AMERICAN INTERNATIONAL UNIVERSITY BANGLADESH-(AIUB)

Faculty of Science and Technology

Project Report

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Automatic Car Parking System

1. Introduction:

1.1 Background of study and motivation:

To easily find an unoccupied parking space in the larger car park is a problem for many drivers. The Car parking system could be used for residential buildings, hotels, offices, shopping centre and show rooms, universities, government buildings, airports, hospitals, and stadium. The advantages of the car parking system are efficient usage of spaces, slots, proper direction, automatically allotment of slots, display of empty and filled parking slots. The parking space will be monitored by IR sensor. As soon as car enters, driver gets information of the filled slots and empty slots on display board. As the driver moves further, he/she will get a message of allotted parking slot and navigation for that slot on small display board situated in the inner lane. When all slots are full, No slots available message displays on the display board.

1.2 Project Objectives:

The objective of Automatic Car Parking system is to guide the driver to a suitable parking space if one is available. The system would only allow entry to the car park, when there is space available. The system would also display the amount of space available in the car park.

1.3 A brief outline of the report:

This report starts by introducing the automatic car parking system and also how it is a huge benefit to drivers and administrators and others. The report also provides an overview an available literature in the automation field. After which it will then propose a hypothesis and also justify all the aspects of the hypothesis.A scenario has been put together so as to provide a clearer understanding on what the project is all about.Later on in, the Arduino platform is explained and that will be used as the core component for this project.Depending on the stage of the project, the methodologies that will be implemented.For this project, we will also present the aim and objectives of the project, analyze the requirements, propose the project plan, outline potential

risks, propose evaluation approaches and also outline potential resolution plans.By the end of the report ,discussion and results are discussed how it can still improve the parking system

2. Literature Review:

Intelligent Transportation Systems are advanced applications which are developed to improve the quality of transportation and also successfully reach other outcomes based on the transportation system. Intelligent Transportation Systems provides ways to manage traffic and also car parking by using various advanced technologies. Looking at our world today, a lot of advanced systems are developed and also implemented. The use of sensors in addition to their implementation will thoroughly analyzed so as to get a better understanding.That's why the focus is more on the fully-automatic parking A little discussion will be made on the automatic parking since it is mostly used around automatic Car Parking Systems is widely known to be more complex and computer based.

3. Methodology and Modelling:

3.1 Introduction:

Car parking issue has some problems with how to control the number of the car inside it, how to monitor the movement in/out side of the parking lot ,how to check whether there is a place inside for more cars or not and the safety to park. The aim of this project is to solve these problems by designing a system to control the parking area using a microcontroller.The microcontroller serves as a programming tool to run the whole operation ,to reduce the cost in terms of requirement such as job opportunity and to increase security.Moreover ,this system is faster, flexible and can meet market needs.

3.2 Working principle of the proposed project: In this project, we proposed our working principal different way. All of the principal discussed clearly.

Car parking system:

Parking facilities have always been important by allowing drivers to safely leave their car while they can go on to their daily activities. Mostly the information provided together with guidance implemented by the smart parking system has been extremely useful by assisting drivers to find an available space. The payment of the

parking has also been made easier with the implementation of the new technology. Sensors are used to help detect the presence of the car. This is absolutely necessary when it comes to the development of the smart parking system because information of the parked vehicle is required. From the sensor, the information can easily be gathered so as the system can use it and the same information will also be sent to the driver.

Advantages of Implementing Smart Car Parking System:

While implementing the automatic Parking System, the car owner, the parking operator and also the environment benefits from it. When looking at the parking operator, the future parking pattern can easily be predicted from the information gathered from the automatic Parking System.The parking price can also be based on the information obtain so as to improve the organization profits. When looking at the environment, the level of pollution can be reduced by decreasing the air pollution in the air.The amount of time spent to find a parking is reduced resulting to the time saving and also fuel consumption. The car owners also benefit from the System because the system automatically indicates parking space available which directly reduces the amount of vehicle travel and the time to search for an available spot.With information provided by the system, car drivers can easily avoid parking that is full and locate the parking which is vacant.The number of illegal parked cars is also reduced.Also the traffic congestion is reduced.Other advantages that come with the automatic Parking System is that it provides safety, security.These advantages make it easy for the users.Some more advantages can be economical and efficiency in space and friendly environment in the parking.

Safety and Security:

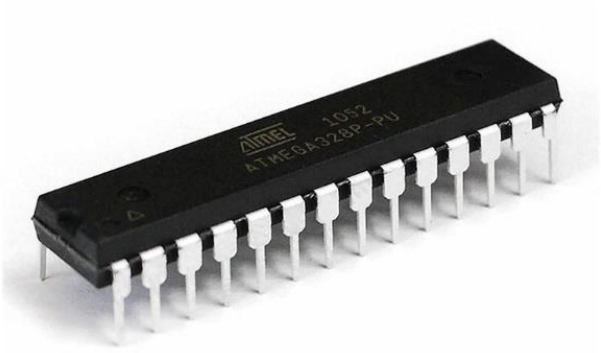
While making use of a car parking system, drivers don't have to spend time searching around searching for an available spot instead they can directly move to an available space which is either shown on the OLED display, indicated by the IR sensor.Driving around searching for parking can be dangerous because drivers do not have a full concentration on the road because their focus is on seeing an available spot.Therefore reaching a parking slot definitely makes it easy for drivers and also removes tension and frustration which increases safety around the automatic car parking system.

Space efficiency and Economical space:

In some parking system such as the conveyor belt parking, client do not have to be worried about how to park or where to park.All they have to do is to leave the car at a certain spot and the car will be carried through the conveyor belt to a free space.This system can contain more at least 40% more cars than what a normal car parking would contain.This system removes the need of car owners to move around the parking looking for space to park and climbing stairs or the exercise of remembering where they parked their car.Even though this system is known to be costly in term of maintenance, and other expenses, this system just provides efficient space around.

3.3 Description of the important components: In Automatic car parking system the main features are:

1.Microcontroller: This part is the heart of the project. It checks for the entry and exit of car. It continuously polls the pins from where we receive the signal from the sensor. When, it detects the car from the entry gate then it checks whether there is any vacant space in the parking lot. If there is vacant space then opens the door and increases the overall count in the parking lot by one.



2.Display: OLED makes this instrument user interface friendly by displaying everything on the display. OLED is display the number of total cars and available car and the time.The parking slots are continuously monitored, and the data is continuously updated in the OLED screen.

3. Servo Motor: Stepper motor is used to open and close the door. It is interfaced with microcontroller and takes command from the microcontroller to rotate some particular specified angle.

4. IR sensor: The IR sensor is used to detect the absence or presence of a car when it enters the parking slot.

3.4. Implementation:

3.4.1 Code:

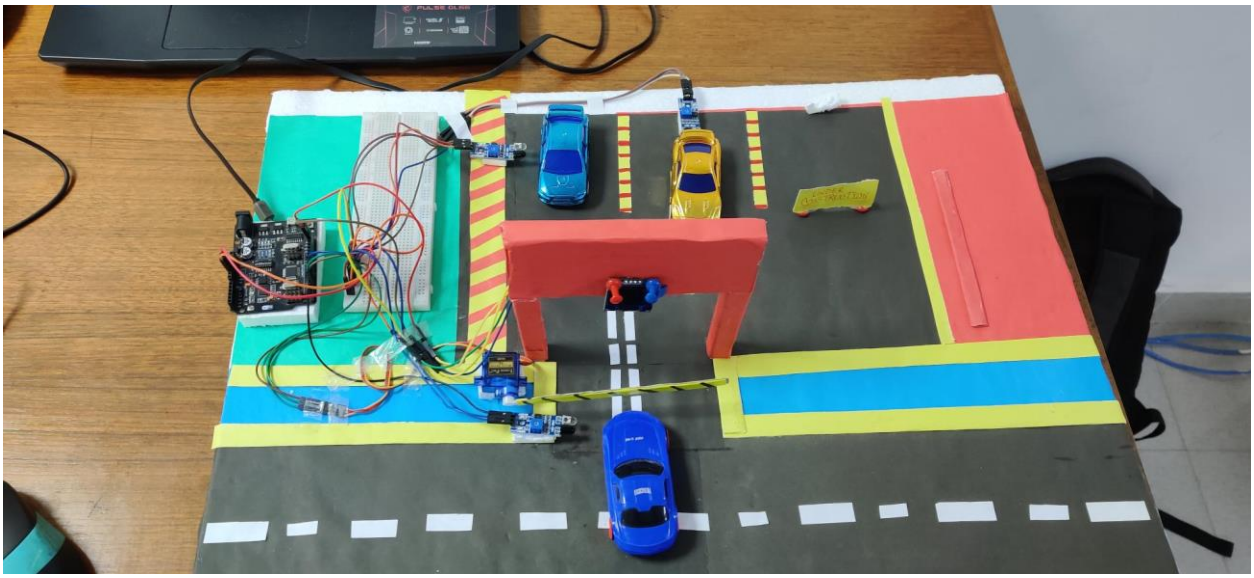
```
/*OLED Temperature and Humidity Meter
oled-temp-humid-meter.ino
Displays results on 128 x 64 OLED display
Uses AM2320 I2C Temperature and Humidity sensor
Uses Adafruit SSD1306 OLED Library
Uses Adafruit AM2320 Library
Uses Adafruit GFX Graphics Library
DroneBot Workshop 2019
https://dronebotworkshop.com
*/
#include <SPI.h>
#include <Wire.h>
#include <Adafruit_GFX.h>
#include <Adafruit_SSD1306.h>
#include <Servo.h>



#define SCREEN_WIDTH 128
#define SCREEN_HEIGHT 64
Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT);
//Adafruit_BMP085 bmp;
#define SEALEVELPRESSURE_HPA (101500)
float simpleweatherdifference, currentpressure, predictedweather,
currentaltitude;
int baselineTemp = 0;
int temp2 = 0 ;
int celsius = 0;
int fahrenheit = 0;
Servo myservo1;
int ir = 2;
int ir1 = 4;
int ir3 = 7;
int stat = HIGH;
int stat1 = HIGH;
int stat2 = HIGH;

void setup() {
```

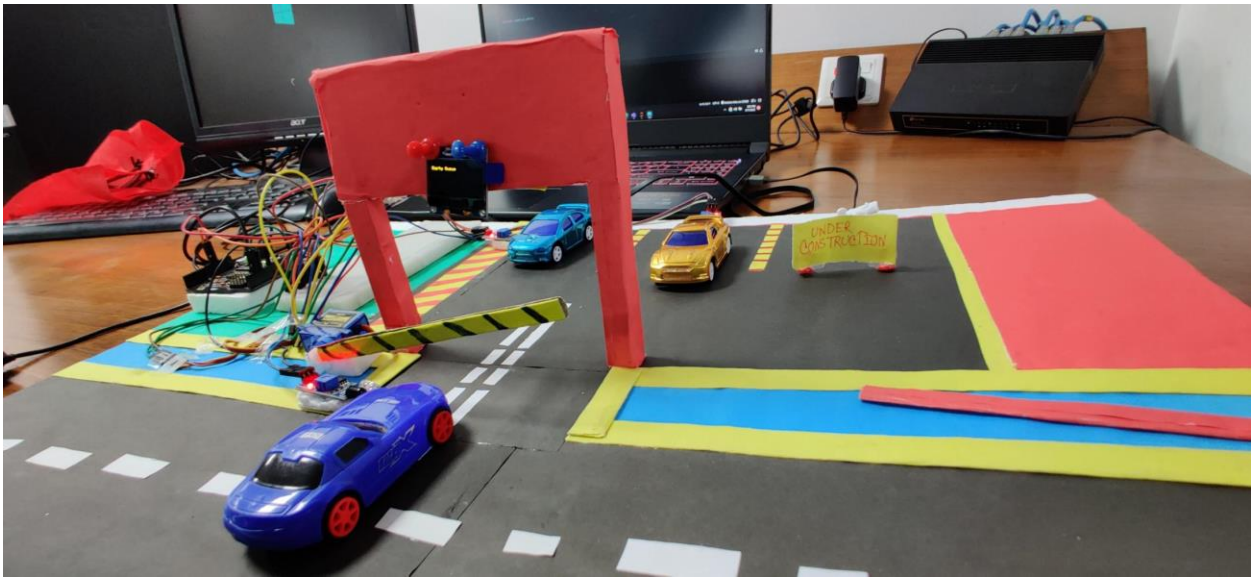
```
// put your setup code here, to run once:
display.begin(SSD1306_SWITCHCAPVCC, 0x3C);
pinMode(ir, INPUT);
pinMode(ir1, INPUT);
pinMode(ir3, INPUT);
myservo1.attach(3);
//myservo1.write(100);
//delay(2000);
/*
if (!bmp.begin()) {



Serial.println("Could not find a valid BMP085 sensor, check wiring!");
while (1) {}
}*/
}

void loop() {

// put your main code here, to run repeatedly:



display.clearDisplay();
display.setTextSize(1);
display.setTextColor(SSD1306_WHITE);
display.setCursor(0,5);
display.print("Welcome");
display.setCursor(0,19);
display.print("TO Parking");
// display.print(bmp.readTemperature(),1);
display.println("*");
display.display();
delay(5000);
display.clearDisplay();
display.display();
display.setTextSize(1);
display.setTextColor(SSD1306_WHITE);
stat = digitalRead(ir);
```

```
stat1 = digitalRead(ir1);
stat2 = digitalRead(ir3);
if(stat == LOW && stat1 == LOW && stat2 == LOW ) {
display.setCursor(0,5);
display.print("Booked");
display.display();
myservo1.write(0);
delay(4000);
myservo1.write(0);
delay(4000);
}
else if(stat == LOW && stat1 == HIGH && stat2== LOW) {
display.setCursor(0,5);
display.print("Empty on slot 1");
display.display();
myservo1.write(0);
delay(4000);
myservo1.write(90);
delay(4000);
}
else if(stat == LOW && stat2 == HIGH && stat1== LOW){
display.setCursor(0,5);
display.print("Empty on slot 2");
myservo1.write(0);
delay(4000);
myservo1.write(90);
delay(4000);
}
else if(stat == HIGH && stat1 == HIGH && stat2 == HIGH){
display.setCursor(0,5);
display.print("Empty Queue");
display.display();
myservo1.write(0);
delay(4000);
myservo1.write(0);
delay(4000);
}
else if(stat == LOW && stat1 == HIGH && stat2 == HIGH){
display.setCursor(0,5);
display.print("Empty on both slot");
```

```
display.display();
myservo1.write(0);
delay(2000);
myservo1.write(90);
delay(2000);
}
/*else {
display.setCursor(0,5);
display.print("Both slots are Empty!");
display.display();
}*/

digitalWrite(3,HIGH);
digitalWrite(2, LOW);
display.setCursor(0,5);

//display.print(bmp.readTemperature(),1);

/* if(celsius > baselineTemp && celsius < temp2){
digitalWrite(3, LOW);
digitalWrite(2, HIGH);
display.setCursor(0,5);
// display.print(bmp.readTemperature(),1);
} */
delay(2000);
myservo1.write(0);
delay(2000);
myservo1.write(0);
delay(2000);

}
```

3.5. Test/Experimental setup:





3.6. Cost analysis:

S.no.	Components Name	Qty	Rate	Total
1	Arduino Uno	1	1300	1300
2	OLED display	1	650	650
3	IR sensor	3	80	240
4	Servo Motor	1	160	160
5	Cork sheet	1	200	200
6	Breed-board	1	80	80
7	wire set	1	70	70
8	Decoration cost		100	100
————————-	————————	————————	Total=	2800

4. Result and discussion: The parked cars are more secure since there is no public access to parked cars. Minor parking lot damage such as scrapes and dents are eliminated. Drivers and passengers are safer not having to walk through parking lots or garages.

5. Conclusion: This Automated car parking system enables the parking of vehicles and thus reduces the time taken to check the space to be used by displaying the spot where the space for parking is available on an OLED display by using IR sensor at the entrance.In this paper, the concept of smart parking was also discussed.Various types of components, their applications and advantages were also discussed.The main advantages are space optimization, cost effectiveness and security.We would like to conclude this project as a very great upgradable experience.

References:

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3. http://www.iraj.in/journal/journal_file/journal_pdf/12-237-145898585349-51.pdf
4. https://www.theseus.fi/bitstream/handle/10024/161090/Sushan Kunwar-thesis.pdf?sequence=5&isAllowed=y
5. https://www.academia.edu/34838312/Automated_Car_Parking_System