

MES's Wadia College of Engineering Pune-01
Department of Computer Engineering

Name of Student:	Class:
Semester/Year:	Roll No:
Date of Performance:	Date of Submission:
Examined By:	Experiment No: 03

ASSIGNMENT NO: 03

AIM: Understanding the connectivity of Raspberry-Pi /Beagle board circuit with IR sensor.
Write an application to detect obstacle and notify user using LEDs.

OBJECTIVES:

- To interface Proximity sensor with Raspberry Pi model
- To program the Raspberry Pi model to detect the nearest object using proximity sensor and give indication through led.

APPARATUS:

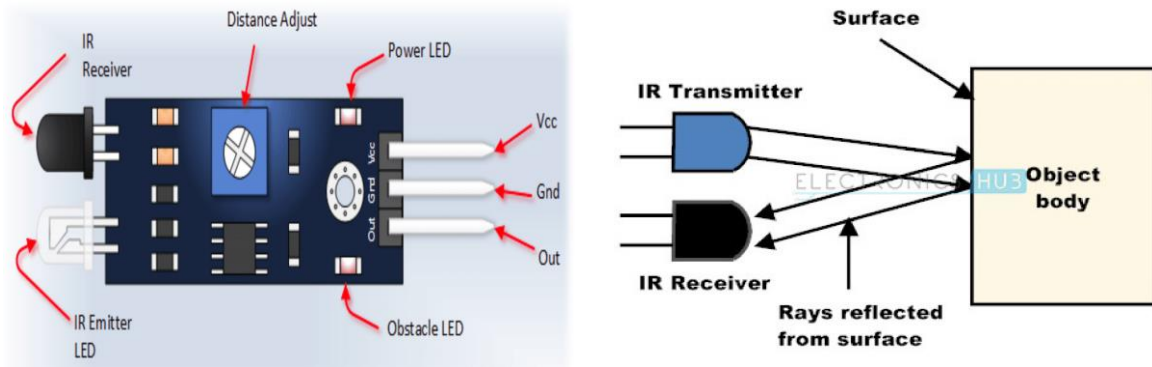
Raspberry Pi 3/4, IR (Infrared) Sensor, 1 LED, 1 Resistor (330 Ω), Few jumper cables, 1 Breadboard.

THEORY:

IR (Infrared) Sensor:

- An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.
- Infrared waves are not visible to the human eye. In the electromagnetic spectrum, infrared radiation can be found between the visible and microwave regions.
- The infrared waves typically have wave lengths between 0.75 and 1000 μm
- Proximity IR sensor is a small board containing an IR transmitter, photodiode, IR Receiver and some processing circuitry.
- This is a discrete sensor that senses when an object comes near to the sensor face
- It works by detecting reflected light coming from its own infrared lights
- By measuring the amount of reflected infrared light & it can glow Onboard led when object is directly front of it.
- In Proximity, it consists of two leds, one is the transmitter (IR LED) and another is receiver (photodiode).
- The IR led transmits the infrared light signal which reaches till the object and deflects back.
- The Photo diode receives the deflected light.
- This signal is then amplified & status of this signal is checked by the microcontroller.
- Proximity sensor is more sensitive but it detects only object but cannot measure a distance value.
- By using a potentiometer, we can change sensitivity accordingly.
- When this sensor detects the object, it gives output as a digital value i.e. '1' and if not detected then the value is '0'

IR Sensor structure:



Circuit: To detect obstacles:

- **Part 1: Connecting IR Sensor**

IR Sensor has 3 pins, viz VCC, GND and OUT. We will use GPIO 18 (do not get confused with pin number 18) for receiving input from the sensor.

1. Connect the VCC pin of IR sensor to 3.3 V (pin) of Raspberry Pi module
2. Connect the GND pin of IR sensor to GND pin of Raspberry Pi module
3. Connect the DATA pin of IR sensor to pin GPIO 18 of Raspberry Pi module

- **Part 2: Connecting LED**

1. Connect positive point of the LED (longer pin of the LED) to GPIO 4 from the Raspberry Pi module via Breadboard.
2. Connect negative point of the LED (smaller pin of the LED) to GND pin of Raspberry Pi module via Breadboard.

CONCLUSION: We have successfully implemented an application to detect obstacle using IR sensor and notified user using LED.

QUESTIONS:

1. List and explain types of IR sensor.
2. Write the working principle of IR sensor with neat diagram.
3. Explain any two applications of IR Sensor.
4. Give the connections used to perform this assignment.