KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY (KUET)

Smart Car Parking

PROJECT REPORT

Course No: CSE 3104

Course Name: Peripherals and Interfacing

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Smart Car Parking

Objectives :

In this project we have built a smart car parking system which can detect a car's presence and can calculate the distance of the car from the last corner of the parking space and open the parking gate both before and after the car parking and give alerts if the car is so close to the wall for safety.

Introduction :

This project deals with an effective way of finding incoming car and outgoing car in an empty garage and helps a driver to safely park while driving backwards. If the garage is not empty, the garage will not be open to a new car . If the driver moves very close to the rear wall, a siren/buzzer will turn up to give warning and driver will see a green light when he has parked the car in the perfect spot. Also, if a driver is coming towards an empty garage, the gate will be open after detecting the distance of the garage using sonar. This automated system is used to find vacancy in paring system and it helps to reduce the parking time. It makes sure that the requirement of the labour is minimum as it is very tiring for a driver to park in a narrow space like garage on a daily basis. It makes the whole process really easy and driver is never in doubt. The gate is not needed to be opened or closed by manual switch or trigger. Gate opens itself by sensing the distance of the car.

Equipments :

1. 3 LED Lights
2. 1 buzzer
3. 1 Sonar
4. 1 Servo Motor
5. 1 Arduino Uno
6. Wires

Project Details :

In our project we used 3 LED lights which are read, green and blue for warning signals, 1 buzzer for giving warning if the car is so close to crash, 1 sonar for detecting the presence of a car and also for calculating the distances

of the car from the parking space, 1 servo motor for opening or closing the gate of the garage. We compiled the project on Arduino Uno.

Arduino pins declaration for the equipments :

- TRIG -> 2
- ECHO -> 3
- LED_RED -> 4
- LED_GREEN -> 5
- LED_BLUE-> 6
- BUZZER -> 7
- SERVO -> 8

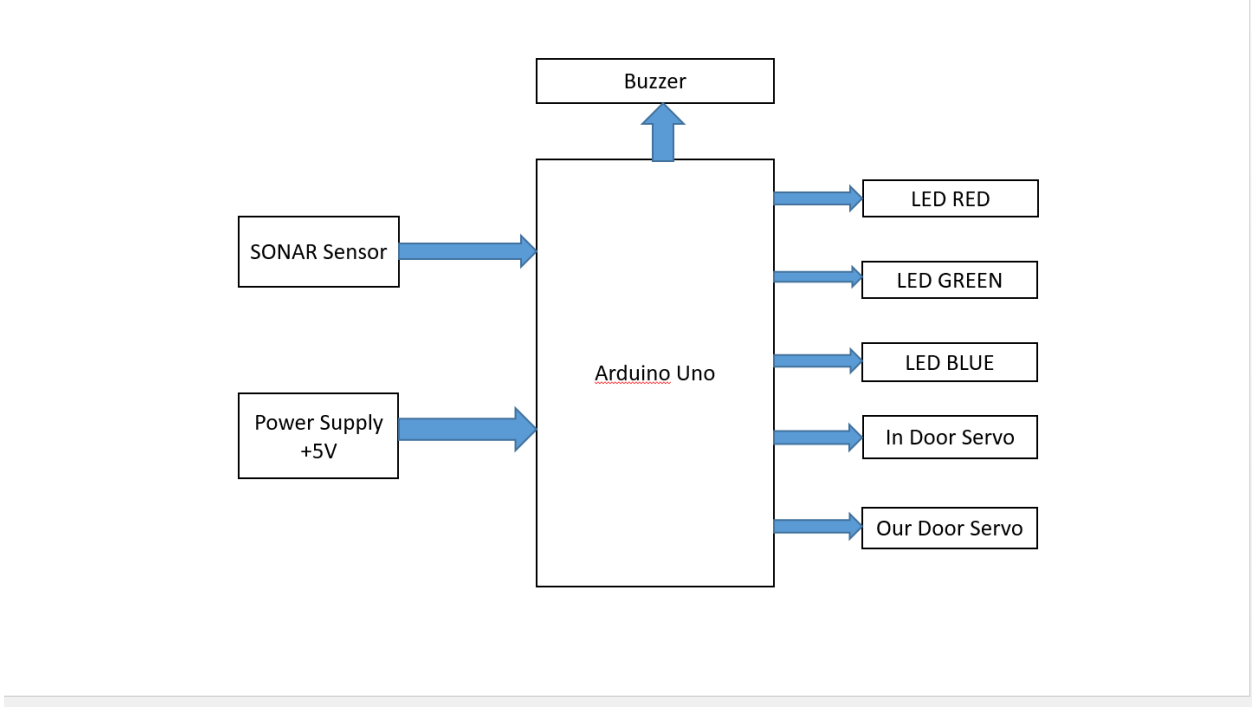

Fig : Diagram for Smart Car Parking

Our project is designed is such formations that,

1. **While Parking,**
   - ☐ when a car is finding a parking space for parking, if the car is 20 cm near from the garage parking space automation will detect the

car and turn on the blue light and also open the gate using servo motor.
- ☐ When the car enters into the parking space, when it is 10 cm away from the last end, the system will turn on the green light indicating that the car is in safe space.
- ☐ If the car drives in near the 5 cm distance from the last end, the system will turn on the red light and also sounds the buzzer for giving the alert that the car is so near to the last end.

2. **Exit from parking space,**
   - ☐ When the car is going to exit from the garage, closing from the gate, the gate will open and the green light will turn off.
   - ☐ When the car is totally outside from the garage but in the range of 20 cm, the system will turn on the blue light.
   - ☐ When the car is totally out of the sonar range, the system will turn off the blue light and close the gate using servo.

Thus the smart parking system will work.

Code for Smart Car Parking :

```
#define trigPin 2
#define echoPin 3 // attach pin D2 Arduino to pin Echo of HC-SR04 //attach pin D3 Arduino to pin Trig of HC-SR04
#define redLight 4
#define greenLight 5
#define whiteLight 6
#define buzzer 7

// defines variables
long duration; // variable for the duration of sound wave travel
int distance; // variable for the distance measurement
```

```
#include<Servo.h>
Servo Myservo;

void setup() {
  pinMode(trigPin, OUTPUT); // Sets the trigPin as an OUTPUT
  pinMode(echoPin, INPUT); // Sets the echoPin as an INPUT
  pinMode(redLight, OUTPUT);
  pinMode(greenLight, OUTPUT);
  pinMode(whiteLight, OUTPUT);
  pinMode(buzzer, OUTPUT);

  Myservo.attach(8);

  Serial.begin(9600); // // Serial Communication is starting with 9600 of baudrate
speed
  Serial.println("Ultrasonic Sensor HC-SR04 Test"); // print some text in Serial
Monitor
  Serial.println("with Arduino UNO R3");
}
void loop() {
  // Clears the trigPin condition
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  // Sets the trigPin HIGH (ACTIVE) for 10 microseconds
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
  // Reads the echoPin, returns the sound wave travel time in microseconds
  duration = pulseIn(echoPin, HIGH);
  // Calculating the distance
  distance = duration * 0.034 / 2; // Speed of sound wave divided by 2 (go and
back)
  // Displays the distance on the Serial Monitor
  Serial.print("Distance: ");
```

```
Serial.print(distance);
Serial.println(" cm");


if(distance <= 20 && distance > 10 )
{
  digitalWrite(redLight, LOW);
  digitalWrite(greenLight, LOW);
  digitalWrite(whiteLight, HIGH);
  noTone(buzzer); // Send 1KHz sound signal...
  //delay(1000);
  Myservo.write(0);
  delay(15);
}
else if(distance <= 10 && distance > 5 )
{
  digitalWrite(redLight, LOW);
  digitalWrite(greenLight, HIGH);
  noTone(buzzer);     // Stop sound...
  //delay(1000);        // ...for 1sec
  Myservo.write(90);
  delay(15);

}
else if(distance <= 5)
{
  digitalWrite(redLight, HIGH);
  tone(buzzer, 200); // Send 1KHz sound signal...
  delay(1000);
}
else if(distance > 20)
{
  noTone(buzzer);     // Stop sound...
  //delay(1000);        // ...for 1sec
  Myservo.write(90);
```

```
    delay(15);
    digitalWrite(redLight, LOW);
    //delay(1000);
    digitalWrite(greenLight, LOW);
    //delay(1000);
    digitalWrite(whiteLight, LOW);
    //delay(1000);
    noTone(buzzer);     // Stop sound...
    //delay(1000);        // ...for 1sec
  }

}
```

Discussion

This project, smart car parking system works on the simple principle of detecting obstacles using SONAR which is a sensor that uses sound propagation to navigate and measure distances. When a car will come near the garage for parking the car, sonar will detect the range and open the garage door automatically and also detect the perfect place for parking the car inside the garage. Our project will also alert the driver with the help of a buzzer when a car will cross the safe zone as well as about to crash into the wall. The smart car
parking system was designed, fabricated and tested which
provided accurate results when the threshold distance was
calibrated and the obstruction was detected. The switching of
LEDs based on the vehicle in the parking space was
instantaneous based on no vehicle and vehicle distance within the garage space.
This project design is flexible and can be altered based on the space available and can be installed even in tight and constrained
space.

Conclusion

Automation is a step in the right direction for a future fulfilled in the world of transportation. This design provides an effective solution for the personal car garage system.It can be concluded that with correct connection of some simple electrical components, it is possible to create an automatic
smart car parking system, thus decreasing aimless driving, fuel and time, as well as making the process of parking considerably simpler.