

SMART CARDFORMEDICAL PRESCRIPTION

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ABSTRACT

The aim of the project is to design a secure, efficient and paperless prescription management system based on a Smart Card System with Arduino Uno, NFC technology and 16×2 LCD display. Here, the prescription and identification information of the patient is stored in the smart card which can be read using an NFC reader (PN532 NFC RFID Module) connected to the Arduino Uno using a USB power supply cable. On tapping the smart card on the reader, the stored information is read by the Arduino which then outputs the prescription information onto the 16×2 LCD module (usually using the HD44780 LCD Controller). The system improves the accuracy of the data, decreases the chance of prescriptions being miswritten, prevents prescribing the wrong medication and ensures better patient records management. Fast retrieval of medical information via contactless communication technology, it is cost effective, portable and can be used in hospitals, clinics and pharmacies.

Keywords Smart Card System, Arduino Uno, NFC Technology, Medical Prescription Management, PN532 NFC Module, 16×2 LCD Display

1. INTRODUCTION

The management of medical information in health care is becoming more and more reliant on accurate and secure information [1]. Conventional handwritten prescriptions are liable to illegibility, duplication and loss [2] and form a critical part of patient treatment. All these issues require a digital solution to guarantee data integrity, access and patient safety [3]. Using smart card technology together with the Near Field Communication (NFC) technology can offer a secure platform to store and retrieve medical information very quickly [4][5]. An embedded system based on Arduino Uno is designed to create a smart prescription card which enables a patient to access their prescription data without touching it [6]. The system is designed to close the gap between the traditional prescription medicine and the modern digital healthcare system, while being affordable and deployable [7].

2. SCOPE OF THE PROJECT:

The objective of the Smart Card – Based Medical Prescription System based on the NFC technology is to offer a secure, efficient and paperless solution for storing and getting the

patient's prescription information. It is proposed to use this system in hospitals, clinics, pharmacies and primary health care centers, aimed at the reduction of prescription errors and increase of the workflow efficiency [3]. It allows healthcare providers to access patients' prescription information easily via contactless communication without needing an internet connection at all times [4]. Project also becomes an application of embedded systems, nfc technology and digital health care solutions in biomedical engineering [5]. It provides flexibility for future extensions like cloud data storage, biometric identification, integration of mobile application and real-time health monitoring system [6]. Moreover, the system can be expanded to be used in the rural and limited resources health care settings, providing a cost effective and stable solution for modern health care prescription management [7].

3. EXISTING SYSTEM:

Presently, medical prescription system is mainly paper-based: doctors write prescriptions by their own, patients carry out paper prescription to the pharmacies to purchase medicine [1]. This is a traditional method that is used in hospitals, clinics, and private practices

but has the drawbacks of illegible handwriting, prescription errors, loss or damage of paper records, and not being able to maintain long term patient history [2][3]. In some high-tech healthcare facilities, electronic prescription systems (e-prescription) are available and prescription information is stored electronically in the hospital's computer databases [4]. These systems, however, typically need to be connected to the internet at all times, must be based on central servers, and the implementation is more expensive [5]. In general, existing solutions do not provide a simple, portable, low cost and secure patient controlled solution for efficient access and storage of prescription data [6].

4. PROPOSEDSYSTEM:

The proposed system is a Medical Prescription System which is based on Smart Card that can be used to store and retrieve patient prescription information securely by using an Arduino Uno microcontroller [1][2] with the help of NFC enabled smart card. The system consists of an NFC reader module like PN532 NFC RFID Module, a 16×2 LCD display module with the help of HD44780 LCD Controller and a USB power supply cable which is to be connected to the Arduino Uno [3]. The patient will tap the smart card on the NFC reader, the information stored in the smart card will be read and processed by the Arduino and displayed on the LCD screen for the medical staff or the pharmacists to check the prescription [4]. This system allows for secure, swift and contactless access to medical prescriptions, reduces paper work, minimises human error and offers a portable, low cost solution which could be used in hospitals, clinics and pharmacies [5][6].

4.1 PROJECTIONDESCRIPTION

Smart Card Based Medical Prescription System based on NFC technology is an embedded health care system, designed to ensure secure storing and retrieval of medical prescription information in the digital, contactless form. System consists of a microcontroller (Arduino Uno), an NFC reader and a 16×2 LCD display. Prescription information of patients is kept on

an NFC enabled smart card which can be read through the NFC reader by the authorized personnel. Microcontroller processes the retrieved information and displays it on the LCD screen for verification. This project seeks to solve the problems of legibility, lost records and medication errors that are common with paper prescriptions. The system doesn't require continuous internet connection, so it's ideal for hospitals, clinics, pharmacies and rural healthcare facilities. The project combines embedded systems and NFC technology to create a cost-effective, secure, and scalable solution for medical prescription managements in the modern era.

4.2 WorkingPrinciple

Smart Card–Based Medical Prescription System is based on Near Field Communication (NFC) and Embedded System Control. The information of patient prescription and identification is initially stored on an NFC-enabled smart card. When the smart card comes into the near field (usually within 2-10 cm) of the NFC reader, it activates the smart card and allows the transfer of contactless data at the frequency of 13.56 MHz.

The data stored in the smart card is read by the NFC reader & sent to the microcontroller (Arduino Uno). The information received is analyzed by the microcontroller based on the programmed logic and the information is checked with details of prescription. After processing, the appropriate information is sent to a 16×2 LCD display, and the prescription information is displayed for the medical staff for verification.

Powered by regulated power supply with the help of Arduino Uno via the USB cable. No permanent internet connectivity is required to access medical prescriptions, making it a secure, fast and paperless system that helps avoid prescription mistakes and streamline the healthcare workflow.

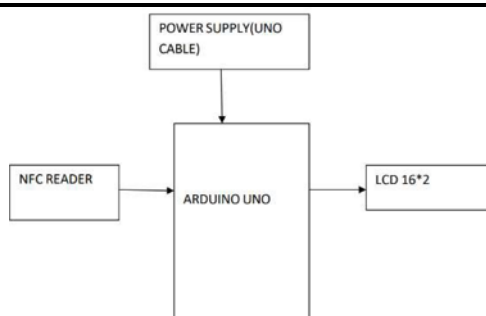


Fig1: Block Diagram

5.RESULT

The Smart Card – Based Medical Prescription System's output is the safe display of the patient's prescription information on the 16×2 LCD display. Once the NFC enabled smart card is brought close to the NFC reader, the system promptly asks the user for a PIN authentication for security reasons. To retrieve the prescription information the user is required to enter the correct Personal Identification Number (PIN). When the PIN is correct, the Arduino reads the data from the smart card and shows the patient ID, medicine name and dosage information on the LCD screen. If the pin is wrong, it will not allow access and the prescription information will not be shown. This guarantees data security, maintaining privacy of patients and stopping unauthorized get access to medical records.



Fig.2: Output

6. FUTUREENHANCEMENT

The Smart Card–Based Medical Prescription System can be further developed by incorporating a cloud-based database system in the future, which will facilitate the seamless and instant transfer of patient information between various hospitals and pharmacies, thereby promoting better access and management of patient data. The system can be enhanced by adding biometric security like fingerprint

recognition for increased security and to prevent unauthorized access. A GSM or Wi-Fi module could enable automatic updates of prescriptions and the approvals of the doctors from afar. In addition, a mobile application interface can be created for both doctors and patients to be able to view their prescription history and medication schedules. The potential for further upgrades and enhancements, such as increasing memory storage capacity, implementing advanced security measures, and integrating health monitoring sensors with the Internet of Things (IoT), has the potential to turn the system into a full-fledged digital healthcare management system.

7. CONCLUSION

Finally, it can be concluded that the Smart Card–Based Medical Prescription System with Arduino Uno, NFC technology, and a 16×2 LCD display is an excellent solution to the problems associated with the paper-based prescriptions. The system allows the data to be accessed without any contact and the prescription information is shown at a glance to prevent human errors, losing or misusing prescriptions and to improve the management of patient data. It provides greater reliability, portability and security, and allows for rapid access to medical data in hospitals, clinics and pharmacies. As a whole, the system proposed in the paper is a practical and scalable system to be used for the digitization of prescription management using embedded system and smart card technology.

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