

TEACHNOOK

COURSE : EMBEDDED SYSTEM DESIGN

FACULTY : KARTHIK KUMAR

MAJOR PROJECT

TOPIC : SMART PARKING SYSTEM

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1. PROJECT OBJECTIVE :

In these modern days finding car parking is a big issue in congested cities. There are too many vehicles on the road but not enough parking spaces. One of the biggest problems is when we enter a parking area then we realize that there are no empty parking slots to park our cars. Important time. Another biggest problem is after entering in a big parking area we confused to find the empty parking slot to park our car. Sometimes maybe we all have been facing these two problems that wasted our important time.

That's why we need efficient parking management systems in all parking areas that will provide confusion-free and easy parking. In this tutorial, we will design a "Smart Parking System Project" to overcome this problem. This project helps the car's driver to park their car with minimum wastage of time with accurate information of the availability of the space to parking.

2. COMPONENTS USED :

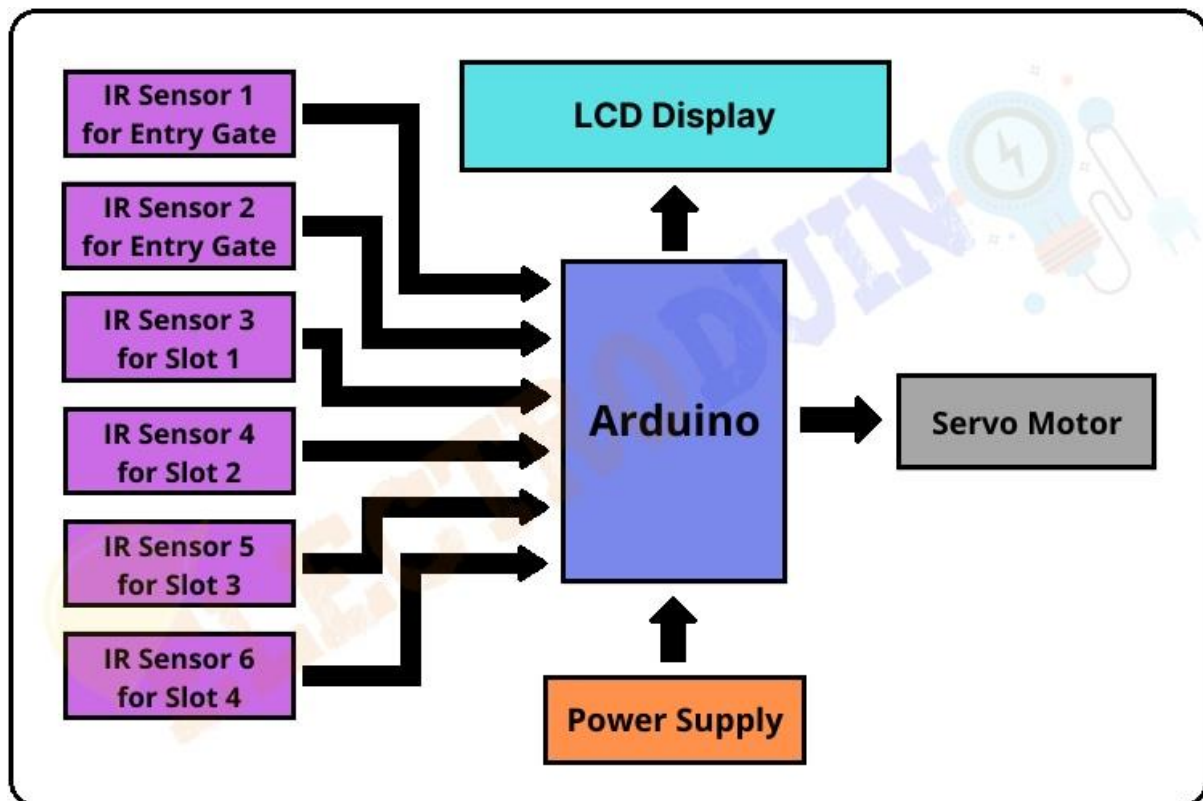
- Arduino Nano/ Arduino UNO.
- IR Sensor.
- Servo Motor.
- 20x4 LCD Display (LM044L)
- Resistors.
- Power Source.
- Jumper Wires.

3. INTERFACING WITH ARDUINO :



FIGURE 1: Interfacing with Arduino

Block diagram:



Circuit Daigram:

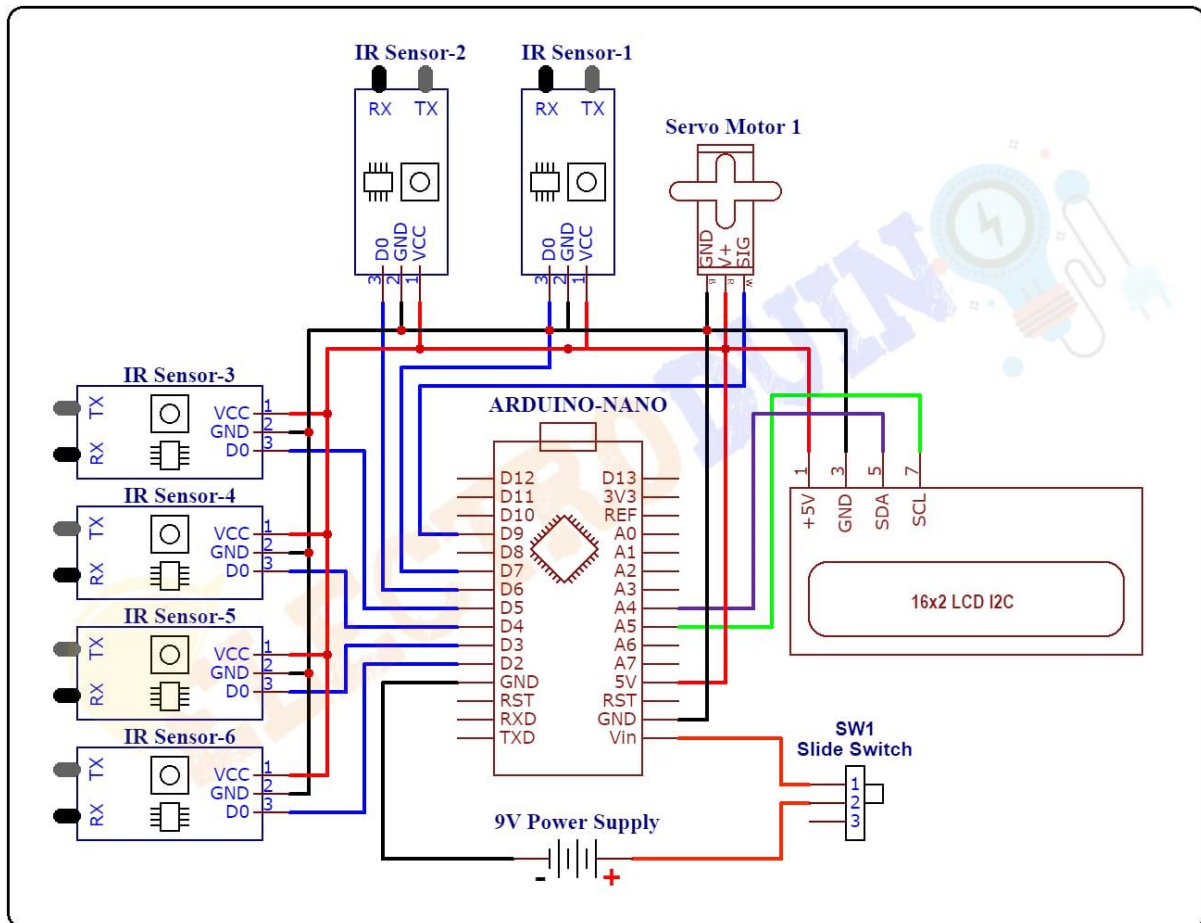


Figure 3 -smart parking circuit diagram

6. EMBEDDED C PROGRAM :

```
#include

#include LiquidCrystal lcd(12,11,5,4,3,2);

Servo myservo;

int S1 = 0,

S2 = 0,

S3 = 0;

int flag1 = 0,

flag2 = 0;

void setup() {

  lcd.begin(16,2);

  lcd.setCursor(5,2);

  lcd.print("WELCOME");

  delay(500);
```

```
lcd.clear();

lcd.setCursor(2,2);

lcd.print("SMART PARKING");

cd.setCursor(26,0);

lcd.print("SYSTEM");

delay(500);

lcd.clear();

lcd.setCursor(0,0);

lcd.print("Slot A :");

lcd.setCursor(0,1);

lcd.print("Slot B :");

lcd.setCursor(20,0);

lcd.print("Slot C :");

pinMode(13,INPUT);

pinMode(10,INPUT);

pinMode(9,INPUT);

pinMode(8,INPUT);

pinMode(7,INPUT);

Read_Sensor();

myservo.attach(6);

myservo.write(90);

}

lcd.print("Full!");

}

Else

{

lcd.setCursor(10,1);

lcd.print("Empty");

}

if(digitalRead(8)==HIGH) {

lcd.setCursor(30,0);
```

```

lcd.print("Full!"); }

else {

lcd.setCursor(30,0);

lcd.print("Empty"); }

if(digitalRead(10)==HIGH)

{

lcd.setCursor(10,0)

; lcd.print("Full!");

}

Else {

lcd.setCursor(10,0);

lcd.print("Empty"); }

loop1(); loop2();

loop3(); }

int loop3() {

int slot=3;

if(digitalRead(10)==HIGH && digitalRead(7) == LOW && digitalRead(8)== LOW)

{

slot=slot-1; lcd.setCursor(39,2);

lcd.print(slot); }

else

if(digitalRead(10)==LOW && digitalRead(7) == HIGH && digitalRead(8)== LOW) {

slot=slot-1;

lcd.setCursor(39,2);

lcd.print(slot); }

else if(digitalRead(10)==LOW && digitalRead(7) == LOW && digitalRead(8)== HIGH) {

slot=slot-1;

lcd.setCursor(39,2);

lcd.print(slot); }

else if(digitalRead(10)==HIGH && digitalRead(7) == HIGH && digitalRead(8)== LOW)

{

```



```

slot=slot-2;

lcd.setCursor(39,2);

lcd.print(slot); }

else

if(digitalRead(10)==LOW && digitalRead(7) == HIGH && digitalRead(8)== HIGH) {

slot=slot-2;

lcd.setCursor(39,2);

lcd.print(slot); }

else

if(digitalRead(10)==HIGH && digitalRead(7) == LOW && digitalRead(8)== HIGH) {

slot=slot-2;

lcd.setCursor(39,2);

lcd.print(slot); }

else if(digitalRead(10)==HIGH && digitalRead(7) == HIGH && digitalRead(8)== HIGH) {

slot=slot-3;

lcd.setCursor(39,2);

lcd.print(slot); }

else if(digitalRead(10)==LOW && digitalRead(7) == LOW && digitalRead(8)== LOW) {

lcd.setCursor(39,2);

lcd.print(slot); }

return slot; }

int loop2() {

int slot=3;

if (digitalRead (13) == 1 && flag1 == 0) {

flag1 = 1;

if (flag2 == 0) {

myservo.write(0);

} }

if (digitalRead (9) == 1 && flag2 == 0) {

```

```

flag2 = 1; if (flag1 == 0)
{ myservo.write(0);
} }
int slot1=loop3();

if(slot1<=0) {
myservo.write(90); }
if (flag1 == 1 && flag2 == 1) {
delay (1000);
myservo.write(90);
flag1 = 0, flag2 = 0;
} }
int loop1() {
if(digitalRead(7) ||
digitalRead(8) ||
digitalRead(10)==LOW) {
lcd.setCursor(20,2);
lcd.print("Parking Available : "); } }
void Read_Sensor() {
S1 = 0, S2 = 0, S3 = 0;
if (digitalRead(10) == 1) {
S1 = 1; }
if (digitalRead(7) == 1)
{
S2 = 1;
}
if (digitalRead(8) == 1)
{
S3 = 1;
}
}
}

```

7. PRACTICAL APPLICATIONS :

Malls, Shopping centers, Amusement parks, Restaurants, etc.. where parking of vehicles becomes important as if one wants to park vehicle, he has to check each and every spot for availability of slot for parking and if he doesn't find any then he has to go search somewhere else for parking which will be a waste of time as well as fuel.

Introducing Smart Parking System into these areas the person can see from outside that if any parking slot is available or not. If available then in which slot so that his time and fuel does not get wasted and if slot isn't available then he can search for somewhere else for parking availability instead of wasting his time and fuel in searching of parking slot where there will be no slot.

8. FUTURE ENHANCEMENTS :

To his facility Automatic Billing System can be added so that based on a person's car parking time, the amount can be calculated appropriately and similar to the FASTAG amount can be automatically deducted from the person's account, so that it won't be time consuming for the person to pay and also no tension for the person in charge to keep a track of the customer's car that how much time a customer's car is parking because in a parking lot there might be hundreds of slots, it will become difficult to keep track on every car when it came and when it will leave and to calculate the amount. So introducing automatic billing system to this project will be a great idea in order to prevent all the above difficulties.

