

# **Design and Implementation of Innovative Health Card for Patient Data manipulation and Decision Making**

## **FIELD OF INVENTION**

The present invention relates to the field of healthcare.

It relates to the interdisciplinary engineering work including IoT, electronics, designing, creating and integrating modules giving a solution to maintain critical health related particulars.

The present invention relates sensor, Arduino computing, scanner based solutions to huge hospital data using IOT and web development.

More particularly, the present invention is given enough effort to be secure as well as user-friendly.

## **BACKGROUND AND PRIOR ART**

In a technologically inclined world, it is never easier to maintain critical information like health particulars in a detail oriented yet easier manner. A health-care information management system is defined as software consisting of a collection of procedures and programs with the requirements for entering, storing, retrieving, updating and manipulating data having adequate capacity to maintain the integrity, security and confidentiality with fulfilling management, legal and accounting requirements. Proper implementation of information technology makes it easy for health-care providers to store, share, access and utilize the health-related information. With an increase in access to larger computers and new advances in information technology resulted in the development of more efficient data management systems. However, all these developments are within the network of a particular hospital or within the network of a limited number of hospitals. The patient cannot utilize their medical data outside the network as the patient wishes. So, the health card comes to our rescue in such situations. It is not only handy but secure as well as demanded by the current systems. It is similar to our travel card for metro rail which not only helps us skip queues but is analogous to permanent rechargeable batteries.

The invention of the smart card concept in the 1970s and the development of the internet in the 1980s envisaged new fields of healthcare information management systems using smart health cards. circuits. The principal benefits of this system are improved quality of health care and reduced cost. These cards can overcome certain shortcomings in the communication of clinical information and thereby improve the quality of health care services.

The limitations of currently available health cards are identified and alternative technologies to enhance the efficiency of the card without compromising the other benefits are developed. The system helps us to reduce health care fraud and support new processes for portable medical records with secure access to emergency medical information. Our project also comes up with additional features related to storage, recommended diet, notes-reminders and similar options.

### OBJECTIVE OF THE INVENTION

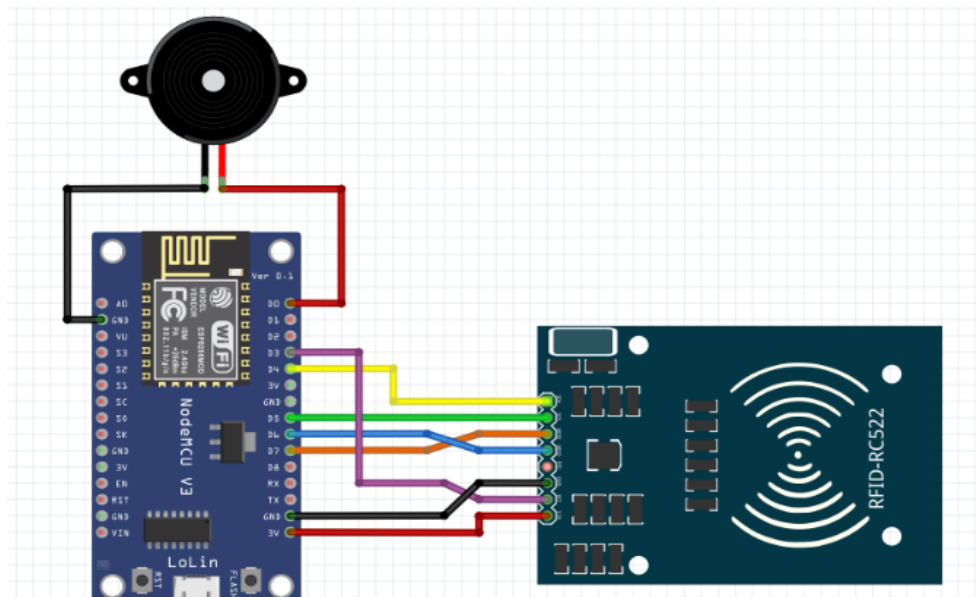
- Develop a portable smart health card to carry the entire medical records of a patient with adequate privacy and security.
- Develop a graphical interface for easy navigation through the treatment history of the patient.
- An encryption method will be applied on patient credentials to ensure adequate privacy and security of the smart health card.
- Store the entire medical data of the patient on the card and in an authorized local database to avoid loss of data due to the damage of smart health cards.
- Develop adequate technology to store and access huge files like operations' videos and CT scan, MRI scans, and X-ray in the smart card.
- Store and update patient medical records including patient personal profile, insurance details, emergency contacts, current and past treatment details, and diagnosis details.
- Emergency access to the critical medical data to the medical data while the patient is unconscious mode as provided.
- Develop a software tool in smart health card application to execute the backup of the entire patient health database as required and make it easier to request, approve/cancel appointments so that time can be saved for both ends (user and doctors).

### SUMMARY

The hardware of our project consists of a physical card which would be read by an RFID Scanner and produce essential information on the front end. The equipment will later be integrated with other modules of the web application to deliver the planned service.

## BRIEF DESCRIPTION OF THE DRAWING

To make the invention more understandable and descriptive, the schematic diagram has been designed. Diagrams conclude more aspects to the proposed invention, as they provide detailed description of the creation.



**Fig. 1**

Fig.1 concludes the CIRCUIT DIAGRAM FOR INTERFACING NODEMCU WITH RFID READER along with the placement of various components, that leads to how the appliance looks physically.

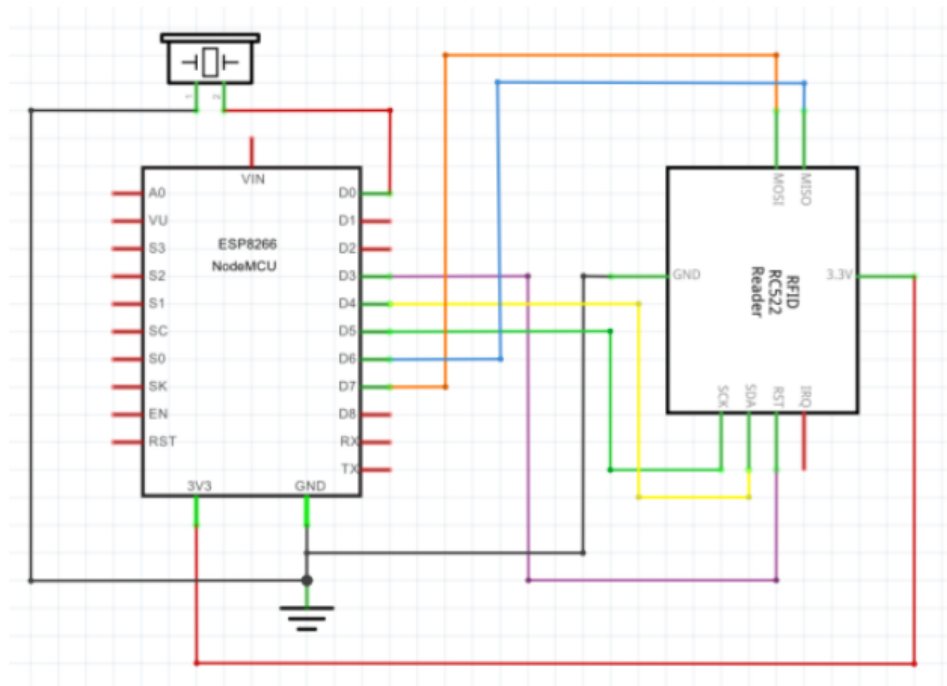


Fig.2 describes the schematic flowchart FOR NODEMCU INTERFACED WITH RFID SCANNER and gives a detailed account of how the wires are to be connected, the power supply placement and the working of the instrument.

The figure above shows pin configuration to make connections and care is taken to supply appropriate power supply.

## DETAIL DESCRIPTION

### Materials:

- NodeMCU
- MFRC522 RFID Reader
- RFID Tags (13.56 MHz)
- Bread Board

- Jumper Wires
- 9V DC supply
- Nest JS (backend)
- React (Web)
- Hardware integration with Wi-Fi

#### Terminologies Description:

1. **NodeMCU** is an open source IoT platform. It includes firmware that runs on ESP8266 Wi-Fi Soc with ESP-12 module-based hardware. ESP is a software programming technique designed to process a continuous stream of device data and act on it in real time. ESP supports the implementation of event-driven architectures that are used in numerous real-world applications.
2. **ESP8266** is a microcontroller with Wi-Fi capability. NodeMCU lessens workload for beginners of hardware interfacing.
3. **Radio-Frequency Identification (RFID)** is the use of radio waves to read and capture information stored on a tag attached to an object. It is a common term in IoT. A tag can be read from up to several feet away and does not need to be within direct line-of-sight of the reader to be tracked. This is its advantage over Bar-code.
  - **Tag:** This does not run on any power supply. It is embedded with an antenna and a microchip containing its unique identification code.
  - **Transceiver Reader:** It consists of a Radio Frequency module and a high frequency electromagnetic field generating antenna.
  - A **RFID reader** is a device used to gather information from an RFID tag, which is used to track individual objects. Radio waves are used to transfer data from the tag to a reader.
  - A **passive tag** is an RFID tag that does not contain a battery, the power is supplied by the reader. When radio waves from the reader are encountered by a passive RFID tag, the coiled antenna within the tag forms a magnetic field. The tag draws power from it, energizing the circuits in the tag.

As soon as the tag is near the reader, it electromagnetically powers up its microchip. The tag then responds by sending the unique identification code back to the reader in the form of radio signals. The RF Module of the reader detects this signal and translates it into human-readable data and sends it to a microcontroller (here NodeMCU) via SPI communication.

## CLAIMS

### **We claim:**

1. A portable smart health card to carry the entire medical records of a patient with adequate privacy and security.
2. A graphical interface for easy navigation through the treatment history of the patient.
3. A software tool in smart health card application to execute the backup of the entire patient health database as required and make it easier to request, approve/cancel appointments so that time can be saved for both ends (user and doctors).
- 4.

## ABSTRACT

The Health Card is a portable smart card that would serve as a paperless record of a patient's entire healthcare information. In simple words, it is like a travel ticket that a person can carry from one hospital to another. Health Card has been designed to store and update patient medical records including personal profile, insurance details, family medical history, emergency details, immunization history, allergy history, full medical treatment history, and diagnosis.

A web application with graphical user interface is being developed to store and manage the entire medical records of the patient on the card and in a server to avoid loss of data due to the damage of the card. Adequate privacy and security of the data is ensured by providing patient credentials and credentials are encrypted in MongoDB to provide adequate protection. Apart from that, we have divided the entire functionality of the card into four panels that includes:

1. The **users' panel** consists of user profile data, his existing medical reports, ongoing medicines (if any), making an appointment, registering emergency cases and payment gateway.
2. The **doctor's panel** which is a dossier on body mass index, blood pressure statistics, sugar levels, heart scans, other bodily analysis, medical history, fresh records, future investigations, external note for the patient and recommended diet chart.
3. The **hospital community panel** consists of information on healthcare appointments schedules, list of patient reviews and feedbacks and other hospital communication.
4. The **admin's panel** consists of columns for approving or rejecting patients' appointment, the ContactUs bar, payment gateway notification and the patient - doctor catalogue.

The Health Card will be a "patient-centric" health information system instead of a "hospital-centric" system for easy navigation through the treatment history of the patient.

**Keywords:** RFID, NodeMCU, interfacing, API, program code for easy integration in back-end as well as front-end.

#### DRAWING:

