

# Smart Card based E-Health Record

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## Abstract

Health care system is one of the critical issues for developing countries and thus the information technology is becoming progressively more important nowadays. The deployment of smart health cards simplifies the prescription process, improves the standard of care given, and facilitates electronic healthcare records management through a coordinated health service process. Using the smart health card patient's data, doctor's prescription, patients present and former health history is accessible. When an infant is born a record is formed with details like blood group, vaccination dates, complications involved, allergies and other important details. This card plays a crucial role during unexpected incidents like accidents and reduces child traffic problems. The cloud computed system enrolled within helps to secure data of patients and prevent data intrusion. For authentication and security purposes the hospital's unique code, Aadhar card number and Doctor's access code is provided which could be accessed only within the Hospitals. The e-health card facilitates privacy protection by filtering access to sensitive data which is accessible only to authorized people like Doctors and Cardholders.

**Keywords:** Smart Card, Hospital, Arduino, Authentication, Patient Medical History.

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## INTRODUCTION

The growth of information and communication technology is an indispensable part of growing nations as it increases the economy of a country; also making it competitive with other developing and developed nations in the field of healthcare [1]. The welfare of a nation entirely depends upon medical field. The requirement of e-health system is essential in developing countries like India[2]. Automation in the field of medicine is needed to improve efficiency in working environment for professionals. The health condition and details of them are collected from the patient, test report, diagnosis of doctor, equipment will be available to check and know the condition of a patient, and from pre-existing data [3]. Paper record of patient data is likely used in many areas of healthcare unit. In general, the reviewing and storage of patient data for further reference is in the form of

records[4]. Smart cards are utilized in medical field because it is less expensive, easy to carry, processing the data, and

managing the data without any disturbance of previous data[5]. Many paper focuses on utilizing smart card either for data storage or immediate access of data[6]. A PDA based e-health smart card system is liable to improve healthcare globally. PDA is said to be a transportable minicomputer. It visualizes the effect of information and communication technology particularly in the field of healthcare[7]. The smart card stores data of a patient and rejects the bribery of medical field. A smart card health monitoring system with cloud storage approach supports hospitals, doctor and pharmacists and allows them to store data in electrical format[8]. There is no chance for data intrusion and data theft in this approach. Bluetooth technique to transmit live monitoring data of a patient is utilized.

The proposed technique is designed in the aspect of knowing patient health status and it involves two step authentication for patients to retrieve their data to reduce and resolve above mentioned difficulties. The storage system is supported by a cloud storage system. The cloud

storage system can allow physician to rewrite the data of patient as per their knowledge and test reports. If patient feels discomfort to communicate with physician during data retrieval, the proposed system helps respective staffs to access it.

**METHODOLOGY**

**A. Cloud Database**

The Collection of Medical data includes test results, reports etc. Cloud database is employed to access an outsized amount of data by storing, retrieving and managing it[9]. PostgreSQL is an Object Relational Database Management System that contains numerous datatypes and potent feature sets which increases the integrity of the software. Heroku is a container based cloud platform as a service. Heroku Postgres is the most advanced open source database that is relatively secure and flexible[10]. The containers in the Heroku Platform is referred as “dynos” that consists of application and required dependencies. Broad Range of add-ons facilitates the development of application

in Heroku. Accurate retrieval of data and application with less downtime is rendered by cloud database.

**B. PROPOSED WORK**

The proposed model involves a design of a smart card. Initially when an infant is born, a card is created with a unique number and this card is updated throughout their lifetime. The first step of E-health record for infants involves registering at the hospital, securely storing all the personal health details. For adults the data will be stored manually based on their medical history. Similarly for hospitals to access this technique, registration is made mandate. Once they complete their registration an unique code will be generated which could be used only by the hospitals. At first, the smart card is scanned by the physician and then it is followed by the authentication. After the validation of the authentication process, the required medical data will be retrieved successfully.

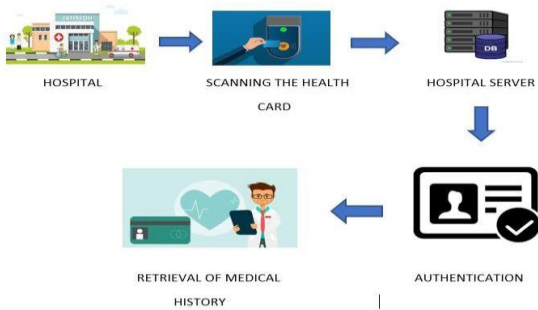


Fig. 1: Proposed methodology

**Arduino Uno**

Arduino is an open source hardware platform. It is a

microcontroller board based on ATmega328P and a total of twenty pins are available within it, fourteen pins are used as digital input/output and remaining pins are used as analog input pins. It operates with a constant DC voltage of 5V. It is comprised of a physical programmable circuit board and a software portion which helps to write and upload the codes onto the physical portion. It is connected to PC via USB cable.

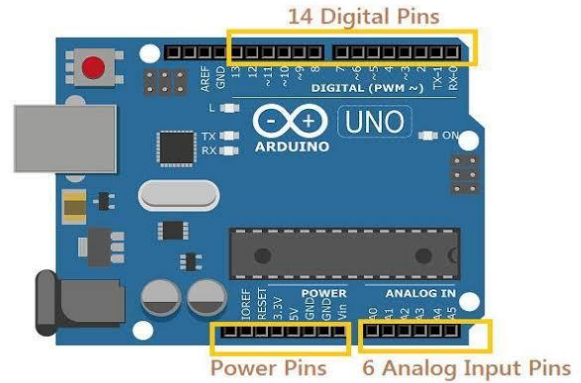


Fig. 2: Arduino

**Smart Card Design**

A RFID reader uses radio waves to scan the RFID card, when the card is held in close proximity to a reader. RFID tag consists of 12 bit unique identification number on the microchip with radio antenna mounted on the substrate. The transponders present in the tag converts the radio signal into usable power and send the stored information to the reader in the form of RF signal. RFID reader has an antenna and a transceiver to transmit the signal, to the Arduino or PC. EM18 RFID reader is used in the proposed approach, which is capable of reading tags in the frequency range of 125kHz. The pictorial representation of the hardware structure is presented in Fig 3.

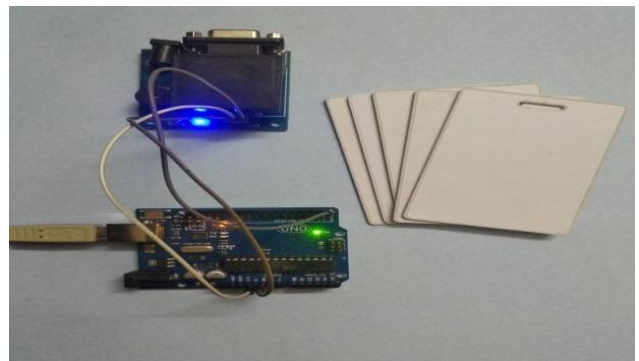


Fig. 3: Hardware structure

**Command Prompt**

Command prompt, a Command-line Interface also referred as text based user interface which aids us to interact with the

system and manage computer programs. Automating Tasks by running multiple commands is made easier by Command prompt. It is distinct from a regular interface as it possess many additional features like run ping and ip config commands. Batch files and Scripts are deployed for Task Automation and for the overall control of Administrative functions. Proper Syntax is substantial for the execution of the tasks. Command prompt is utilized as a user interface that makes us to interact with the server and hardware.

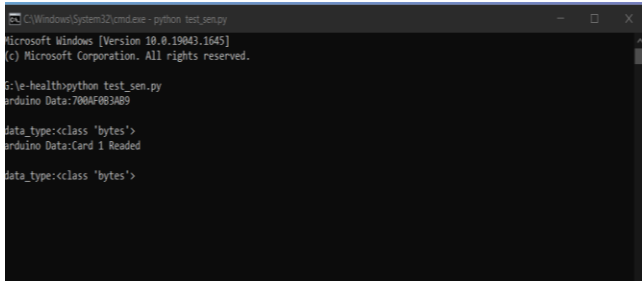
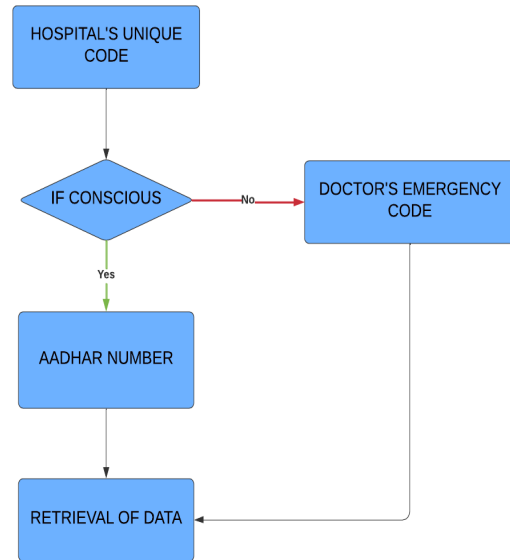


Fig. 4: Command prompt as user interface

### C. Authentication and Aurtherization

Authentication is the primary security to protect the data from unauthorized users who tries to access it. During authentication, the user should provide the credentials which is compared to the files stored in the database. If the credentials given match the files in the database, then the authenticated entity is authorized to use the resource[11].Once the authentication is done, authorization process will start. Authorization is the safety mechanism which determines the access levels or user privileges related to the resources includes files, services etc. This is the process of permitting or refusing the access to a network resource which admits the user access to different resources based on the identity of the user. For this purpose, the process of authentication and authorization is carried out by the healthcare system [12].

The proposed technique is designed in the aspect of knowing patient health status and makes two different sections for patients to retrieve their data. For this purpose, the process of authentication and authorization is carried out by the healthcare unit. The flow diagram for the proposed authentication is shown below.



### RESULT AND DISCUSSIONS

A smart card is accessed by a portable reader. The contactless RFID card is chosen because RFID card enables easy updating of data. This card has two level authentication and can be accessed only in the hospitals. When the RFID card of the patient is scanned, it is redirected to the Hospital server. Once it is redirected, hospital code must be entered as a first level authentication. After entering the hospital code, the physician needs to know whether the patient is in conscious or unconscious state.

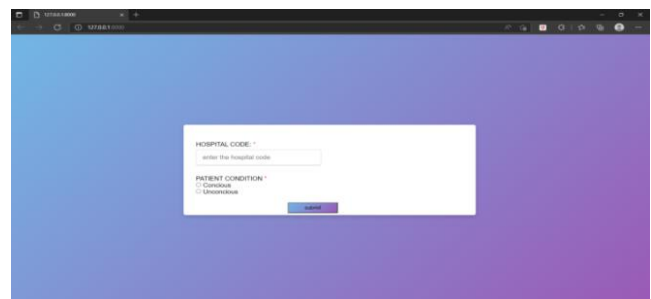


Fig. 5: Homepage for Authentication

When a patient uses a smart healthcare card in a conscious stage, the patient must enters the Aadhar number as a second level authentication and the medical history of the patient could be accessed for further treatment.

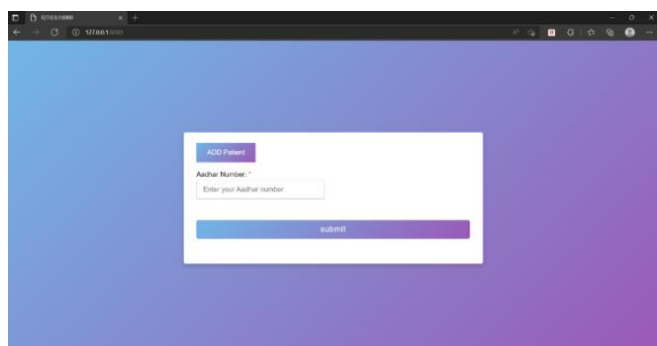


Fig. 6: Authentication for conscious stage

When the patient is unconscious or in a situation unable to convey the entire medical data accurately or when language barriers impede effective communication, smart cards are accessed by hospital staff with their unique code which was generated during the deployment of this system at hospital. Patients benefit from immediate and improved treatment.

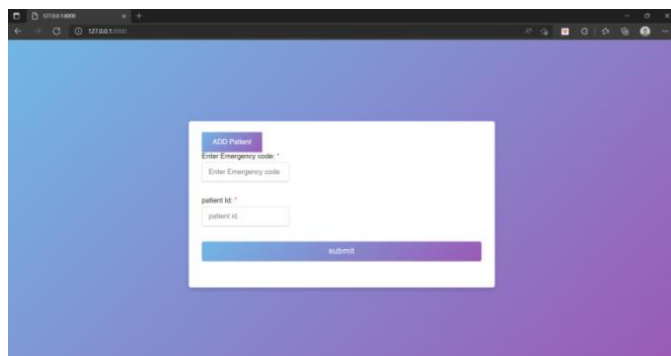


Fig. 7: Authentication for unconscious stage

After scanning the card and completion of the authentication process, the patient's data is displayed on the hospital's system successfully.

id	patient name	age	gender	blood group	PCV	rbc	hbc	platelet	lgh	mobile	sugar after fasting	sugar before fasting	treatment for	Last visit	Aadhar	Alle
3	Gayathri	22	Female	O+ve	40.4%	4.64	13.4	220890	110	7358586802	129	96	PCOD	01/2022	99867765544	Wh

Fig. 8: Retrieval of patient's data

Once data is retrieved and updated, the status of a patient is modified in cloud storage system. The data is more secure and it is having SQL attack prevention system. Hence, on implementing the E-Medical record, Doctor's would be efficient in decision making which is boon to human life.

## CONCLUSION

This paper aims at providing quick access to patient's medical data during trauma. Electronic health record benefits the people by giving better health care system. Physicians can exchange the medical history of a patient with every clinic. This helps the physician to have the current and accurate information of the patient and provide quality treatment. Patients suffering with a specific health ailment are expected to test various medications. Maintaining a proper health record digitally helps us to save both time and money. Also, it would improve Patient's Safety by updating the basic medical information. The analysis and differentiating the state of patients make this proposed study more effective and economical. It is ease to access patient data at any difficult health condition of a patient.

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