



COMPUTER ORGANIZATION & ASSEMBLY LANGUAGE

PROJECT REPORT

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PROBLEM STATEMENT

- Humidity that is too high or too low can make indoor spaces uncomfortable for people.
- Poor humidity can have a negative impact on people's health. It can dry out the mucous membrane in the nose and throat, making people more susceptible to colds, flu, etc. Whereas, high humidity can cause respiratory problems and allergies.
- High humidity can cause wood to warp and rot, while low humidity can cause wood to become brittle and crack, corrosion or degradation of electronic equipment and insect infestations.
- For this project we are making a humidity sensor with the help of the DHT11 Humidity and Temperature sensor and Raspberry Pi.

COMPONENTS REQUIRED

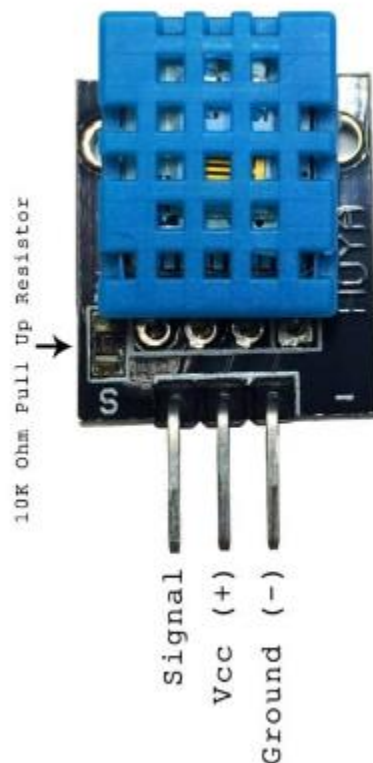
- Raspberry Pi 2 with Raspberry Pi OS
- 5V Power Supply
- DHT11 - Humidity and Temperature Sensor (3 pins)
- A Keyboard and Mouse
- Display
- WiFi Adapter
- Python and Python Modules (Sys & Adafruit)

RASPBERRY PI

Raspberry Pi is a small, low-cost computer that was developed in the UK by the Raspberry Pi Foundation. The Raspberry Pi is about the size of a credit card and has a variety of inputs and outputs, including HDMI, audio, and USB ports. It can be used for a wide range of applications, including media center, home theater, desktop computers, and as a platform for programming and learning.

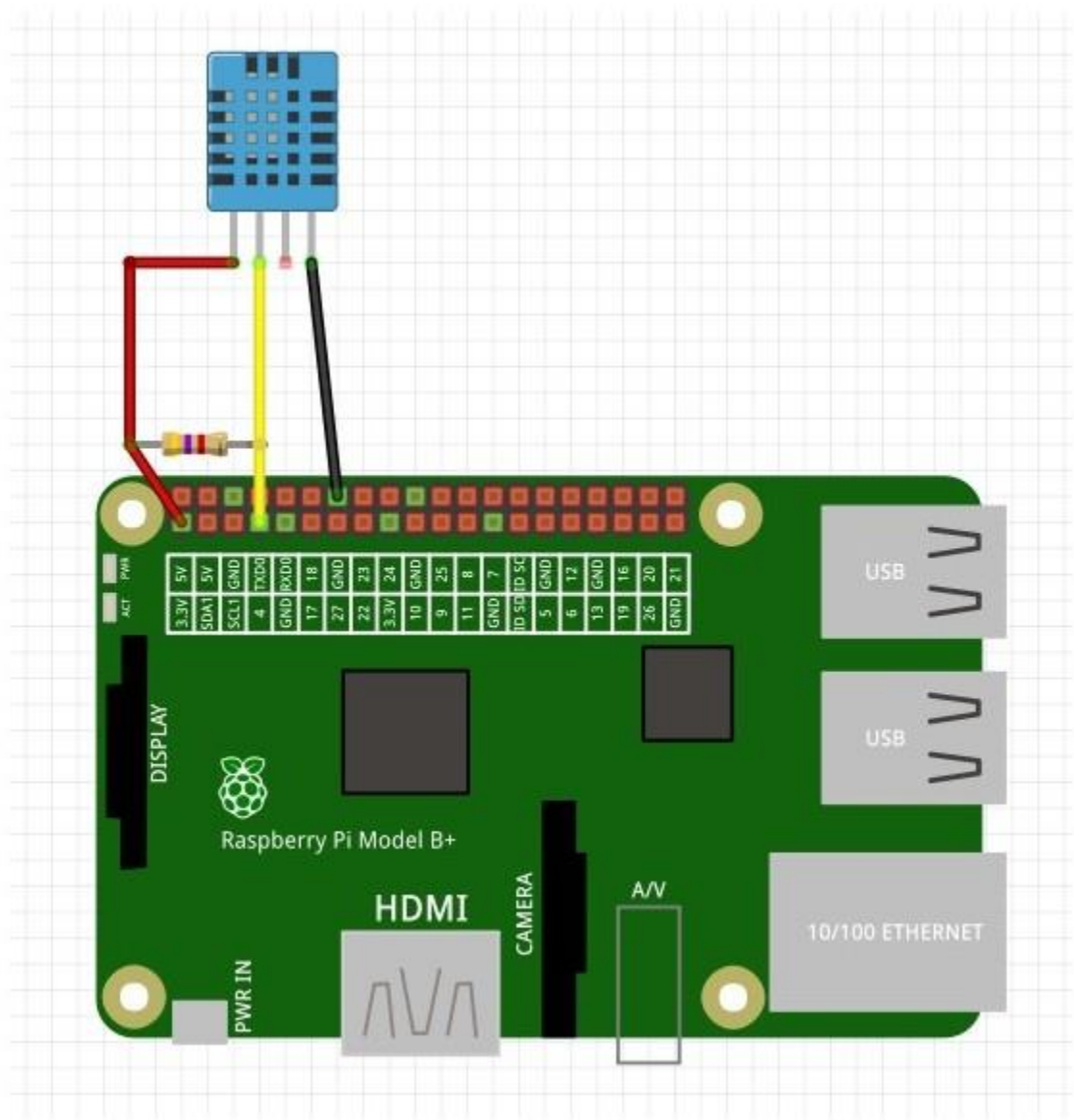
DHT11 Temperature & Humidity Sensor

The DHT11 sensor is a low-cost humidity and temperature sensor that is commonly used in DIY projects. It consists of a capacitive humidity sensor and a thermistor, which are combined in a single package with an integrated digital signal processing chip. It is capable of measuring humidity in the range of 20-90% with an accuracy of $\pm 5\%$ and temperature in the range of 0-50°C with an accuracy of $\pm 2^\circ\text{C}$. It has a single-wire digital interface and can be connected to a microcontroller or single-board computer, such as an Arduino or Raspberry Pi, to read and interpret the sensor data. The DHT11 is a popular choice for projects that require low-cost and low-power humidity and temperature sensing, such as home automation, weather stations, and plant monitoring.



DHT11 Sensor (3 Pins)

CIRCUIT DIAGRAM



Raspberry PI 2 with DHT11

INTERACTING WITH RASPBERRY PI

- In order to turn on and use the Raspberry Pi we will have to connect a keyboard and mouse using the USB ports on the board.
- For the display we need to connect a HDMI cable using the HDMI port on the board.
- For the network, we connected the Raspberry to a WiFi network using a WiFi adapter.
- The Raspberry Pi has a set of GPIO pins that can be used to interface with external hardware and sensors. We connect it with the DHT11 sensor using these pins.
- For programming purposes, we will have to install Python in the Raspberry Pi OS.
- Later, we install the requisite Python modules.
- Now we start Python and run the program in any desired directory, preferably on the desktop.
- Post installation we will open the terminal and execute the requisite code.
- The program runs and returns the temperature and humidity of its surroundings.

CODING

```
sudo apt-get install git-core

Note: If you get an error installing Git, run sudo apt-get update and try it again.

To install the Adafruit DHT11 library:

1. Enter this at the command prompt to download the library:

git clone https://github.com/adafruit/Adafruit_Python_DHT.git

2. Change directories with:

cd Adafruit_Python_DHT

3. Now enter this:

sudo apt-get install build-essential python-dev

4. Then install the library with:

sudo python setup.py install
```

Requisite installation using Python

```
#!/usr/bin/python
import sys
import Adafruit_DHT

while True:

    humidity, temperature = Adafruit_DHT.read_retry(11, 4)

    print 'Temp: {0:0.1f} C Humidity: {1:0.1f} %'.format(temperature, humidity)
```

Code for project execution

OUTPUT

```
Temp: 21.0C Humidity: 64.0%
Temp: 21.0C Humidity: 65.0%
Temp: 22.0C Humidity: 65.0%
Temp: 22.0C Humidity: 65.0%
Temp: 22.0C Humidity: 65.0%
Temp: 22.0C Humidity: 65.0%
Temp: 22.0C Humidity: 66.0%
Temp: 22.0C Humidity: 67.0%
```

Output of Installed Library



VIDEO LINK

<https://drive.google.com/file/d/15eD6gnQCM8G4-tCTfqsx7VtaUVd8pF79/view?usp=drivesdk>



APPLICATIONS

- Home automation: You can use a Raspberry Pi with a DHT11 sensor to monitor and control the temperature and humidity in your home. You can use this data to automatically adjust the thermostat or humidity control, or to trigger alerts if the temperature or humidity falls outside a certain range.
- Weather stations: You can use a Raspberry Pi with a DHT11 sensor to build a weather station that measures and records temperature and humidity data. This data can be used to create weather forecasts, or to analyze long-term weather patterns.
- Agriculture: You can use a Raspberry Pi with a DHT11 sensor to monitor temperature and humidity in a greenhouse or other agricultural setting. This data can be used to optimize growing conditions and improve crop yields.
- Food storage: You can use a Raspberry Pi with a DHT11 sensor to monitor temperature and humidity in a refrigeration unit, such as a refrigerator or a freezer. This can help to ensure that food is stored at the appropriate temperature and humidity levels to prevent spoilage.
- HVAC system monitoring: You can use a Raspberry Pi with a DHT11 sensor to monitor temperature and humidity in a heating, ventilation, and air conditioning (HVAC) system. This can help to ensure that the system is working efficiently and that the indoor environment is comfortable for occupants.
- Environmental monitoring: You can use a Raspberry Pi with a DHT11 sensor to monitor temperature and humidity in an outdoor or industrial setting. This data can be used to monitor changes in the local environment, such as temperature and humidity fluctuations caused by climate change.
- Industrial process monitoring: You can use a Raspberry Pi with a DHT11 sensor to monitor temperature and humidity in an industrial setting to help improve process efficiency and product quality.