

NFC-Based Hospital Management System (ZoeSync)

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Abstract — Healthcare is changing rapidly, and proper management of patient data; billing, and expenses are important. This abstract describes a modern solution, which employs the Near Field Communication (NFC) technology that would simplify retrieval of patient details, maintain a log billing, administer medications as well as monitor all costs in the hospital room. The NFC-based system ensures seamless and secure access to vital information for healthcare providers including medical history, plans for treatment and allergies by just swiping an NFC-enabled device on a patient's tag within their rooms. This helps health professionals to make quick decisions while improving care quality. Additionally, the system combines billing and expense management into one whole. It automates the calculation and recording of medical expenses as well as drug prices thus facilitating correct and timely invoicing of patients. As such this enhances financial operations in hospital while promoting transparency and accountability in provision of healthcare services.

Keywords: Near Field Communication (NFC), Raspberry PI, RFID Reader

I. INTRODUCTION

In healthcare's ever-changing world, patient data management must be efficient. Good care quality, safety of a patient and financial well-being for health organizations rely on effective communication of important information within hospital settings. Nonetheless, traditional approaches to patient data access alongside billings have been mainly characterized by inefficiencies as well as delays. What is being introduced here is a revolutionary Near Field Communication (NFC) technology-driven solution that transforms how healthcare givers can get to the records of patients while also billing them at the same time and tracking all relevant expenses inside what is known as the hospital room. In terms of medical environments, NFC – which you may have heard about concerning contactless payment – has come quite far. The present paper guides readers through various aspects of NFC application in healthcare, system elements as well as major advantages it offers both providers and recipients. We will dwell on challenges faced by these systems and give examples based on cases before we finally discuss future opportunities in this field through NFC-based systems.

II. LITERATURE SURVEY

Divyashikha Sethia, Daya Gupta, Huzur Saran proposed a paper on Smart Health Record Management with Secure NFC-enabled Mobile Devices on November 2018[1] in which Patients with dispersed health records faces the many challenges of accessing readily available health data history and mobility across different types of hospitals. they can be hinder timely diagnosis and treatment, especially in the case

of an emergency or travellers. Cloud-based solutions have open challenges of interoperability and integration, higher challenges for security and privacy and may lack 24/7 support for the high availability of health history.

I Prof. Rupali Chopade, Punam Deshmukh, Kavita Kamble, and Dhanashri Nazarkar proposed a paper on NFC Based Health care System on March 2016[2], for this android based mobile device with NFC smartcard technology it can be used for storing credentials and securing of the data and to create Health Secure service on hybrid cloud. This system can benefit for both the patient and doctor, the doctors by providing a robust and secure health flow. It can also provide the portability of devices and usability for health management in emergency situations, overpopulated hospitals and remote locations.

Nadeem Mahmood; Asadullah Shah; Ahmad Waqas; Zeeshan Bhatti; Adamu Abubakar; H. Abid M. Malik proposed a paper RFID Based Smart Hospital Management System: A Conceptual Framework on January 2015[3], in this paper, propose RFID Based Conceptual Framework for Smart Hospital Management System which provide a safe and secure patient data management system.

Abhishek Gune; Anirudha Bhat; Abhijith Pradeep proposed a paper on Implementation of Near Field Communication based healthcare management system on February 2014[4], this paper proposes the application of Near Field Communication (NFC) for patient monitoring. Different patient monitoring NFC based modules have been proposed in the paper pertaining to patients admitted to the hospitals, self-care of patients, patients can suffering from memory loss diseases like Alzheimer etc.

Atluri Venkata Gopi Krishna, Cheeerla Sreevardhan, S. Karun, S. Pranava Kumar proposed a paper on NFC-based Hospital Real-time Patient Management System on April 2013[5], in this paper, outline an NFC model for designing a system in the health care. An application of the architecture is described in the area of NFC-based Real-time Hospital Patient Management System (HPMS).

III. PROPOSED MODEL

A developed model consist a Web application built using Django and react native. Zoesync is a Web application that store patient information about medical history, current medication medical reports etc. To reduce the work load on the hospital staff that is the hectic work of writing down the entire med data which is really hard to manage and can cause huge problems if not managed properly, with the help of zoesync all this could be achieved. In this system all the staff members are given a RFID with specific functions like only the doc can prescribe medicines and allocate tests, the nursed can only check if the prescribe medicines are given or not for the cleaner he can only check if the room is cleaned or not if not cleaned, he has to clean it and upload a pick of the cleaned room to confirm that he has cleaned the premises.

A. Working Overview

Earlier we used NFC in mobile but with the emerging technology we are going to use it in wearable. The proposed model is to make a model which plans to present how we utilize NFC innovation and implant encoded chips inside the card. After loading required data in the NFC band, a web application with a centralized database will scan the band to load the saved information about a particular patient. NFC chip will contain a unique key for a unique staff member which redirects to the associated record of patient in the database. Scanner will scan a card and patient data will be displayed on app of screen. Hospital staff can simply tap their NFC-enabled device against an NFC reader at the entry point, eliminating the need for manual verification. The real-time application of hospital management system using NFC (Near Field Communication) technology is to enable secure and fast access to patient data at time of emergencies.

B. Architecture

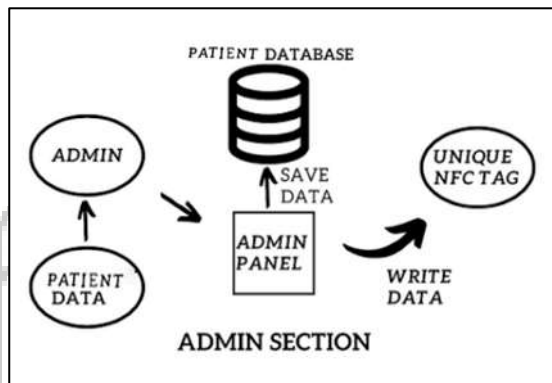


Fig. 1: Architecture of Admin section

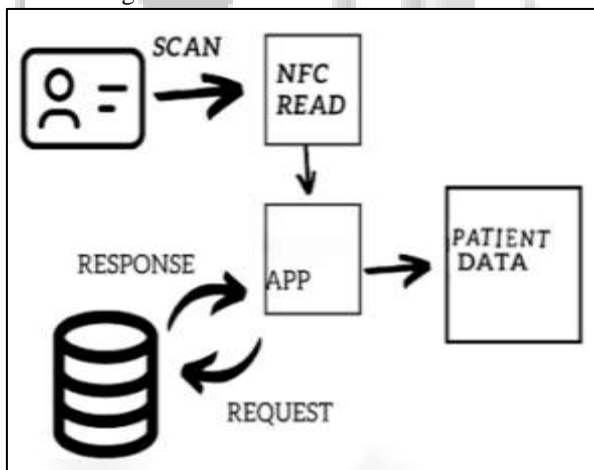


Fig. 2: Architecture of Front Desk Section

C. RFID Technology

RFID (Radio Frequency Identification) technology employs RFID tags containing microchips and antennas to wirelessly communicate with RFID readers. These tags come in passive, active, or semi-passive variants, with passive tags drawing power from reader signals and active tags equipped with their own power source for extended range. RFID readers emit radio waves to activate nearby tags, capturing data from them. The collected data is then processed by the reader, enabling applications such as inventory management, supply chain tracking, access control, asset tracking, and contactless

payment systems. RFID technology enhances efficiency, accuracy, and automation across various industries, offering real-time visibility and control over assets and processes

D. Hardware Requirements

1) Raspberry Pi 4 Model B

Raspberry Pi is a series of minute, single-board systems developed by the Raspberry Pi Foundation in the UK. These computers are designed to promote the teaching of basic computer science and programming skills in schools and developing countries. The Raspberry Pi boards are low-cost, credit-card-sized computers that feature a range of capabilities comparable to a desktop computer. They typically run on Linux-based operating systems and can be used for a wide variety of projects, including programming, gaming, home automation, robotics, and more. Raspberry Pi has gained widespread popularity among hobbyists, educators, and professionals due to its affordability, versatility, and accessibility.



Fig. 3: Raspberry Pi 4 Model B

2) RFID Reader

An RFID (Radio Frequency Identification) reader is a device that is used to wirelessly communicate with RFID tags or transponders. RFID tags contain electronically stored information, which can be read or written to by an RFID reader using radio waves. The reader emits radio waves that activate the RFID tag, allowing it to transmit its data back to the reader. RFID readers are commonly used in various applications such as access control systems, inventory management, supply chain tracking, toll collection, and asset tracking. They come in different forms including handheld devices, fixed readers installed at specific locations, and integrated readers in other devices such as smartphones and computers.



Fig. 4: RFID Reader

3) NFC Card

Solenoid valve is used as water control valve, it is a simple electronic device that converts electric current directly into electronic devices. Solenoid valves are a combination of mechanical components and solenoid valves. Therefore, the solenoid valve consists of two parts: solenoid valve and mechanical valve. Solenoid valves convert electrical energy into electrical energy to actuate a solenoid valve to open, close, or adjust its position. The solenoid valve is shown.



Fig. 5: NFC Card

IV. FUTURE SCOPE

- Appointment and Queue Management: NFC can simplify the check-in process for appointments. Patients can use NFC based devices to check-in automatically, reducing the waiting time and improving the overall flow of patients in the hospital.
- Access Control: NFC can enhance security by controlling access to different areas within the hospital. For example, only authorized person with NFC-enabled badges could access restricted zones, ensuring patient privacy and sensitive information protection.
- Emergency Response: In emergency situations, NFC can provide quick access to critical information. First responder can use NFC-enabled devices to retrieve

essential medical data, allergies, and pre-existing conditions, enabling faster and more informed decision making

V. CONCLUSION

Lastly, the advantages of embracing NFC technology in healthcare environment are more than challenges. Through good preparation, resource allocation and firmness on having sound measures for security, the health sector will be able to use NFC as a tool that can transform its operations in relation to better patient care, transparent billing and streamlined administrative procedures. The future of healthcare management is advancing at an alarming rate and this has provided an avenue for NFC based systems to change it positively. Therefore, in order to enhance both patient outcomes and financial efficiency through the adoption of NFC technology; we must take our steps cautiously since these needs are different in every health care setting.

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