HOSPITAL DIGITALIZATION VIA RFID

MINOR PROJECT REPORT

SUBMITTED BY:

ADITI DEB 19102162

PRIYANJALI CHAUDHARY 19102164

MUGDHA KHANDELWAL 19102133

UNDER THE SUPERVISION OF **DR. SAMRITI KALIA**

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JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY NOIDA SEC-62

CERTIFICATE

This is to certify that the work titled "Hospital Digitalization via RFID" submitted by "Priyanjali Chaudhary, Aditi Deb, Mugdha Khandelwal" in partial fulfilment for the award of degree of Bachelors of Technology in Electronics and Communication of Jaypee Institute of Information Technology, Noida has been carried out under my supervision. This work has not been submitted partially or wholly to any other University or Institute for the award of this or any other degree or diploma.

Signature of Supervisor ....

Name of Supervisor   Dr. Samriti Kalia

Designation   Assistant Professor (Senior Grade)

Date   ....

ACKNOWLEDGEMENT

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We would also like to thank her for always answering our issues and her guidance has given us enormous confidence in completing our work. Her high expectations from her student have always encouraged us to do our best to be successful. It is a great honor for us to be one of her students.

Last but not least, we want to thank our family for their support and encouragement. Their love, patience and understanding have encouraged us to pass all the difficulties.

Priyanjali Chaudhary

Aditi Deb

Mugdha Khandelwal

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CHAPTER - 1

INTRODUCTION

1.1 OVERVIEW

The word health [1] refers to a state of complete emotional and physical well-being. Healthcare exists to help people maintain this optimal state of health. 'Hospital Digitalization via RFID' is designed to improve the quality and management of hospital in the areas of clinical process and the convenience to reach the hospital. This digitalization enables you to develop your organization and improve its effectiveness and quality of work. Managing the key processes efficiently is critical to the success of the hospital helps you manage your processes.

RFID-based technology has revolutionized the healthcare industry in more ways than we could ever imagine. The next time you walk past an elderly person at the hospital, don't be surprised to see an RFID tag wrapped around their ankle or wrist or in their hands.

According to Grandview Research, the global RFID in healthcare market size was valued at USD 2.58 billion in 2018 and is anticipated to expand at a CAGR of 22.4% by 2025. Another research study by Precedence Research highlights that the global RFID in healthcare market size will reach around US$ 12 billion by 2027 and the market will grow at a CAGR of 21% during forecast period 2020 to 2027.

1.2 MODULES

This report is divided into two modules –

    i)   Hospital Management System
    ii)   Parking System

The first module consists of 'Hospital Management System' where a web-based application and RFID technology will be used for authentication purposes to ease the communication between the doctor and the patient. To reduce the time during login activities of doctor, RFID technology is being used with the help of which doctor can give approval to their patients within seconds. It is designed to replace the existing manual paper-based system. This system is to control the information of patients as well as doctors and their respective appointments. These services will be provided in an efficient, cost-effective manner, with the goal of reducing the time and resources currently required for such tasks.

The second module consists of 'Parking System'. This module is significant in various ways because in today's world, everyday many lives are affected because the patients are not timely and properly operated. To deal with these types of situations, our system is beneficial. Our system is designed to be used in hospitals and any place where parking is required like malls. The results can be recorded using Arduino. As the number of vehicles are increasing, the problems faced by manual parking management systems are also increasing. Such problems can be eliminated to some extent by implementing an intelligent parking system where the entry and exit of cars is monitored with RFID technology.

CHAPTER 2

LITERATURE SURVEY

1. RFID Technology

Radio Frequency Identification (RFID) is a technology that uses radio waves to passively identify a tagged object. It is used in several commercial and industrial applications, from tracking items along a supply chain to keeping track of items checked out of a library.

KEY TAKEAWAYS

- Radio Frequency Identification (RFID) is a type of passive wireless technology that allows for tracking or matching of an item or individual.
- The system has two basic parts: tags and readers. The reader gives off radio waves and gets signals back from the RFID tag, while the tag uses radio waves to communicate its identity and other information.
- The technology has been approved since before the 1970s but has become much more prevalent in recent years due to its usages in things like global supply chain management and pet microchipping.

2. NODEMCU ESP8266

The NodeMCU ESP8266 development board comes with the ESP-12E module containing the ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built

Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects.

3. ARDUINO UNO

Arduino board senses the environment by receiving inputs from many sensors, and affects their surroundings by controlling lights, motors, and other actuators. Arduino board are the microcontroller development platform that will be at the heart of your projects.

It has 14 digital input/output pins, a 16 MHz ceramic resonator, USB connection, power jack, an ICSP header and a reset button.

i.   Processor – Atmega328P
ii.   Memory – 2KB SRAM, 32KB FLASH, 1KB EEPROM
iii. Main Processor – ATmega328P 16MHz
iv.   USB-Serial Processor – Atmega16U2 16MHz

CHAPTER 3

FUTURE SCOPE

Today's hospitals [2] are particularly interested in increasing the quality and efficiency of patient identification and monitoring procedures. While most patient health records are stored in separate systems, there is still a huge stack of paperwork left for health-care providers to fill out in order to comply with different regulations. Since many health care errors occur when important patient information is missing or simply not available, the electronic medical records (EMRs) may easily alleviate the distress of most doctors and nurses working in today's care system.

Some of the useful application [3] of this project in future are –

1. Inventory Tracking

Items like gauze, disposable exam paper, boxes of gloves, and plastic vials are all important single-use inventory items in hospitals that must be kept on hand. Because they are single-use and relatively low cost, using high-cost RFID tags to track them isn't feasible. RFID inlays can provide a cost-effective inventory solution for these single-use items that can be stored in inventory rooms, shelving units, or in vending machines outfitted with RFID.

2. Patient and Staff Tracking

Patients and staff are outfitted with RFID tags in hospitals primarily for three reasons:

1. To verify patient information.
2. Reduce wait times and bottlenecks.
3. To locate patients.

3. Security

Security is another facet of people tracking those hospitals use to limit access to certain rooms or areas in order to prevent people from wandering around the facility. With this type of system, the staff members must wave or tap their RFID-enabled badges in front of door readers in order to gain access. Not only does this prevent unauthorized access to restricted areas, but it provides patients, medicine, and medical equipment with a level of security that deters theft or damage.

4. Laundry Tracking

Towels, blankets, and sheets are just few examples of linens and textiles that reside in almost every hospital room. Each of these items must be washed and disinfected for use before the next patient is admitted. An efficient way to keep track of these items, as well as ensure that they are sterile, is by using a system with RFID laundry tags.

CHAPTER 4

REQUIREMENT SPECIFICATION

3.1 HARDWARE SPECIFICATION

MODULE 1 – HOSPITAL MANAGEMENT SYSTEM
   a) NodeMcu ESP8266
   b) RFID Reader
   c) RFID tags

MODULE 2 – PARKING SYSTEM
   a) ESP-01
   b) RFID Reader
   c) Arduino

3.2 SOFTWARE SPECIFICATION

MODULE 1 – HOSPITAL MANAGEMENT SYSTEM
   a) Front-end: Html, CSS, JavaScript, React.js [4]
   b) Backend: Firebase, JavaScript
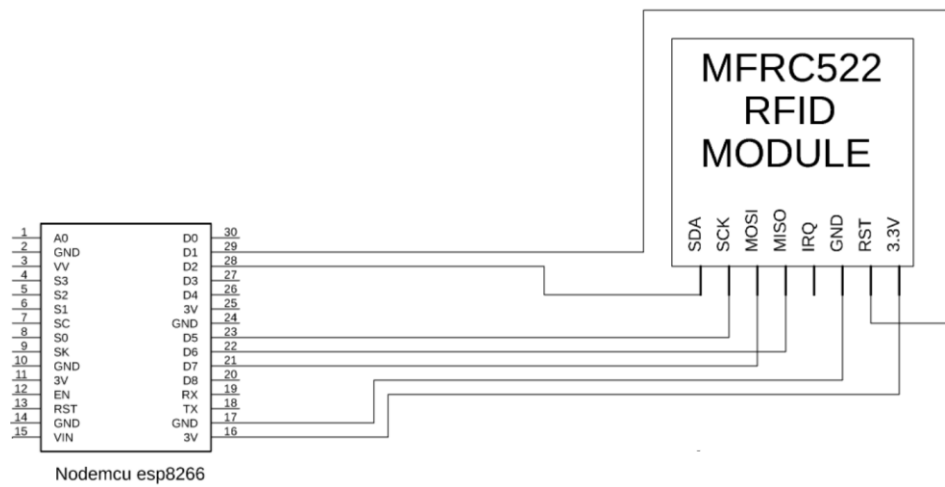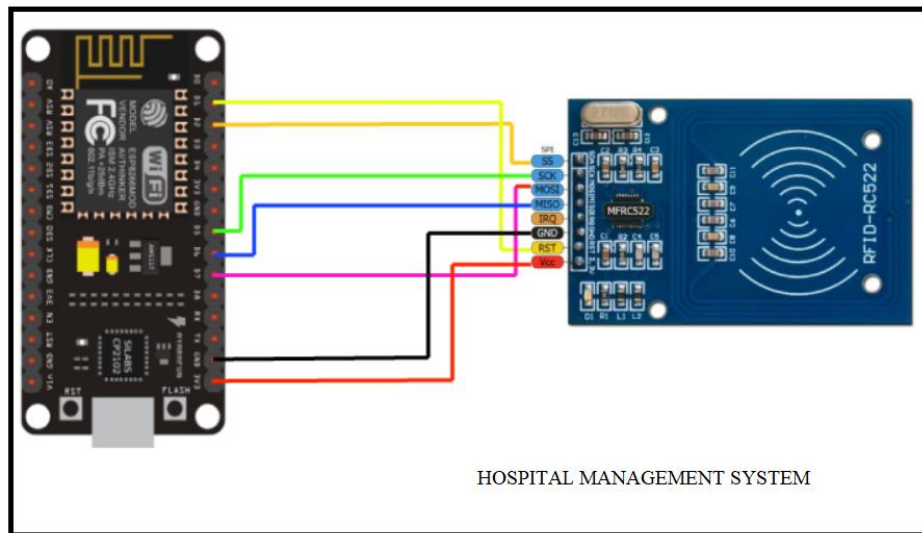   c) Development env/tools: Arduino IDE, Visual Studio, Git

MODULE 2 – PARKING SYSTEM
   a) Front-end: Html, CSS
   b) Backend: MYSQL, PHP
   c) Development env/tools: Arduino IDE, Visual Studio, Git

CHAPTER 5

CIRCUIT DIAGRAM

Module 1 – HOSPITAL MANAGEMENT SYSTEM

HOSPITAL MANAGEMENT SYSTEM

Nodemcu esp8266

Module 2 – PARKING SYSTEM
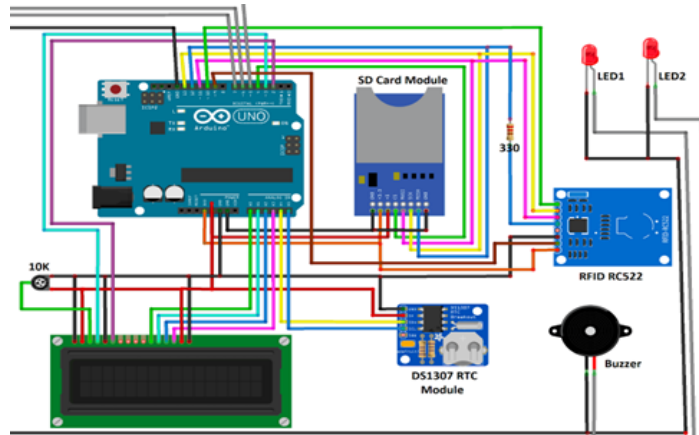
PARKING SYSTEM
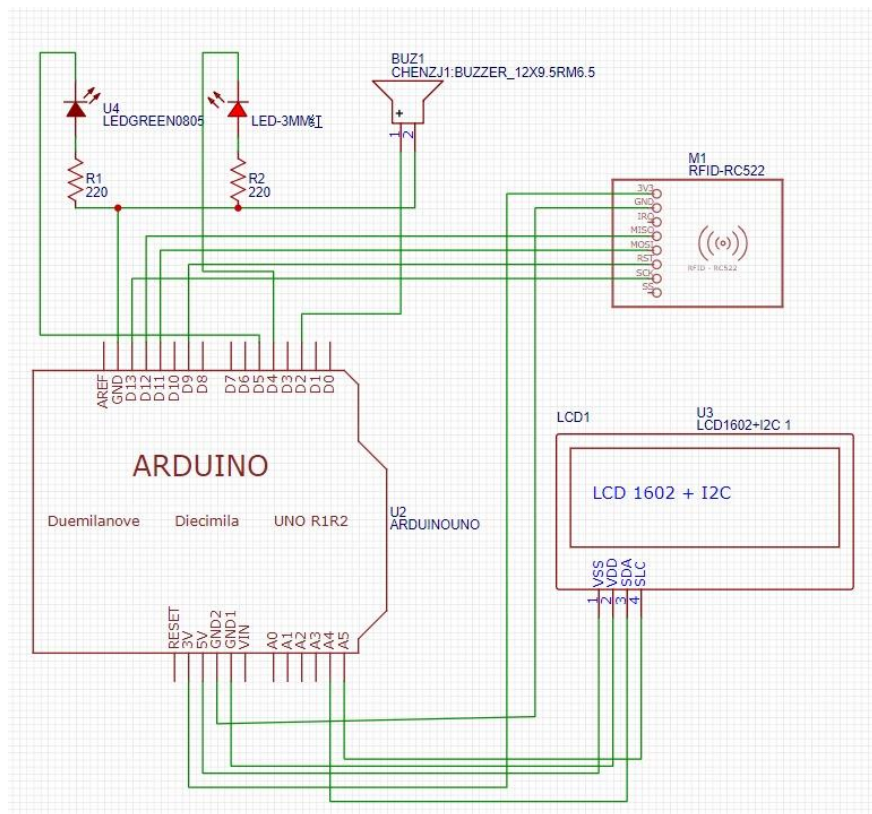
CHAPTER 6

PROJECT IMPLEMENTATION

i) HOSPITAL MANAGEMENT SYSTEM

This System aim is to give authentication ease to the doctors with the help of RFID technology. Hospital Management System is the combination of Hardware circuit as well as Software based web-application through which patients can make their appointments to the doctors by sitting at their own place. The login authentication of patients will be through their registered mail-id and password whereas doctor's authentication will be through RFID tags. The database can be altered by the doctors only and the approval of the appointment will be visible at both the ends.

Code – NodeMcu [5] and RFID reader

```cpp
#include <ESP8266WiFi.h>
#include <Wire.h>
#include <FirebaseArduino.h>
#include <MFRC522.h> // for the RFID
#include <SPI.h> // for the RFID and SD card module
#define CS_RFID D2
#define RST_RFID D1
MFRC522 rfid(CS_RFID, RST_RFID);

// Set these to run example.
#define FIREBASE_HOST "hospitalmanagement-7db07-default-
rtdb.firebaseio.com"
#define FIREBASE_AUTH "KNc38R2NZi7l0vb71zj5r0lqjOXeriTZXq2ayI8F"
#define WIFI_SSID "Galaxy M30sA666"
#define WIFI_PASSWORD "priyanjali"
void setup() {
  Serial.begin(9600);
  SPI.begin();
```

```
  rfid.PCD_Init();
  Wire.begin(3,4);
  // connect to wifi.
  WiFi.begin(WIFI_SSID, WIFI_PASSWORD);
  Serial.print("connecting");
  while (WiFi.status() != WL_CONNECTED) {
    Serial.print(".");
    delay(500);
  }
  Serial.println();
  Serial.print("connected: ");
  Serial.println(WiFi.localIP());

  Firebase.begin(FIREBASE_HOST, FIREBASE_AUTH);
}
int n = 0;
float my = 0.0;
void loop() {
  // set value
  Firebase.setFloat("number", my);
  // handle error
  if (Firebase.failed()) {
      Serial.print("setting /number failed:");
      Serial.println(Firebase.error());
      return;
  }
  if(rfid.PICC_IsNewCardPresent()) {
    String ret = readRFID();;
    if(ret == "160 84 186 27") {
      my = 1.0;
    }
    else {
      my=0.0;
    }
  }
  // update value
  Firebase.setFloat("number", my);
  // handle error
  delay(2000);
  my = 0.0;
```
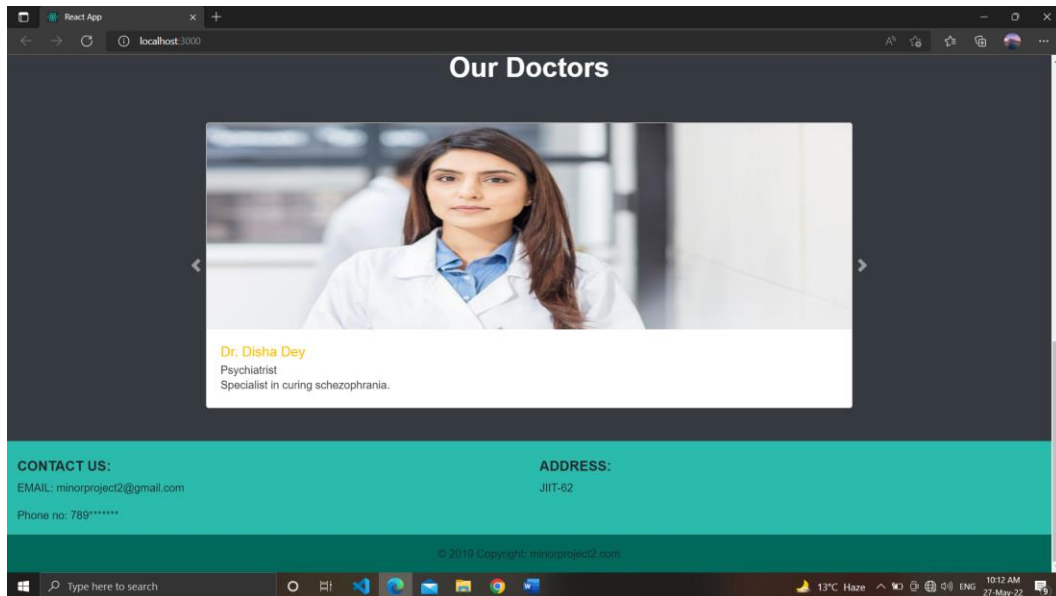
```
}
String readRFID() {
  rfid.PICC_ReadCardSerial();
  String  uidString = String(rfid.uid.uidByte[0]) + " " +
String(rfid.uid.uidByte[1]) + " " +
  String(rfid.uid.uidByte[2]) + " " + String(rfid.uid.uidByte[3]);
  return uidString;
  delay(2000);
}
```

Sample Screenshots
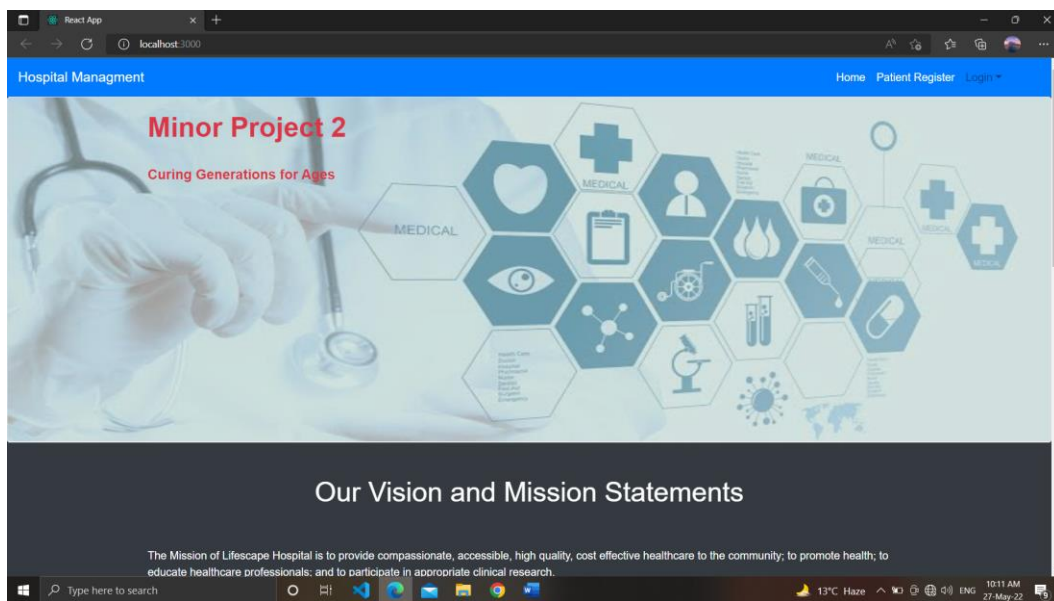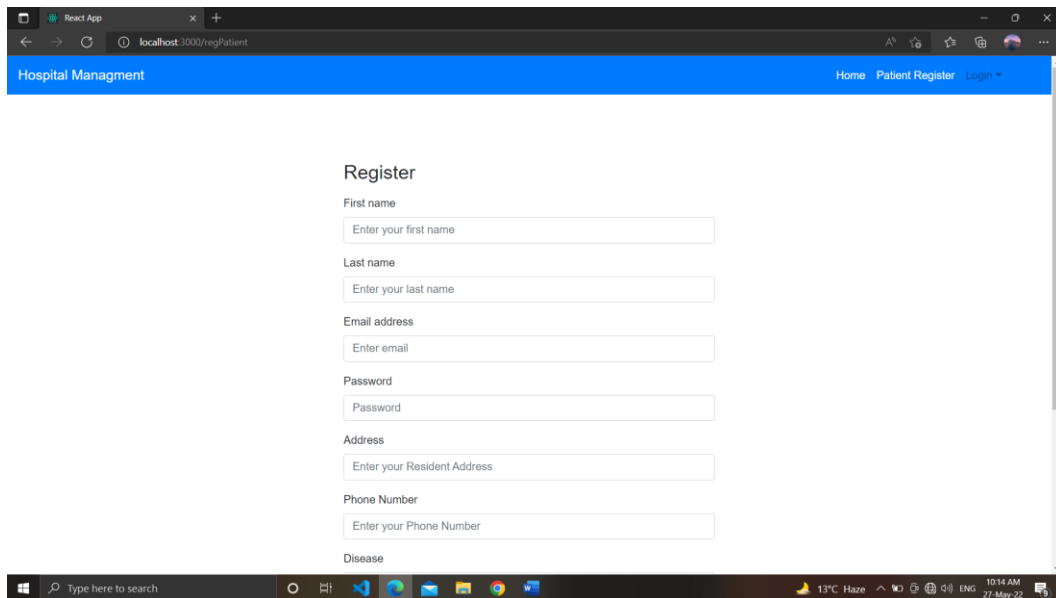
ii) PARKING SYSTEM
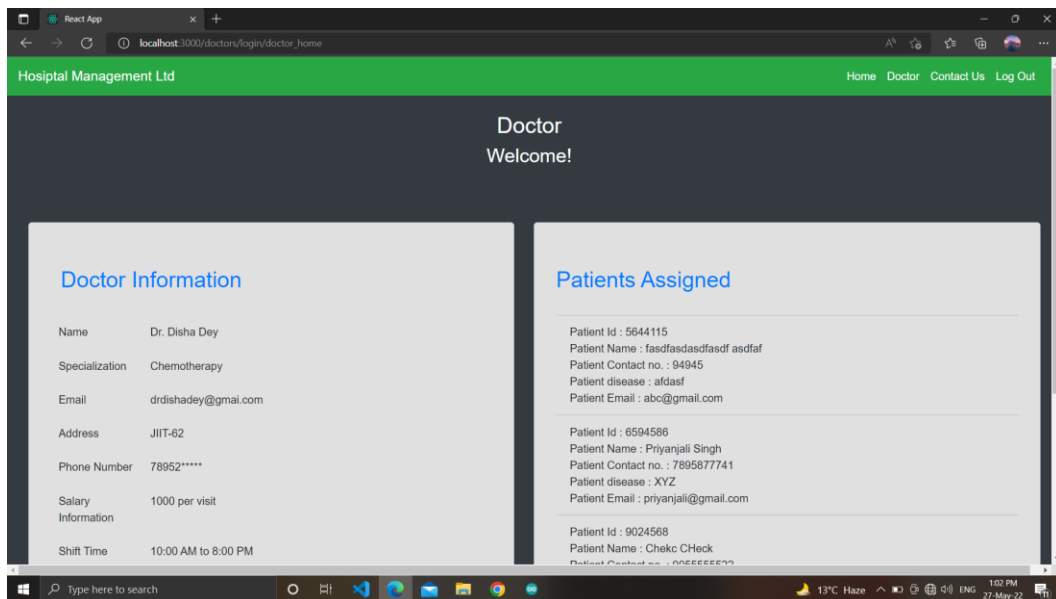
Parking System using PHP and MySQL

We use PHP and MySQL database. This keeps records of the vehicle [6] which is going to park in the parking area. This has one module i.e., admin.

1. Dashboard: admin can briefly view the number of vehicle entries in a particular period.

2. Category: admin can manage category (add/update).

3. Add Vehicle: admin add vehicle which is going to park.

4. Manage Vehicle: admin can manage incoming and outgoing vehicle and admin can also add parking charges and his/her remarks.

5. Reports: admin can generate vehicle entries reports between two dates.

6. Search: admin can search a particular vehicle by parking number.

Admin can also update his profile, change the password and recover the password.

Code - Arduino

```
#include <SPI.h>
#include <MFRC522.h>
#include "LiquidCrystal.h"
LiquidCrystal lcd(A0, A1, A2, A3, A4, A5);
#define SS_PIN 10
#define RST_PIN 9
#define LED_G 5 //define green LED pin
#define LED_R 4 //define red LED pin
#define BUZZER 2 //buzzer pin
MFRC522 mfrc522(SS_PIN, RST_PIN);  // Create MFRC522 instance.
int count1 = 0;
int count2 = 0;
int count3 = 0;
```

```
void setup()
{
Serial.begin(9600);  // Initiate a serial communication
SPI.begin();    // Initiate SPI bus
mfrc522.PCD_Init();  // Initiate MFRC522
lcd.begin(16,2); // Turn on the blacklight and print a message.
pinMode(LED_G, OUTPUT);
pinMode(LED_R, OUTPUT);
pinMode(BUZZER, OUTPUT);
noTone(BUZZER);
}
void loop()
{
// Look for new cards
if ( ! mfrc522.PICC_IsNewCardPresent())
{
lcd.setCursor(3,0);
lcd.print("SHOW YOUR");
lcd.setCursor(4,1);
lcd.print("ID CARD");
return;
}
else{
lcd.clear();
}
// Select one of the cards
if ( ! mfrc522.PICC_ReadCardSerial())
{
return;
}
//Show UID on serial monitor
Serial.print("UID tag :");
String content= "";
byte letter;
for (byte i = 0; i < mfrc522.uid.size; i++)
{
Serial.print(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " ");
Serial.print(mfrc522.uid.uidByte[i], HEX);
content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " "));
content.concat(String(mfrc522.uid.uidByte[i], HEX));
```

```
}
Serial.println();
content.toUpperCase();
if (content.substring(1) == "FD 40 67 C3") //change here the UID of
the card/cards that you want to give access
{
  if(count1%2 == 0){
    lcd.print("WELCOME");
    lcd.setCursor(0,1);
    lcd.print("MOVE TO SLOT 01");
    digitalWrite(LED_G, HIGH);
    tone(BUZZER, 500);
    delay(300);
    noTone(BUZZER);
    delay(2000);
    digitalWrite(LED_G, LOW);
    lcd.clear();
    count1++;
  }
  else if(count1%2 == 1)
  {
    lcd.print("THE TOTAL COST IS: ");
    lcd.setCursor(0,1);
    lcd.print("Rs 100");
    digitalWrite(LED_G, HIGH);
    tone(BUZZER, 500);
    delay(300);
    noTone(BUZZER);
    delay(2000);
    digitalWrite(LED_G, LOW);
    lcd.clear();
    count1++;
  }
}
else if (content.substring(1) == "DD 1E 60 C3") //change here the
UID of the card/cards that you want to give access
{
 if(count2%2 ==0)
 {
    lcd.print("WELCOME");
```

```
      lcd.setCursor(0,1);
      lcd.print("MOVE TO SLOT 02");
      digitalWrite(LED_G, HIGH);
      tone(BUZZER, 500);
      delay(300);
      noTone(BUZZER);
      delay(2000);
      digitalWrite(LED_G, LOW);
      lcd.clear();
      count2++;
 }
else if(count2%2 == 1)
  {
      lcd.print("THE TOTAL COST IS: ");
      lcd.setCursor(0,1);
      lcd.print("Rs 100");
      digitalWrite(LED_G, HIGH);
      tone(BUZZER, 500);
      delay(300);
      noTone(BUZZER);
      delay(2000);
      digitalWrite(LED_G, LOW);
      lcd.clear();
      count2++;
  }
}
else if (content.substring(1) == "9D 5F 75 C3") //change here the
UID of the card/cards that you want to give access
{
  if(count3%2 == 0){
    lcd.print("WELCOME");
    lcd.setCursor(0,1);
    lcd.print("MOVE TO SLOT 03");
    digitalWrite(LED_G, HIGH);
    tone(BUZZER, 500);
    delay(300);
    noTone(BUZZER);
    delay(2000);
    digitalWrite(LED_G, LOW);
    lcd.clear();
```
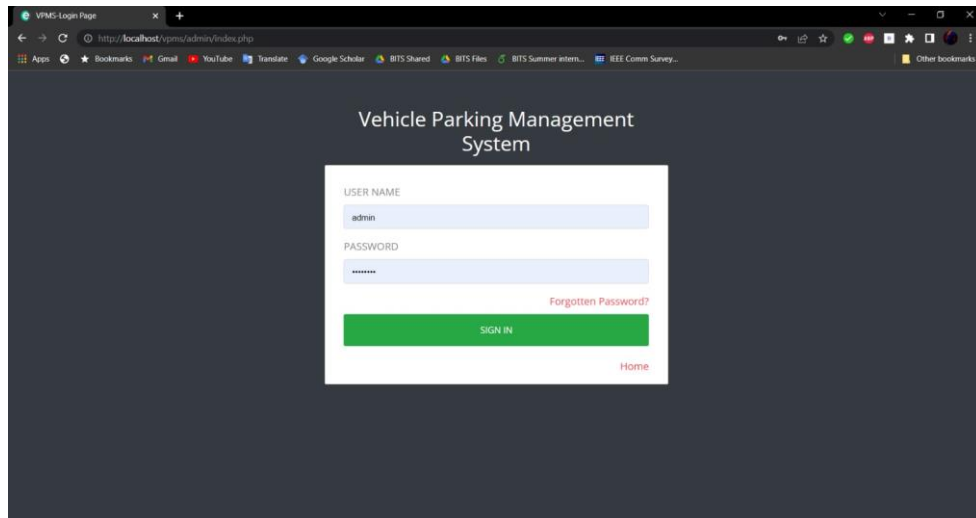
```
      count3++;
  }
else if(count2%2 == 1)
  {
    lcd.print("THE TOTAL COST IS: ");
    lcd.setCursor(0,1);
    lcd.print("Rs 100");
    digitalWrite(LED_G, HIGH);
    tone(BUZZER, 500);
    delay(300);
    noTone(BUZZER);
    delay(2000);
    digitalWrite(LED_G, LOW);
    lcd.clear();
    count3++;
  }
}
else  {
lcd.print("UNAUTHORIZE");
lcd.setCursor(0,1);
lcd.print("ACCESS");
digitalWrite(LED_R, HIGH);
tone(BUZZER, 300);
delay(3000);
digitalWrite(LED_R, LOW);
noTone(BUZZER);
lcd.clear();
}
}
```

Sample Screenshots

CONCLUSION

Since we are entering details of patients and the people entering the hospital electronically in the 'Hospital Management System' and 'Parking System', the data will be secured. Using this application, we can retrieve patient's and the parking history with a single click. Thus, processing and entering information will be faster through this proposed system. It easily reduces the book keeping task and thus reduces the human effort and increases accuracy speed.

Hospital Digitalization via RFID is essential for maintaining the detail about Doctor, Patient, Hospital staff etc. we understand that by using this system the work became very easy and saved a lot of time. This would enable to improve the response time to the demands of patient care because it automates the process of collecting, collating and retrieving patient information. This product will eliminate complexity.

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