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**TECHNOLOGY-PROJECT NAME**

Building Performance Analysis

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**Title: Building Performance Analysis**

Abstract:

The Building Performance Analysis project evaluates the efficiency, sustainability, and operational effectiveness of building systems using data-driven techniques. The analysis includes environmental factors (thermal comfort, lighting, air quality), energy usage, and structural integrity. This document presents a comprehensive summary of the final phase of the project, covering demonstration procedures, technical documentation, performance results, source code integration (where applicable), and testing metrics. The goal is to inform decisions for optimizing building operations and supporting sustainable design choices.

# Index

1. **Project Demonstration**
2. **Project Documentation**
3. **Feedback and Final Adjustments**
4. **Final Project Report Submission**
5. **Project Handover and Future Works**

# Project Demonstration

Overview:

The Building Performance Analysis tool is demonstrated to stakeholders to showcase its analysis capabilities for energy efficiency, structural monitoring, and environmental comfort levels.

Demonstration Details:

* Tool Walkthrough: Overview of the analysis dashboard with historical and real-time data visualization.
* Energy Monitoring: Display of daily/monthly energy usage trends and areas of loss.
* Environmental Metrics: Analysis of indoor temperature, CO2 levels, lighting, and HVAC efficiency.
* Structural Analysis: Basic structural health monitoring using sensor data (if applicable).
* Security & Data Accuracy: Ensuring privacy in sensor networks and reliability of readings.

Outcome:

A live presentation confirms the system's reliability in assessing building performance and delivering actionable insights for improved efficiency.

# Project Documentation

Overview:

This section documents the system architecture, software used, sensor networks, user guides, and testing results.

Documentation Sections:

* System Architecture: Layout of building sensors, software pipelines, and data flow diagrams.
* Code Documentation: Scripts used for data processing, modeling, and visualization (if software-based).
* User Guide: Instructions for building operators to access dashboards and interpret metrics.
* Admin Guide: For IT/admin personnel to manage data pipelines and ensure sensor integrity.
* Testing Reports: Accuracy, uptime, latency, and system calibration data.

Outcome:

Provides a solid base for future system upgrades or replications in other facilities.

# Feedback and Final Adjustments

Overview:

User feedback is collected to refine the system before handover.

Steps:

* Collection from test users, facility managers, and engineers.
* Performance tuning based on comfort thresholds and energy benchmarks.
* Final retesting post-implementation.

Outcome:

Refinements ensure real-world usability, accuracy, and energy savings.

# Final Project Report Submission

Overview:

The report summarizes the project journey, findings, and key deliverables.

Sections:

* Executive Summary: Project goals, scope, and achieved outcomes.
* Phase Breakdown: From planning, data collection, modeling, to deployment.
* Challenges & Solutions: Issues with sensor placement, data gaps, or integration delays.
* Outcomes: Quantifiable improvements in building performance.

Outcome:

A clear, actionable report supports decision-makers and records project success.

# Project Handover and Future Works

OVERVIEW:

Details for future iterations and ongoing monitoring.

Handover Details:

* Guidance on maintaining sensor calibration.
* Future plans: machine learning-based predictive analysis, cross-building comparisons.
* Suggestions for integrating with BMS or ERP platforms.

OUTCOME:

Ensures long-term value through maintainability and scalability.

SOURCE CODE:

import pandas as pd

import matplotlib.pyplot as plt

# Load sample building data (e.g., from a CSV file)

def load\_data(file\_path):

try:

data = pd.read\_csv(file\_path, parse\_dates=['Timestamp'])

print("Data loaded successfully.")

return data

except Exception as e:

print(f"Error loading data: {e}")

return None

# Analyze energy usage over time

def analyze\_energy(data):

data['Date'] = data['Timestamp'].dt.date

daily\_energy = data.groupby('Date')['Energy\_kWh'].sum()

print("Energy analysis completed.")

return daily\_energy

# Visualize temperature and CO2 levels

def plot\_environmental\_metrics(data):

plt.figure(figsize=(12, 6))

plt.plot(data['Timestamp'], data['Temperature\_C'], label='Temperature (°C)', color='orange')

plt.plot(data['Timestamp'], data['CO2\_ppm'], label='CO2 (ppm)', color='green')

plt.xlabel('Time')

plt.ylabel('Environmental Metrics')

plt.title('Building Temperature and CO2 Over Time')

plt.legend()

plt.tight\_layout()

plt.grid(True)

plt.show()

# Main workflow

def main():

file\_path = 'building\_sensor\_data.csv' # Replace with your actual file

data = load\_data(file\_path)

if data is not None:

energy\_usage = analyze\_energy(data)

print(energy\_usage.head())

plot\_environmental\_metrics(data)

if \_\_name\_\_ == "\_\_main\_\_":

main()

OUTPUT:  


