

METHODOLOGY

Phase 1: Database Design and Development

1. Design a database schema to store user and appliance data using SQLite.
2. Implement the database schema and create tables for users, appliances, energy usage, and threshold settings.

Phase 2: Backend Development

1. Develop the SHEMS backend using Python to handle user requests, appliance registration, threshold setting, and energy consumption tracking.
2. Implement algorithms for efficient energy management and optimal control mechanisms.
3. Integrate the database with the backend to store and retrieve data.

Phase 3: Web Interface Development

1. Design and develop a user-friendly web dashboard using Streamlit for users to interact with the system.
2. Implement features for appliance registration, threshold setting, energy consumption tracking, and manual control.
3. Integrate the backend with the web interface to enable data exchange.

Phase 4: Simulation and Data Generation

1. Develop simulation models to emulate the behavior of SHEMS in a virtual environment.
2. Simulate SHEMS operations and actions to generate data representing energy consumption, electrical appliance usage, and system performance.

Phase 5: Data Analysis and Visualization

1. Analyze the simulated data for trends, patterns, insights, and decision-making related to efficient energy management and optimization.
2. Visualize the data using Python libraries (Matplotlib, Plotly) to display statistics and visualizations of appliance usage, energy consumption, and duration of use.

Phase 6: Deployment

1. Deploy the SHEMS on a cloud platform (Render) for scalability and reliability.