

Understanding the connectivity of Raspberry Pi board circuit with IR sensor (Proximity)

Aim/Objectives:

- To understand the concept of Proximity sensor
- 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.

Software:

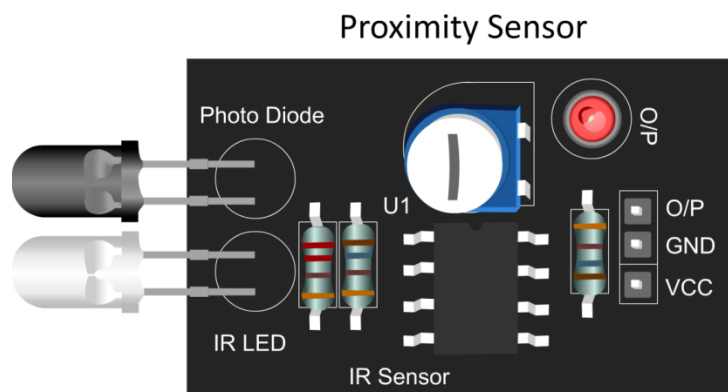
- Raspbian OS (IDLE)

Hardware Modules:

- Raspberry Pi Board
- Proximity sensor, Led, 330 ohm register
- Monitor

Theory:

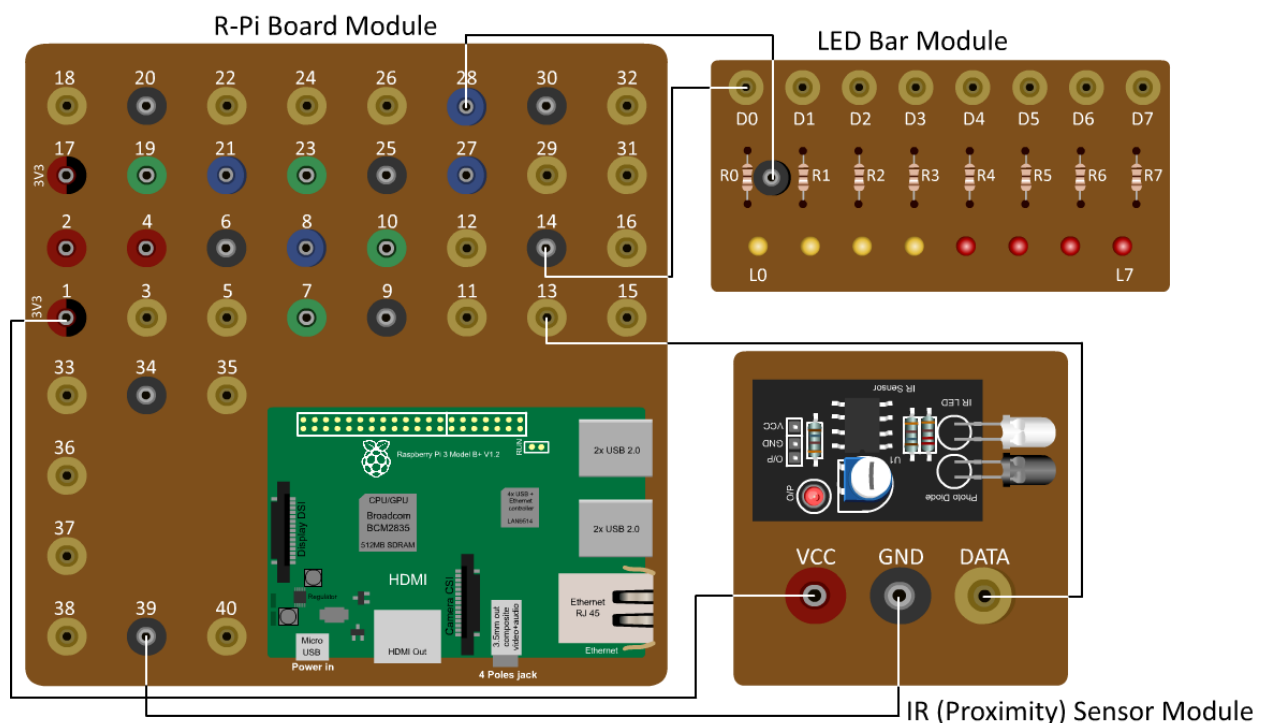
- Proximity IR sensor is a small board containing an IR transmitter, photodiode, IR Receiver and some processing circuitry.
- This is a discrete sensor that senses when an object comes near to the sensor face
- It works by detecting reflected light coming from its own infrared lights
- By measuring the 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'



Safety precautions:

- Raspberry-Pi provides 3.3V and 5V VCC pins
- Raspberry-Pi operates on 3.3V.
- Various sensors and actuators operate on different voltages.
- Read datasheet of a given sensor or an actuator and then use appropriate VCC pin to connect a sensor or an actuator.
- Ensure that signal voltage coming to the Raspberry-Pi from any sensor or actuator does not exceed 3.3V.
- If signal/data coming to Raspberry-Pi is greater than 3.3V then use voltage level shifter module to decrease the incoming voltage.
- The Raspberry-Pi is a costly device, hence you should show the circuit connections to your instructor before starting your experiment.

Interface diagram:



Steps for assembling circuit:

- Connect the VCC pin of Proximity sensor to 3.3 V (pin) of Raspberry Pi module
- Connect the GND pin of Proximity sensor to GND pin of Raspberry Pi module
- Connect the DATA pin of Proximity sensor to pin '15' of Raspberry Pi module
- Connect the D0 pin of LED bar to pin '16' of Raspberry Pi module
- Connect the GND pin of LED bar to GND pin of Raspberry Pi module

Procedure:

- Write the program as per the algorithm given below.
- Save program.
- Run code using Run module.

Algorithm:

- Import GPIO and Time library
- Set mode i.e. GPIO.BOARD
- Set GPIO pin '15' as Input
- Set GPIO pin '16' as Input
- Read input from GPIO pin '15'
- Store the input value in the variable 'i'
- If (i==1) then print the message as "Object is detected" and make the LED ON
- If (i==0) then print the message as "No object detected" and make the LED OFF

Observation:

- See output on Command prompt or Python shell and also check LED status.