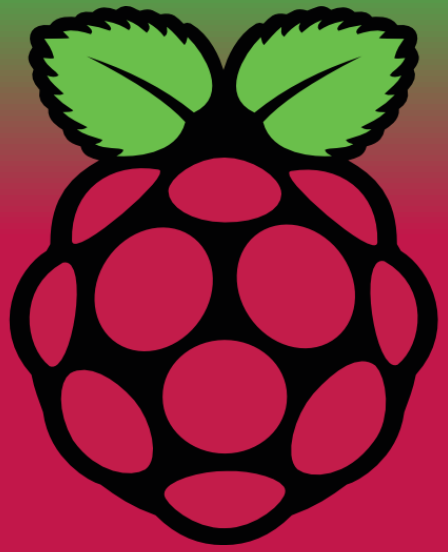


2026 Summer Tech Internship

Thermostat

Thomas Trickel

Thermostat

Thermostat

What do we need?

Thermostat

Temperature sensor
LED to simulate heater

Thermostat

- User Interface
- Algorithm
- Syntax

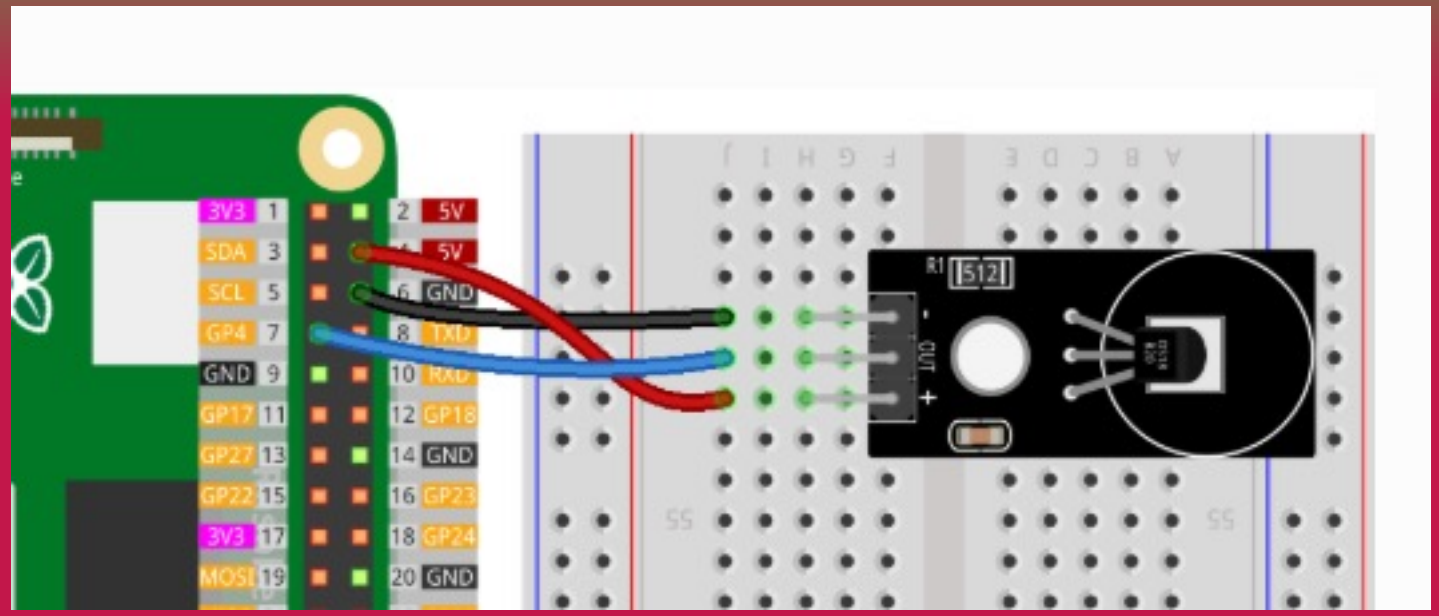
Thermostat

Start simple

Add features

Keep your program working

Wiring


3V3 1
2 5V
SDA 3
5V
SCL 5
6 GND
GP4 7
8 TXD
GND 9
10 RXD
GP17 11
12 GP18
GP27 13
14 GND
GP22 15
16 GP23
3V3 17
18 GP24
MOSI 19
20 GND
R1 512
OUT

Thermostat - Software

MAGIC

```python
import glob
import time

# Path to the directory containing device files for 1-wire devices
base_dir = "/sys/bus/w1/devices/"

# Finds the first device folder that starts with "28", specific to DS18B20
device_folder = glob.glob(base_dir + "28*")[0]

# Device file containing the temperature data
device_file = device_folder + "/w1_slave"


def read_temp_raw():
    # Reads raw temperature data from the sensor
    f = open(device_file, "r")
    lines = f.readlines()
    f.close()
    return lines


def read_temp():
    # Parses the raw temperature data and converts it to Celsius and Fahrenheit
    lines = read_temp_raw()
    # Waits for a valid temperature reading
    while lines[0].strip()[-3:] != "YES":
        time.sleep(0.2)
        lines = read_temp_raw()
    equals_pos = lines[1].find("t=")
    if equals_pos != -1:
        temp_string = lines[1][equals_pos + 2 :]
        temp_c = float(temp_string) / 1000.0  # Convert to Celsius
        temp_f = temp_c * 9.0 / 5.0 + 32.0  # Convert to Fahrenheit
        return temp_c, temp_f


try:
    # Main loop to continuously read and print temperature
    while True:
        temp_c, temp_f = read_temp()
        formatted_output = f"Temperature: {temp_c:.2f}°C / {temp_f:.2f}°F"
        print(formatted_output)
        time.sleep(1)  # Wait for 1 second between readings
except KeyboardInterrupt:
    # Gracefully exit the program on CTRL+C
    print("Exit")
```

```
try:
    # Main loop to continuously read and print temperature
    while True:
        temp_c, temp_f = read_temp()
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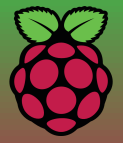

Formatted String Literals (f-strings)

python

```python
name = "Alice"
age = 30
pi = 3.14159265

# Basic variables
print(f"Hello, {name}. You are {age} years old.")

# Numbers with decimal precision (: .nf)
print(f"Pi to 2 decimal places: {pi:.2f}")

# Padding with thousands separator (:,)
large_number = 1000000
print(f"Formatted number: {large_number:,}")

# Evaluating expressions directly
print(f"Next year you will be {age + 1}.")
```

Sunfounder Lesson

Lesson 18: Temperature Sensor Module (DS18B20)

- Be careful when wiring – don't let the magic smoke out
- Can copy and paste the code

Stupendously Excellent!

Document Project

Lucidcharts wiring diagram
Code sharing