Task 01

Task Overview:

Develop a web application that processes zipped CSV files containing temperature and strain sensor data from two structural platforms (WIN & NC). The application should extract, analyse, and visualise this data, and provide real-time alerts if any parameter crosses a critical threshold.

Key Requirements:

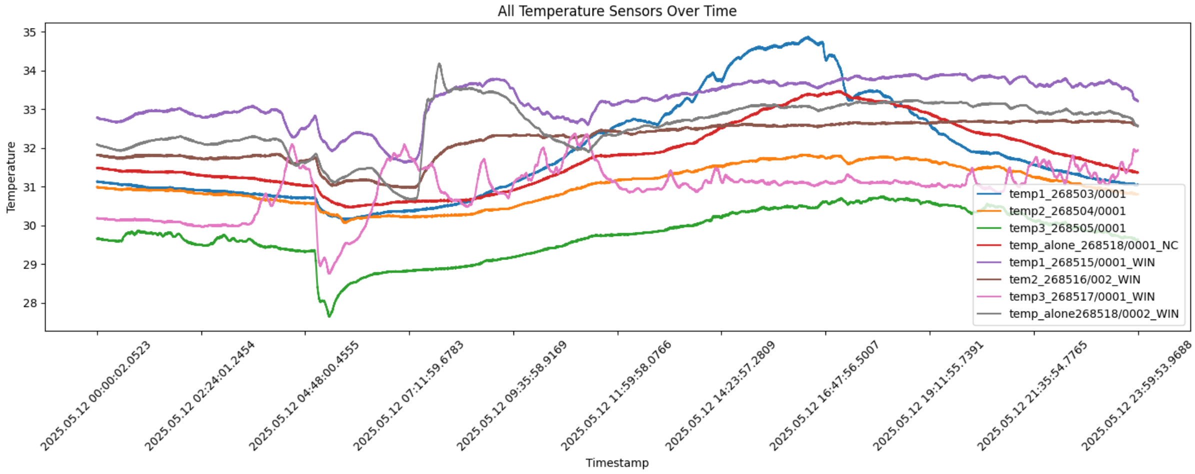
1. **Backend (Python):**
   - Create a function to accept a folder file containing multiple CSVs.
   - Each CSV will have columns like:
     'TimeStamp', 'temp1_268503/0001', 'strain1_slanted_268503/0001_NC', 'temp2_268504/0001', 'strain2_vertical_268504/0001_NC', 'temp3_268505/0001', 'strain3_horizontal_268505/0001_NC', 'temp_alone_268518/0001_NC', 'temp1_268515/0001_WIN', 'strain1_horizontal_268515/0001_WIN', 'tem2_268516/002_WIN', 'Strain2_Vertical_268516/002', 'temp3_268517/0001_WIN', 'strain3_slanted_268517/0001?_WIN', 'temp_alone268518/0002_WIN' ...
   - Plot data with day on x-axis and temp and strain on y-axis. (see reference image)
   - Combine all files, extract relevant data, and check if any temperature or strain readings cross critical values (e.g., temp > 50°C, strain > 5000).
   - Generate alerts when critical values are detected.
2. **Frontend (Web Interface):**
   - Build a user-friendly interface to upload the folder file.
   - Display interactive plots (e.g., using Plotly or similar) for temperature and strain data trends.
   - Show notifications or alerts when critical values are crossed.
   - Optionally, allow users to adjust threshold values and compare data from both platforms.
3. **Suggestion:**
   - Well-documented code and the steps you followed during learning.

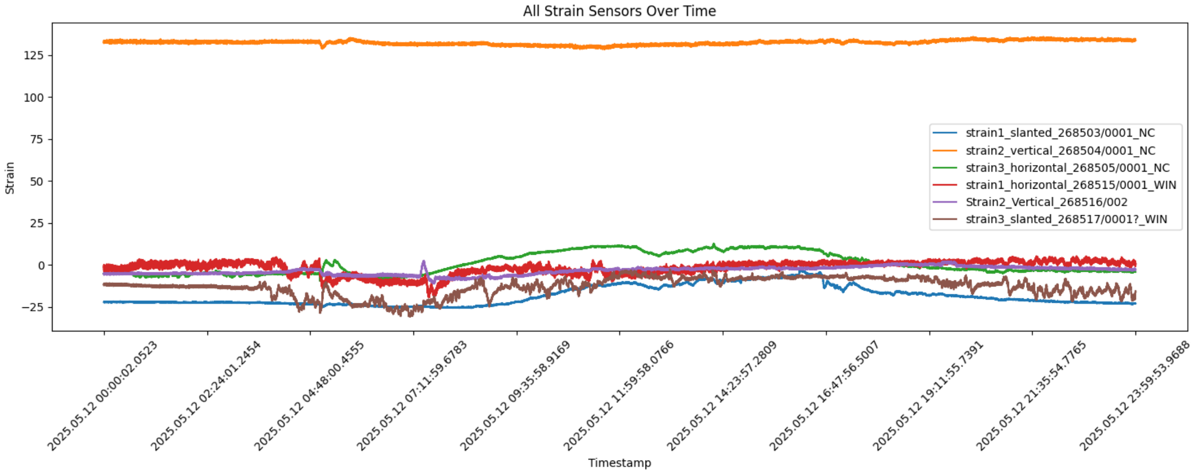
Deliverables:

- Full source code (backend and frontend)

- Instructions for running the application
- Brief documentation explaining your approach and any assumptions

Reference:


All Temperature Sensors Over Time
Temperature
Timestamp
2025.05.12 00:00:02.0523
2025.05.12 02:24:01.2454
2025.05.12 04:48:00.4555
2025.05.12 07:11:59.6783
2025.05.12 09:35:58.9169
2025.05.12 11:59:58.0766
2025.05.12 14:23:57.2809
2025.05.12 16:47:56.5007
2025.05.12 19:11:55.7391
2025.05.12 21:35:54.7765
2025.05.12 23:59:53.9688
temp1_268503/0001
temp2_268504/0001
temp3_268505/0001
temp_alone_268518/0001_NC
temp1_268515/0001_WIN
tem2_268516/002_WIN
temp3_268517/0001_WIN
temp_alone268518/0002_WIN


All Strain Sensors Over Time
Strain
Timestamp
2025.05.12 00:00:02.0523
2025.05.12 02:24:01.2454
2025.05.12 04:48:00.4555
2025.05.12 07:11:59.6783
2025.05.12 09:35:58.9169
2025.05.12 11:59:58.0766
2025.05.12 14:23:57.2809
2025.05.12 16:47:56.5007
2025.05.12 19:11:55.7391
2025.05.12 21:35:54.7765
2025.05.12 23:59:53.9688
strain1_slanted_268503/0001_NC
strain2_vertical_268504/0001_NC
strain3_horizontal_268505/0001_NC
strain1_horizontal_268515/0001_WIN
Strain2_Vertical_268516/002
strain3_slanted_268517/0001?_WIN