PHASE 3

DEVELOPMENT PART 1

Smart parking system using IOT

TEAM MEMBERS

VADIVEL .R	(821021104051)
MOHAMMAD THASLIM .M	(821021104031)
SUBASH CHANDRABOSE .S	(821021104046)
DHANUSH .M	(821021104016)

Concept :

This smart parking system project consists of Arduino, six IR sensors, one servo motor, and one LCD display. Where the Arduino is the main microcontroller that controls the whole system. Two IR sensors are used at the entry and exit gates to detect vehicle entry and exit in the parking area.

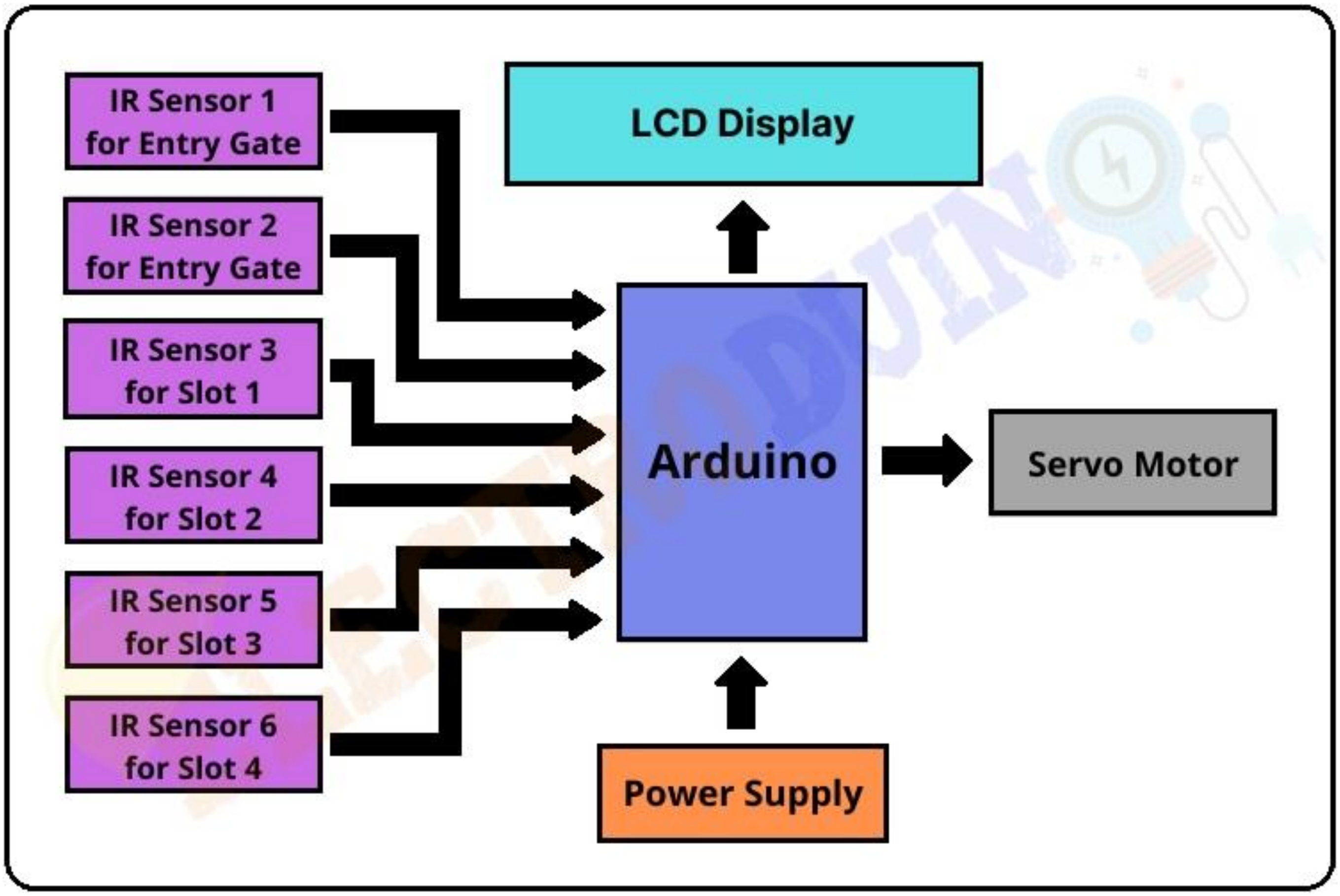
And other four IR sensors are used to detect the parking slot availability. The servo motor is placed at the entry and exit gate that is used to open and close the gates.

Also, an LCD display is placed at the entrance, which is used to show the availability of parking slots in the parking area.

When a vehicle arrives at the gate of the parking area, the display continuously shows the number of empty slots. If there have any empty slots then the system opens the entry gate by the servo motor.

After entering the car into the parking area, when it will occupy a slot, then the display shows this slot is full. If there is no empty parking slot then the system displays all slots are full and does not open the gate.

Block Diagram :



Tools Required :

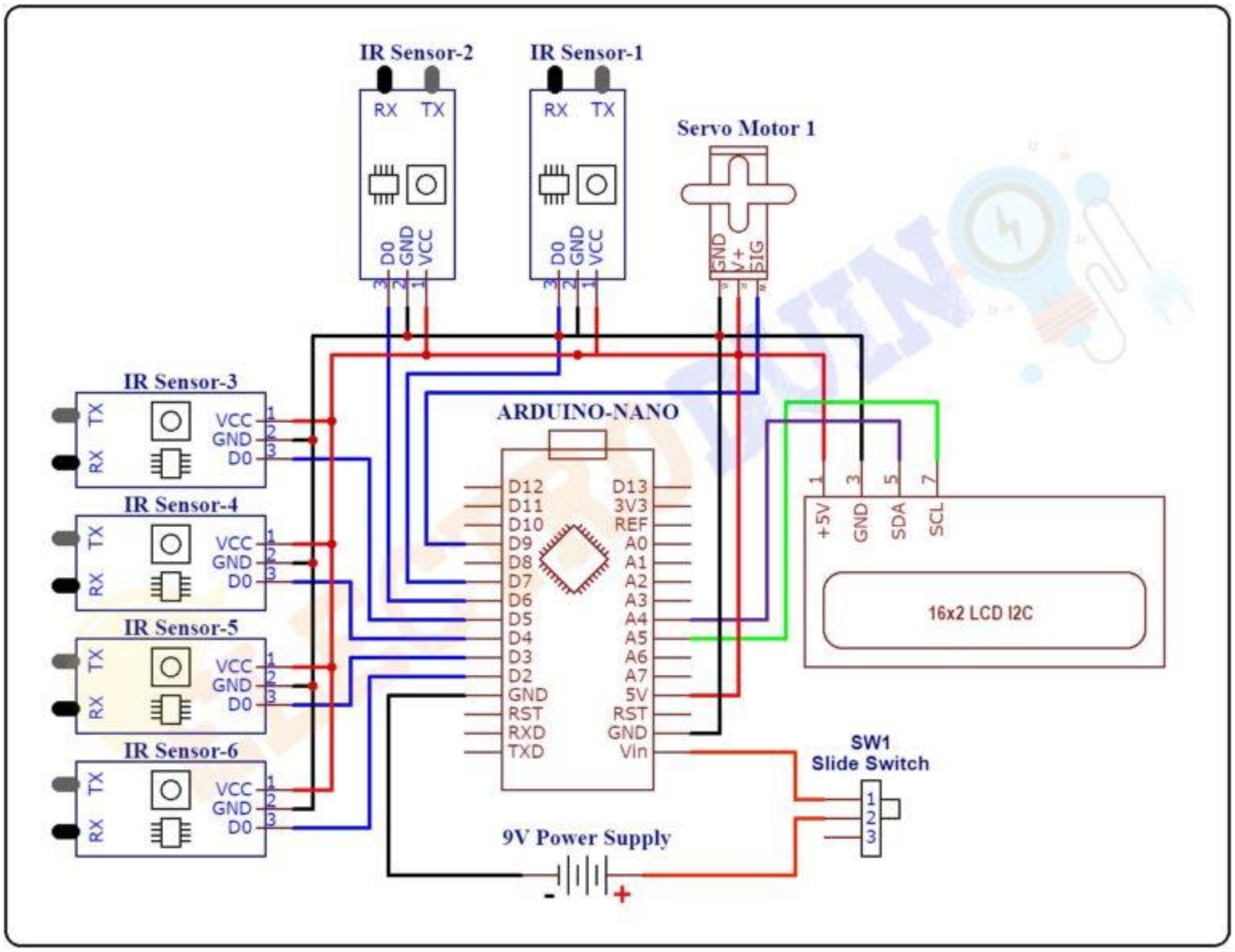
Name	QUANTITY
Arduino Nano or Arduino Uno	**1**
USB Cable for Arduino	1
IR Sensor	6
Sg90 Servo Motor	
9V power supply	1
PCB board or Breadboard	1
Connecting wires	As required in the circuit diagram

Working principle :

There are four parking slots in this project, IR sensor-3, 4, 5, and 6 are placed at slot-1, 2, 3, and 4 respectively. IR sensor-1 and 2 are placed at the entry and exit gate respectively and a servo motor is used to operate the common single entry and exit gate. The LCD display is placed near the entry gate.The system used IR sensor-3, 4, 5, and 6 to detect whether the parking slot is empty or not and IR sensor-1, and 2 for detecting vehicles arriving or not at the gate.In the beginning, when all parking slots are empty, then the LCD display shows all slots are empty.When a vehicle arrives at the gate of the parking area then the IR sensor-1 detects the vehicle and the system allowed to enter that vehicle by opening the servo barrier. After entering into the parking area when that vehicle occupies a slot then the LED display shows that the slot is full. In this way, this system automatically allows 4 vehicles.

In case the parking is full, the system blocked the entrance gate by closing the servo barrier. And the LED display shows that slot-1, 2, 3, and 4 all are full.When a vehicle leaves a slot and arrives at the gate of the parking area then the IR sensor-2 detects that vehicle and the system open the servo barrier. Then the LED display shows that the slot is empty. Again the system will allow entering a new vehicle.

Circuit Diagram of Smart Parking System Project using Arduino and IR Sensor



Python code :

1. **Install Flask:**

Ensure you have Flask installed by running:

***bash

Pip install Flask

2. **Python Script (smart_parking.py):**

***python

From flask import Flask, jsonify, request

Import random

Import threading

Import time

App = Flask(___name___)

Parking spots = [0] 10 # Represents 10 parking *

Spots, initially all vacant

```
Def simulate_iot_data():

Global parking spots

While True:

# Simulate IoT data (occupancy: 0 for vacant, 1 for occupied)

Parking spots = [random.randint(0, 1) for in range(10)]

Time.sleep(5) # Simulate data update every 5 seconds

@app.route('/parking, methods=['GET'])

Def get_parking_status():

Global parking spots

Return jsonify({parking_status: parking spots))

If __name__ == '__main__':

# Start IoT data simulation in a separate thread

Jot_thread =
Threading.Thread(target=simulate_iot_data)

Jot thread.daemon = True

Lot thread.start()

# Run the Flask app

App.run(debug=True)
```

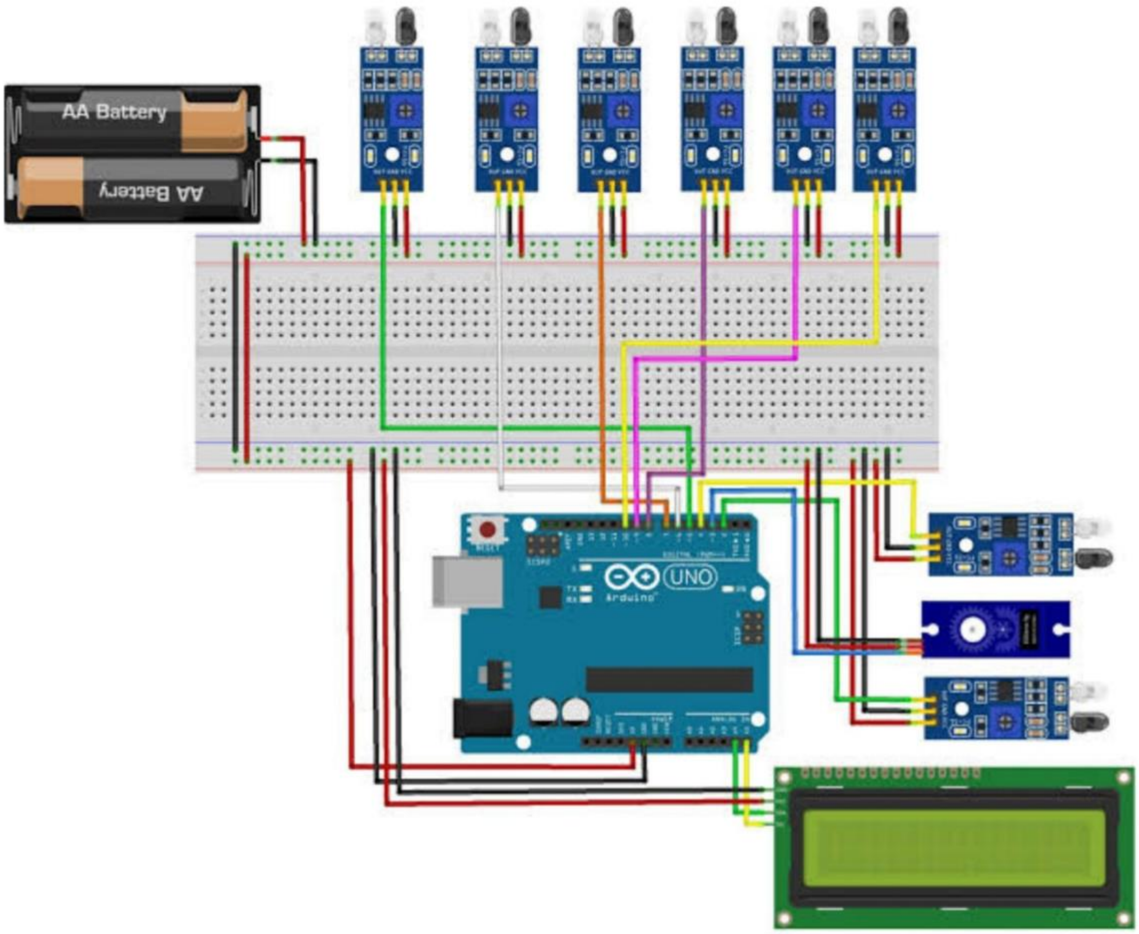
3. ****Run the Script:****

Run the script using:

***bash

```
Python smart parking.py
```

Tinkercad Circuit setup



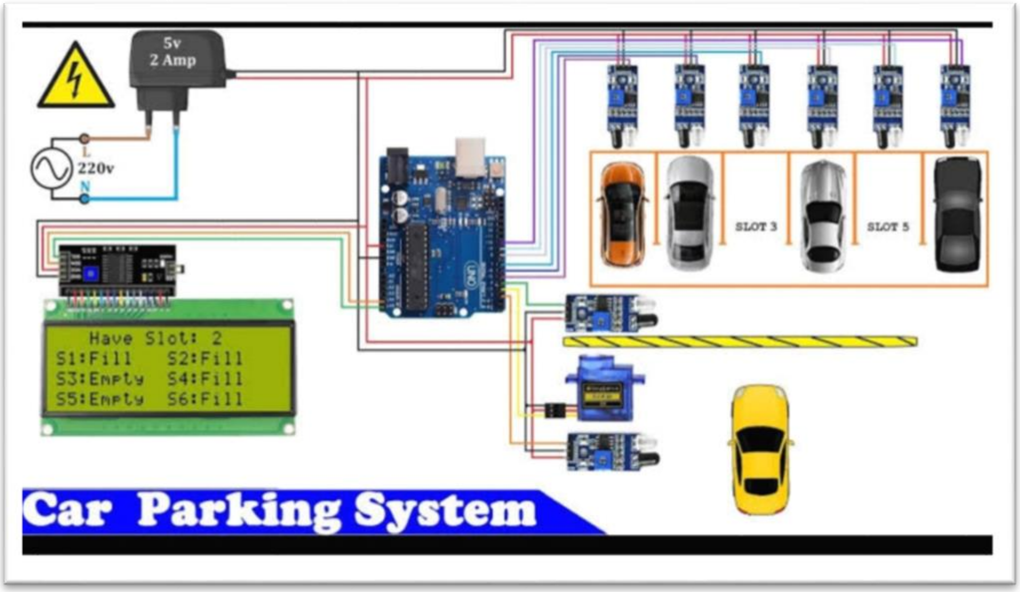
Arduino code :

```
   #include <Servo.h> //includes the servo library
#include <Wire.h>
#include <LiquidCrystal_I2C.h> //includes LiquidCrystal_I2C library
LiquidCrystal_I2C lcd(0x27, 20, 4);

Servo myservo;

#define ir_enter 2
#define ir_back  4

#define ir_car1 5
#define ir_car2 6
#define ir_car3 7
#define ir_car4 8

Int S1=0, S2=0, S3=0, S4=0 ;
Int flag1=0, flag2=0;
Int slot = 6;

Void setup(){
Serial.begin(9600);
// initialize digital pins as input.
pinMode(ir_car1, INPUT);
pinMode(ir_car2, INPUT);
pinMode(ir_car3, INPUT);
pinMode(ir_car4, INPUT);

pinMode(ir_enter, INPUT);
pinMode(ir_back, INPUT);

myservo.attach(9); // Servo motor pin connected to D9
myservo.write(90); // sets the servo at 0 degree position

// Print text on display
Lcd.begin(20, 4);
Lcd.setCursor (0,1);
Lcd.print(“    Smart Car   “);
Lcd.setCursor (0,2);
Lcd.print(“ Parking System “);
Delay (2000);
Lcd.clear();

Read_Sensor();

Int total = S1+S2+S3+S4;
Slot = slot-total;
}

Void loop()
{
```

```
Read_Sensor();

Lcd.setCursor (0,0);
Lcd.print(“   Have Slot: “);
Lcd.print(slot);
Lcd.print(“    “);

Lcd.setCursor (0,1);
 If(S1==1)
  {
   Lcd.print(“S1:Fill “);
  }
 Else
  {
   Lcd.print(“S1:Empty”);
  }

Lcd.setCursor (10,1);
 If(S2==1)
  {
   Lcd.print(“S2:Fill “);
    }
 Else
  {
   Lcd.print(“S2:Empty”);
    }
 Lcd.setCursor (0,2);
  If(S3==1)
   {
    Lcd.print(“S3:Fill “);
    }
  Else
   {
    Lcd.print(“S3:Empty”);
    }

 Lcd.setCursor (10,2);
  If(S4==1)
   {
    Lcd.print(“S4:Fill “);
    }
  Else
   {
    Lcd.print(“S4:Empty”);
    }

/* Servo Motor Control
***********************/
  If(digitalRead (ir_enter) == 0 && flag1==0) // read degital data from IR sensor1
   {
    If(slot>0)
     {
      Flag1=1;
    If(flag2==0)
     {
      Myservo.write(180);
      Slot = slot-1;
      }
   }
  Else
   {
    Lcd.setCursor (0,0);
    Lcd.print(“ Sorry Parking Full “);
    Delay(1500);
    }
 }

If(digitalRead (ir_back) == 0 && flag2==0) // read degital data from IR sensor2
 {
  Flag2=1;
  If(flag1==0)
   {
    Myservo.write(180); // sets the servo at 180 degree position
    Slot = slot+1;
    }
 }

If(flag1==1 && flag2==1)
 {
  Delay (1000);
```

```
    Myservo.write(90); // sets the servo at 90 degree position
    Flag1=0, flag2=0;
    }
    Delay(1);
}

Void Read_Sensor()
{
 S1=0, S2=0, S3=0, S4=0;
 If(digitalRead(ir_car1) == 0){S1=1;} // read degital data from IR sensor3
 If(digitalRead(ir_car2) == 0){S2=1;} // read degital data from IR sensor4
 If(digitalRead(ir_car3) == 0){S3=1;} // read degital data from IR sensor5
 If(digitalRead(ir_car4) == 0){S4=1;} // read degital data from IR sensor6
}
```

OUTPUT :



```
  Have Slot: 2
S1:Fill    S2:Fill
S3:Empty   S4:Fill
S5:Empty   S6:Fill
```