

```
In [1]: student_name = "Rammaka Aaron Iddamalgodu" # fill your name
student_id = "s223496576" # fill your student ID
print("Student name: " + student_name)
print("Student ID: " + student_id)
```

Student name: Rammaka Aaron Iddamalgodu

Student ID: s223496576

Hypothesis:

I initially expected a stronger correlation between fluctuations in temperature and humidity. Specifically, I hypothesized that as temperature fluctuates, humidity would show a more direct and proportional change, given that these two environmental variables are often related. For example, an increase in temperature can often cause a decrease in relative humidity as warmer air holds more moisture.

Analysis of Actual Data:

Upon reviewing the actual data, I observed that:

Temperature fluctuated more frequently than humidity, showing more dynamic changes throughout the dataset.

Humidity remained relatively stable, with minor variations compared to temperature. The fluctuations in humidity did not strongly correlate with those of temperature, but being in a controlled indoor environment would have had a factor to play.

The only period where both temperature and humidity fluctuated together was when external heat (from the lighter) was introduced to the sensor. During this time, temperature rose sharply, and humidity showed a noticeable but smaller change. This suggests that both variables responded to the environmental change, but I only got the lighter going around 30 seconds to a minute of the time.

Sensor Accuracy: The DHT11 sensor used for data collection has a known accuracy of around 80%. This limited accuracy could account for some of the observed discrepancies and minor variations in humidity, as the sensor may not capture all the subtle changes accurately. Thus, part of the limited relationship between temperature and humidity might be due to the sensor's precision.

Conclusion: The hypothesis did not hold under normal conditions, as temperature fluctuated more frequently than humidity, and there was no strong correlation between the two except when heat was directly introduced. The sensor's accuracy (80%) likely contributed to the muted relationship observed in the data.

```
In [17]: import pandas as pd
import matplotlib.pyplot as plt

# Read the Excel file
df = pd.read_csv("/PythonPrograms/sensor_data.csv", skiprows=1, names=["Time

# Check the first few rows to ensure data is read correctly
print("Data Preview:\n", df.head())

# Check data types to ensure everything is correct
print("\nData Types:\n", df.dtypes)

# Convert the 'Timestamp' column to a datetime format (since it's in the for
df['Timestamp'] = pd.to_datetime(df['Timestamp'], format='%Y%m%d%H%M%S')

# Plot temperature data
plt.figure(figsize=(10,5))
plt.plot(df['Timestamp'], df['Temperature'], label='Temperature', color='red')
plt.xlabel('Time')
plt.ylim(16, 50)
plt.ylabel('Temperature (°C)')
plt.title('Temperature Over Time')
plt.xticks(rotation=45)
plt.tight_layout()
plt.legend()
plt.show()

# Plot humidity data
plt.figure(figsize=(10,5))
plt.plot(df['Timestamp'], df['Humidity'], label='Humidity', color='blue')
plt.xlabel('Time')
plt.ylim(60, 100)
plt.ylabel('Humidity (%)')
plt.title('Humidity Over Time')
plt.xticks(rotation=45)
plt.tight_layout()
plt.legend()
plt.show()

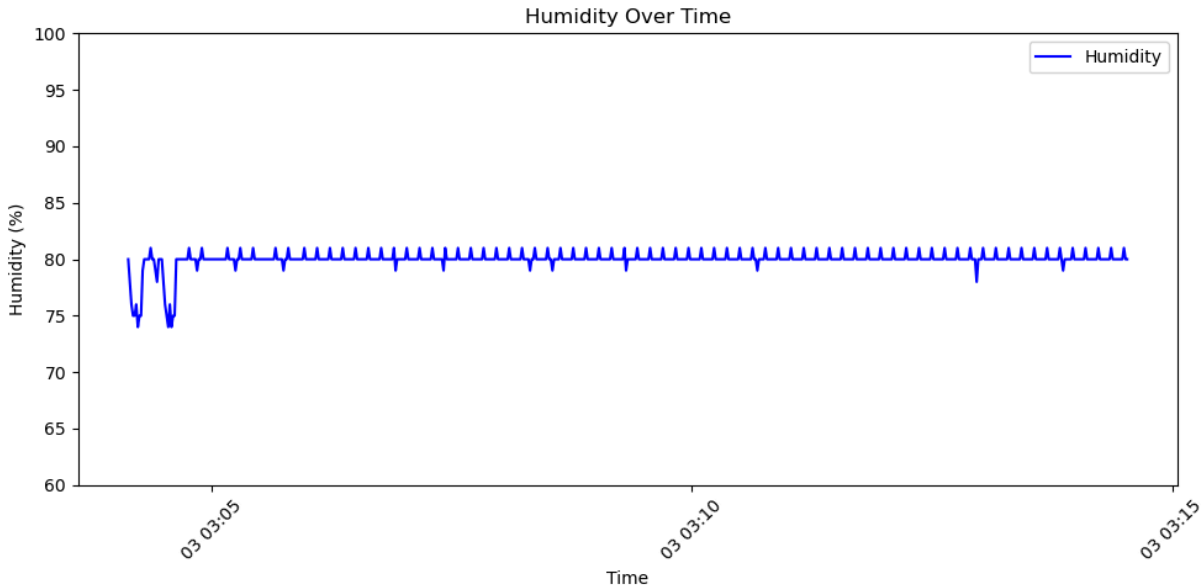
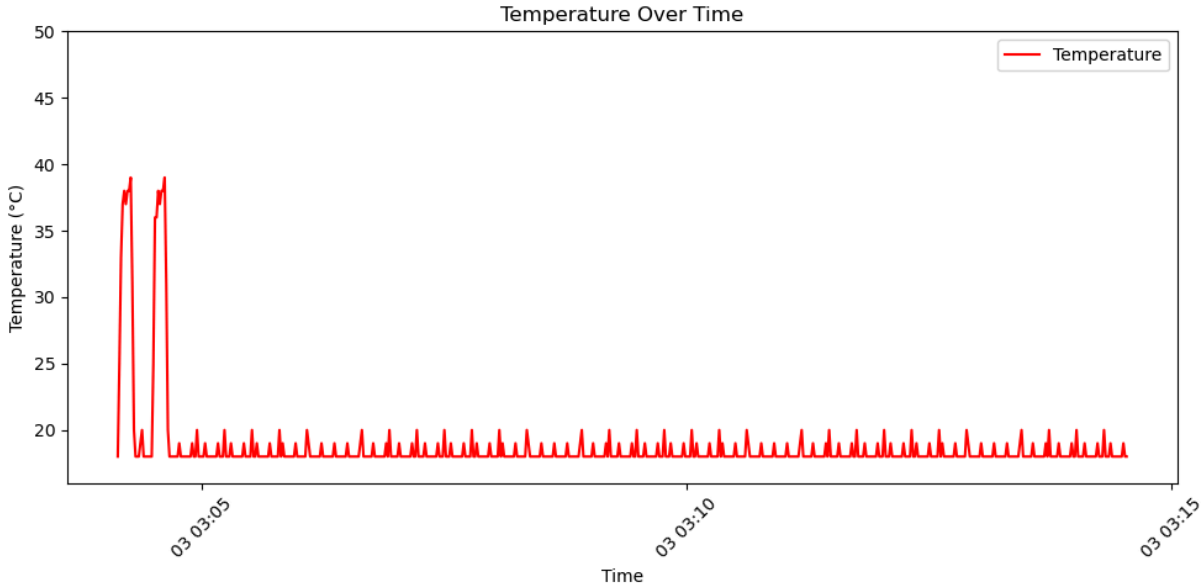
# Plot both temperature and humidity in the same figure for comparison
plt.figure(figsize=(10,5))
plt.plot(df['Timestamp'], df['Temperature'], label='Temperature', color='red')
plt.plot(df['Timestamp'], df['Humidity'], label='Humidity', color='blue')
plt.xlabel('Time')
plt.ylim(16, 100)
plt.ylabel('Sensor Readings')
plt.title('Temperature and Humidity Over Time')
plt.xticks(rotation=45)
plt.tight_layout()
plt.legend()
plt.show()
```

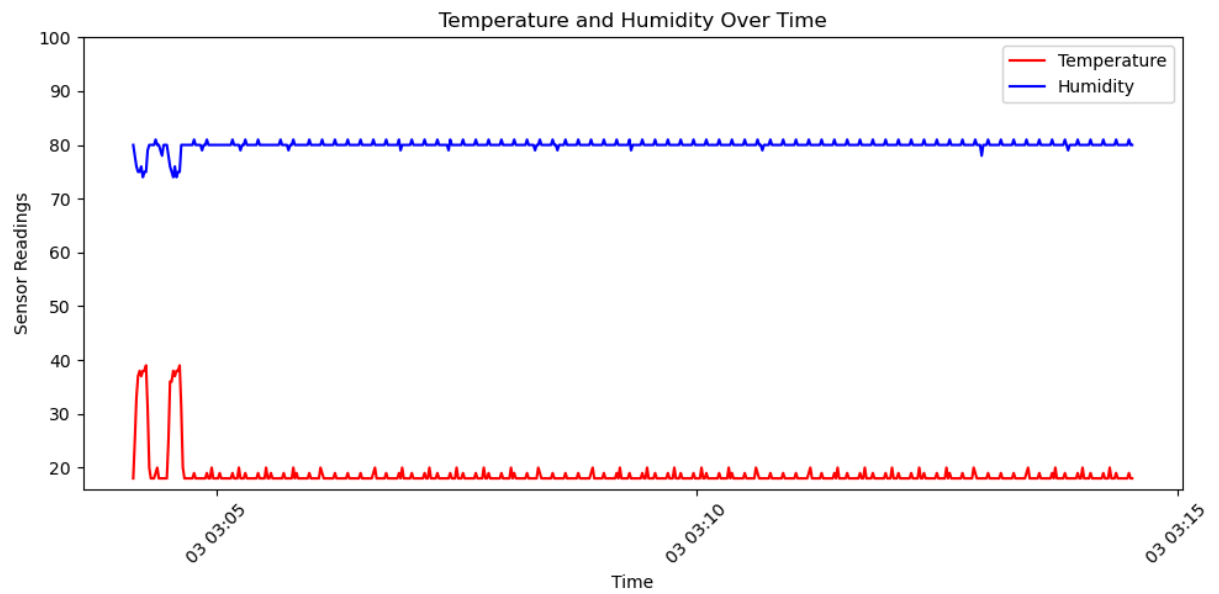
Data Preview:

| | Timestamp | Temperature | Humidity |
|---|----------------|-------------|----------|
| 0 | 20241003030408 | 18 | 80 |
| 1 | 20241003030409 | 25 | 78 |
| 2 | 20241003030410 | 33 | 76 |
| 3 | 20241003030411 | 37 | 75 |
| 4 | 20241003030412 | 38 | 75 |

Data Types:

Timestamp int64
Temperature int64
Humidity int64
dtype: object





In []: