Smart home project

01 Introduction

Our project is a smart home prototype that provides security and safety features that people need these days, many sensors have been used to offer convenience and safety

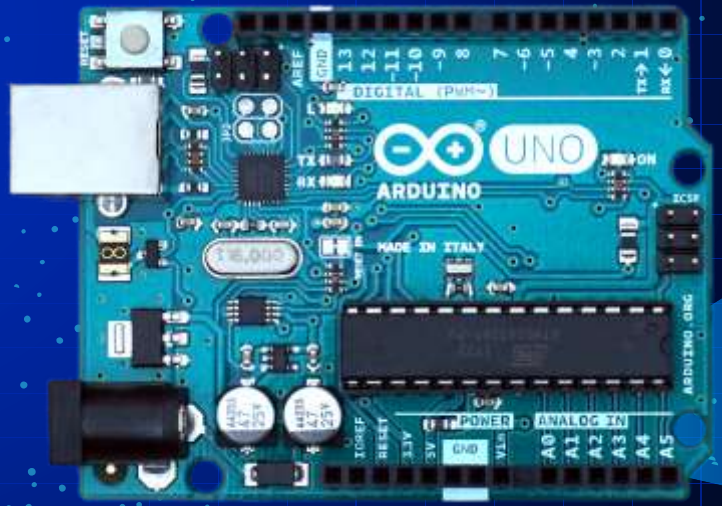
02
Project Hardware

Arduino Leonardo

The Arduino Leonardo is a microcontroller board based on the ATmega32u4. It has 20 digital input/output pins (of which 7 can be used as PWM outputs and 12 as analog inputs), a 16 MHz crystal oscillator, a micro-USB connection, a power jack, an ICSP header, and a reset button.

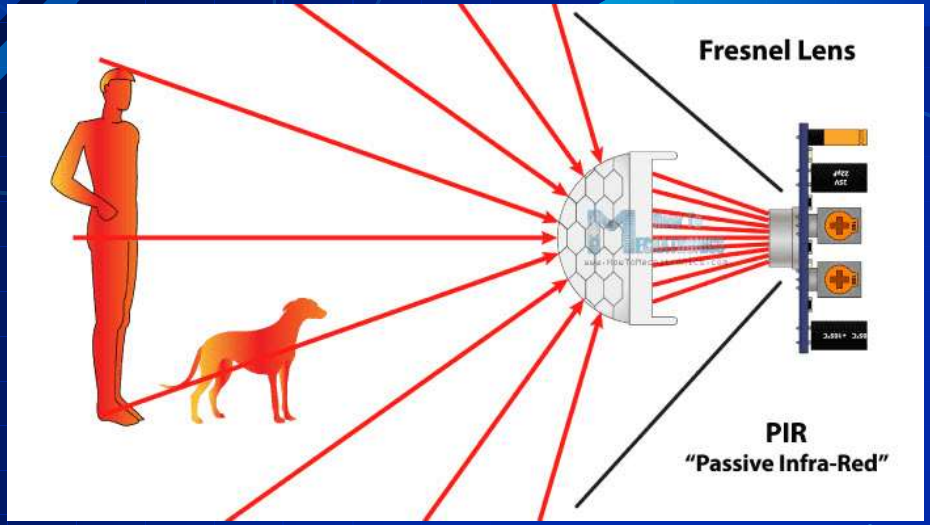
Arduino UNO

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.

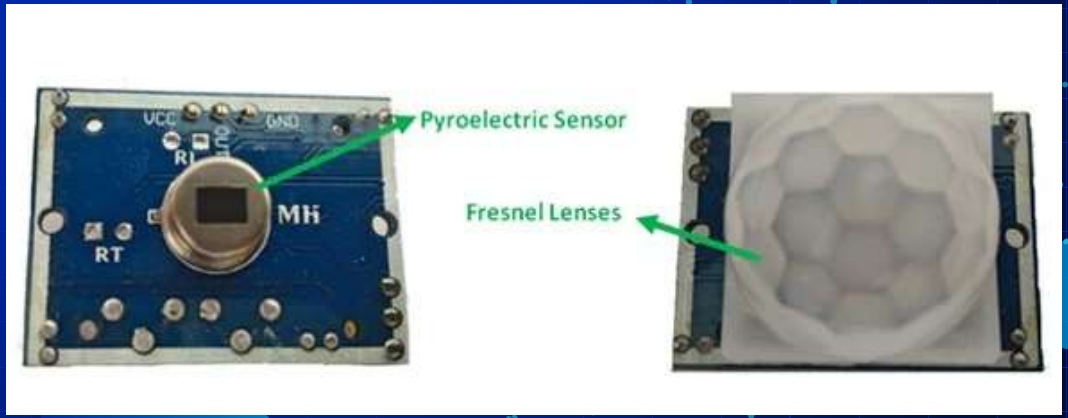


PIR Sensor

A PIR is a passive infrared sensor used to detect motion, so a PIR is a passive motion detector that waits for infrared temperature from body heat to trigger an activity. In other words, it can sense motion through changes in temperature.

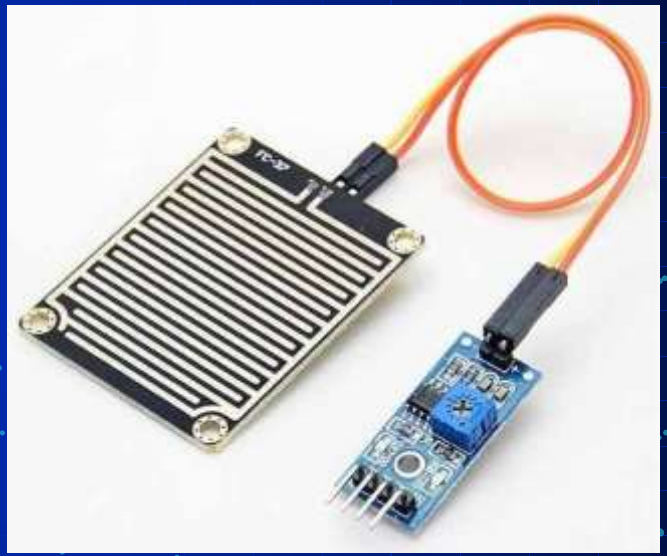

Fresnel Lens
PIR
"Passive Infra-Red"

✓ How it work?


VCC
GND
RT
Pyroelectric Sensor
Fresnel Lenses

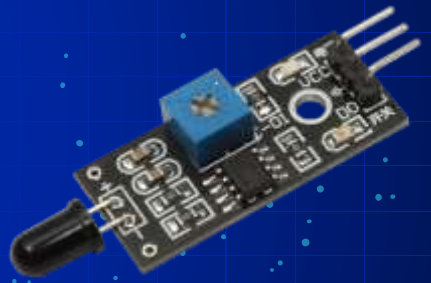
Rain Sensor

This sensor detects the rain and gives an alert to concerned persons in different fields like irrigation, automobile communication, home automation, etc.



Flame Sensor

A flame-sensor is one kind of detector which is mainly designed for detecting as well as responding to the occurrence of a fire or flame. The flame detection response can depend on its fitting. The response of these sensors is faster as well as more accurate compare with a heat/smoke detector because of its mechanism while detecting the flame.



RFID

RFID is an acronym for “radio-frequency identification” and refers to a technology whereby digital data encoded in RFID tags or smart labels (defined below) are captured by a reader via radio waves.

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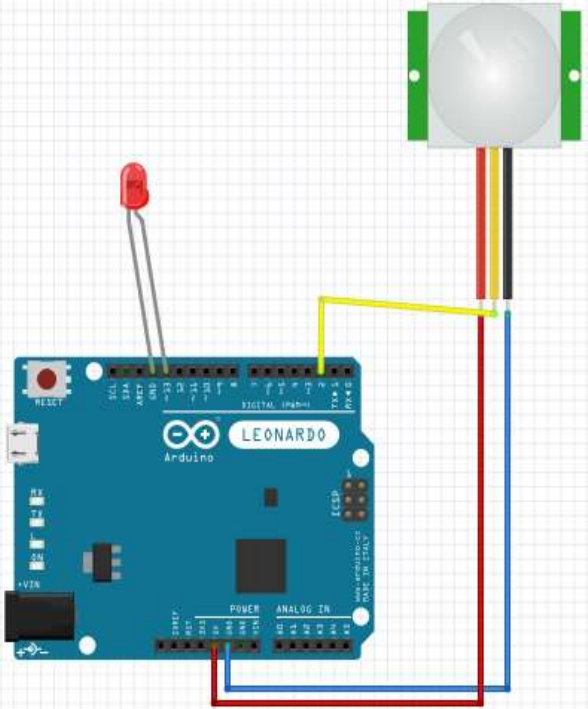
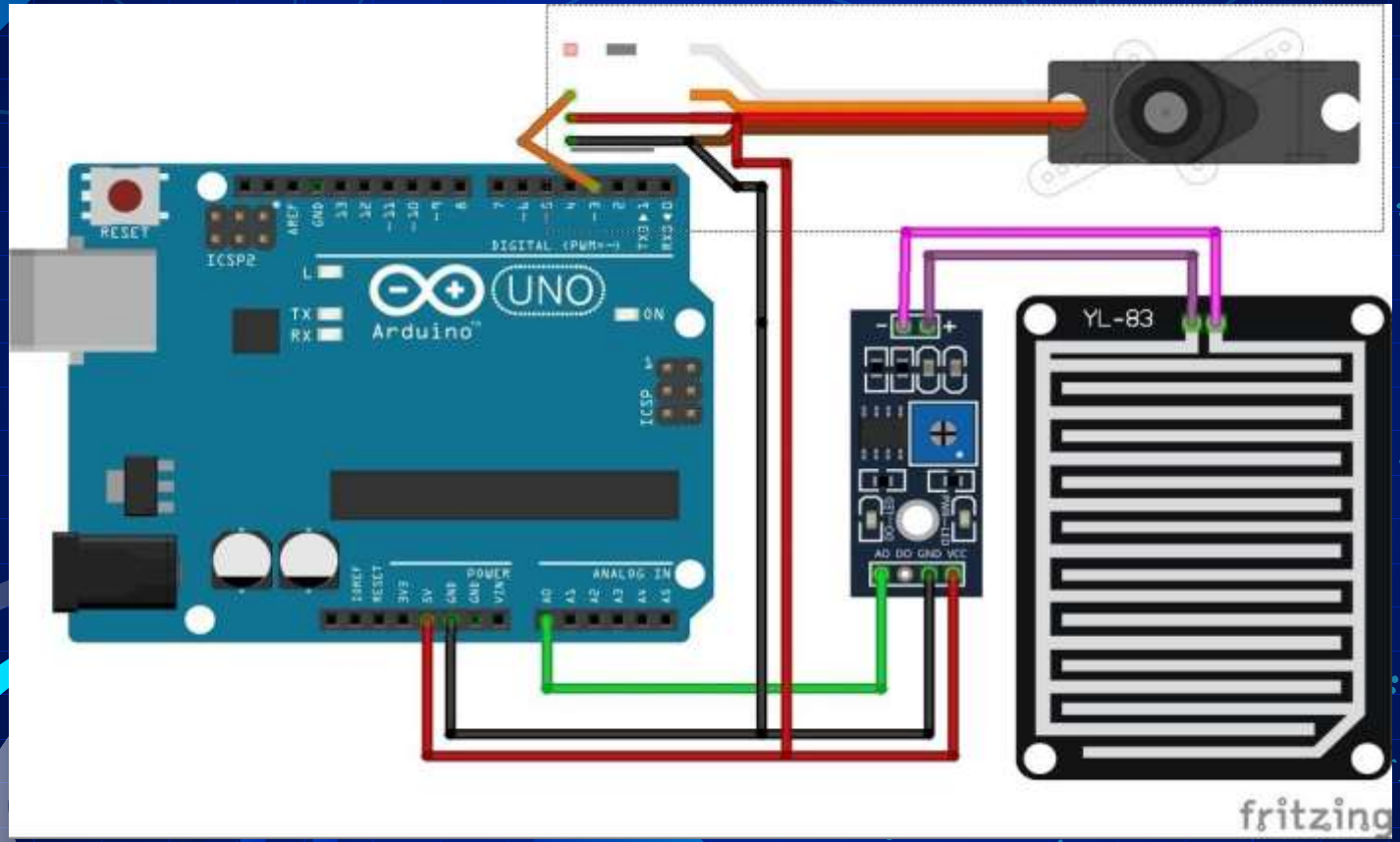
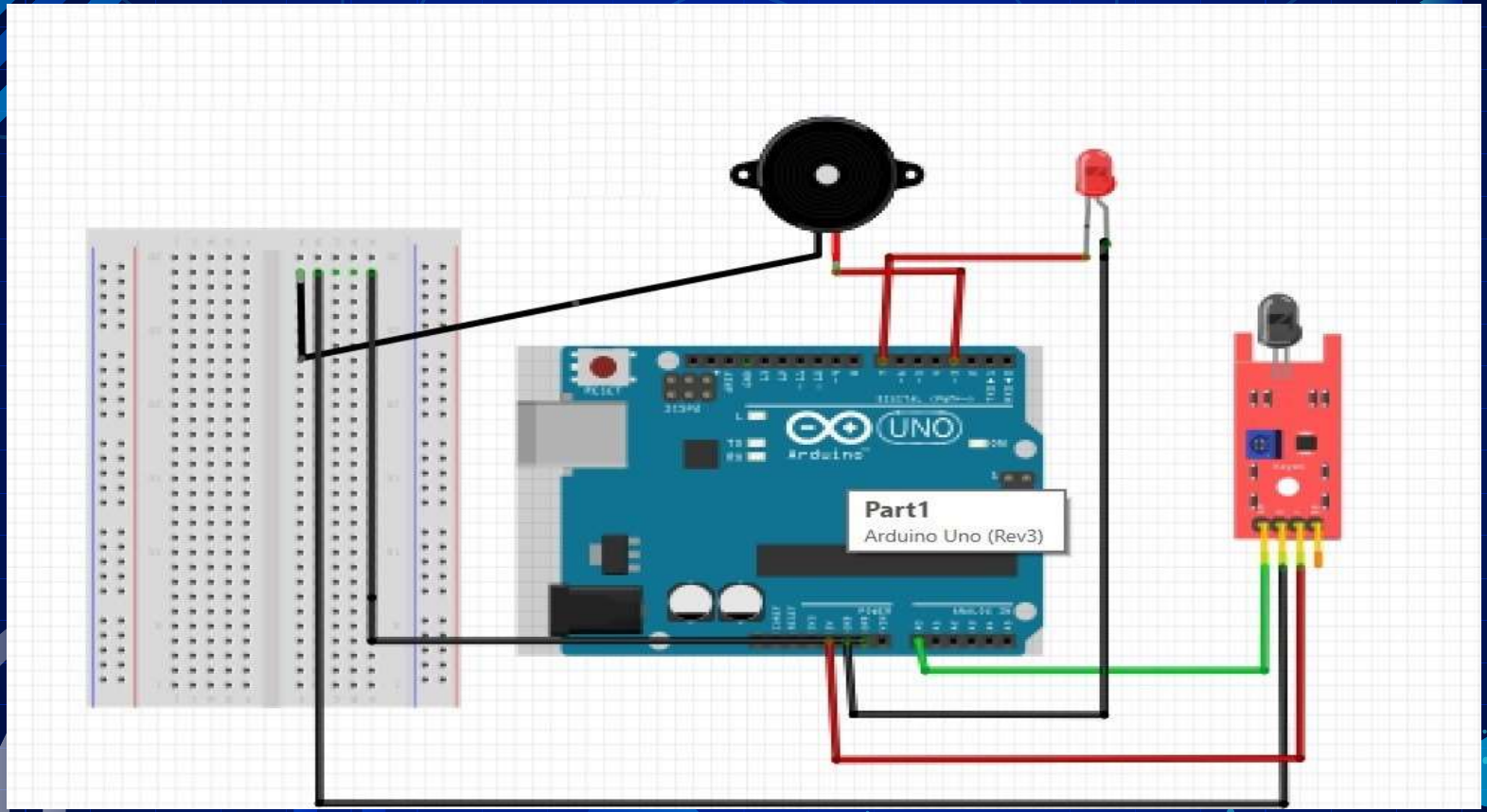
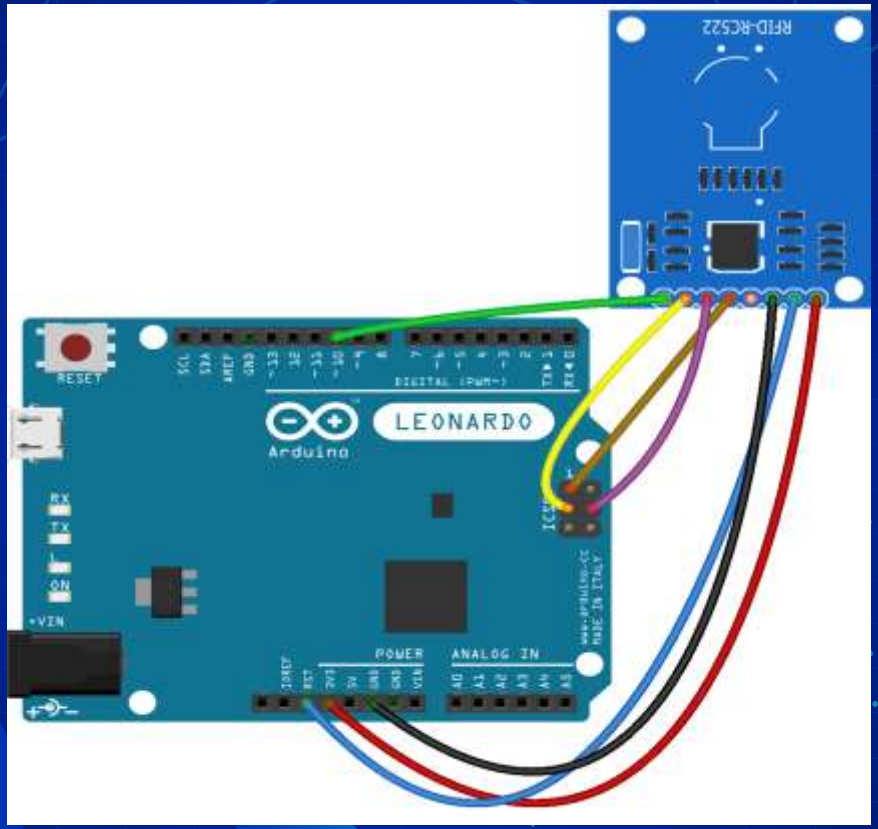
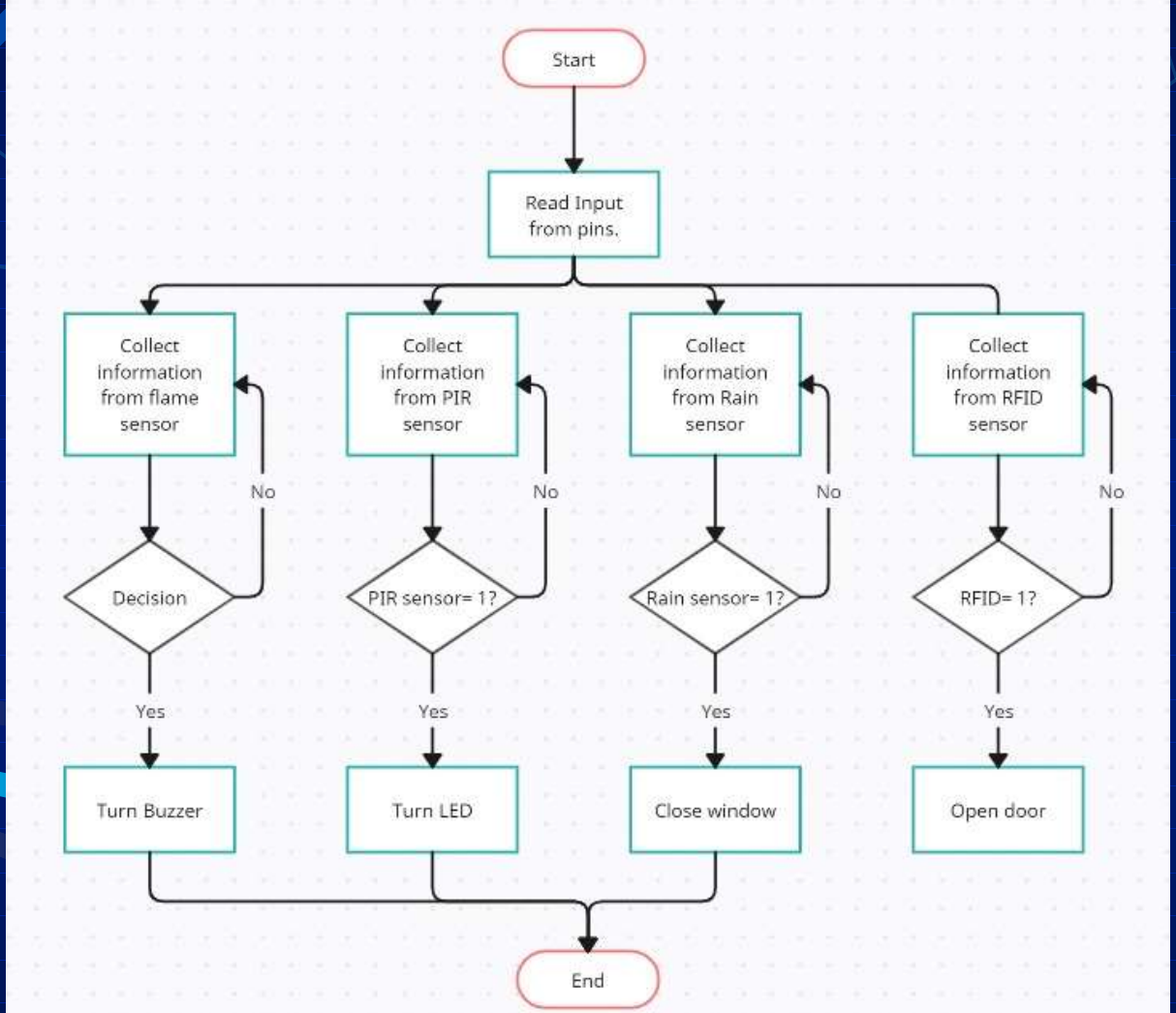

RESET
LEONARDO
Arduino
POWER
ANALOG IN
fritzing


RESET
ICSP2
DIGITAL (PWM~)
UNO
Arduino
TX
RX
ON
ICSP
POWER
ANALOG IN
AD DO GND VCC
YL-83
fritzing


UNO
Arduino
Part1
Arduino Uno (Rev3)


RFID-RC522
RESET
LEONARDO
Arduino
RX
TX
ON
POWER
ANALOG IN


Start
Read Input from pins.
Collect information from flame sensor
Collect information from PIR sensor
Collect information from Rain sensor
Collect information from RFID sensor
No
No
No
No
Decision
PIR sensor= 1?
Rain sensor= 1?
RFID= 1?
Yes
Yes
Yes
Yes
Turn Buzzer
Turn LED
Close window
Open door
End

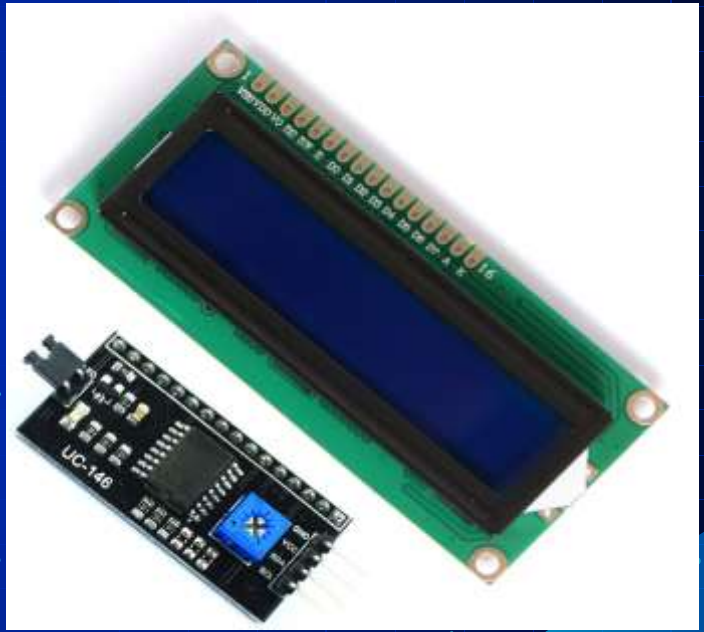
IR-Infrared sensor

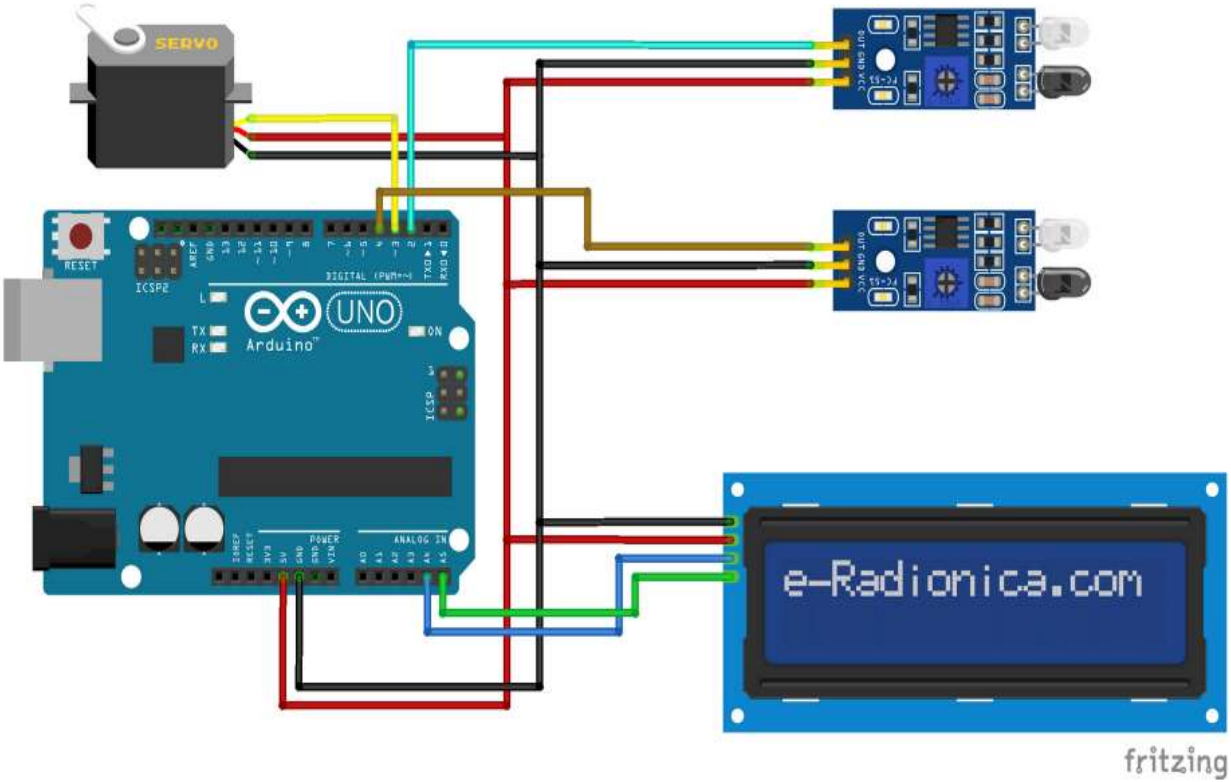
Infrared Sensor is most used sensor in wireless technology where remote controlling functions and detection of surrounding objects/ obstacles are involved.

Example of IR sensor:

Liquid Crystal Display (LCD)

16x2 LCD modules are very commonly used in most embedded projects, the reason being its cheap price, availability, programmer friendly and available educational resources.




SERVO
RESET
ICSP2
UNO
Arduino
TX
RX
ON
ICSP
POWER
ANALOG IN
e-Radionica.com
fritzing

3
Project code

Smart home code

```
#include <Servo.h>
#include <SPI.h>
#include <MFRC522.h>

#define SS_PIN 10
#define RST_PIN 9
MFRC522 mfrc522(SS_PIN, RST_PIN);   // Create MFRC522 instance.
String cards[] ={ "F9 48 01 7F","1B 3A 65 0A"};
String users[] = {"Smart home ","Team"};

Servo tap_servo;
Servo myservo;

int sensor_pin = 2;
int tap_servo_pin =6;
int val;

int Buzzer = 4; // Use buzzer for alert
int FlamePin = 3;  // This is for input pin
int Flame;

int led = 11;
int PIR = 5;
int PIR_val = 0;

```

Continue ...

```
void setup(){
  pinMode(sensor_pin,INPUT);
  tap_servo.attach(tap_servo_pin);

  pinMode(Buzzer, OUTPUT);
  pinMode(FlamePin, INPUT);
  Serial.begin(9600);

  pinMode(led, OUTPUT);
  pinMode(PIR, INPUT);

  Serial.begin(9600);   // Initiate a serial communication
  SPI.begin();      // Initiate  SPI bus
  mfrc522.PCD_Init();   // Initiate MFRC522
  Serial.println("Scan Your Tag...");
  Serial.println();
  myservo.attach(7);

}
```

```
void loop(){
  val = digitalRead(sensor_pin);

  if (val==0)
  {tap_servo.write(90);
  }
  if (val==1)
  {tap_servo.write(0);
    }

  Flame = digitalRead(FlamePin);
  if (Flame == 1)
  {
    digitalWrite(Buzzer, HIGH);
  }
  else
  {
    digitalWrite(Buzzer, LOW);
  }
```

Continue ...

```
66  PIR_val = digitalRead(PIR);
67  if (PIR_val == HIGH)
68   {
69  digitalWrite(led, HIGH);
70  }
71  else
72  {
73  digitalWrite(led, LOW);
74  }
```

```
76  // Look for new cards
77  if ( ! mfrc522.PICC_IsNewCardPresent())
78  {
79    return;
80  }
81  // Select one of the cards
82  if ( ! mfrc522.PICC_ReadCardSerial())
83  {
84    return;
85  }
86  //Show UID on serial monitor
87  Serial.print("UID tag :");
88  String content= "";
89  byte letter;
90  for (byte i = 0; i < mfrc522.uid.size; i++)
91  {
92     Serial.print(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " ");
93     Serial.print(mfrc522.uid.uidByte[i], HEX);
94     content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " "));
95     content.concat(String(mfrc522.uid.uidByte[i], HEX));
96  }
```

Continue ...

```
97    Serial.println();
98    Serial.print("Message : ");
99    content.toUpperCase();
100   if (content.substring(1) == cards[0] )
101   {
102
103     Serial.println("Access Granted");
104     Serial.print("User: ");
105     Serial.println(users[0]);
106     unlock();
107     lock();
108     }
109     else if (content.substring(1) == cards[1] )
110   {
111
112     Serial.println("Access Granted");
113     Serial.print("User: ");
114     Serial.println(users[1]);
115     unlock();
116     lock();
117     }
118   else   {
119     Serial.println(" Access denied");
120     delay(1000);
121   }
```

```
void unlock()
{
 for (int pos = 0; pos <= 180; pos += 1)
      {
      myservo.write(90);
      delay(15);
      }
 delay(3000);
}
void lock()
{
   for (int pos = 180; pos >= 0; pos -= 1) {
    myservo.write(180);
    delay(15);
  }
}
```

Car parking system code

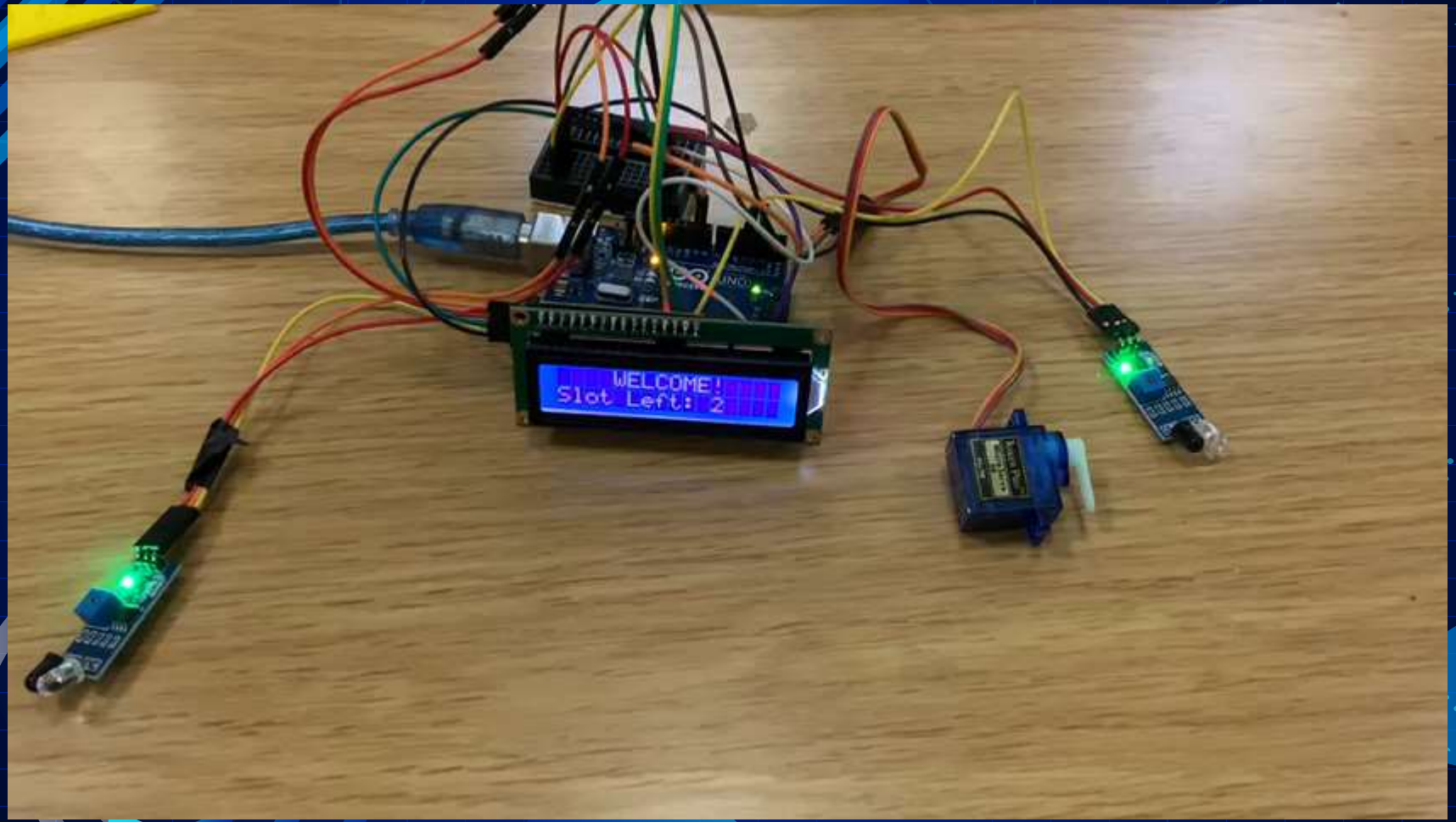
```
#include <LiquidCrystal_I2C.h>

#include <Wire.h>
LiquidCrystal_I2C lcd(0x27, 16, 2);
#include <Servo.h>

Servo myservo1;

int IR1 = 12;
int IR2 = 2;

int Slot = 2;

int flag1 = 0;
int flag2 = 0;

pinMode(IR1, INPUT);
pinMode(IR2, INPUT);

myservo1.attach(3);
myservo1.write(90);

lcd.init();
lcd.backlight();
lcd.setCursor (0,0);
lcd.print("     ARDUINO    ");
lcd.setCursor (0,1);
lcd.print(" PARKING SYSTEM ");
delay (2000);
lcd.clear();
}
```

Continue ...

```
35  void loop(){
36
37  if(digitalRead (IR1) == LOW && flag1==0){
38  if(Slot>0){flag1=1;
39  if(flag2==0){myservo1.write(0); Slot = Slot-1;}
40  }else{
41  lcd.setCursor (0,0);
42  lcd.print("    SORRY :(    ");
43  lcd.setCursor (0,1);
44  lcd.print("  Parking Full  ");
45  delay (3000);
46  lcd.clear();
47  }
48  }
49
50  if(digitalRead (IR2) == LOW && flag2==0){flag2=1;
51  if(flag1==0){myservo1.write(0); Slot = Slot+1;}
52  }
53
54  if(flag1==1 && flag2==1){
55  delay (1000);
56  myservo1.write(100);
57  flag1=0, flag2=0;
58  }
59
60  lcd.setCursor (0,0);
61  lcd.print("    WELCOME!    ");
62  lcd.setCursor (0,1);
63  lcd.print("Slot Left: ");
64  lcd.print(Slot);
65  }
```

Abdallah Nader | | 0206921
Ahmad Abu-Diak | | 0207744
Hasan Fuad | | 0207670
Osama Awad | | 0206505
Ahmad Riyad | | 0202679
Mohammad Ali | |0207684
Mmohammad AlNajjar | | 0207904

Thank You ..!


WELCOME!
Slot Left: 2