***MEASURE ENERGY CONSUMPTION USING PYTHON***

**TEAM MEMBER**

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**Phase 2 Submission Document**

**Project: Measure Energy Consumption**

Introduction:

\* Provide an overview of the project, highlighting the significance of energy conservation in residential and commercial buildings.

\* Explain the challenges faced in accurately measuring and analyzing energy consumption.

\* Introduce the AI-based solution as a means to tackle these challenges effectively

**Steps:**

1. **Data Collection**: Gather comprehensive data on energy consumption, including electricity, gas, and water usage, from various sensors and meters installed in buildings.

2**. Data Preprocessing**: Clean and preprocess the collected data, handling missing values, outliers, and ensuring data consistency.

3. **Feature Engineering**: Create meaningful features from the raw data, such as daily, weekly, and monthly energy usage patterns, weather conditions, and occupancy information.

4. **Machine Learning Model**: Develop a predictive model using machine learning techniques to estimate energy consumption. The model should consider factors like historical usage, external factors (e.g., temperature, humidity), and occupancy patterns.

5. **Real-time Monitoring**: Implement a real-time monitoring system that continuously collects data and updates predictions, providing insights into current and future energy consumption trends.

6**. Anomaly Detection**: Incorporate anomaly detection algorithms to identify unusual spikes or drops in energy consumption, which may indicate faults or inefficiencies in the building's systems.

7**. User Interface**: Create a user-friendly interface or dashboard that allows users to visualize and interact with energy consumption data, view predictions, and set energy-saving goals.

8. **Recommendations**: Provide energy-saving recommendations based on the analysis, such as optimizing heating and cooling systems, lighting schedules, and appliance usage.

9. **Scalability:** Ensure that the system can scale to accommodate data from multiple buildings and adapt to different types of sensors and meters.

10**. Energy Efficiency Reporting:** Generate reports summarizing energy consumption trends, cost savings, and environmental impact for building owners and occupants.

**Data source:**



Wave form:



**Program**

import time

import random

# Simulate sensor data

def read\_sensor\_data():

return {

"temperature": random.uniform(10, 30),

"pH": random.uniform(6, 8),

"dissolved\_oxygen": random.uniform(5, 10),

}

# Simulate energy consumption

def measure\_energy\_consumption():

return random.uniform(1, 5) # In watts

# Main loop

while True:

sensor\_data = read\_sensor\_data()

energy\_consumption = measure\_energy\_consumption()

# Process and log sensor data

# You can also calculate total energy consumption over time

print(f"Sensor Data: {sensor\_data}")

print(f"Energy Consumption: {energy\_consumption} Watts")

time.sleep(60) # Log data every minute

Outputs:

