based system provided a wider scope to store and retrieve the medical records of the patients but it was a desktop bound software and required scanner to process the RFID tags , which led to low portability and data access became obsolete for an on-site attendant in case of an accident.

III. PROPOSED METHODOLOGY

Patient will be equipped with NFC tag. The medical application (In-built NFC reader/writer) writes the link of the patient into the NFC tag from smart phone. To create patient application we are using ANDROID 2.2.3 studio. Although substantial progress was made in improving the sharing of patient medical information among healthcare providers, professionals still need to address the issue of efficient electronic medical records. In emergency situations, particularly with unconscious, incoherent and unaccompanied patients, providing emergency physicians with a patient's accurate medical history could be the difference between life and death [2].

A. Patient Identification using NFC Tags

When Smart phone are placed near the NFC tag, data will be accessed and this unique ID will be sent to server to select the appropriate record. This tag can be assigned to patient with a unique ID at the time of registration. NFC based Identification and hospital management system is developed for Android platform will run in all NFC enabled Android smart phones . For successful identification it opens up the patient records and display information coming from the backend server system. If not then the record application displays the message of unidentified ID.

B. Records

As soon as the patient gets the NFC tag, the information related to the medical will be stored in the database and can be used by the doctors in case of emergency issue. This record can be accessed by the patient, doctors and on site attendant (in case of emergency).

C. Other Details

Prescription and Appointments are independent of the Tag and are used for daily reminders. In SAFE MODE these will not be affected and details entered will be marked in red for safe Mode reference.

D. NFC Tag Reader/Writer

The writer/ reader will be in-built so that users do not have to download separate NFC reader/writer, for adding tags and reading others tags. This also makes it unique and secure form other general tag readers.

IV. ALGORITHM

- 1) Start
- 2) The on-site attendant should Login.
- 3) Scan the card of the patient.
- 4) When others card is read, automatically location of that card is sent to patients next of kin and patients account enters the SAFE MODE.
- 5) On-site attendant can now view Records, Emergency contact details, Help-lines, insurance details, prescriptions, Appointments of the patient.
- 6) The on-site attendant can also use the help-lines provided to contact authorities.
- 7) If user clicks on logout button, user will get out of the system and login page will be displayed for new login.
- 8) End.

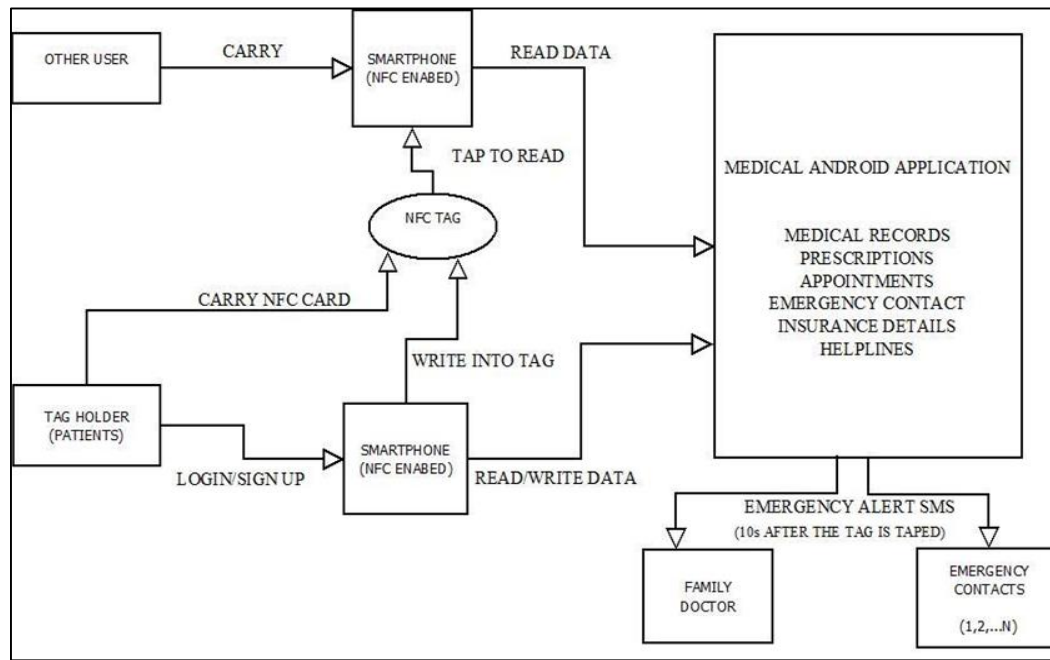


Fig. 1: Block diagram of Emergency medical data access using NFC

V. DIFFERENCE BETWEEN EXISTING SYSTEM AND PROPOSED SYSTEM

<i>Proposed system</i>	<i>Existing system</i>
<i>In proposed system for emergency scenario's NFC card is used.</i>	<i>In existing system for emergency scenario's RFID card is used.</i>
<i>Proposed system can easily read and write information into the NFC tag from the NFC enabled smart phone.</i>	<i>Earlier system needs scanner for RFID card which is not possible to be carried everywhere.</i>
<i>Proposed system can prevent thread as NFC range in very short and security is maintained.</i>	<i>Existing system provides less security as compared to proposed system. RFID is capable of accepting and transmitting beyond a few meters while NFC is restricted to within 4 inches.</i>
<i>Proposed system automatically sends alert message with location of the patient is sent to its next of kin when the tag is taped on the on-sight attendant's smart phone.</i>	<i>In existing system there is no automatic alert messaging feature. It only provides access to medical data.</i>
<i>In case of emergency our system provides a SAFE MODE option where location of the patient is sent to his/her next of kin.</i>	<i>No such feature is provided in existing system.</i>
<i>For daily use, proposed system provides the user with prescription and insurance management facilities in the form of reminders and alert message.</i>	<i>As Existing system is desktop application it is not possible to provide this feature as efficient as in proposed system.</i>
<i>System provides portability for the user and it can help in emergency situation.</i>	<i>Existing system is restricted to desktops in hospitals.</i>

VI. BENEFITS

The presented system aim at providing a user friendly and smooth interaction between the patient's and the doctors involved. The benefits of this holistic system in the healthcare domain are:

- To provide medical aid in case of emergency.
- Eliminates patient misidentification: the risk to patient safety and medical malpractice will decrease.
- The health status of the patient will be known quickly. Thus reducing diagnosis time and retesting cost.
- Based on these concepts and advantages of e-Health, the Emergency medical data access using NFC system aims at providing a digital environment for patients to interact with doctors efficiently at day -to-day bases and also in case of emergency.

VII.CONCLUSION

This system is intends to provide a hassle free and smooth medical data access in case of emergency and for daily routine basis. This is provided using the concepts of e-Health and NFC technology. Thus giving rise to a mobile application that provides medical records as well as location of the patient in case of emergency. It bridges the gap between patients and doctors in terms of communication and provides a unique and secure platform to interact, thus providing to better healthcare services.

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REFERENCES

- [1] Cosmin-Ionuț Imbrișcă, Alina-Maria Neațu(2015, October), "The Implementation of E-Health Solutions. A Review of International Solutions and Their Relevance for Romania," International Journal of Economic Practices and Theories, vol. 5, No. 5. Available: http://ijept.org/index.php/ijept/article/view/The_Implementation_of_E_Health_Solutions_A_Review_of_International_Solutions_and_Their_Relevance_for_Romania/0
- [2] Cristina TURCU, Cornel TURCU, Valentin POPA (2009), "An RFID-based System for Emergency Health Care Services" International Conference on Advanced Information Networking and Applications Workshops. Available: https://www.researchgate.net/publication/221191754_An_RFIDbased_System_for_Emergency_Health_Care_Services
- [3] A. Devendran, R. Jayam and P. Sindhuja (2015, March 03), "ELECTRONIC MEDICAL RECORDS USING NFC TECHNOLOGY", ARPN Journal of Engineering and Applied Sciences VOL. 10. Available: http://www.arpnjournals.com/jeas/research_papers/rp_2015/jeas_0315_1717.pdf
- [4] Akanksha Sharma,(2016, April)"e-Health in India," Overview HTSM.
Available: <http://india.nlembassy.org/binaries/content/assets/postenweb/i/india/netherlands-embassy-in-new-delhi/import/e-health-in-india.pdf>
- [5] About Near field communication Available: <http://nearfieldcommunication.org/about-nfc.html>
- [6] Samaneh Madanian(2016, April),"The Use of e-Health technology in Healthcare Environment: The Role of RFID Technology ", Auckland University of Technology, Conference. Available: https://www.researchgate.net/publication/297706424_The_Use_of_e-Health_technology_in_Healthcare_Environment_The_Role_of_RFID_Technology
- [7] Kohn LT, Corrigan JM, Donaldson MS, (2000.), "Err is Human: Building a Safer Health System", Institute of Medicine (US) Committee on Quality of HealthCare in America; National Academies Press (US). Available: <http://www.csen.com/err.pdf>