

Mobile Healthcare System using NFC Technology

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Abstract

Although primary care physicians are increasingly interested in adopting electronic medical record (EMR) systems, few use such systems in practice. Mobile devices offer new ways for users to access health care data and services in a secure and user-friendly environment. Mobile healthcare (m-healthcare) systems are regarded as a solution to healthcare costs without reducing the quality of patient care. We are developing a basic architecture for m-healthcare services using Near Field Communication (NFC) to facilitate the provisioning of healthcare to people anywhere, anytime using mobile devices that are connected through wireless communication technologies

Keywords: *Healthcare, Mobile Phone, Mobile Healthcare Service, Near Field Communication.*

1. Introduction

Mobile devices are personal, always on, always with the patient and are location aware; the patient can use them for self help or to communicate with a professional and or to monitor the health of the patient this makes the cell phone a much more appropriate device for remote healthcare than any other media.

1.1. BACKGROUND

The advancement of science and technology in the field of healthcare has improved the quality of people's life. At the same time mobile phones are gradually adopted for solving some tough healthcare issues. "No Health without Research" according to the World Health Organization's (WHO's) report 2012 justify that research helps, and that research is essential to improve health outcomes. Diseases are by far the leading cause of mortality in the world, which places an ever enormous strain on the world's healthcare industry.

1.2. RECENT DEVELOPMENT

Health monitoring is mostly implemented in hospital or health care center. The requirements for mobile monitoring are increasing rapidly.

In mobile health monitoring applications, the patients are located at a distance or mobile. Small portable devices such as mobile phones, personal digital assistants (PDAs), Tablets, Watches, and Key chain rather than settled equipment, are used for collecting and processing health information. Transmission technologies such as 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.

The increased use of wireless technologies in the Healthcare industry can have an enormous impact on the both the quality and cost of healthcare. The level of patient care can be increased dramatically though more consistent monitoring and better integration with Healthcare providers.

2. MOBILE -HEALTH

Mobile – Health is delivering health, defined as the state of complete physical, mental and social well being, via the mobile channel .No agreed industry definition for m-health. Note m-health is not a subset of or mobilization of e -health. Mobile devices have unique attributes, including being personal to the patient, always with the patient, and always on and as well as helping to provide social context, eg.location. This makes mobile a more appropriate channel for delivering health than any other mass media.

In the past few years, mobile health, or m-health, has drawn a lot of interest. This isn't surprising as it's one of several sectors, where mobile really makes senses and make a difference in myriad situations, from the persons who falls ill in a rural village in India (There are 5.3 billion mobile subscribers (that's 77 percent of the world population). Growth is led by China and India.

3. NEAR FIELD COMMUNICATION TECHNOLOGY FOR THE FUTURE

In today's world, technology is advancing at a blistering pace, helping to make our lives easier in every aspect imaginable. We as a society for the most part have embraced each new technology with open arms and little regard to security and reliability. However, in past few years many concerns over these aforementioned issues have become an integral part in enhancing and progressing technology and winning over the public's trust. The answer is Near Field Communications, an up and coming technology that has proven to be as reliable and secure as it is innovative.

As a society we have placed our trust into technologies that handle our health care, credit lines, financials, enhancement of education and many more. These technologies have added a level of ease into our lives that usually goes unnoticed and often taken for granted.

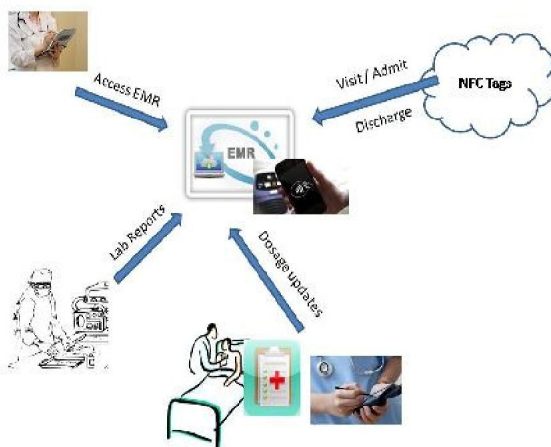
3.1. WHAT IS NFC?

NFC is a short range wireless RFID technology that makes use of interacting electromagnetic radio fields. It is meant for application where physical touch, or close to it, is required in order to maintain security.

3.2. APPLICATION IN NFC

Near field Communications to work, the mobile phone needs to come with bundled with the technology at the time of manufacture. There would be a chip inside the mobile device which holds the details of patient's information. Near field communication is the technology of the future to make payments through mobile phone devices. Besides that it can be used to pay for mobile ticketing in public transport, device acting a debit/credit card to make payments, read RFID Tag.

3.3 PROPOSED ARCHITECTURE

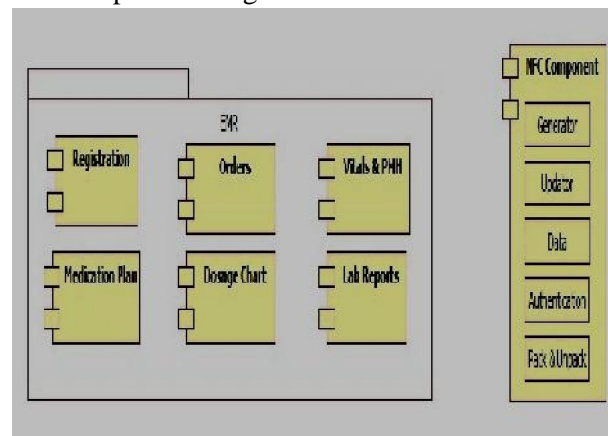


The above diagram represents a NFC using EMR. Electronic Medical Records (EMR) system makes the entire process of patient record keeping easier, more accurate and comprehensive, and more efficient. With an EMR system, doctors use specialized software that allows them to enter their patient records electronically. The software stores the patient information on a server and each patient's complete history is available instantly, including digitized copies of x-rays, lab results, prescriptions ordered and other necessary medical data. Physicians can use their desktop, laptop, or an electronic clipboard-type computer to navigate through their patient charts and record notes. EMR software also coordinates with their medical billing software, such as transferring diagnosis and procedural codes in order to facilitate the billing process after each patient visit.

Electronic Medical Record :

1. While a person gets Admit/Visit to the hospital, the health information about the person will be accessed through there NFC tags which will be synchronized and stored temporarily on that particular hospital Electronic Medical Record (EMR) Database .The doctor can easily access full information about the patient by viewing the patient EMR instead of going through bundle of paper reports.
2. If the patient is been asked to take any tests then those test reports will also be updated in that EMR.
3. Based on the test the updates which the doctor prescribed will be updated too in their EMR.
4. Finally while the patient Leave/Discharge all those information which have been updated in his EMR will be synchronized and transferred back to his NFC tag which will hold the complete medical report about what happened that particular day.

3.4 Component Diagram



Generator

Initialize a tag (patient data) with EMR package its available in hospital

Updater:

Update patient data with EMR Package

Data :

Data will synchronize

Authentic:
Security will be checking

Pack & Unpack:
Pack & Unpack patients

Near Field Tags

NFC tags contain data and are typically read-only but may be rewriteable. They can be custom-encoded by their manufacturers or use the specifications provided by the NFC Forum, an industry association charged with promoting the technology and setting key standards. The tags can securely store personal data such as debit and credit card information, loyalty program data, PINs and networking contacts, among other information. The NFC Forum defines four types of tags which provide different communication speeds and capabilities in terms of configurability, memory, security, data retention and write endurance

Tag Used

The ACR122U NFC Reader is a PC-linked contactless smart card reader/writer developed based on the 13.56 MHz Contactless (RFID) Technology. Compliant with the ISO/IEC18092 standard for Near Field Communication (NFC), it supports not only Mifare and ISO 14443 A and B cards but also all four types of NFC tags.

ACR122U is compliant with both CCID and PC/SC. Thus, it is a plug-and-play USB device allowing interoperability with different devices and applications. With an access speed of up to 424 kbps and a full USB speed of up to 12 Mbps, ACR122U can also read and write more quickly and efficiently. The proximity operating distance of ACR122U is up to 5 cm, depending on the type of contactless tag in use.

In order to increase the security level, ACR122U can be integrated with an ISO 7816-3 SAM slot. Furthermore, the ACR122U NFC Reader is available in module form, permitting easy integration into bigger machines, such as POS terminals, physical access systems and vending machines.

The ACR122U NFC Reader is ideal for both secure personal identity verification and online micro-payment transactions. Other applications of the ACR122U include access control, e-payment, e-ticketing for events and mass transit, toll road fare collection and network authentication.

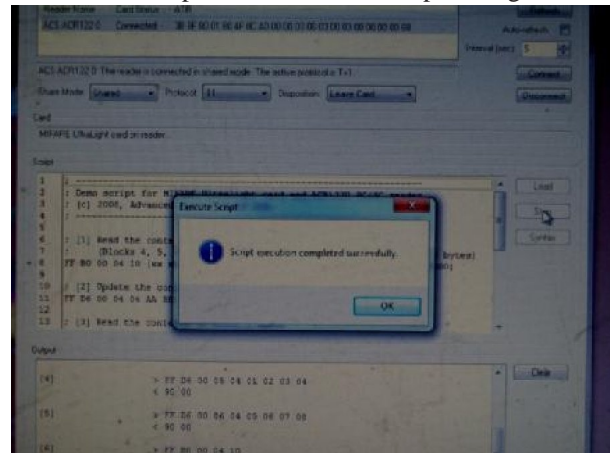
I. PROS OF NFC USED IN HEALTHCARE

Care providers, whether they are within health institutions or delivering healthcare at patients' homes, need to optimize the cost of quality care. Real-time reporting is needed, but should not distract from the main task of patient care.

NFC technology allows individual acts to be reported with the wave of a mobile phone near a low cost tag.

- Room / bed / medication identified by low cost tag
- Time / place / care giver identified by mobile phone
- Quick fill, multiple choice forms in option for additional information

Real- time feedback for care personal
Sample screen shot for script testing



This paper has presented a solution to improve quality assurance in healthcare sector; this is reaching reducing clinical errors caused by drug interaction dose etc. For that purpose, we have proposed an EMR-architecture using NFC such as mobile device, PDAs, laptops and smart phones, where is being considered the incipient NFC technology. This solution also offers support for a legacy identification solution based on healthcare before that NFC technology is widely implemented in new devices, is substituted by NFC tags.

Appendixes, if needed, appear before the acknowledgment.

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