SMART CAR PARKING SYSTEM USING ARDUINO AND IR SENSORS

A PROJECT REPORT

Submitted by

LATHIKA P (2116210701131)
MADHUMTHA S (2116210701142)

in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

RAJALAKSHMI ENGINEERING COLLEGE

ANNA UNIVERSITY, CHENNAI

MAY 2024

RAJALAKSHMI ENGINEERING COLLEGE, CHENNAI

BONAFIDE CERTIFICATE

Certified that this Thesis titled **"SMART CAR PARKING SYSTEM USING ARDUINO AND IR SENSORS**" is the bonafide work of "**LATHIKA P (2116210701131), MADHUMITHA S (2116210701142)"** who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

SIGNATURE

Mr. Gunasekaran M.Tech

PROJECT COORDINATOR

Professor

Department of Computer Science and Engineering

Rajalakshmi Engineering College

Chennai - 602 105

Submitted to Project Viva-Voce Examination held on_____

Internal Examiner **External Examiner**

ABSTRACT

Moving towards the development of smart cities, various smart applications like smart home automation , healthcare , industrial automation , etc. are part of it. With the advent of Embedded Systems , these concepts are readily achievable . A major challenge for modern cities is how to maximize the productivity and reliability of urban infrastructure , such as minimizing road congestion by making better use of limited car parking facilities that are available . The main aim is to create a completely automated car parking system with minimal human interference . Normally we could see in the multiplexes , cinema theaters , large industries and convention halls , that people have to go in search of available parking slot to park their vehicle and if parking needs workers , it's money consuming process . Hence , to avoid this problem , "Smart Car Parking System " project is implemented . In this project , the expected mechanism is executed by using Arduino UNO R3 and IR sensors that will help us deliver a safe and efficient way of automated parking technology . Hence , the main motto is to provide a completely safe and automated experience that is robust and hopefully can be implemented in real time and as a general norm for parking system in the future .

1. INTRODUCTION

A parking management system refers to the innovative technologies providing solutions in the parking industry . The core idea behind any parking management system is self – explanatory . Parking Management solutions include innovative technology that solves problems within the parking industry . Parking Managers are gradually migrating from a hardware focus to a digital focus . It's a system that helps people , companies , and organizations to manage their parking spaces . Managing car parks isn't an easy task for companies and organizations because there are lots of moving parts including traffic and the availability of spaces . It is a time – consuming task , requires human labor , and is inefficient . Using a parking management system can help reduce a business's administrative overhead on parking and reduce the impact of their parking space on their local community . Parking software is used at educational institutions , municipalities , offices , businesses , and corporate organizations .

2. PROJECT WORK

TITLE OF THE PROJECT :

SMART CAR PARKING SYSTEM USING ARDUINO AND IR SENSORS

COMPONENTS USED IN THE PROJECT :

- ARDUINO UNO N3
- IR SENSORS
- BREAD BOARD
- ARDUINO IDE
- USB CABLE
- JUMPER WIRES

ARDUINO UNO :

- The Arduino Uno is based on the ATmega328P microcontroller.
- It has 14 digital input/output pins (of which 6 can be used as PWM outputs).
- There are 6 analog input pins.
- The microcontroller runs at 16 MHz
- It has 32 KB of flash memory for storing your program.
- Recommended input voltage is 7-12V, but it can operate within a range of 6-20V.

IR SENSORS :

● Infrared (IR) sensors are commonly used in electronics to detect the presence or absence of objects by measuring the infrared radiation emitted or reflected by the object.

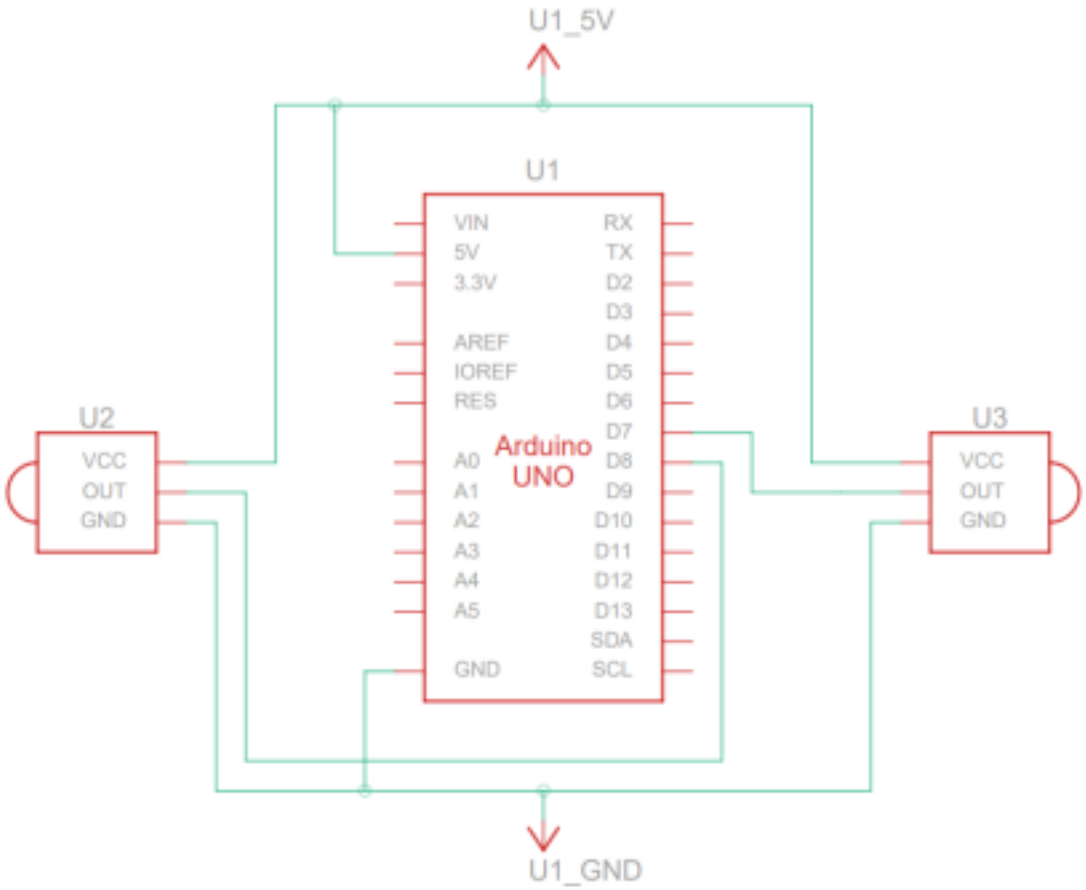
● These sensors find applications in a wide range of projects, including proximity sensing, object detection, etc.

ARDUINO IDE :

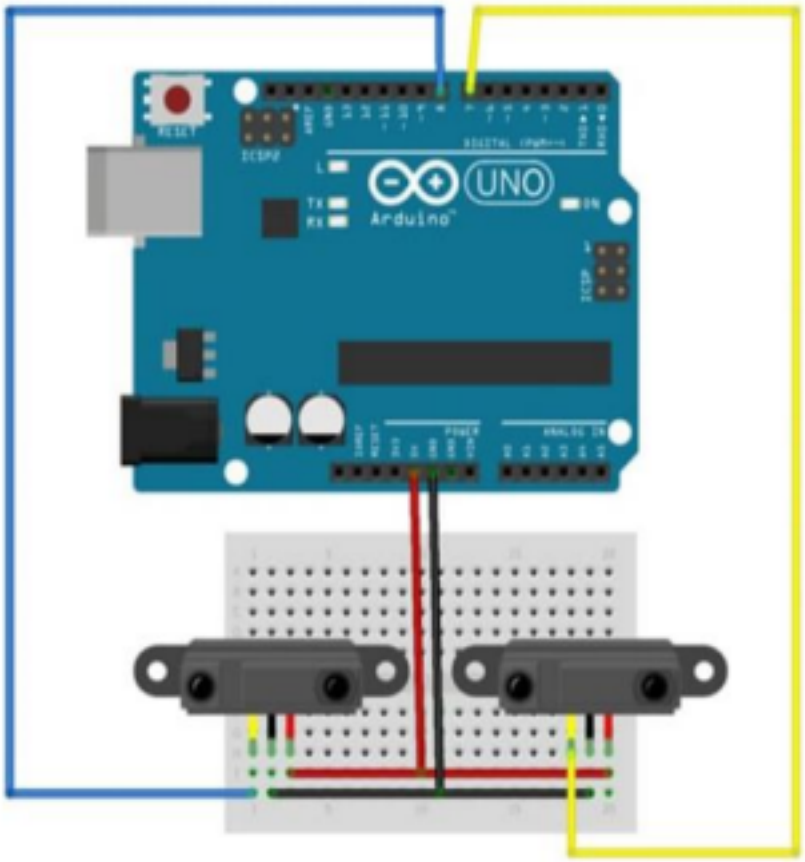
- The Arduino IDE (Integrated Development Environment) is a software application that provides a platform for writing, compiling, and uploading code to Arduino boards.
- It is designed to simplify the process of programming Arduino microcontrollers and is suitable for both beginners and experienced developers.

CIRCUIT DIAGRAM OF THE PROJECT :

The following diagram is the block diagram of the project :



The following picture shows how the circuit looks like (using tinker cad):



PROJECT CODE :

```
int irPin1=7;
int irPin2=8;
int count=0;
boolean state1 = true;
boolean state2 = true;
boolean outsideIr=false;
int i=1;

void setup() {
Serial.begin(9600);
pinMode(irPin1, INPUT);
pinMode(irPin2, INPUT);
}
void loop() {
```

```
if (!digitalRead(irPin1) && i==1 && state1){
outsideIr=true;
delay(100);
i++;
state1 = false;
}
   else if (!digitalRead(irPin2) && i==2 && state2){
Serial.println("Entering inside");
outsideIr=true;
delay(100);
i = 1 ;
count++;
     Serial.print("No. of cars inside: ");
Serial.println(count);
state2 = false;
}
else if (!digitalRead(irPin2) && i==1 && state2 ){  outsideIr=true;
delay(100);
i = 2 ;
state2 = false;
}
  else if (!digitalRead(irPin1) && i==2 && state1 ){
Serial.println("Exiting");
outsideIr=true;
delay(100);
count--;
     Serial.print("No. of cars inside : ");
Serial.println(count);
i = 1;
state1 = false;
}
if (digitalRead(irPin1)){
state1 = true;
}
if (digitalRead(irPin2)){
state2 = true; }  }
```

EXPLANATION ON THE PROJECT :

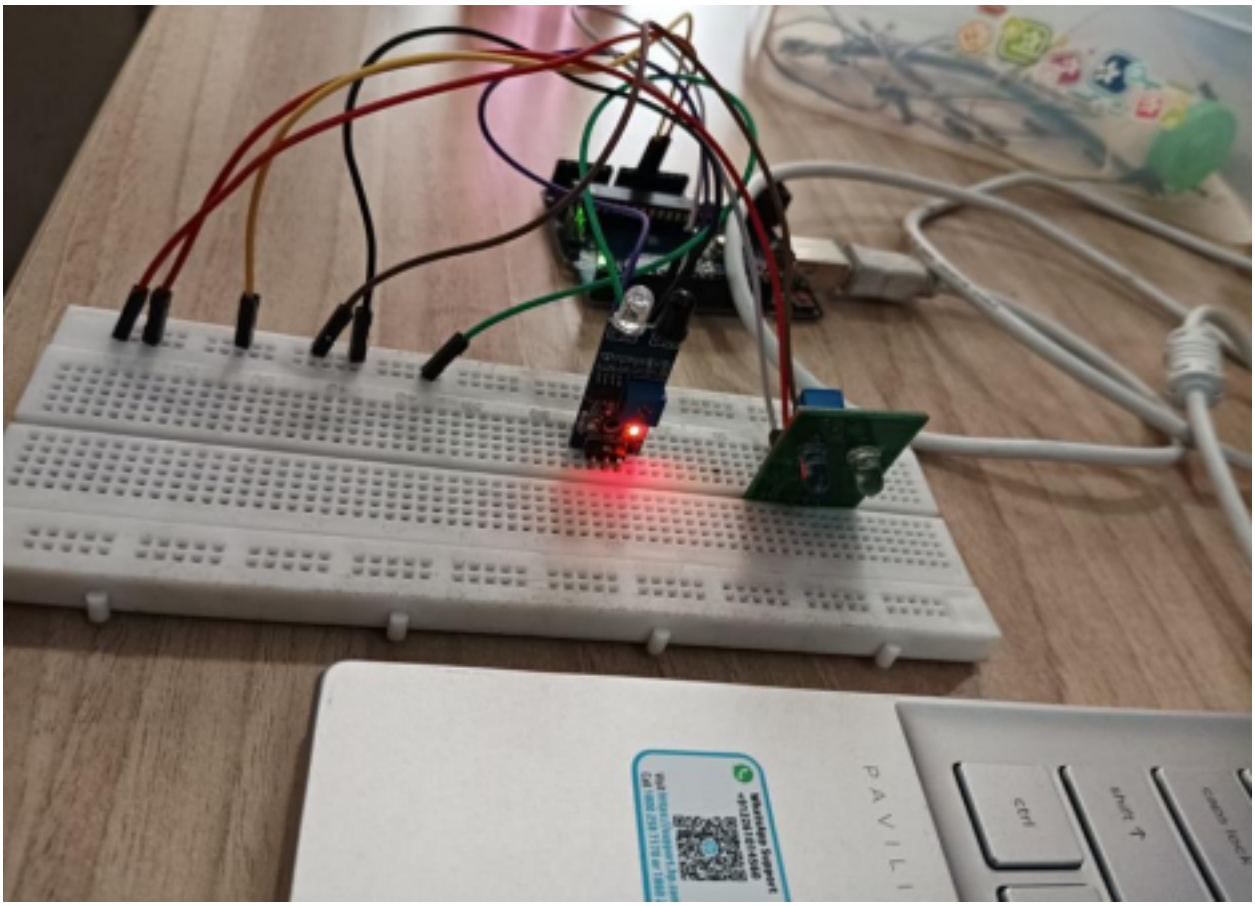
This project involves the use of two IR sensors , where one sensor is placed at the entrance and the other is placed at the exit. When a car enters the parking space , it is sensed by the IR sensor placed at the entrance and the count increases as each car enters the parking and a message stating “ENTERING INSIDE” is displayed.

Thus, when the car leaves the parking space it is sensed by the IR sensor at the exit and an “EXITING” message is displayed.

And also, the number of cars present in the parking space is displayed. When the first IR sensor senses the car , the count of cars inside the parking space is increased by ‘1’ and when a car leaves the count decreases by ‘1’ simultaneously displaying the number of cars present inside. Thus, it becomes easy for the owners to know if there is a place left for their cars to get parked.

4. OUTCOMES OF THE PROJECT

The image of the project is attached below :



OUTPUT OF THE CODE :

The following is the output of the code observed in the serial monitor of Arduino ide:

```
Entering inside
No. of cars inside : 1
Entering inside
No. of cars inside: 2
Entering inside
No. of cars inside: 3
Entering inside
No. of cars inside: 4
Exiting
No. of cars inside : 3
Entering inside
No. of cars inside: 4
Exiting
No. of cars inside : 3
Exiting
No. of cars inside : 2
```

CONCLUSIONS

In this proposed system , we can find out the free slot in the parking area and it can be used for the security system . This can be implemented in a real time environment and the corresponding data can be computed and displayed on the web page or mobile application . This system can reduce manpower , radiates effective solutions for real time problems . The system has satisfactorily fulfilled the basic things such as finding a free parking slot in the parking area in the public places . In future this technology can be easily modified for further improvement and development to the automated parking system and enhance the smart city life anywhere and everywhere .

REFERENCE :

https://youtu.be/6gccSyp_uJQ?feature=shared
https://techatronic.com/automatic-car-parking-system-project-using-arduino/

The above-mentioned links were referred for the project .