Infrared (IR) SENSOR INTERFACING WITH ARDUINO

Introduction

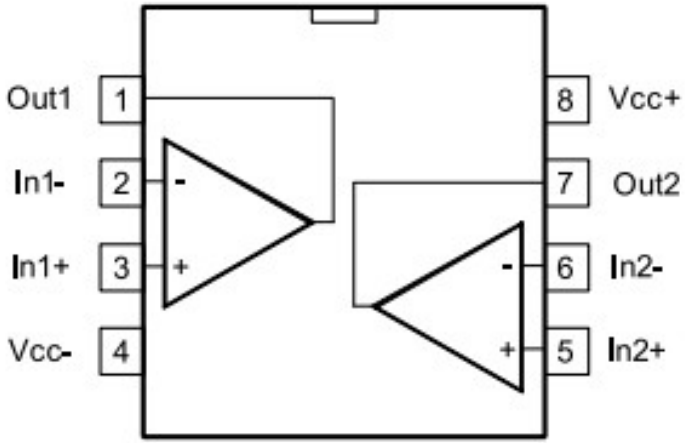
Infrared sensor commonly called by the name IR sensor is one of the most widely used sensor for detecting any object in the close proximity of the sensor module.

This is the most commonly used sensor in Robotics applications where it is required to give a signal to the Arduino board about an obstacle that comes in the way of the robot.

The IR LED emits light when it is forward biased and when these radiations are reflected from the nearby object then they are detected by the photodiode. The photodiode generates a small voltage signal whenever it detects the reflected IR rays.

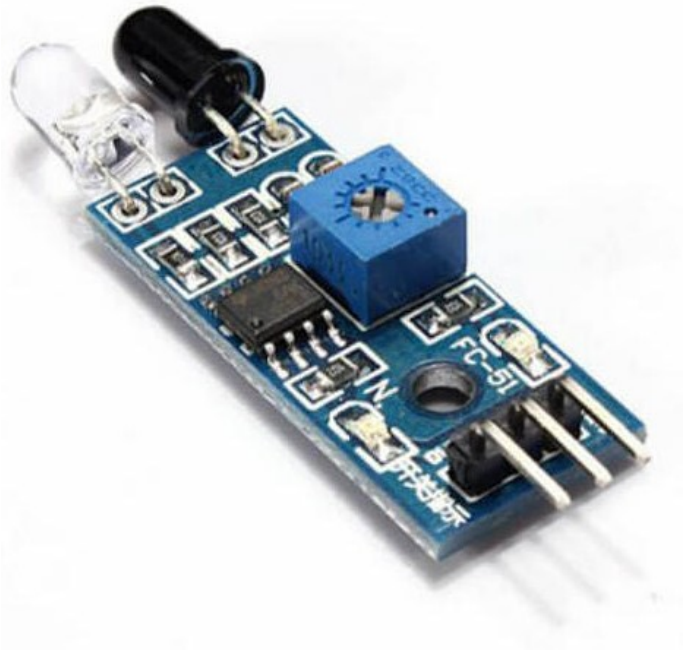
This sensor has a very short range of detecting a target of around 10 cm.

LM358 Comparator IC

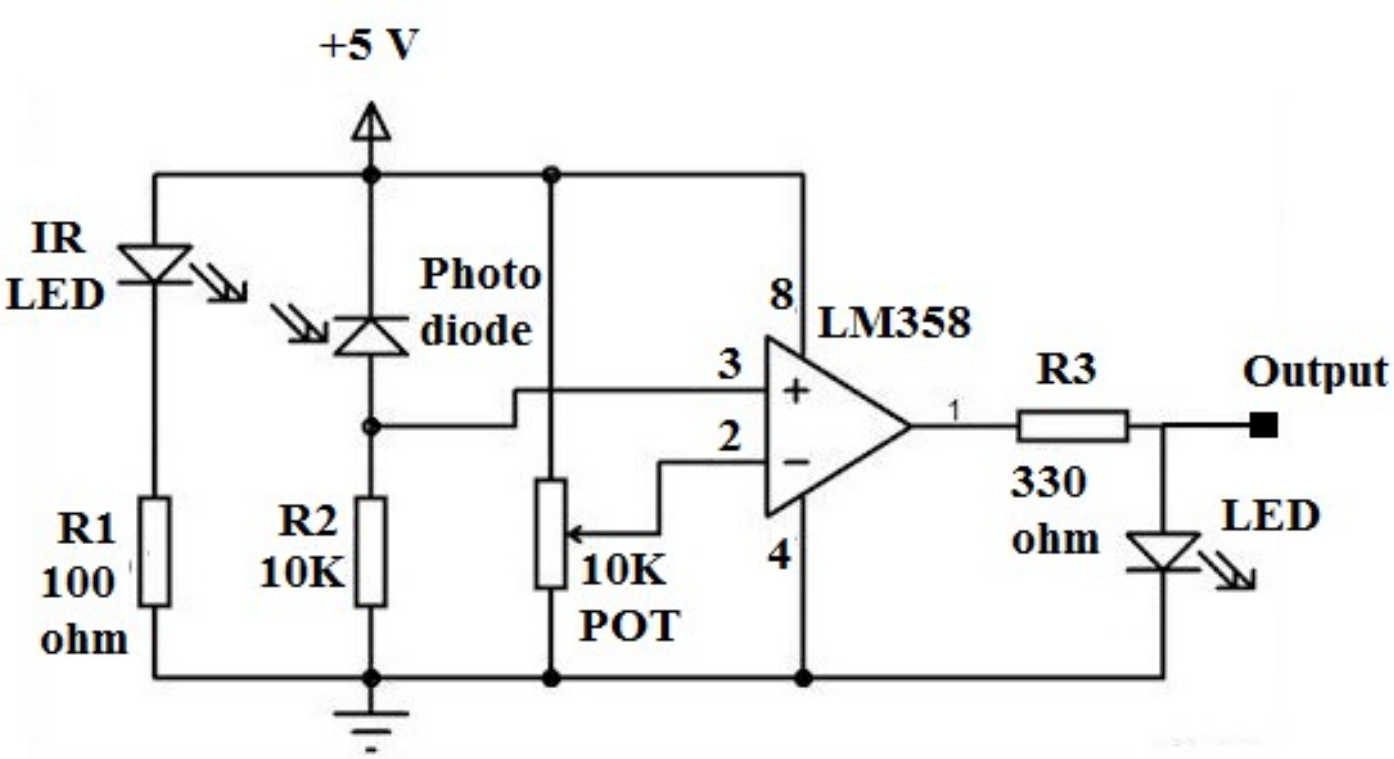


Pin Details	Functionality
In1-	Inverting input of OPAMP1
In1+	Non-Inverting input of OPAMP1
Out1	Output of OPAMP1 Out1 = 1 if In1+ > In1- Out1 = 0 if In1+ < In1-
Vcc-	Ground pin connected to circuits common ground
In2-	Inverting input of OPAMP2
In2+	Non-Inverting input of OPAMP2
Out2	Output of OPAMP2 Out2 = 1 if In2+ > In2- Out2 = 0 if In2+ < In2-
Vcc+	Supply voltage pin connected to +5V

IR Sensor Module



IR Sensor Circuit

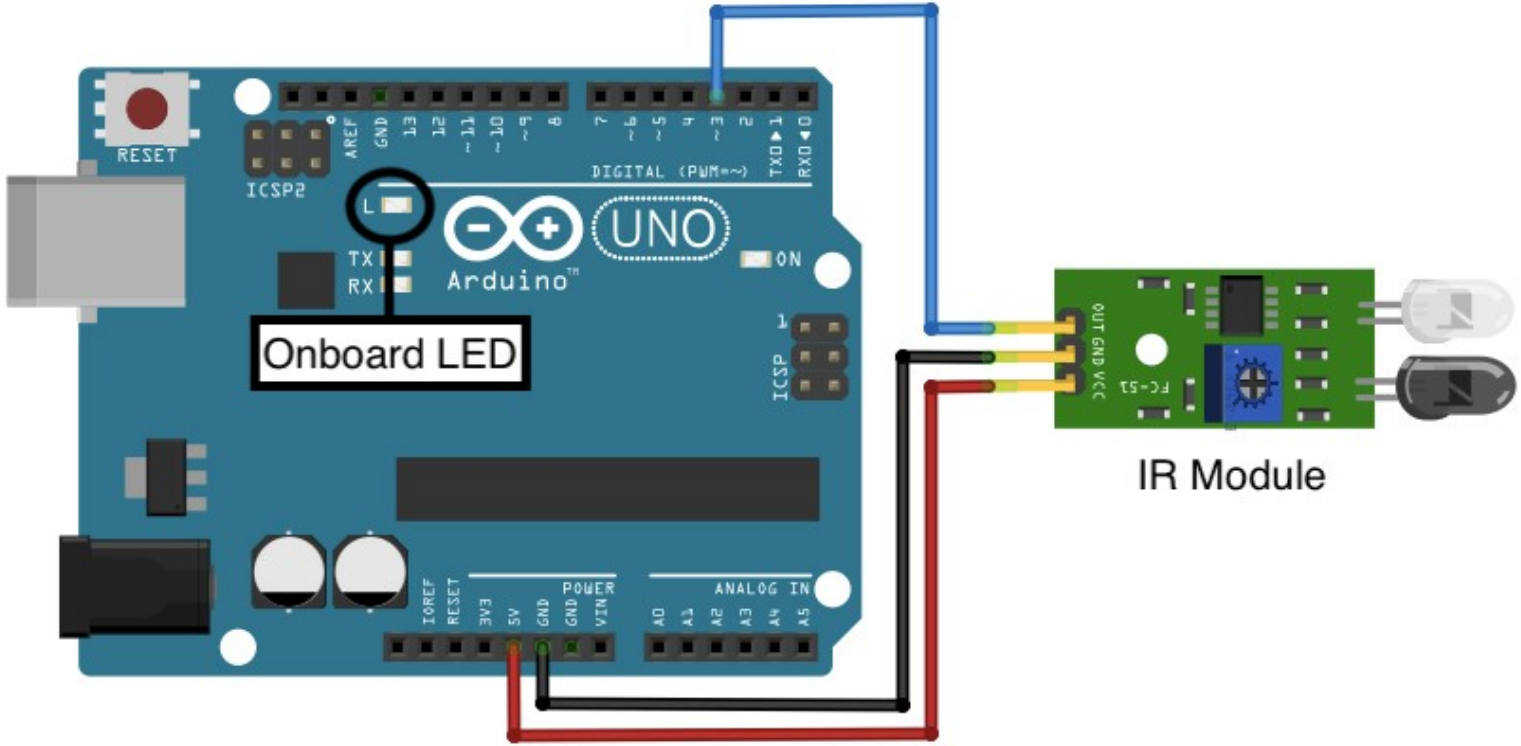


Circuit Description

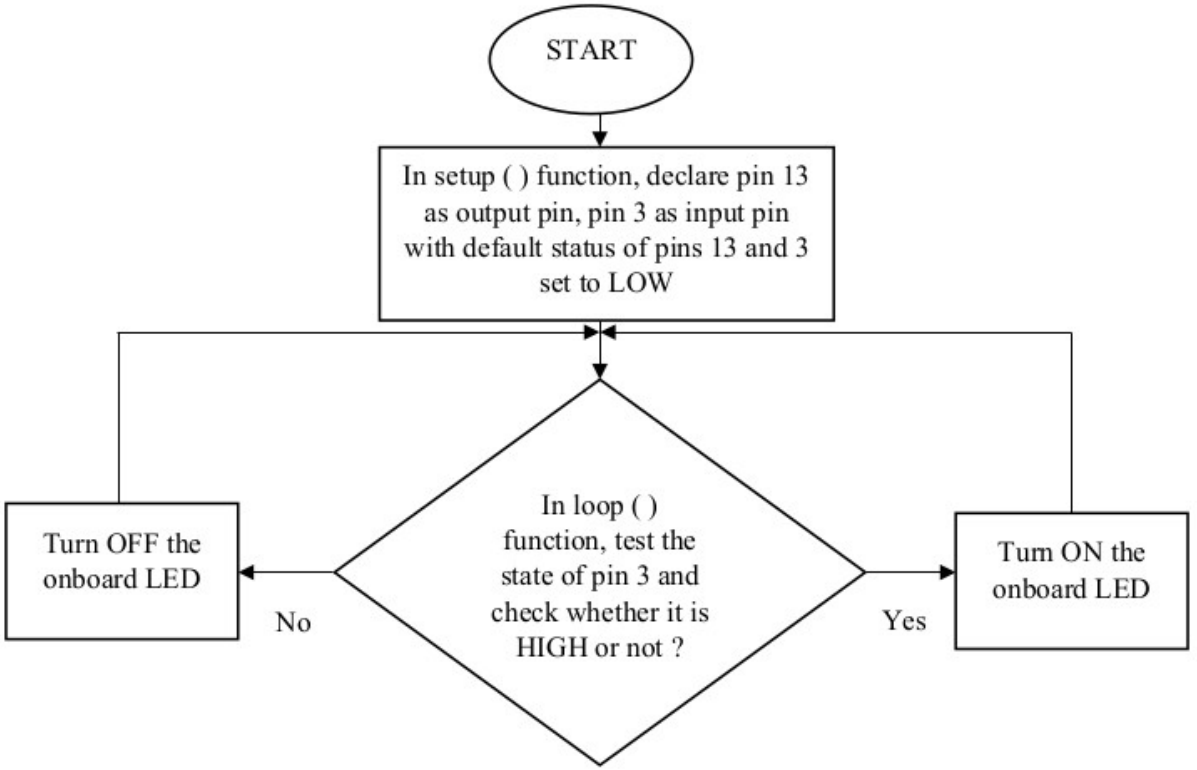
When no obstacle is in the proximity of the sensor, then the output of the sensor will be at logic LOW. This is because there will be almost negligible IR light that is returned back and hence the voltage across the detector will be less as compared to the preset voltage value that is set using 10 K ohm potentiometer.

The output of the sensor becomes HIGH when an obstacle is detected i.e. an object comes within the range of the sensor. This is because the reflected light from obstacle will cause an increase in detector current and also the detector voltage. So now the voltage across the Non inverting terminal of LM358 IC will be more as compared to inverting terminal input and hence it outputs a logic HIGH signal.

Interfacing Diagram



Flow Chart

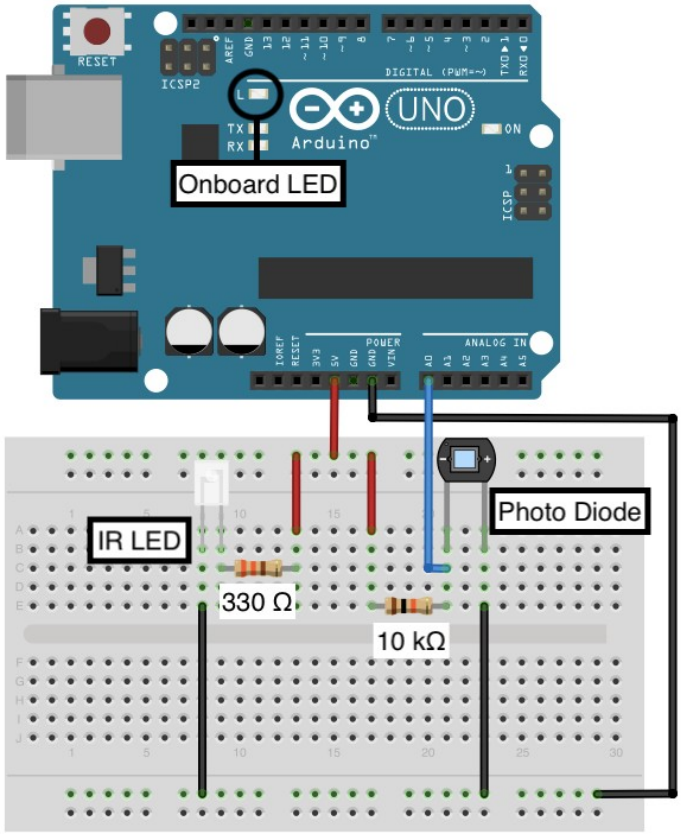

START
In setup ( ) function, declare pin 13 as output pin, pin 3 as input pin with default status of pins 13 and 3 set to LOW
In loop ( ) function, test the state of pin 3 and check whether it is HIGH or not ?
No
Yes
Turn OFF the onboard LED
Turn ON the onboard LED

Code

```
int delta;
// creating a variable 'delta' to store input value from the IR sensor
void setup()
{
// put your setup code here, to run once:
Serial.begin(9600);
// Configuring serial communication at 9600 bps baud rate
pinMode(13, OUTPUT);
// Configuring built in LED on pin 13 as Output
digitalWrite(13, LOW);
// LED is OFF in the beginning
pinMode(3, INPUT);
// connecting the sensor to pin 3 on the Arduino
}
void loop()
{
delta = digitalRead(3);
Serial.println(delta);
if (delta==0)
// no object is around the sensor
{
digitalWrite(13, LOW);
}
else
// an object is in the proximity of the sensor
{
digitalWrite(13, HIGH);
}
delay(1000);
}
```

Alternative Approach

The output of the photodiode is fed to one of the analog channels and the integer equivalent output of the voltage of photodiode output is compared with a threshold value.



Code

```
int delta;
setup() {
// put your setup code here, to run once:
Serial.begin(9600);
//serial communication at 9600 bps baud rate
pinMode(13, OUTPUT);
// Configuring built in LED on pin 13 as Output
digitalWrite(13, LOW);
// LED is OFF in the beginning
}
```

```
void loop() {
delta = analogRead(A0);
Serial.println(delta);
if (delta<=300) // change this value by testing your surrounding
// no object is around the sensor
{
digitalWrite(13, LOW);
}
else
// an object is in the proximity of the sensor
{
digitalWrite(13, HIGH);
}
delay(1000);
}
```