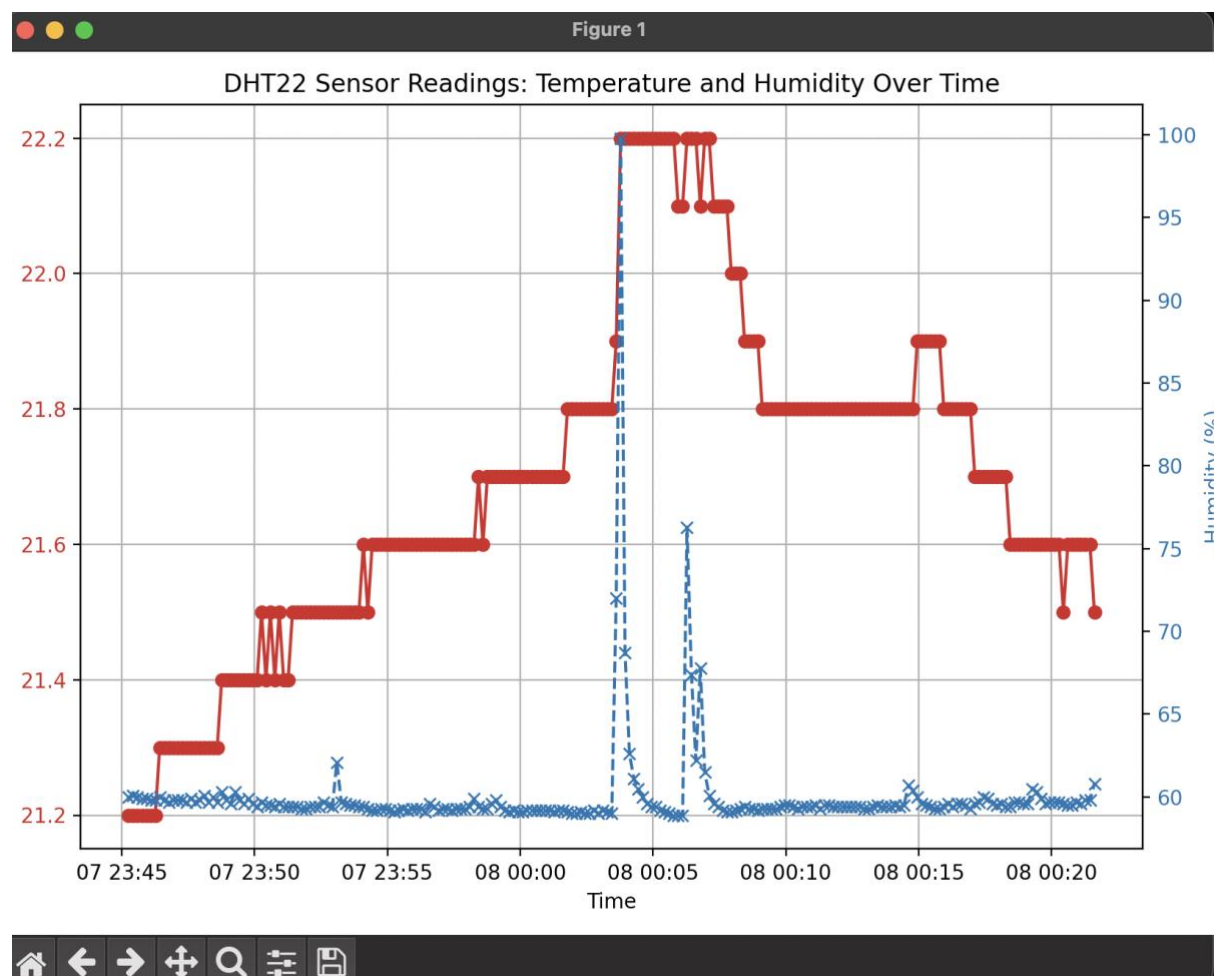


SIT225 Data Capture Technologies – Working with sensors



I collected temperature and humidity data using the dht22 sensor in my room, the two variables help in understanding the environmental conditions of my room. I collected new data every 10 seconds to avoid repeat data, we collected the data using the Arduino 33 nano to read the data from the dht22. The Arduino sent the temperature and humidity as comma separated values, a python script was used to receive the data and save it to a csv file.

I collected new data every 10 seconds to avoid repeat data and it is well matched with the dht22 two second update rate

a) a repeating pattern I found was the temp was stable for long durations, humidity showed small fluctuations

b) Around 20250808000337 to 20250808000417, there's a rapid spike in humidity from ~59 to 72 to 99.8, then back down to 60.

c) when the humidity went up a slight increase in temp was noticed

q3)

```
1  import pandas as pd
2  import matplotlib.pyplot as plt
3  from datetime import datetime
4
5  # === CONFIG ===
6  FILENAME = "dht22_data.csv"
7
8  # === Step 1: Load CSV data ===
9  df = pd.read_csv(FILENAME, header=None, names=["timestamp", "temperature", "humidity"])
10
11 # === Step 2: Convert timestamps to datetime ===
12 df["datetime"] = pd.to_datetime(df["timestamp"], format="%Y%m%d%H%M%S")
13
14 # === Step 3: Create combined plot with two y-axes ===
15 fig, ax1 = plt.subplots(figsize=(12, 6))
16
17 # Primary Y-axis (Left): Temperature
18 color1 = "tab:red"
19 ax1.set_xlabel("Time")
20 ax1.set_ylabel("Temperature (°C)", color=color1)
21 ax1.plot(df["datetime"], df["temperature"], color=color1, marker='o', label="Temperature")
22 ax1.tick_params(axis='y', labelcolor=color1)
23
24 # Secondary Y-axis (Right): Humidity
25 ax2 = ax1.twinx()
26 color2 = "tab:blue"
27 ax2.set_ylabel("Humidity (%)", color=color2)
28 ax2.plot(df["datetime"], df["humidity"], color=color2, marker='x', linestyle='--', label="Humidity")
29 ax2.tick_params(axis='y', labelcolor=color2)
30
31 # === Add title and grid ===
32 plt.title("DHT22 Sensor Readings: Temperature and Humidity Over Time")
33 fig.tight_layout()
34 ax1.grid(True)
35
36 plt.show()
```

```

2  import time
3  from datetime import datetime
4
5  # === CONFIG ===
6  SERIAL_PORT = '/dev/tty.usbmodem21201'
7  FILENAME = "dht22_data.csv"
8
9  def get_timestamp():
10     """Return current timestamp in YearMonthDayHourMinuteSecond format."""
11     return datetime.now().strftime("%Y%m%d%H%M%S")
12
13  def main():
14      try:
15          with serial.Serial(SERIAL_PORT, BAUD_RATE, timeout=5) as ser:
16              print(f"Listening on {SERIAL_PORT} ... ")
17              with open(FILENAME, "a") as file:
18                  while True:
19                      line = ser.readline().decode().strip()
20                      if not line:
21                          continue # ignore empty lines
22
23                      timestamp = get_timestamp()
24
25                      # Basic validation: two values, comma-separated
26                      if "," in line:
27                          data_items = line.split(",")
28                          if len(data_items) == 2:
29                              csv_line = f"{timestamp},{data_items[0]},{data_items[1]}"
30                              file.write(csv_line)
31                              file.flush()
32                              print(f"Logged: {csv_line.strip()}")
33                          else:
34                              print(f"⚠ Malformed data: {line}")
35                      else:
36                          print(f"⚠ Ignored line: {line}")
37      except KeyboardInterrupt:
38          print("\nLogging stopped by user.")
39      except Exception as e:

```

```

1  #include <DHT.h>
2
3  #define DHTPIN 2          // Data pin connected to D2
4  #define DHTTYPE DHT22    // DHT 22 (AM2302)
5
6  DHT dht(DHTPIN, DHTTYPE);
7
8  void setup() {
9      Serial.begin(9600);
10     while (!Serial); // Wait for Serial Monitor
11     dht.begin();
12 }
13
14 void loop() {
15     delay(10000); // Sample every 10 seconds
16
17     float temp = dht.readTemperature();
18     float humid = dht.readHumidity();
19
20     if (!isnan(temp) && !isnan(humid)) {
21         Serial.print(temp);    // Temperature first
22         Serial.print(",");
23         Serial.println(humid); // Humidity second
24     } else {
25         Serial.println("NaN,NaN");
26     }
27 }
28

```

I implemented an Arduino sketch that reads temperature and humidity values from a DHT22 sensor every 10 seconds and sends the data as comma-separated values over the Serial port. Then, a Python script (`dht22_logger.py`) listens for this data, adds a timestamp using the computer's clock, and saves each reading to a CSV file in the format `timestamp,temperature,humidity`. A second Python script (`plot_dht22_combined.py`) reads this CSV file, converts the timestamps into readable datetime objects, and plots both temperature and humidity on a single graph using dual y-axes to visualize how the environment changes over time.

Q4)

<https://deakin.au.panopto.com/Panopto/Pages/Sessions/List.aspx?folderID=10ec970b-fca5-4ea3-b4b7-b33200ec3313>