EX.No : 6.9

DATE : 23/09/2022

MEASURE THE HUMIDITY AND MOISTURE VALUE OF ENVIRONMENT - ARDUINO

AIM

To measure the humidity and moisture level of the environment using DHT11 sensor with arduino.

DHT11 Sensor

* the DHT11 is a low cost temperature and humidity sensor.
* It isn't the fastest sensor around but its cheap price make it useful for experimenting or project where dont require new reading multiple times a second.
* The device only require more connections to arduino

COMPONENT REQUIRED

1 x Arduino UNO
1 x DHT11 sensor
1 x Breadboard
Jumping wires.

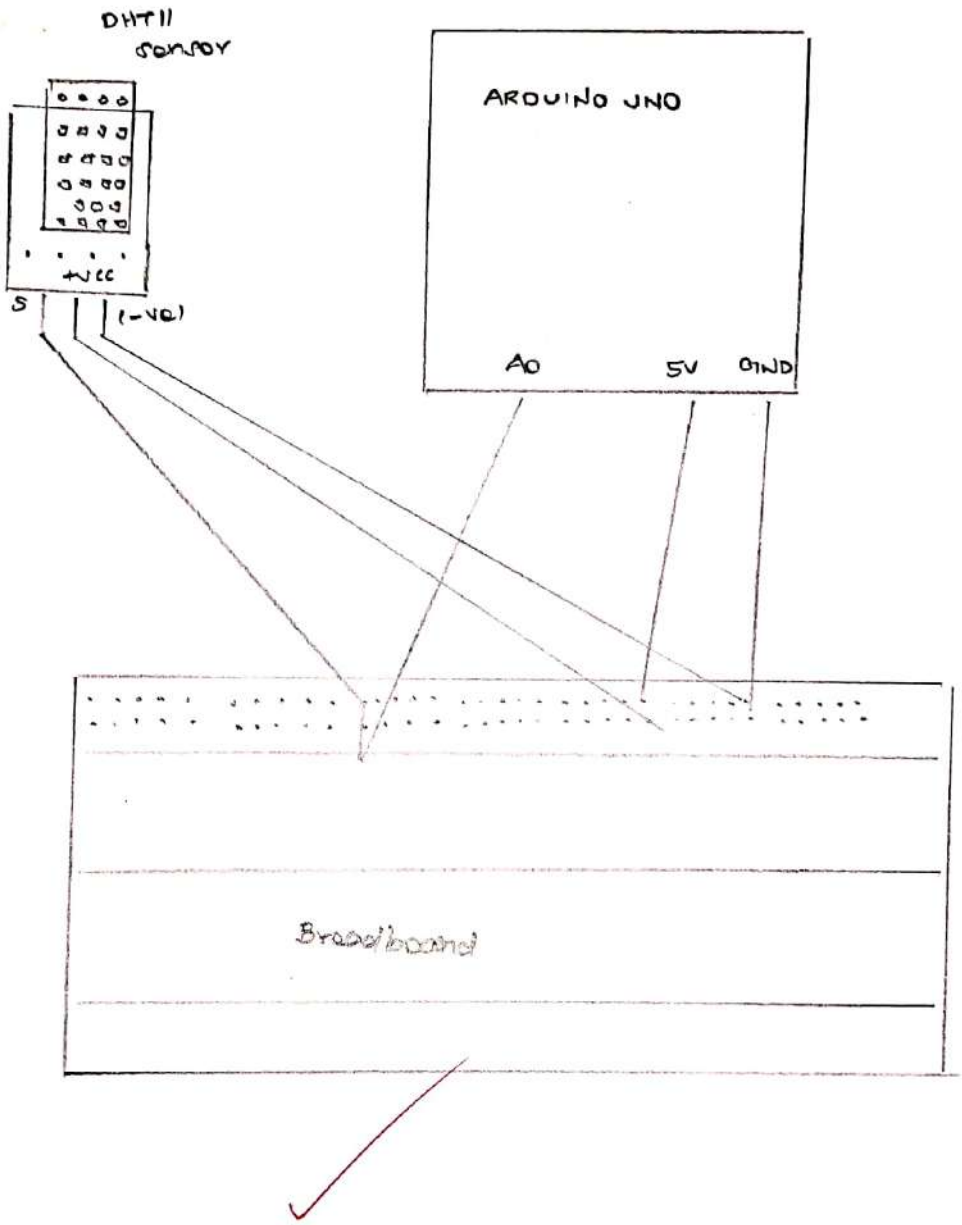
Procedure - circuit connection

DHT11 sensor - sensor (S) to header A0 and arduino
- voltage (+Vcc) to 5V.
- (-ve) sign to GND of arduino

Then Adding DHT library [Sketch >> Include library >> Add zip File in Arduino IDE]

After that it will measure temperature and humidity of the environment using the DHT11 sensor.

CIRCUIT DIAGRAM



EX.NO : 6.b DATE : 23/09/2022	MEASURE THE HUMIDITY AND MOISTURE VALUE OF ENVIRONMENT - RASPBERRY PI

AIM

TO measure the humidity and moisture level of the environment using DHT11 sensor with Raspberry pi.

DHT11 SENSOR

* The DHT11 sensor is a low cost temperature and humidity sensor.

* It isn't the faster sensor around but it's cheap. Price make it useful for experimenting or project where don't require new reading multiple times a second.

* The device only require three connections to pi +3, 3V ground and GPIO pin 1

COMPONENT REQUIRED

1 x Raspberry pi
1 x DHT11 sensor
1 x Broadboard
Jumping wires

PROCEDURE - circuit connections

DHT 11 sensor - pin1 to Raspberry pi pin 2
- pin 2 to Raspberry pi pin 11 (GPIO 17)
- pin 4 to 6 or 9 pin of Raspberry pi (GND)

PYTHON LIBRARY

The DHT11 requires a specific protocol to be applied to the data pin.

In order to save time trying to implement this and its for easier to use the adafruit DHT library.

Software setup

To start with update package list

```
sudo apt-get update
sudo apt-get install build-essential python-dev
```

then install the library for python 2 and 3

```
sudo python setup.py install
sudo python3 setup.py install
```

Python script example - adafruit

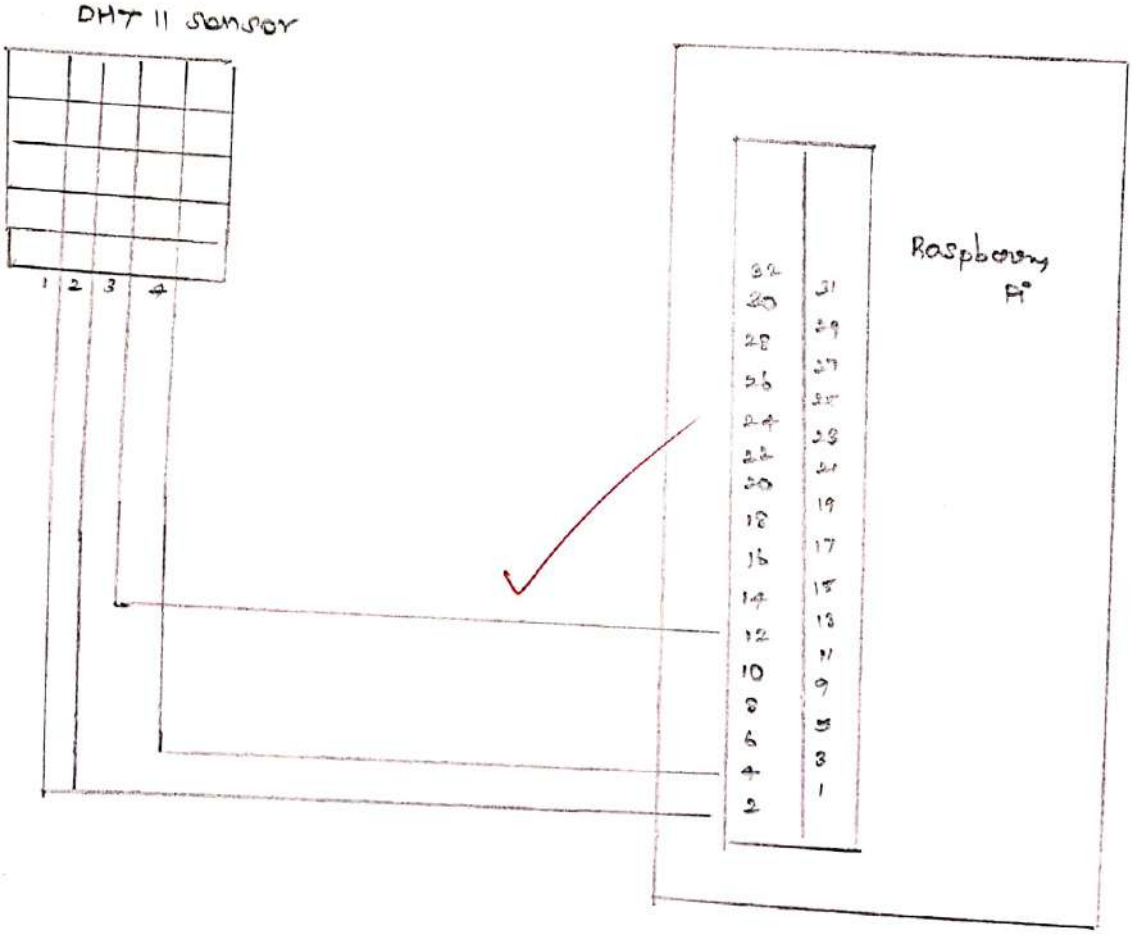
Adafruit provide an example script that you can to check sensor is operating correctly.

```
cd ~
cd adafruit.python-DHT
cd examples
```

then

```
python Adafruit.py 11 17
```

CIRCUIT DIAGRAM



EX.No: 7.a DATE : 21/10/2022	CONTROL A LED USING BLUETOOTH -ARDUINO	Page.No : 74

AIM

To control an LED using bluetooth module with arduino UNO.

Bluetooth Module HC-05

* Hc-05 module is an easy to use bluetooth spp module, designed for transparent wireless serial communication setup.

* It is fully qualified bluetooth V2.0 + Enhanced Data rate.

COMPONENTS REQUIRED

1 X Arduino UNO, 1 X LED
1 X Breadboard
1 X Bluetooth module
Jumping wires

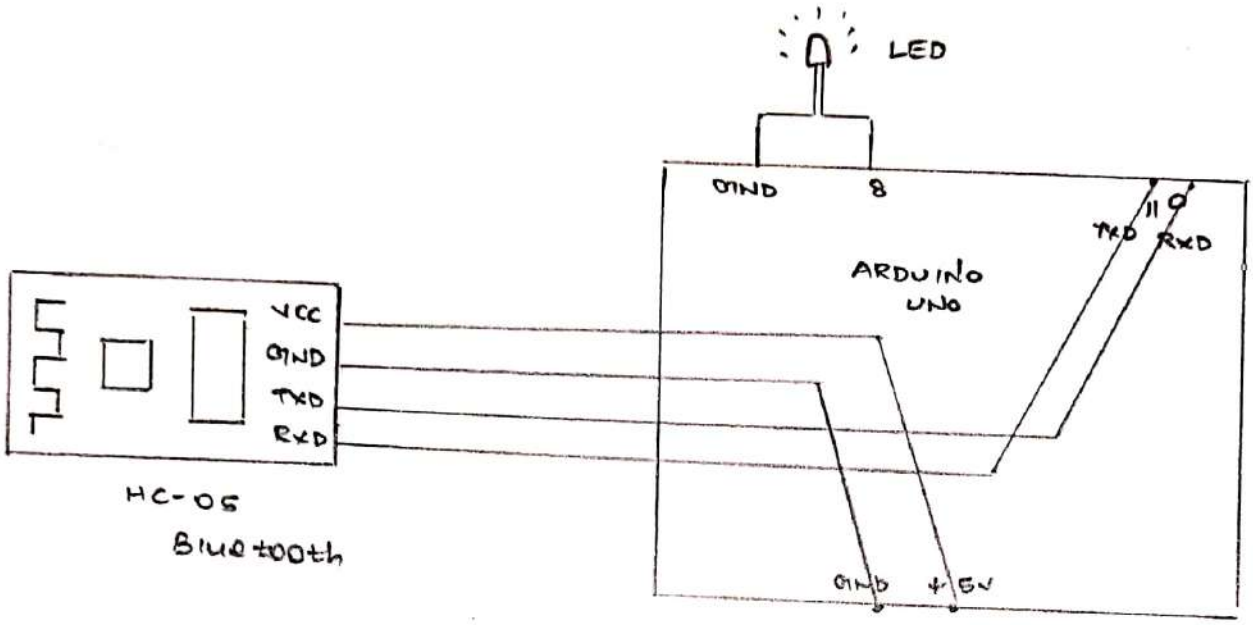
PROCEDURE - circuit connection

Bluetooth Module - Vcc to arduino +5V
GND to arduino GND
TX to arduino of Rx
Rx to arduino of TX

After that the mobile app named "Arduino LED Bluetooth control", available in google play store is to be downloaded and installed in mobile.

After the connection in app, Enter "a" in terminal to glow LED and enter "b" to OFF LED.

CIRCUIT DIAGRAM



EX.NO: 7.b DATE : 21/10/2022	CONTROL AN LED USING BLUETOOTH - RASPBERRY PI	Page.NO : 79

AIM:

TO control an LED using bluetooth module using Raspberry pi.

Bluetooth HC-06

* The module is very cheap and easy to interface with microcontroller and it's generally implemented by using UART communication.

* It is designed for transparent wireless serial communication setup and fully qualified bluetooth V2.0 + Enhanced data rate.

COMPONENT REQUIRED

1 X Bluetooth module HC-06
1 X Raspberry pi
1 X LED
Jumping wires

PROCEDURE - CIRCUIT CONNECTION

Bluetooth module - Transmitter pin to GPIO 1 (pin no. 2)
Receiver pin to GPIO 0 (pin no. 1)
Vcc to VBus of Raspberry pi
Ground to GND of Raspberry pi device

LED device - +ve connected to GPIO 16
-ve connected to GND

SETUP - Bluetooth Terminal Android App

* Need to download "Serial Bluetooth Terminal App" from Google play Store

* Need to setup "M1" to "LED ON" button and "M2" to "LED OFF" button.

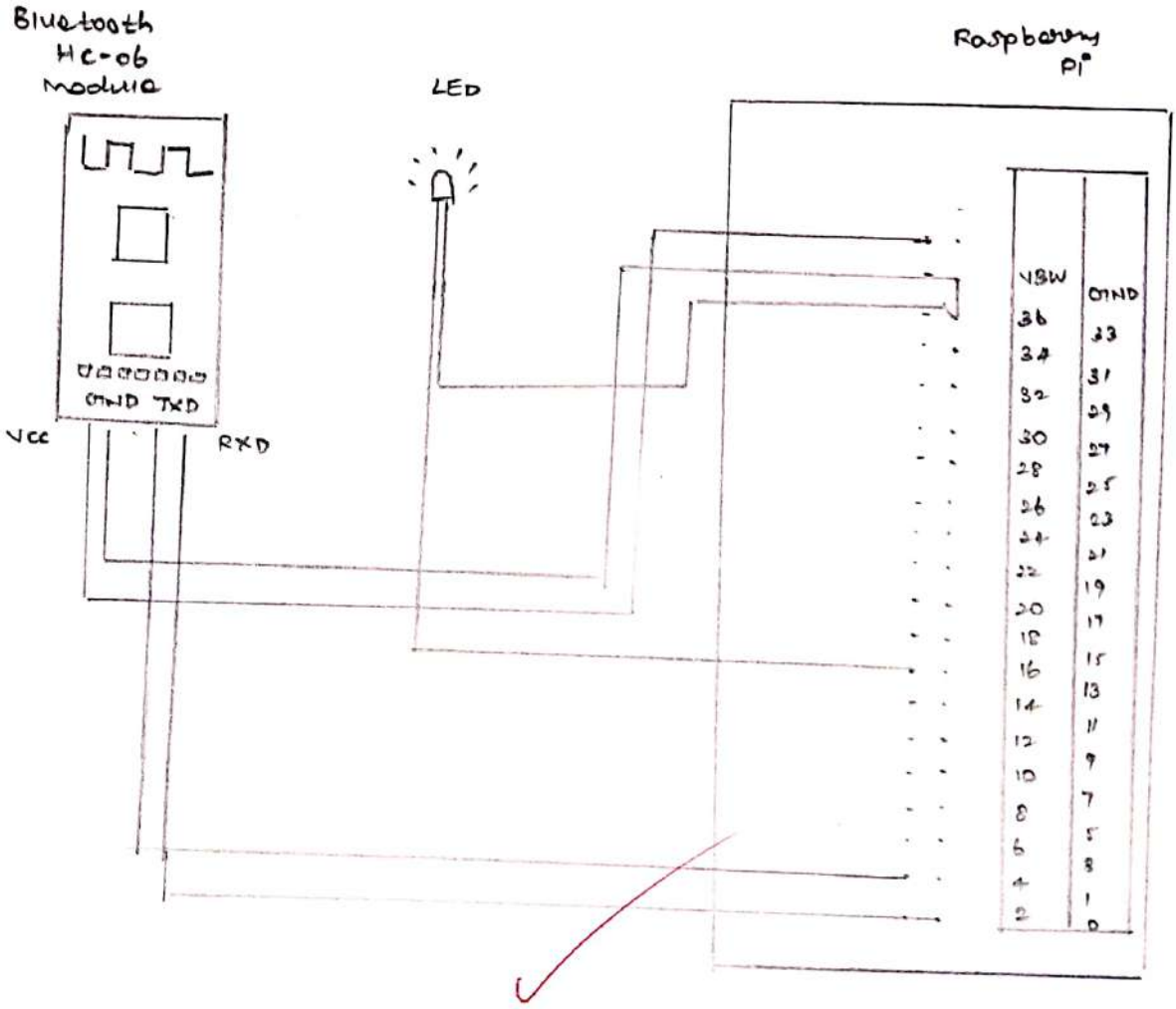
Import necessary library

Import "pin" and "UART" class from "machine" library

from machine import pin, UART

Then run .py file to execute the code to control LED using Bluetooth Hc-06

CIRCUIT DIAGRAM



EX.NO: 8.a DATE: 28/10/2022	CONTROL A LED USING RELAY SWITCH -ARDUINO	Page.No: 85

AIM:

To control an LED with Relay switch using arduino.

RELAY SWITCH

IOT power relay is an controllable power relay equipped with four outputs

A relay is an electronic component as a electronic light switch.

It is electrically operated switch which use electro magnet to mechanically operate a switch.

COMPONENT REQUIRED:

1 X Arduino Uno
1 X Relay Module (5V)
1 X LED
1 X Breadboard
Jumping wire

PROCEDURE - CIRCUIT CONNECTION

Relay switch - connect Vcc pin of Relay to arduino 5V
connect GND pin of Relay to arduino GND connect IN pin of Relay to arduino digital pin D3

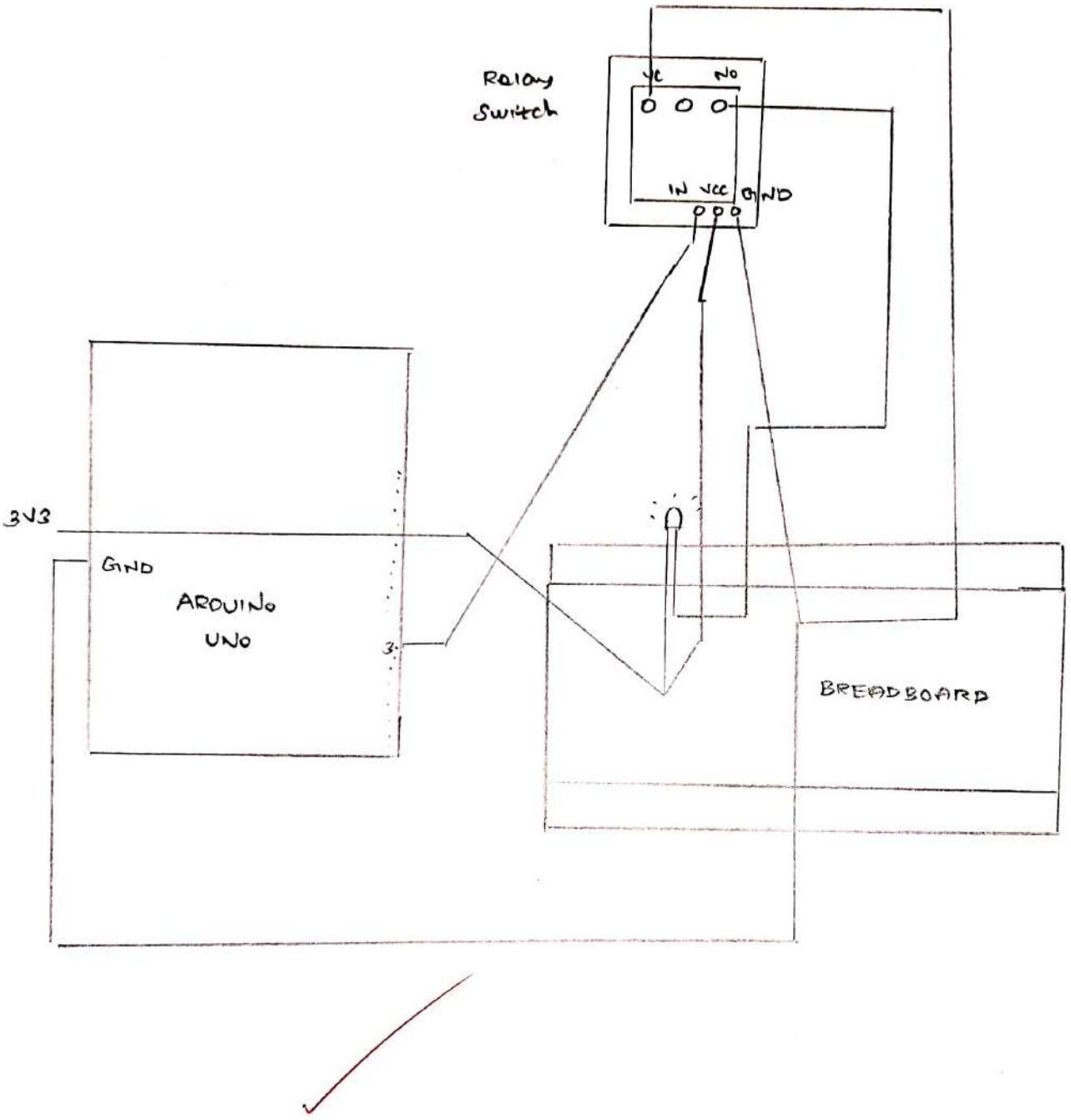
LED - +ve connect to VCC AND NO of relay switch
-ve connect to GND of arduino

the connected LED is always ON until it receive a signal from arduino to turn it OFF.

the connected LED is off until it receive a signal from arduino to turn it on

than it control an LED with relay switch to move up and DOWN.

CIRCUIT DIAGRAM



EX.NO: 8.6 DATE: 28/10/2022	CONTROL A LED USING RELAY SWITCH - RASPBERRY PI	PAGE.NO: 90

AIM

To control an LED using relay switch with raspberry pi.

RELAY SWITCH

Relay is an electromagnetic switch where a small control signal at input of relay will control high voltage supply.

Relay coil need small current in order to get energized driving directly through transistor.

It is simple circuit board that consist of relay switch and necessary components that are required to drive relay and required connectors to connect the load.

COMPONENT REQUIRED

1 X Raspberry pi
1 X channel -2 Relay module
1 X LED
Jumping wires

PROCEDURE - CIRCUIT CONNECTION

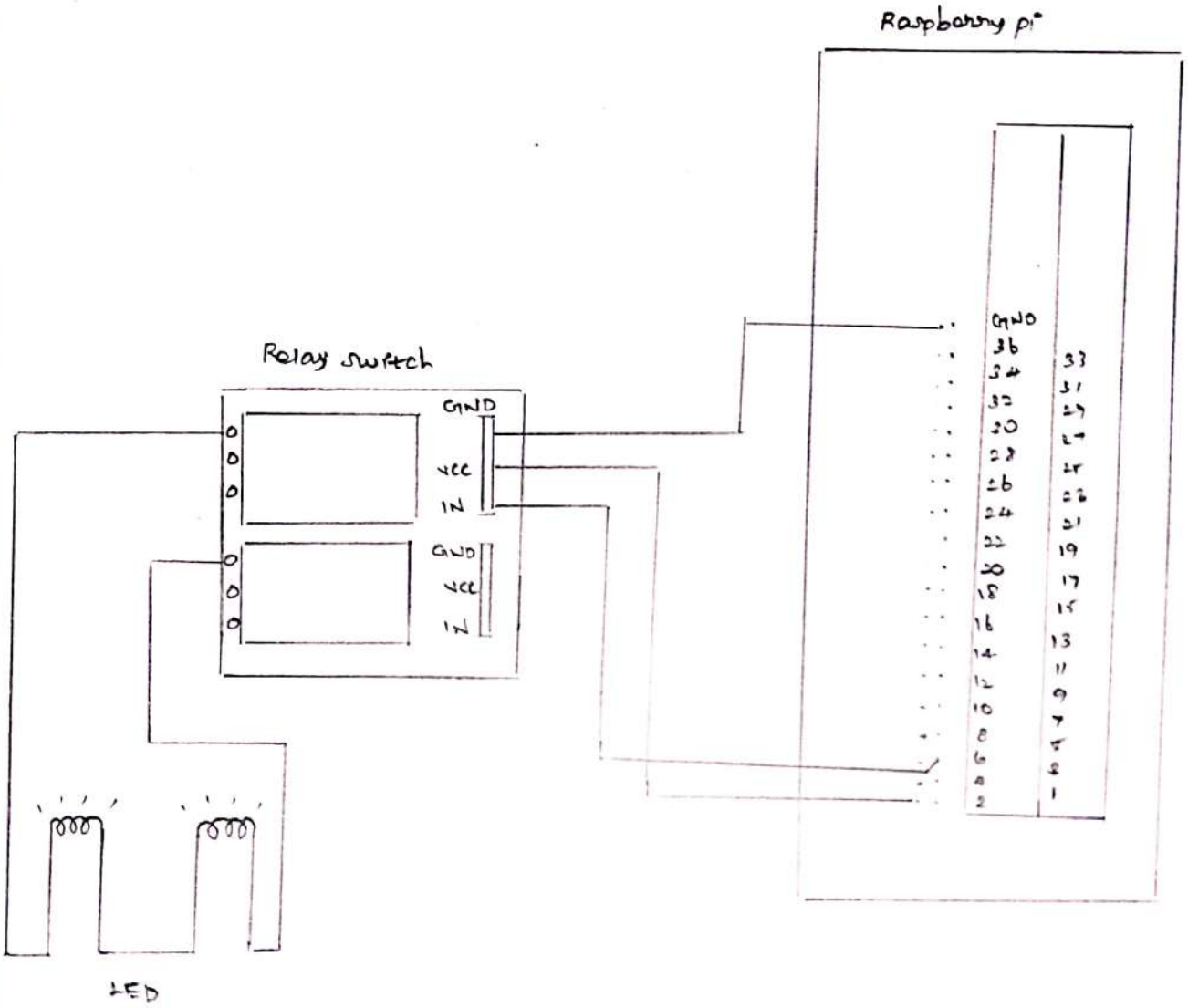
Relay Switch - IN pin connected to digital pin 5 (GPIO)
GND pin connected to GND of Raspberry pi
Vcc pin connect to pin 1 (3V3)

LED - +ve connect to NO of relay switch
-ve connect to GND

If GPIO pin is made HIGH, the corresponding load will be switched ON.

To turn OFF the load, make GPIO pin LOW.

CIRCUIT DIAGRAM



EX.NO: 9 DATE: 18/11/2022	SENSOR DATA STORAGE IN THE CLOUD	Page.NO: 95

AIM

To write arduino sensor data to cloud using the sensor device to get data.

COMPONENT REQUIRED

1 x Arduino UNO
1 x DHT 22 Temparature and humidity sensor
1 x ESP8266 Wifi module
Thinkspeak cloud - storage
Jumping wires

THINGSPEAK

It is an IOT and cloud platform that enable things on physical device to connect to the cloud.

The HTTP and MQTT communication protocols provide a connection between things and cloud.

The platform allow registered users to collect, display, analyze, make inference and act on data.

Thingspeak was released to the market by iO Bridge and got support from MATLAB give to advanced data analysis.

Thingspeak allow users to analyse and visualise data sensor data.

PROCEDURE

CONNECT ARDUINO TO THINGSPEAK

* Install ESP8266 flasher tool and at firmware. Select serial port of arduino navigate to firmware file.
* After writing the AT command firmware open arduino serial port and send the AT command.
* Then register and create Account on thingspeak.

* TO log temperature and humidity sensor, create new channel with two field table label.

* obtain Api key to write data to thingspeak channel.

SEND SENSOR DATA TO THINGSPEAK

Encapsulate all variable into single URL

"https://api.thingspeak.com/update?api_key=dmfN5823ea field1=12 field2=4"

Field 1 → Temperature field name and value.

Field 2 → Humidity field name and value.

GRAPH SENSOR DATA ON THINGSPEAK

Thingspeak to collect, visualize and analyze the sensor data. It offer ability to either use built-in visualization plot to create own custom plot function to get query the DHT22 for humidity and temperature information.

```
TempSensor = getTempData();
HumidSensor = getHumidData();
```

Then it will show the sensor data in graph format.

CIRCUIT DIAGRAM