

IBM NaanMuthalvan – Artificial Intelligence Group 4

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Phase 3 :

MEASURE ENERGY CONSUMPTION

Process:

Step1:

Gather the necessary data

Step2:

This typically involves collecting energy consumption data from various sources

Step3:

Clean and preprocess the data to remove outliers, handle missing values, and format it for analysis

Step4:

Create relevant features from the data, such as time of day, weather conditions, or occupancy patterns, which could impact energy consumption

Step5:

Choose the appropriate AI techniques for our project

Step6:

Train our AI models using the preprocessed data

Step7:

Implement anomaly detection algorithms to identify irregular or inefficient energy consumption patterns.

Step8:

Develop visualization tools to present the results

Step9:

Consider how our project can be scaled to accommodate more extensive energy monitoring, if needed

Python Coding:

```
import random
```

```
import time
```

```
from datetime import datetime
```

```
# Simulated energy consumption data generator
```

```
def generate_energy_data():
```

```
    current_time = datetime.now()
```

```
    while True:
```

```
        timestamp = current_time.strftime("%Y-%m-%d %H:%M:%S")
```

```
        energy_consumption = random.uniform(100, 1000) #
```

```
Simulated consumption in watts
```

```
        yield timestamp, energy_consumption
```

```
        time.sleep(1) # Simulate data update every second
```

```
# Data storage (you can use a database or file storage in a real system)
```

```
def store_energy_data(timestamp, energy_consumption):
```

```
    with open('energy_data.csv', 'a') as f:
```

```
        f.write(f'{timestamp},{energy_consumption}\n')
```

```
if __name__ == "__main__":
```

```
    data_generator = generate_energy_data()
```

```
    try:
```

```
        while True:
```

```
            timestamp, energy_consumption = next(data_generator)
```

```
            store_energy_data(timestamp, energy_consumption)
```

```
            print(f"Timestamp: {timestamp}, Energy Consumption:  
{energy_consumption} W")
```

```
        except KeyboardInterrupt:
```

```
            print("Monitoring stopped.")
```

Energy monitor:



Solution:

- Smart meters with built-in AI algorithms can continuously collect and analyze energy consumption data at a granular level, often in real-time
- Machine learning models can identify patterns, anomalies, and trends in energy consumption

- AI can forecast future energy consumption based on historical data and external factors like weather forecasts
- Some devices can be integrated with smart home or building systems to remotely control appliances, thermostats, lighting, and other devices to optimize energy usage
- Many of these devices have companion apps that provide users with easy access to energy consumption data and insights on their mobile devices
- This information can motivate users to reduce their environmental impact

Conclusion:

Incorporating AI into energy consumption management provides a pathway to reducing energy costs, minimizing environmental impact, and promoting sustainability. It empowers individuals, businesses, and utilities to make data-driven decisions, ultimately contributing to more efficient and responsible energy use. Regular updates and maintenance are crucial to keep AI algorithms accurate and relevant.

