A Project Report

on

AUTOMATIC CAR PARKING SYSTEM

Submitted for the partial fulfilment of the requirement

for the award of the Degree of

B.TECH.

In

CSE-IOT

by

HARITA AANCHAL

&

SIDDHARTH SHANKAR MITTAL

Under the Guidance of

Mr. ROCHAK SHARMA

DIT UNIVERSITY, DEHRADUN

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DECLARATION

This is to certify that the Project entitled "***SMART CAR PARKING SYSTEM***" in partial fulfillment of the requirement for the award of the **Degree of *B.TECH*.** in ***CSE-IOT*** submitted to **DIT University, Dehradun, Uttarakhand, India,** is an authentic record of bonafide work carried out by us, under the guidance of ***MR.ROCHAK SHARMA***. The matter embodied in this Project/Thesis/Dissertation has not been submitted for the award of any other degree or diploma to any University/Institution.

Students Name & Signature:

1.HARITA AANCHAL

…….

2.SIDDHARTH SHANKAR MITTAL

……..

Supervisor Name & Signature:

MR. ROCHAK SHARMA

……..

Head of Department

Dr. VISHAL BHARTI

……

Date:

Place: Dehradun

CERTIFICATE

This is to certify that the Project entitled " ***SMART CAR PARKING SYSTEM***" in partial fulfilment of the requirement for the award of the **Degree *B.TECH.*** in ***CSE-IOT*** submitted to **DIT University, Dehradun, Uttarakhand, India,** is an authentic record of bonafide research work carried out by ***MS. HARITA AANCHAL & MR.SIDDHARTH SHANKAR MITTAL*** Roll No ***170112019 & 170112017*** under my supervision/guidance.

Signature and Name of

Supervisor/Guide

MR. ROCHAK SHARMA

Date:

Place: Dehradun

ACKNOWLEDGEMENT

We would like to express our special thanks of gratitude to our IOT teacher "***Mr. ROCHAK SHARMA***" for his able guidance and support in completing our project.

We would also like to extend our gratitude to the HOD sir "***Dr. VISHAL BHARTI***" for providing me with all the facility that was required.

HARITA AANCHAL

&

SIDDHARTH SHANKAR MITTAL

Date:

Place: Dehradun

ABSTRACT

The main aim of this project is to reduce the traffic in the parking place. Normally we can see in the multiplexes, cinema halls, large industries, and function halls there is problem they have to go and search which line is empty and which line having place to park the vehicle, for parking then they need workers for parking in correct position,it is the money consumed process. So to avoid this problem **Smart Car Parking System** project is implemented.

In this IOT based project we have to use the equipments of microcontroller, Infrared transmitters and infrared receivers for each and every parking slot, IR receivers should be connect to the microcontroller. Here we are using infrared communication because it can support LOS (line of sight communication), and while entering into gate for parking, the gate gets opened automatically as soon as the vehicle reaches near the gate and then there is the display to get the information regarding which line is empty. This information gives the microcontroller. The microcontroller first give the information to the IR transmitter then it gives to the IR receiver then this information show on the display, so by this process the parking is easy process. So the traffic can be reduced in the parking place of the theatres, multiplex, and in large industries and in commercial places.

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CHAPTER-1

INTRODUCTION

1.1 PURPOSE

1.1.1 To overcome the Parking Lot Problems

A. Difficulty in Finding Vacant Spaces

Quickly finding a vacant space in a multilevel parking lot is difficult if not impossible, especially on weekends or public holidays. Finding spaces during weekends or public holidays can take more than 10 minutes for about 66% of visitors. Stadiums or shopping malls are crowded at peak periods, and difficulty in finding vacant slots at these places is a major problem for customers. Insufficient car park spaces lead to traffic congestion and driver frustration.

B. Improper Parking

If a car is parked in such a way that it occupies two parking slots rather than one, this is called improper parking .Improper parking can happen when a driver is not careful about another driver's rights. This is tackled by the development of automated smart car parking system.

1.2 OBJECTIVE

A. To develop an intelligent, user friendly automated car parking system which reduces the manpower and traffic congestion.

B. To offer safe and secure parking slots within limited area.

1.3 MOTIVATION

A. Optimized parking

Users find the best spot available, saving time, resources and effort. The parking lot fills up efficiently and space can be utilized properly by commercial and corporate entities.

B. Reduced traffic

Traffic flow increases as fewer cars are required to drive around in search of an open parking space.

C. Reduced pollution

Searching for parking burns around one million barrels of oil a day. An optimal parking solution will significantly decrease driving time, thus lowering the amount of daily vehicle emissions and ultimately reducing the global environmental footprint.

D. Enhanced User Experience

A smart parking solution will integrate the entire user experience into a unified action. Driver's payment, spot identification, location search and time notifications all seamlessly become part of the destination arrival process.

E. New Revenue Streams

Many new revenue streams are possible with smart parking technology. For example, lot owners can enable tiered payment options dependent on parking space location. Also, reward programs can be integrated into existing models to encourage repeat users.

F. Increased Safety

Parking lot employees and security guards contain real-time lot data that can help prevent parking violations and suspicious activity. License plate recognition cameras can gather pertinent footage. Also, decreased spot- searching traffic on the streets can reduce accidents caused by the distraction of searching for parking.

G. Real-Time Data and Trend Insight

Over time, a smart parking solution can produce data that uncovers correlations and trends of users and lots. These trends can prove to be invaluable to lot owners as to how to make adjustments and improvements to drivers.

H. Decreased Management Costs

More automation and less manual activity saves on labor cost and resource exhaustion.

1.4 DEFINITIONS AND OVERVIEW

Seeking a vacant parking space during peak hours in areas like Hospitals, Hotels & Shopping Centers, Airports, Universities, and Exhibitions & Convention Center has always been frustrating for many drivers. Surveys says that traffic generated by cars searching for vacancies in Parking Spaces is up to 40% of the total traffic . Now that is a serious issue to look after, and Smart Parking System is one of the best available solutions to at least reduce the traffic congestion caused due to the above problem. This system gives information about the occupancy status of the spaces in the parking lot equipped with sensors that detect the presence of vehicles. Smart Parking is an Internet of Things (IoT) based system, used to detect the available parking slots. This system uses infrared sensor to detect the presence of a vehicle (whether the parking slot is

occupied or not). Based on the parking slot occupancy, the status (occupied/unoccupied) is displayed on the lcd . In real time, the environment have sensors and devices embedded into parking spaces, transmitting data on the occupancy status; and the vehicle drivers can search for parking availability on the lcd. Hence the driver would know where there is an available spot to park his vehicle in less time, reducing the energy consumption and air pollution.

Figure 1.1 Project Architecture

CHAPTER-2

OVERALL DESCRIPTION

2.1 PROJECT PERSPECTIVE

The perspective is to implement the 3-D view of the system to a 2-D project to make the understanding more clear. Before implementing in real life we can have an idea of how it is going to look like which will help in knowing what problems we may face while implementing in the real life.

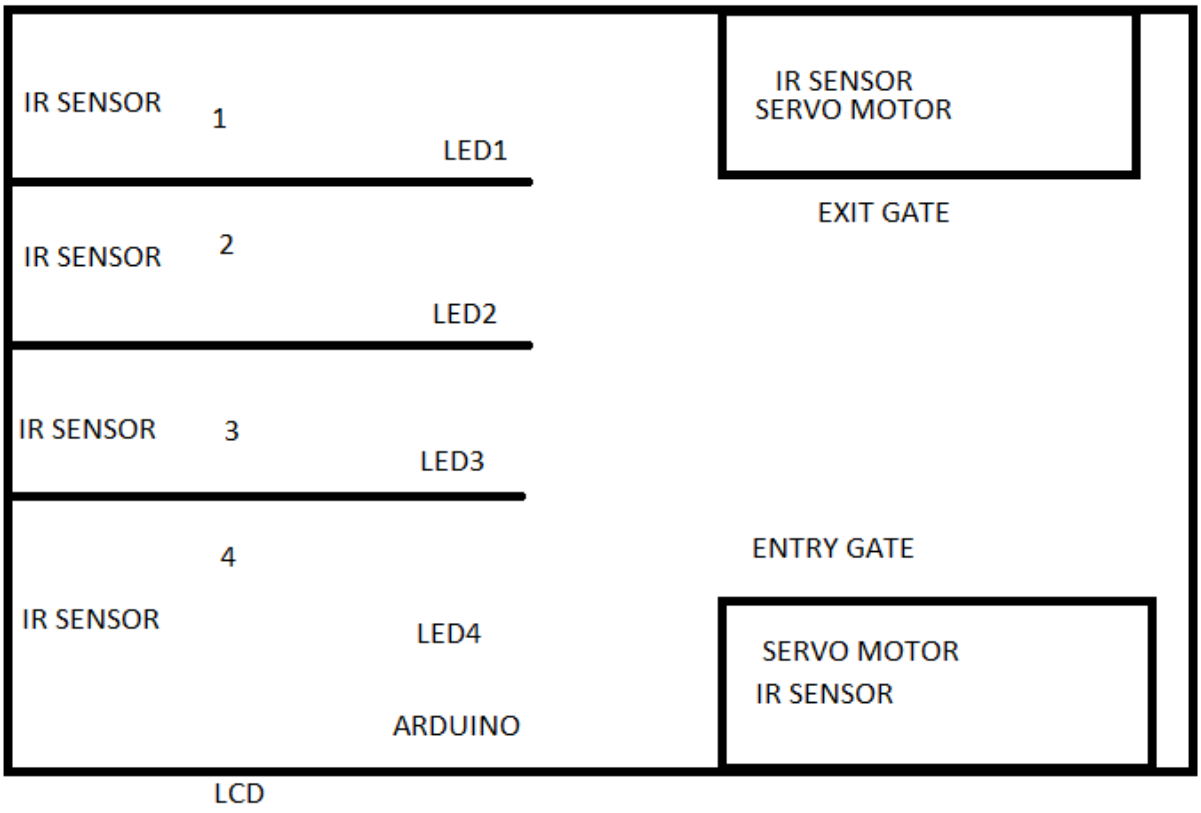

Figure 2.1 2-D view of the project

2.2 PROJECT FUNCTIONS

A. Automatic entry gate.

B. Displaying parking status on lcd.

C. free slots are easily visible by glowing an LED in these slots.

D. Automatic exit gate.

2.3 CONSTRAINTS AND ASSUMPTIONS:-

2.3.1 CONSTRAINTS

A. There is a greater construction cost per space.

B. It may be a bit confusing for unfamiliar users.

C. There may be a fear breakdown of connections.

D. Power supply issues.

2.3.2 ASSUMPTIONS

A. We have shown only 3 parking slots in the project.

B. The code has been designed for 3 slots only.

C. The range of sensors used is less because we are showing it in a small area.

CHAPTER 3

EXTERNAL INTERFACE REQUIREMENTS

3.1 USER INTERFACE

In particular there is only one interface provided for one way communication of the user and the system that is the lcd display that displays all the necessary details required for parking in the parking area in which we get to know about the available or empty parking area also since the parking system is automated there is no such user interface made .

3.2 HARDWARE INTERFACE

1. Arduino uno

Figure 3.1 Arduino Uno

2. Infrared sensor

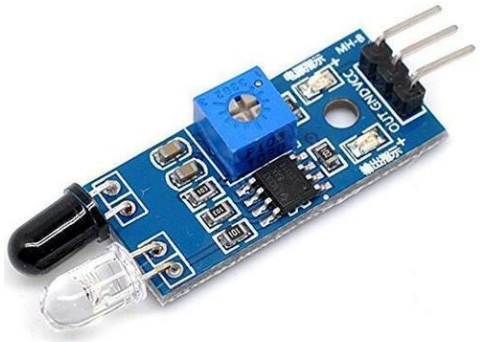

Figure 3.2 Infrared sensor

3. Jumper wires

Figure 3.3 Jumper Wires

4. Servo motor

Figure 3.4 Servo Motor

5. Connections and pin diagrams

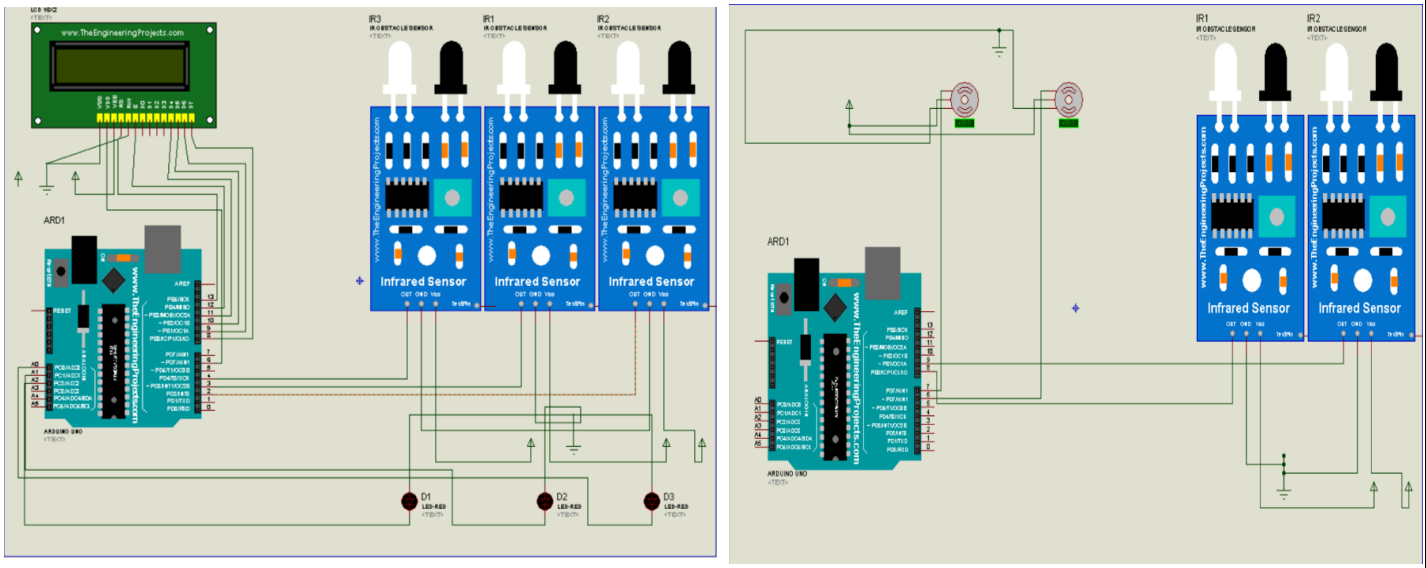

Figure 3.5 Connections And Pin Diagrams

6. Dotted PCB Development Board

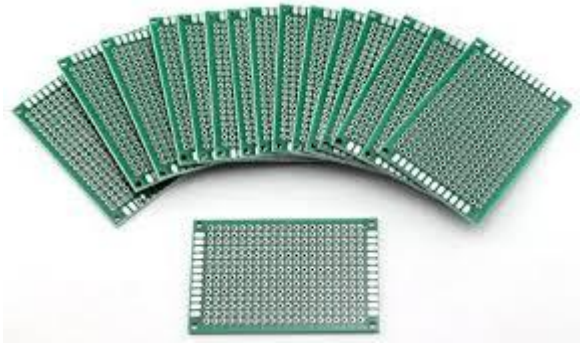

Figure 3.6 Dotted PCB Development Board

7. Soldering Iron

Figure 3.7 Soldering Iron

3.3 SOFTWARE INTERFACE

- ARDUINO IDE
- PROTEUS

CHAPTER 4

SYSTEM FEATURES

SYSTEM FEATURE 1:-

Automated entry and exit gates:-

The parking entry and exit gates are made automated so whenever any vehicle comes in the parking area in the entry gate the gate opens automatically if and only if the parking area is free if there is no parking area left for parking the entry gate does not opens also if someone tries to come through the exit gate there is no possibility for the exit gate to open.

SYSTEM FEATURE 2:-

Free slots are easily visible:-

The parking area that are vacant are shown by glowing the led placed on them also as soon as the parking area get filled the led stops glowing giving a signal that the parking area is not vacant.

SYSTEM FEATURE 3:-

Displaying the parking status:-

The parking status is displayed in the LCD or liquid crystal display which can be found at the entry gate that tells about if there is any vacant parking area, is the parking slot full, is it empty, which parking area is free.

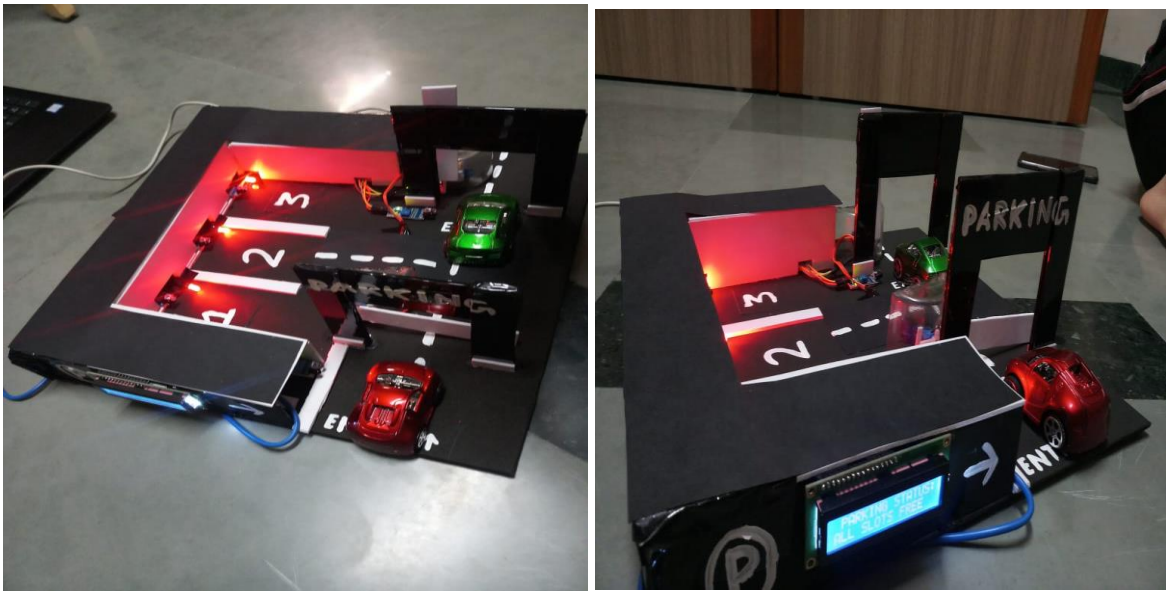

Figure 4.1 Final Image

CHAPTER-5

OTHER NON-FUNCTIONAL REQUIREMENTS

5.1 PERFORMANCE REQUIREMENTS

Cars should come near the gate one by one .

If more than one car come at once the system might get confused, a care needs to be taken during designing that if more than 1 car comes at the entry gate at a time then the door should get opened and closed properly. It should not collide with the vehicle.

Proper power supply is needed.

5.2 SAFETY REQUIREMENTS

The wires and sensors used should be properly designed.

The manufacturing of wires should be done in a way that it doesn't get broken or melted easily.

The sensors should be designed properly.

5.3 SECURITY REQUIREMENTS

The cars should follow the designed path(on the floor) exactly, otherwise it may collide with the sensors or something and the system may get damaged.

5.4 SOFTWARE QUALITY ATTRIBUTES

The software should support all the basic coding methods.

The proteus and Arduino ide should have all the libraries installed.

CHAPTER 6

CODE

6.1 CODE FOR GATE

```
#include <Servo.h>
Servo myservo1,myservo2;
#define l4 8
#define l5 9
int pos1=0;
int pos2=0;
void setup()
{
myservo1.attach(7);
myservo2.attach(6);
pinMode(l4,INPUT);
pinMode(l5,INPUT);
}
int count=0;
void loop()
{
 // entry
 if(count<=3)
 {
 if(digitalRead(l4)==LOW)
 {
   gateentry();
```

```
    count++;
   }
   }
   //exit
   if(digitalRead(l5)==LOW)
   {
    gateexit();
    count--;
   }
}
void gateentry()
{
    for (pos1 = 0; pos1 <= 90; pos1 += 1)
    {
    myservo1.write(pos1);
    delay(15);
    }
    while(digitalRead(l4)!=HIGH);
    delay(2000);
    for (pos1 = 90; pos1 >= 0; pos1 -= 1)
    {
    myservo1.write(pos1);
    delay(15);
    }
}
void gateexit()
```

```
{
  for (pos2 = 0; pos2 <= 90; pos2 += 1)
   {
   myservo2.write(pos2);
   delay(15);
   }
   while(digitalRead(l5)!=HIGH);
   delay(2000);
   for (pos2 = 90; pos2 >= 0; pos2 -= 1)
   {
   myservo2.write(pos2);
   delay(15);
   }
}
```

6.2 CODE FOR SENSORS

```
#include<LiquidCrystal.h>
LiquidCrystal lcd(13,12,11,10,9,8);
#define l1 2
#define l2 3
#define l3 4
int pos1 = 0;
int pos2 = 0;
int pos3 = 0;
//LED A1 AT PIN A0
//LED A2 AT PIN A1
//LED A3 AT PIN A2
```

```
void setup()
{
pinMode(l1,INPUT);
pinMode(l2,INPUT);
pinMode(l3,INPUT);
analogWrite(6,20);
lcd.begin(16,2);
}
void loop()
{
     int count;
     count=pos1+pos2+pos3;
  if(count<=3)
  {
   if(digitalRead(l1)==HIGH)
   {
    analogWrite(A2,140);
    pos1=0;
   }
   else
   {
    analogWrite(A2,0);
    pos1=1;
   }
   if(digitalRead(l2)==HIGH)
   {
```

```
  analogWrite(A0,140);
  pos2=0;
 }
 else
 {
  analogWrite(A0,0);
  pos2=1;
 }
 if(digitalRead(l3)==HIGH)
 {
  analogWrite(A1,140);
  pos3=0;
 }
 else
 {
  analogWrite(A1,0);
  pos3=1;
 }
}
else{
}
  lcd.setCursor(1,0);
  lcd.print("PARKING STATUS:");
  lcd.setCursor(0,1);
  if(count==3)
  {
```

```
 lcd.print("SORRRY BUT FULLL");
}
if(count==2)
{
 if(pos1==0)
   lcd.print("HURRAY 1 FREEE");
 if(pos2==0)
   lcd.print("HURRAY 2 FREEE");
 if(pos3==0)
   lcd.print("HURRAY 3 FREEE");
}
if(count==1)
{
 if(pos1==0&&pos2==0)
 lcd.print("HURRAY 1,2 FREEE");
 if(pos1==0&&pos3==0)
 lcd.print("HURRAY 1,3 FREEE");
 if(pos3==0&&pos2==0)
 lcd.print("HURRAY 2,3 FREEE");
}
if(count==0)
{
 lcd.print("ALL SLOTS FREE");
}
}
```

CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.1 CONCLUSION

Due to advancement in technology, drivers are demanding easier and less time-consuming parking facilities. There are various methodologies of smart parking that have been implemented to provided better services to the end users and improve the overall management of the existing parking system. The real time monitoring of available parking lots using sensors and then self allotment of parking if there are any vacant parking space is one of the methods of smart parking. After analyzing the different solutions, it is observed that there are some drawbacks of each system like excessive use of expensive sensor modules, difficulty in sensing accurate parking availability data due to speed constraints of the vehicle, use of certain modules like Bluetooth that function efficiently only for short distance, inefficient user authentication techniques and centralized management of the database of parking areas in different regions. These drawbacks need to be eliminated to enhance the overall performance of the system.

7.2 FUTURE SCOPE

The future of the smart parking is expected to be significantly influenced by the arrival of automated vehicles. Several cities around the world are already beginning to trial self-parking vehicles, specialized automated vehicles parking lots, and robotic parking valets.

For example, in Boulder, Colorado, Parkplus is working on deploying a fully automated parking garage in the Western United States through Boulder's PearlWest mixed-use development. The company's automated parking system uses lasers to scan cars and a robotic valet to park the vehicles. Vehicles are transported by a robotic dolly that lifts and transfers them to storage racks. Using this system, up to 4 times as many cars can be parked in the same amount of space as a traditional garage (since there is no need for extra space in between cars). The automated system is expected to deliver vehicles within 3-5 minutes of a retrieval request.

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