NITTE EDUCATION TRUST | NMAM INSTITUTE OF TECHNOLOGY

INTERNET OF THINGS LAB

Report

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SMART CAR PARKING SYSTEM

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In partial fulfillment of the requirements for the award

of the Degree of

Bachelor of Engineering in Information Science and Engineering

from

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(An Autonomous Institution affiliated to VTU, Belagavi)

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CERTIFICATE

*Certified that the project work entitled "**SMART CAR PARKING SYSTEM** " is a bonafide work carried out by **PAVITHRA (4NM21IS102), SANDHYA NAYAK (4NM22IS409), NANDINI P V (4NM2IIS091)** in partial fulfilment of the requirements for the award of Bachelor of Engineering Degree in Information Science and Engineering prescribed by Visvesvaraya Technological University, Belagavi during the year 2023-2024.*

It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library.

The project report has been approved as it satisfies the academic requirements in respect of the project work prescribed for the Bachelor of Engineering Degree.

_____	_____	_____
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Name of the Examiners	**Signature with Date**
1. _____	_____
2. _____	_____

ABSTRACT

The main aim of our project is to develop and implementing IoT- based car parking system. In this project, track of vehicles in the parking slot is done automatically using IR sensor, car allowance inside the car parking area is monitored by ultrasonic sensor and displayed on the blynk. Parking Counting System is known to be a common need for the comfort of visitors which helps to monitor the number of available spaces in the parking facility. The present parking management system is manual which takes time and needs manpower whereas automatic car parking system is used as an alternate for time consuming manual parking system. Intelligent Parking Counting System automatically counts the number of vehicle present in the parking lot. This system aims to address parking congestion challenges in urban areas by providing real-time parking status updates through an IoT platform.

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MOTIVATION

The motivation behind this project stems from the need to optimize parking space utilization and alleviate the challenges posed by parking congestion. Traditional parking management systems often lack the capability to provide real-time information, leading to inefficiencies and frustration among drivers. The IoT-based car parking system aims to enhance user experience and improve overall urban mobility.

Chapter 1

INTRODUCTION:

Due to rapid increase in the vehicles there exists a problem for parking of vehicles. Too many cars, too much of traffic and there is no enough parking area and it leads to traffic congestion and also pollution. This is the situation which is seen most common in the metropolitan cities today. People keep on roaming on roads searching for a parking space to park their vehicles especially at the peak hours of time. So we have a need to maintain the vehicle park management in order to reduce the wastage of time. If we see in the larger cities when we visit the shopping malls or tourist places or any other commercial areas there arises a problem for parking of our vehicle. We have so many methods of parking systems such as using WSN, RFID methods. But the major drawback of those systems is they help us to find the available spaces for parking but not the exact location of those spaces. It can be overcome by using Automatic Car Parking System using IR Sensors. Our proposed system presents an automatic car parking system in which it gives us information on the parking space availability. Drivers take their cars to the entrance of the automatic parking system where all occupants exit the vehicle. From here, the vehicle is moved into parking space and IR sensor detect the movement and displayed number of car which are parked into parking lot. So it’s same for exit, I-R sensor detect the movement on exit gate and display by subtracting.

Chapter 2

DESIGN AND IMPLEMENTATION

2.1 BLOCK DIAGRAM/ CIRCUIT DIAGRAMS

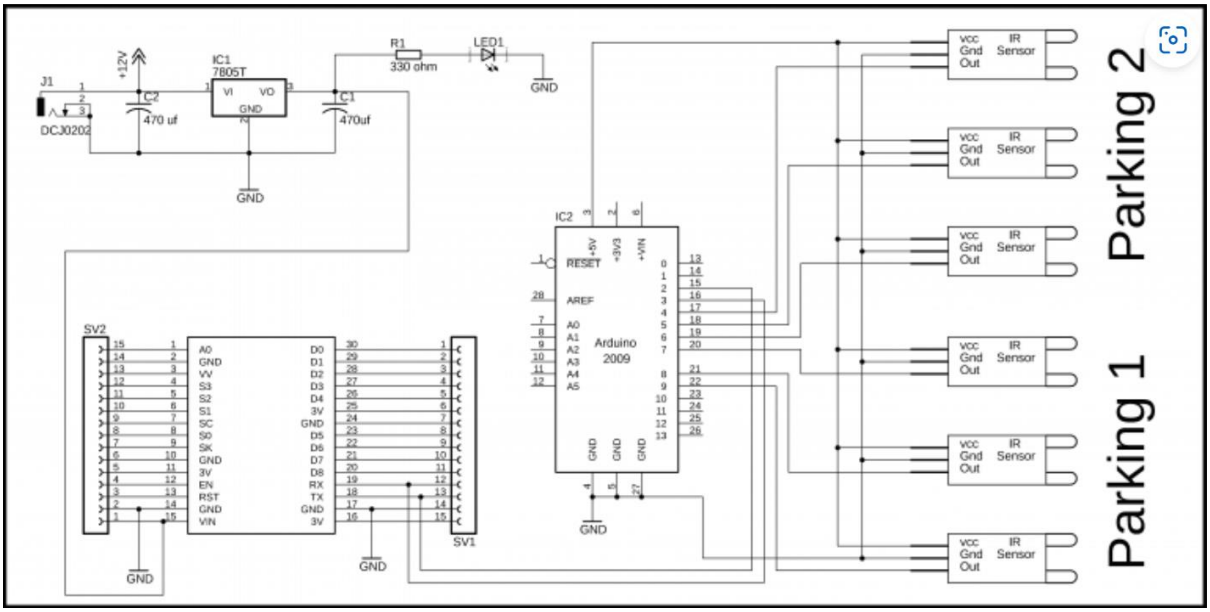

Fig 2.1.1

Iot based car parking slots monitoring system using Arduino, Nodemcu esp8266 wifi module and Blynk application.

The parking Area is divided into two Parkings.

1. Parking 1
2. Parking 2

Each parking has a 3 slots and every slot has one IR sensor. Each sensor used to detect the presence of the Car in the slot. So, when car is parked in the slot the arduino sends command to the Nodemcu esp8266 wifi module, then Nodemcu then sends the command to the Blynk application.

IR Sensor:

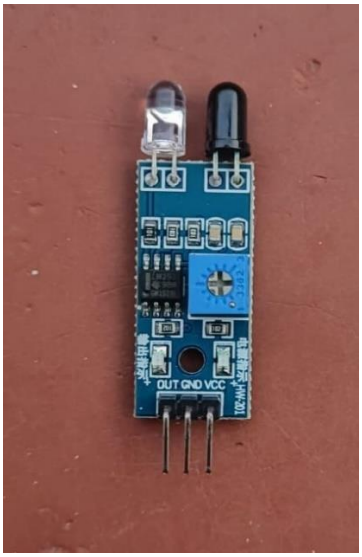

Fig 2.1.2

Nodemcu esp8266 :

Fig 2.1.3

IR sensors which are placed at the entrance and exit of the area to be monitored. IR sensor is an electronic device,that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations. The emitter is simply an I-R LED (Light Emitting Diode).

Car Parking Arduino Programming:

```
#include <SoftwareSerial.h>

SoftwareSerial nodemcu(2,3);

int parking1_slot1_ir_s = 4; // parking slot1 infrared sensor connected with pin number 4 of arduino
int parking1_slot2_ir_s = 5;
int parking1_slot3_ir_s = 6;
```

```
int parking2_slot1_ir_s = 7;
int parking2_slot2_ir_s = 8;
int parking2_slot3_ir_s = 9;

String sensor1;
String sensor2;
String sensor3;
String sensor4;
String sensor5;
String sensor6;

String cdata =""; // complete data, consisting of sensors values

void setup()
{
Serial.begin(9600);
nodemcu.begin(9600);

pinMode(parking1_slot1_ir_s, INPUT);
pinMode(parking1_slot2_ir_s, INPUT);
pinMode(parking1_slot3_ir_s, INPUT);

pinMode(parking2_slot1_ir_s, INPUT);
pinMode(parking2_slot2_ir_s, INPUT);
pinMode(parking2_slot3_ir_s, INPUT);

}

void loop()
{

p1slot1();
p1slot2();
p1slot3();

p2slot1();
p2slot2();
p2slot3();
```

```
cdata = cdata + sensor1 +”,” + sensor2 + “,”+ sensor3 +”,”+ sensor4 + “,” + sensor5 + “,”
+ sensor6 +”,”; // comma will be used a delimeter
Serial.println(cdata);
nodemcu.println(cdata);
delay(6000); // 100 milli seconds
cdata = “”;
digitalWrite(parking1_slot1_ir_s, HIGH);
digitalWrite(parking1_slot2_ir_s, HIGH);
digitalWrite(parking1_slot3_ir_s, HIGH);

digitalWrite(parking2_slot1_ir_s, HIGH);
digitalWrite(parking2_slot2_ir_s, HIGH);
digitalWrite(parking2_slot3_ir_s, HIGH);
}

void p1slot1() // parkng 1 slot1
{
if( digitalRead(parking1_slot1_ir_s) == LOW)
{
sensor1 = “255”;
delay(200);
}
if( digitalRead(parking1_slot1_ir_s) == HIGH)
{
sensor1 = “0”;
delay(200);
}

}

void p1slot2() // parking 1 slot2
{
if( digitalRead(parking1_slot2_ir_s) == LOW)
{
sensor2 = “255”;
delay(200);
}
if( digitalRead(parking1_slot2_ir_s) == HIGH)
{
sensor2 = “0”;
```

```
delay(200);
}
}

void p1slot3() // parking 1 slot3
{
if( digitalRead(parking1_slot3_ir_s) == LOW)
{
sensor3 = “255”;
delay(200);
}
if( digitalRead(parking1_slot3_ir_s) == HIGH)
{
sensor3 = “0”;
delay(200);
}
}

// now for parking 2

void p2slot1() // parking 1 slot3
{
if( digitalRead(parking2_slot1_ir_s) == LOW)
{
sensor4 = “255”;
delay(200);
}
if( digitalRead(parking2_slot1_ir_s) == HIGH)
{
sensor4 = “0”;
delay(200);
}
}

void p2slot2() // parking 1 slot3
{
if( digitalRead(parking2_slot2_ir_s) == LOW)
{
sensor5 = “255”;
delay(200);
```

```
}
if( digitalRead(parking2_slot2_ir_s) == HIGH)
{
sensor5 = “0”;
delay(200);
}
}

void p2slot3() // parking 1 slot3
{
if( digitalRead(parking2_slot3_ir_s) == LOW)
{
sensor6 = “255”;
delay(200);
}
if( digitalRead(parking2_slot3_ir_s) == HIGH)
{
sensor6 = “0”;
delay(200);
}
}
```

Nodemcu esp8266 wifi module Programming of IoT based car parking:

```
#define BLYNK_PRINT Serial

#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#include <SoftwareSerial.h>
#include <SimpleTimer.h>

char auth[] = “ac173b0527c94a91a6cde0dcdfe6bdef”;

// Your WiFi credentials.
// Set password to “” for open networks.
char ssid[] = “ZONG MBB-E8231-6E63”;
char pass[] = “08659650”;

SimpleTimer timer;

String myString; // complete message from arduino, which consistors of snesors data
```

```
char rdata; // received charactors

int firstVal, secondVal,thirdVal; // sensors
int led1,led2,led3,led4,led5,led6;
// This function sends Arduino's up time every second to Virtual Pin (1).
// In the app, Widget's reading frequency should be set to PUSH. This means
// that you define how often to send data to Blynk App.
void myTimerEvent()
{
// You can send any value at any time.
// Please don't send more that 10 values per second.
Blynk.virtualWrite(V1, millis() / 1000);

}

void setup()
{
// Debug console
Serial.begin(9600);

Blynk.begin(auth, ssid, pass);

timer.setInterval(1000L,sensorvalue1);
timer.setInterval(1000L,sensorvalue2);
timer.setInterval(1000L,sensorvalue3);
timer.setInterval(1000L,sensorvalue4);
timer.setInterval(1000L,sensorvalue5);
timer.setInterval(1000L,sensorvalue6);

}

void loop()
{
if (Serial.available() == 0 )
{
Blynk.run();
timer.run(); // Initiates BlynkTimer
}

if (Serial.available() > 0 )
```

```
{
rdata = Serial.read();
myString = myString+ rdata;
// Serial.print(rdata);
if( rdata == '\n')
{
Serial.println(myString);
// Serial.println("fahad");
// new code
String l = getValue(myString, ',', 0);
String m = getValue(myString, ',', 1);
String n = getValue(myString, ',', 2);
String o = getValue(myString, ',', 3);
String p = getValue(myString, ',', 4);
String q = getValue(myString, ',', 5);

// these leds represents the leds used in Blynk application
led1 = l.toInt();
led2 = m.toInt();
led3 = n.toInt();
led4 = o.toInt();
led5 = p.toInt();
led6 = q.toInt();

myString = "";
// end new code
}
}

}

void sensorvalue1()
{
int sdata = led1;
// You can send any value at any time.
// Please don't send more that 10 values per second.
Blynk.virtualWrite(V10, sdata);

}
void sensorvalue2()
```

```
{
int sdata = led2;
// You can send any value at any time.
// Please don't send more that 10 values per second.
Blynk.virtualWrite(V11, sdata);

}

void sensorvalue3()
{
int sdata = led3;
// You can send any value at any time.
// Please don't send more that 10 values per second.
Blynk.virtualWrite(V12, sdata);

}

void sensorvalue4()
{
int sdata = led4;
// You can send any value at any time.
// Please don't send more that 10 values per second.
Blynk.virtualWrite(V13, sdata);

}

void sensorvalue5()
{
int sdata = led5;
// You can send any value at any time.
// Please don't send more that 10 values per second.
Blynk.virtualWrite(V14, sdata);

}

void sensorvalue6()
{
int sdata = led6;
// You can send any value at any time.
// Please don't send more that 10 values per second.
```

```
Blynk.virtualWrite(V15, sdata);

}

String getValue(String data, char separator, int index)
{
int found = 0;
int strIndex[] = { 0, -1 };
int maxIndex = data.length() – 1;

for (int i = 0; i <= maxIndex && found <= index; i++) {
if (data.charAt(i) == separator || i == maxIndex) {
found++;
strIndex[0] = strIndex[1] + 1;
strIndex[1] = (i == maxIndex) ? i+1 : i;
}
}
return found > index ? data.substring(strIndex[0], strIndex[1]) : “
```

Result snapshots:

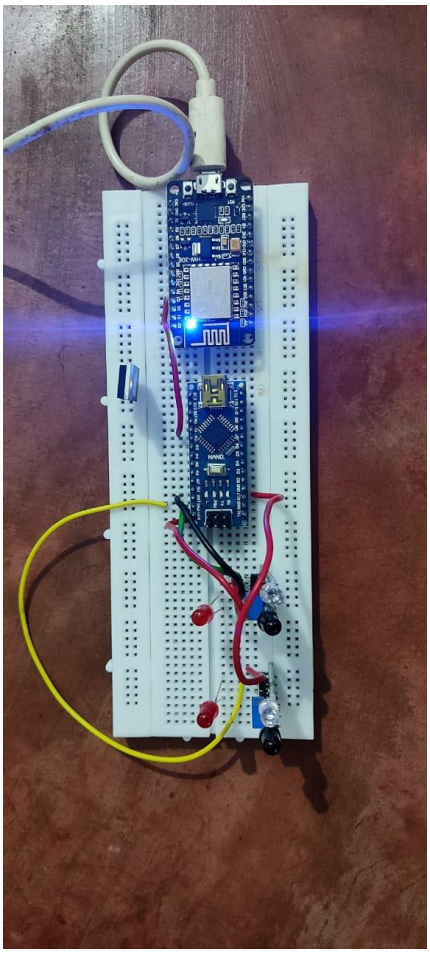

Fig 3.1.1

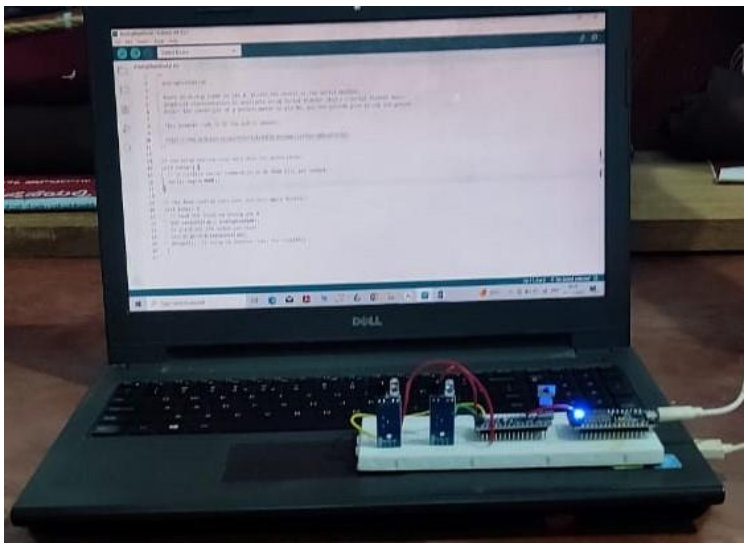

Fig 3.1.2

Chapter 4

CONCLUSION

The IoT-based car parking system presented in this project represents a significant step towards addressing the challenges associated with parking congestion in urban areas. BY providing real-time information about parking space availability, the system contributes to more efficient space utilization and improved traffic flow. The integration of IoT technologies offers a scalable and adaptable solution for modernizing urban parking management, enhancing the overall quality of urban life.

This project not only showcases the technical feasibility of an IoT-based car parking system but also highlights its potential to positively impact urban mobility and transform the parking experience for both drivers and city planners. Further research and development in this area can lead to the widespread adoption of smart parking solutions, contributing to smarter and more sustainable urban environments.

REFERENCES

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2. IC4093: https://www.ourpcb.com/ic-4093.html
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