

# IOT Exp-1

Title :- Study of IoT Microcontroller kits  
e.g. Raspberry Pi 3

Aim :- To study IoT Microcontroller kit's like Raspberry Pi 3 and Arduino.

Theory :- Internet of things

The IoT is the concept of connecting any device to the internet & to other connected devices.

The IoT is a giant network of connected things and people - all of which collect and share data about the way they are used & about the environment around them.

Microcontroller :- A microcontroller is a compact integrated circuit designated to govern a specific operation in an embedded system. A typical microcontroller includes a processor, sometimes referred to as an embedded controller or microcontroller unit (MCU).

Types of Microcontroller kits :

1. Arduino :- Arduino is the most popular open-source electronics prototyping platform to create interactive electronic applications :-

- (i) Arduino UNO.
- (ii) LilyPad Arduino.

2. Raspberry Pi 3 Model B+ Development Board :-

(i) Raspberry Pi 3 Model B+ :-

Raspberry Pi is a credit-card sized single-board computers designed and manufactured by the Raspberry Pi foundation in the UK.



Components :-

Model A & Model B. The only real differences are the addition of Ethernet & an extra USB port on the more expensive Model B.

ARM CPU / GPU :- This is a Broadcom BCM2835 system on a chip (SoC) that's made up of an ARM ~~cpu~~ CPU & a videocore 4 graphics processing unit (GPU).

- GPIO
- RCA
- Audio out
- LED's
- USB
- HDMI
- Power
- SD cardslot
- Ethernet

Linux Distributions for Raspberry Pi

- ① Raspbian wheezy
- ② Soft-float Debian wheezy
- ③ Arch Linux ARM
- ④ Gton Pi

3. The Beagle Bone Black Development Board.

The Beagle Bone Black is one of the popular open source computers. Now it comes with built-in wireless networking capability.

Features :-

- Processor : AM335x 1GHz ARM cortex - A8.
- 512 MB DDR3 RAM.



- 2 GB 8-bit eMMC on-board flash storage
- NEON floating-point accelerators
- 2x PRU 32-bit microcontrollers
- 3D graphics accelerators.

Conclusion :- Thus we have studied various microcontroller boards which are used in IoT.



Title :- Study of different types of sensors, actuators, transducers.

Aim :- To study about types and different applications of sensors, actuators and transducers.

Theory :-

### Sensors

Sensors detect the presence of energy, changes in or the transfer of energy.

Types of sensors.

All types of sensors can be basically classified into analog sensors & digital sensors. But, there are few types of sensors such as temperature sensors, IR sensors, ultrasonic sensors, pressure sensors, & touch sensors are frequently used in most of the electronics applications.

#### • Temperature Sensor.

A temp. sensor plays an important role in many applications. e.g., maintaining a specific temperature is essential for equipment used to fabricate medical drugs, heat liquids, or clean other equipment.

Commonly used temperature sensor types.

- Negative Temperature Coefficient (NTC) thermistors
- Resistance Temperature Detector (RTD)
- Thermocouple
- Semiconductor-based sensors.



ii) IR sensor:- An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting & / or detecting infrared radiation.

iii) Ultrasonic sensor :-

Ultrasonic transducers or ultrasonic sensors are a type of acoustic sensor divided into 3 broad categories :-

- transmitters
- receivers
- Transceivers

iv) Proximity sensors

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact.

v) Pressure sensor :-

A pressure sensor measures pressure, typically of gases or liquids.

vi) Level sensors :-

The level sensors provide measure concerning the content of tanks, silos, boilers, tanks, wells, basins & other containers of liquid & solid material.

Transducer

Transducer is a device that converts input energy into output energy, the latter usually differing in kind but bearing a



known relation to input.

### Types of Transducer.

- (i) Electrochemical Transducers
- (ii) Electro acoustic, Electromagnetic, and Electrostatic Transducers.
- (iii) Electromechanical Transducers.

### Actuators :-

An actuator is something that actuates or moves something. More specifically, an actuator is a device that converts energy into motion or mechanical energy.

Therefore, an actuator is a specific type of a transducer.

- 1) Thermal Actuators.
- 2) Electric Actuators
- 3) Mechanical Actuators.

Conclusion :- Thus we have studied various sensors used in IoT with it's pin layouts.



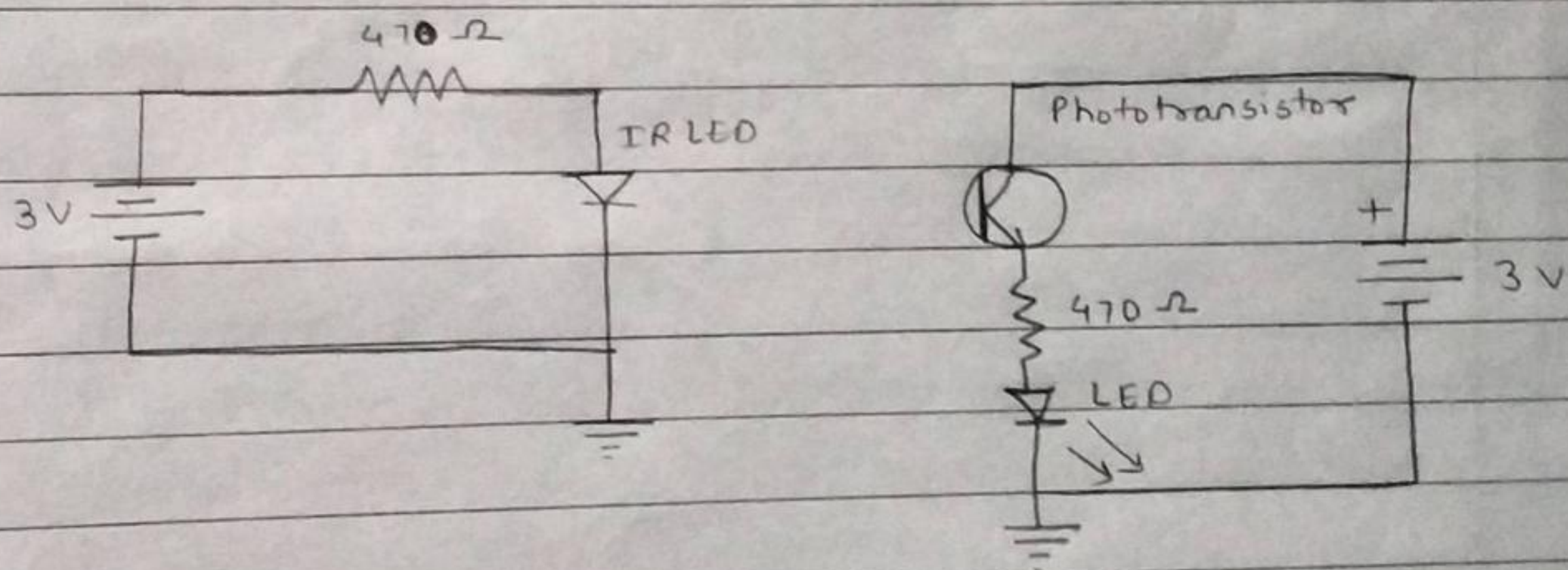
## IoT Exp - 3.

Aim :- To study IR sensor & it's application to detect obstacle & notify user using LED.

Requirement :- Implement a program to understand the concept of IR sensors.

Theory :-

An infrared sensor (IR) is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting & / or detecting infrared radiation. And they are also capable of sensing the heat & detecting motion. IR (INFRARED) sensor is based on LM 358 IC which is an operational amplifier acting as a comparator.



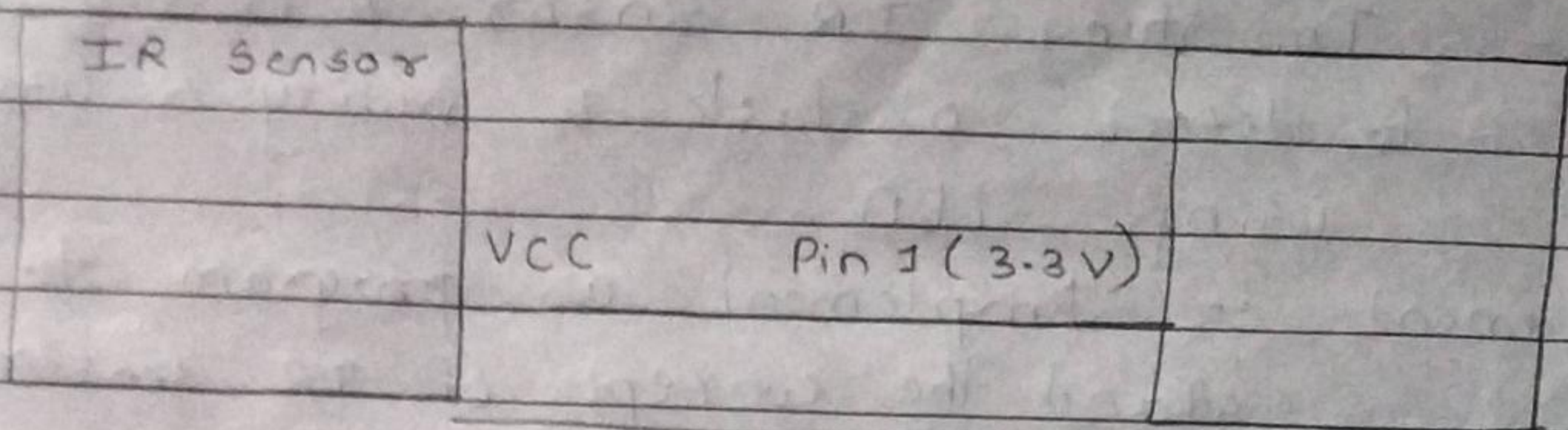
Steps to perform Experiment:-

- Connect IR sensor to Raspberry Pi as follows,
  - IR interfacing with RPi.

(i) Connect the two LED's with resistors to RPi using GPIO pins & ground pins.

(ii) Make green led on which notifies no obstacle detected while red is off.





GND

Pin 6 (Ground)

O/P

Pin 3 (GPIO)

RPI

Conclusion :- Thus we have studied interfacing of IR sensor with Raspberry Pi board and usage of IR sensor for detecting obstacles.



# POT Exp - 4

Title :- Demonstrate Raspberry - Pi connectivity with FIRE sensor. Write an app<sup>l</sup>n to detect fire & notify users using LED's.

Aim :- Experiment based on FIRE sensor. Write an application to detect obstacle & notify user using LED.

Theory : The Fire sensor, as the name suggests, is used as a simple & compact device for protection against fire. The module makes use of IR sensor & comparator to detect fire up to a range of 1-2 meters depending on fire density. The fire sensor circuit is too sensitive & can detect a rise in temperature in it's vicinity.

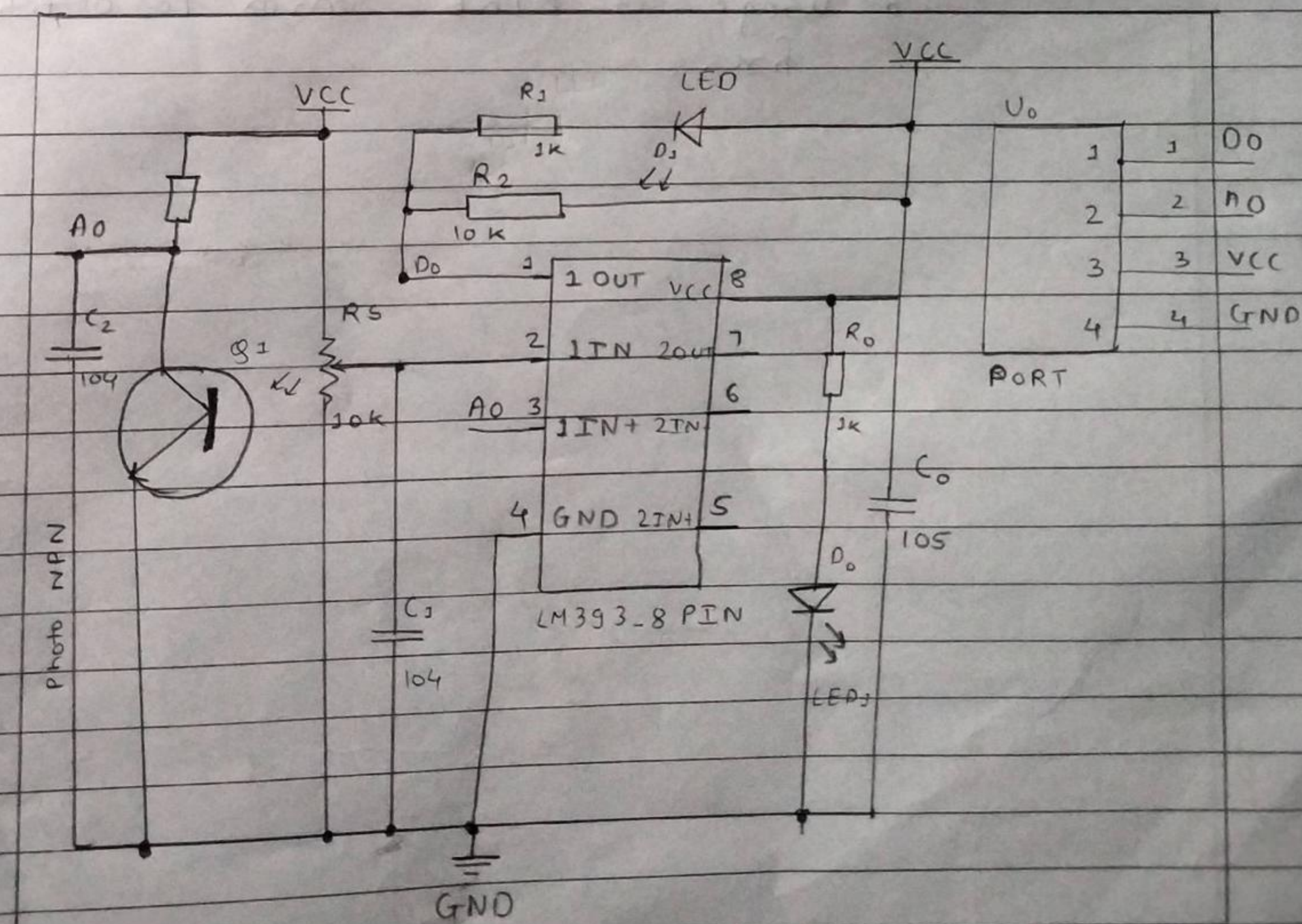


Fig. FIRE Sensor circuit.



### Steps to perform Experiment :

- Connect FIRE sensor to Raspberry Pi as follows,
  - Fire interfacing with Rpi

(ii) Connect the two LED's with resistors (Green & Red colour) to RPi using G P I O pins & ground pins.

(iii) Make green led on which notifies no obstacle detected while red is off. If obstacle detected then you should turn on red led & make green led off.

Conclusion :- Thus we have studied interfacing of FIRE sensor with Raspberry pi board & usage of FIRE sensor for detecting fire.



## IoT Exp - 5

Title :- Experiment based on ultrasonic sensor  
Write an appl<sup>n</sup> to detect distance  
bet<sup>n</sup> obstacle.

Requirement :- Raspberry Pi board, Ultrasonic  
Sensor, Resistors, Jumper cables & / or  
breadboard.

Theory :- Ultrasonic Sensor is a very popular  
used in many applications where measuring  
distance or sensing objects are required.  
The module has 2 eyes like projects in the  
front which forms the Ultrasonic transmitter  
& Receiver. The Ultrasonic Sensor sends  
out a high-frequency sound pulse & then times  
how long it takes for the echo of the sound  
to reflect back. The sensor has 2 openings  
on it's front.

$$\text{Distance} = \text{Time} \times \text{Speed of sound divided by 2}$$

Steps to perform Experiment :

1. Perform pin connections with the help  
of resistors as show in diagram.
2. Write and run the application program  
to measure distance bet<sup>n</sup> obstacles.

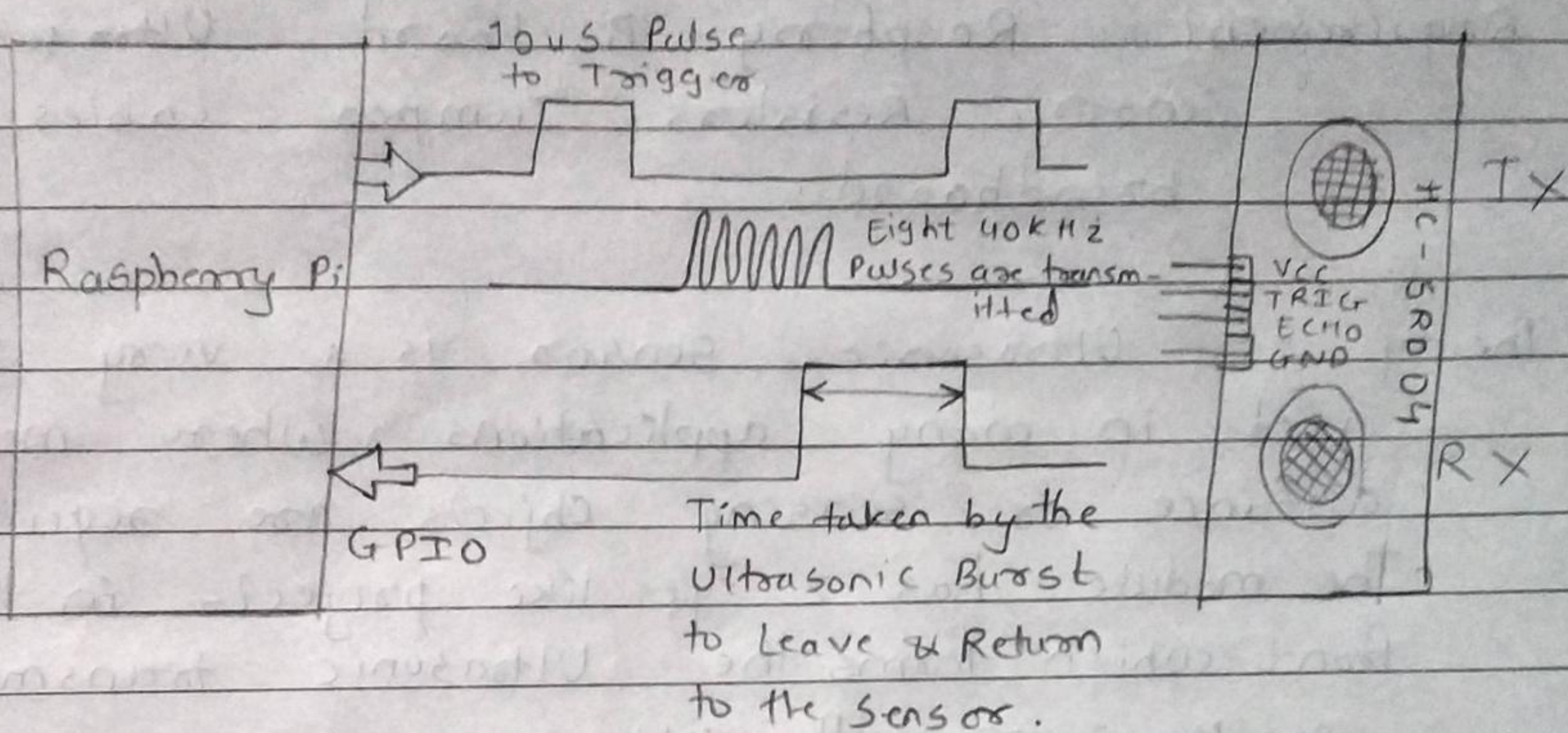
Ultrasonic sensor pin configuration.

Pin 1 → Vcc → The Vcc pin powers the  
sensor, typically with +5V

Pin 2 → Trigger → Trigger pin is an input pin.  
This pin has to kept high for 10ms



to initialize : measurement by sending  
US wave.



Consi.

Conclusion :- Thus we have studied the ultra-  
sonic sensor & it's connectivity with  
the RPi