



Shalaka Foundation's
Keystone School of Engineering, Pune
T.E. (COMPUTER ENGINEERING)
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EXPERIMENT NO. I

Title:

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

Aim/Objectives:

- To understand the concept of Proximity sensor
- To interface Proximity sensor with Raspberry Pi model / Arduino uno r3
- To program the Raspberry Pi model to detect the nearest object using proximity sensor and give indication through led.

Software:

Raspbian OS (IDLE) / Tinkercad

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.



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- 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'

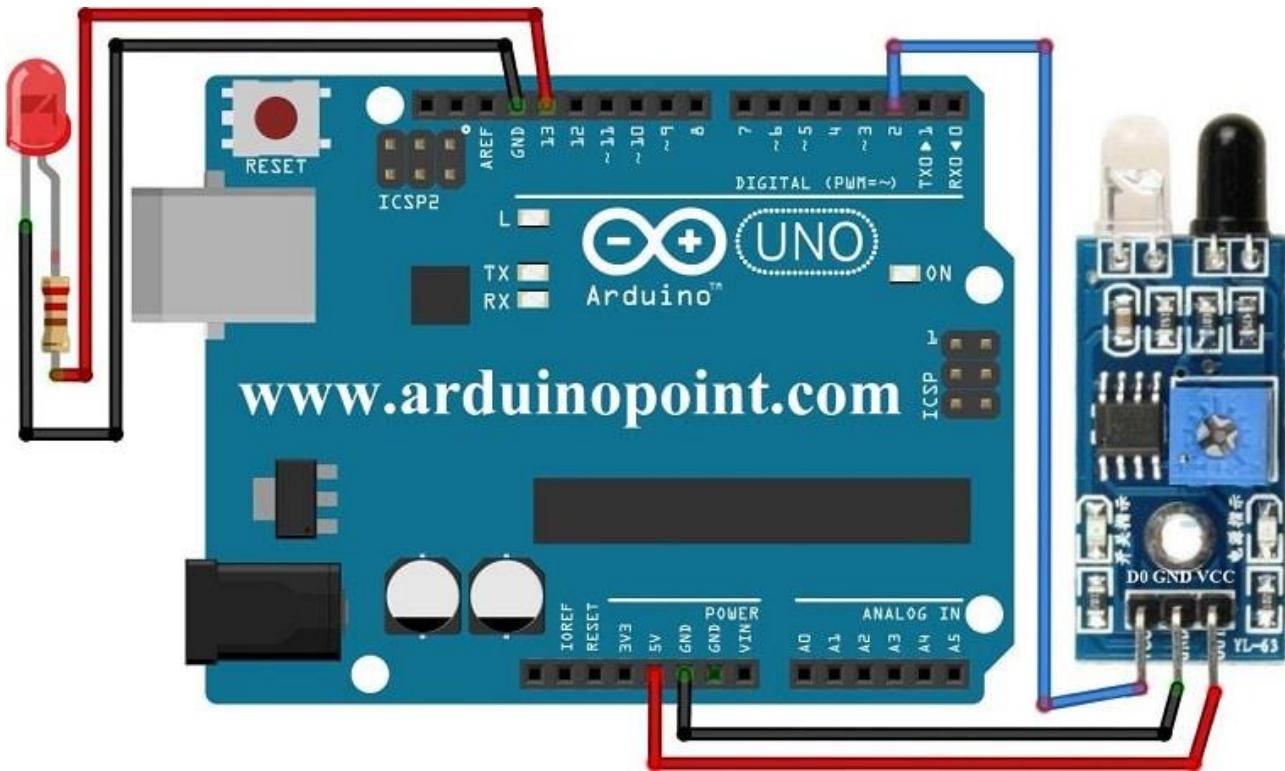


Fig. IR Sensor

Interface Diagram:



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Steps for assembling circuit:

- Connect the signal pin of Proximity sensor to D2 (pin) of Arduino uno r3
- Connect the Power pin of Proximity sensor to 5V pin of Arduino uno r3
- Connect the GND pin of Proximity sensor to GND pin of Arduino uno r3
- Connect Cathode pin of LEDs RGB to GND pin of Arduino uno r3
- Connect Green pin of LEDs RGB to 13 pin of Arduino uno r3
- Connect positive terminal pin of Piezo to GND of Arduino uno r3
- Connect negative terminal pin of Piezo to 12 pin of Arduino uno r3

Procedure:

- Write the program in the cpp / java.
- Save program.
- Run code using Run module.



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Observation:

- See output on Tinkercad dashboard and also check LED status.

Conclusion:

We successfully learnt about the connectivity of Raspberry-Pi /Beagle board circuit(Arduino uno r3) with IR sensor and can be able to Write an application to detect obstacle and notify user using LEDs.



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EXPERIMENT NO. II

Title:

Understanding the connectivity of Raspberry-Pi /Beagle board circuit with temperature sensor. Write an application to read the environment temperature. If temperature crosses a threshold value, the application indicated user using LEDS

Aim/Objectives:

- To understand the concept of Temperature-Humidity sensor (DHT11)
- To interface Temperature-Humidity sensor with Raspberry Pi model
- To program the Raspberry Pi model to measure the real time Temperature and Humidity of the Environment

Software:

Raspbian OS (IDLE) / Tinkercad

Hardware Modules:

- Raspberry Pi Board module
- Temperature-Humidity sensor (DHT11) module
- Monitor

Theory:

- Physical quantities like Humidity, temperature, pressure etc. are monitored to get information about the environmental conditions.
- Temperature is basically amount of heat present in environment. Humidity is the presence of water vapors in air. The Temperature & amount of water vapor in air can affect human comfort as well as many manufacturing processes in industries. The presence of water vapor also influences various physical, chemical, and biological processes.
- In our module we are using "DHT11 Temperature and Humidity Sensor". The features of this sensor are, calibrated digital signal output, and high reliability and excellent long-term stability.
- This sensor has a resistive-type humidity measurement component in which resistivity of semiconductor material changes as per humidity in environment changes.
- This sensor also includes NTC temperature measurement component which detects the change in temperature.



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- DHT11 basically provides two outputs from single data pin semiconductor material.

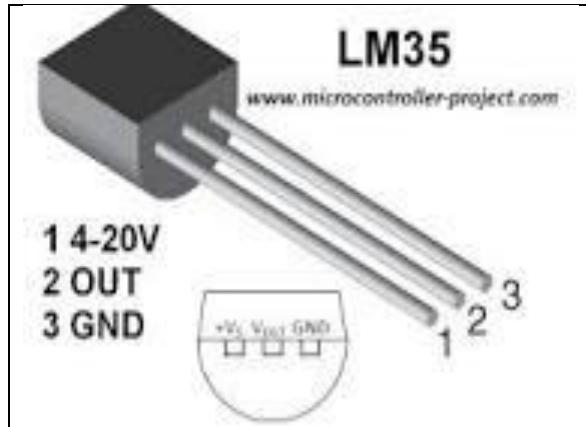
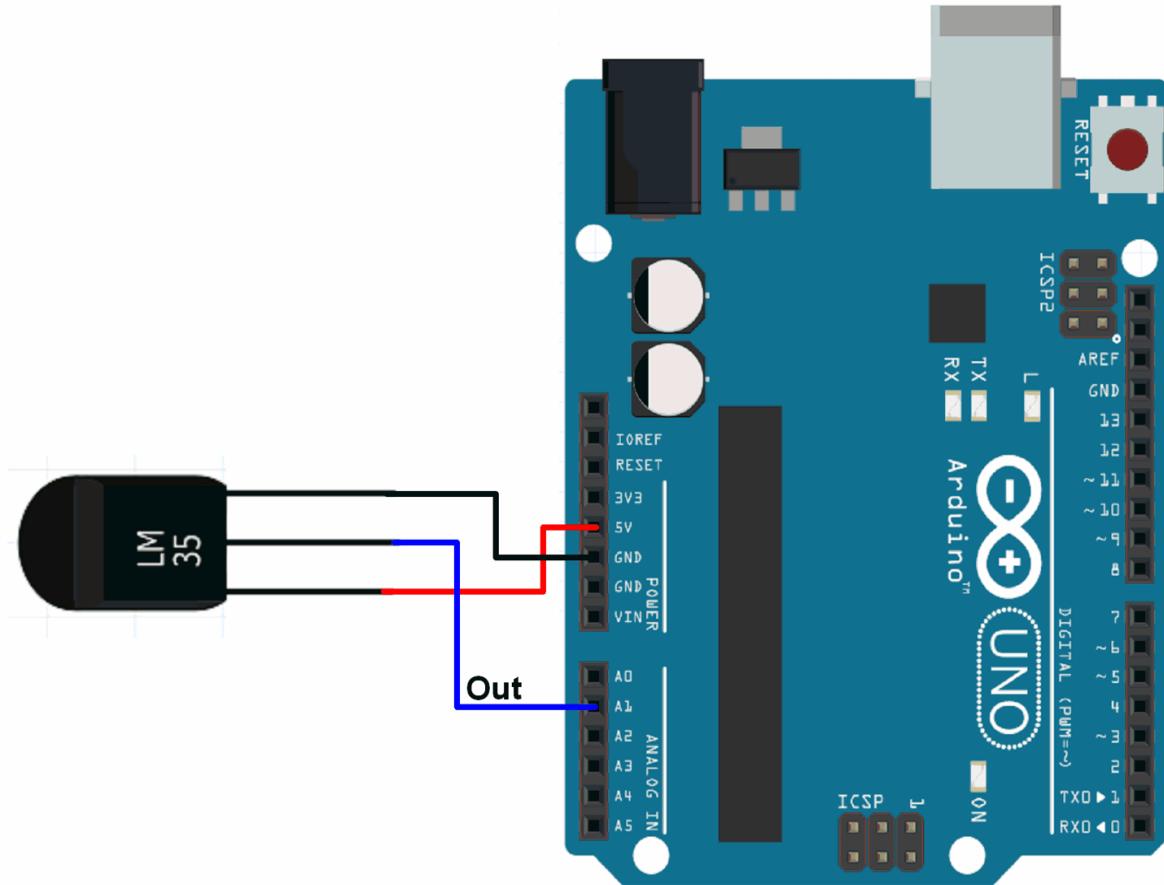


Fig. LM 35 Temperature and Humidity Sensor



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Interface Diagram:





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Steps for assembling circuit:

- Connect the power pin of Temperature sensor to 5V pin of Arduino uno r3
- Connect the Vout pin of Temperature sensor to A2 pin of Arduino uno r3
- Connect the GND pin of Temperature sensor to GND pin of Arduino uno r3
- Connect Cathode pin of LEDs RGB to GND pin of Arduino uno r3
- Connect Green pin of LEDs RGB to 13 pin of Arduino uno r3
- Connect positive terminal pin of Piezo to GND of Arduino uno r3
- Connect negative terminal pin of Piezo to 12 pin of Arduino uno r3

Observation:

- Observe the ON and OFF status of the LEDs RGB and generate alert using tone

Conclusion:

We successfully learnt about the connectivity of Raspberry-Pi /Beagle board circuit (Arduino uno/r3) with temperature sensor And also to read the environment temperature. If temperature crosses a threshold value, the application indicated user using LEDS