Home Energy Optimization System

Group 7

Smart Home

Currently, homeowners have **little insight into the energy consumption in their homes**. Energy bills are both burdensome on the homeowner and on the environment.

Our Plan:

- Build a system that **tracks** home energy consumption patterns.
- The user can view consumption **patterns** by device, or time of day.
- System will provide **recommendations** on how energy usage can be improved to save resources

Functional Requirements

Account/User

Sign up through email/phone

Delete account logic

Update account information (email, phone, name, password, etc)

Automatic calibration if moving to a new house

Devices

Add/remove a device through a specific number

Software updates for a specific device

Turn off/on a device

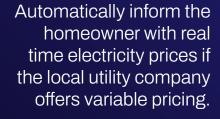Schedule device operations based on predefined user settings

User Alerts/ Notifications

Get notified for specific energy rebates and incentives

Send alerts to the user if device energy use is abnormal (anomaly detection)

Automatically inform the homeowner with real time electricity prices if the local utility company offers variable pricing.

Display any problems with appliances and get notified if it may be time to replace an appliance

Analytics

Display total energy consumption by user

Display reports for energy usage by device

Display user consumption patterns over time

Weekly energy report at a specific time so you can observe how information has changed on a week to week basis

Optimization

Provide recommendations on how to adjust energy consumption during seasonal changes.

Automatically switch to low-energy mode in the midst of an emergency like a power outage or a grid strain.

Determine average price + usage of energy around the area and compare that with what the homeowner data

Set monthly goals for energy consumption

Nonfunctional Requirements

1. Ensure the security and safety of the user who is accessing the application
   a. data is not being shared to third parties

2. Control connected devices with < 1 second response time while handling multiple devices at once.

3. Energy consumption statistics are updated to the minute

4. High system availability and very minimal downtime
   a. Data server is cleaned periodically to increase response times

5. Ensure the system will continue to run even if some of the system's components fail for any reason.

Team Responsibilities

- Labiba: User Alerts/ Notifications and ensure system functionality in case of other device failure.

- Ayesha: Optimization - Provide recommendations and set goals

- Shreyas: Analytics and make sure energy consumption statistics are updated to the minute

- Syam: Account/User and Ensure the security and safety of the user who is accessing the application (Make sure the data is not being shared to third parties)

- Krish: Devices and control connected devices with < .01 second response time while handling multiple devices at once.

Potential Challenges

- Password encryption and data security

- Identifying a set buffer before sending out notifications and reminders of too much usage.

- Little to no knowledge on energy usage and what is too excessive

- Determining which designs are most effective and user-friendly when planning our application

Overcoming Challenges

- Do market research into the home energy resources industry

- Consistent team communication to stay on the same page and learn from each other

- Research mock user interfaces in this subspace to get an idea of implementation.

- Iterative process of making designs to get reviews along the way (agile)

Thank you