

# Electricity Saving System

## Software Requirements Specification

**Team VoltSolver**

**Group 11**

**Project Assignment**

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# 1. Introduction

## 1.1 Purpose

The Electricity Management Web Application project aims to allow users to manage and monitor their electricity usage effectively. The purpose of this web app is to assist users in controlling their electricity consumption based on their monthly plan, providing advice on consumption, and facilitating meter reading updates for accurate billing. This System Requirements Specification document outlines the functional and non-functional requirements of the app.

## 1.2 Document Conventions

Throughout this documentation, standard conventions for clarity and coherence will be adhered to, ensuring that all stakeholders can easily comprehend and engage with the project's objectives, features, and requirements.

## 1.3 Intended Audience and Reading Suggestions

This document is intended for developers, project managers, stakeholders, and anyone involved in the development process of the Electricity Usage Management App. Readers are suggested to begin with the overview sections and then proceed to the sections relevant to their role or interest.

## 1.4 Project Scope

The scope of this project includes the development of a mobile application that allows users to input their electrical appliances, usage patterns, and meter readings to receive personalized recommendations on electricity consumption management. The app will focus on providing users with insights into their electricity usage and helping them optimize it according to their needs and preferences.

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## 2. Overall Description

### 2.1 Product Perspective

The Electricity Usage Management App is a standalone product designed to run on mobile devices. It will interface with users to collect data about their electrical appliances, usage habits, and meter readings. The app will not be dependent on any other system or component.

### 2.2 Product Features

- User registration and authentication
- Input of electrical appliances and their usage patterns
- Meter reading input and tracking
- Personalized electricity consumption management recommendations
- Notification reminders for meter readings and bill payments

### 2.3 User Classes and Characteristics

The app will cater to various user classes including residential electricity consumers, landlords managing multiple properties, and small businesses. Users may vary in their technical expertise and familiarity with electricity management practices.

### 2.4 Operating Environment

The web application will be accessible across multiple platforms, including desktop computers, laptops, tablets, and smartphones, ensuring ubiquitous availability and seamless user experience. Compatibility with popular web browsers and responsive design principles will enable users to access the application from any internet-enabled device, thereby fostering widespread adoption and usability.

### 2.5 Design and Implementation Constraints

The design and implementation of the web application will be governed by several constraints, including compliance with Sri Lankan electricity regulations, integration with existing metering infrastructure operated by electricity providers, adherence to best practices in user interface design and user experience optimization, and scalability to accommodate future enhancements and feature expansions.

## 2.6 User Documentation

To facilitate user onboarding and enhance usability, comprehensive user documentation will be provided within the web application, offering step-by-step guides, tutorials, and FAQs to assist users in navigating the various features and functionalities. Additionally, interactive tooltips, contextual help prompts, and in-app notifications will be employed to proactively address user queries and facilitate seamless interaction with the application.

## 2.7 Assumptions and Dependencies

The successful development and deployment of the web application are contingent upon several assumptions and dependencies, including users' access to internet-connected devices, cooperation from electricity providers for data access and integration, availability of reliable data sources for consumption tracking and billing information retrieval, and alignment with regulatory frameworks governing data privacy and security.

# 3. System Features

## 1. User Registration and Profile Setup

- **User-friendly registration process**
  - Provide a streamlined registration form with clear instructions.
  - Include fields for name, email address, and phone number.
- **Input of essential user information**
  - Require users to input their name, email address, and phone number.
  - Ensure validation checks for data accuracy.
- **Option to set up personalized profiles with household details and preferences**
  - Allow users to create personalized profiles after registration.
  - Include fields for household details such as address and family size.
  - Provide options for users to specify preferences related to energy usage and billing.

## 2. Input of Household Appliances and Usage Patterns

- **Ability for users to list household appliances**
  - Offer a section where users can add details about their household appliances.
  - Include fields for appliance name, power rating, and usage frequency.

- **Input of appliance power ratings and usage durations**
  - Require users to input power ratings and estimated usage durations for each appliance.
  - Provide guidance or tooltips to assist users in determining accurate values.
- **Basis for generating personalized consumption plans**
  - Utilize the inputted appliance data as the basis for generating consumption plans.
  - Analyze usage patterns to identify areas for optimization.

### **3. Meter Reading Updates and Billing Information Retrieval**

- **Integration with electricity meters for automated reading updates**
  - Implement a feature to integrate with users' electricity meters for automated reading updates.
  - Use APIs or other communication protocols to fetch meter readings.
- **Retrieval of billing information from electricity providers**
  - Establish a connection with electricity providers' databases to retrieve billing information.
  - Ensure secure data transmission and compliance with privacy regulations.
- **Real-time insights into consumption and billing cycles**
  - Provide users with real-time insights into their consumption and billing cycles.
  - Display current usage, projected bills, and historical data for reference.

### **4. Generation of Personalized Consumption Plans**

- **Utilization of user-inputted data for plan generation**
  - Incorporate the user's inputted appliance data and usage patterns into the plan generation process.
  - Utilize machine learning algorithms or rule-based systems to optimize plans.
- **Consideration of user preferences and tariff structures**
  - Take into account user preferences and constraints when generating consumption plans.
  - Consider variable tariff structures and peak/off-peak hours in plan recommendations.
- **Provision of actionable recommendations for energy optimization**
  - Offer actionable recommendations to users based on their consumption patterns.

- Suggest energy-saving tips, appliance upgrades, or behavioral changes to optimize usage.

## 5. Adding OTP Verification Code Using Phone Number

- **Incorporate OTP verification during registration**
  - Prompt users to verify their phone number through OTP before completing the registration process.
  - Send an OTP to the provided phone number via SMS.
- **Verify OTP for authentication**
  - Allow users to input the OTP received on their phone.
  - Validate the OTP against the one generated and sent by the system.
- **Ensure security and reliability**
  - Implement measures to prevent OTP misuse, such as rate limiting and expiration time.
  - Handle edge cases, such as incorrect OTP inputs or failed SMS delivery, gracefully.

## 4. External Interface Requirements

- **User Interfaces**
  - Intuitive interfaces for desktop and mobile devices.
  - Responsive design for consistent usability.
  - Interactive elements for seamless interaction.
- **Hardware Interfaces**
  - Standardized interfaces for meter integration.
  - Compatibility with metering protocols.
  - Interoperability with various metering infrastructure.
- **Software Interfaces**
  - Integration with external databases operated by electricity providers.
  - Secure APIs and data exchange protocols.

- Reliable data retrieval and synchronization.
- **Communications Interfaces**
  - Email notifications for meter readings and billing updates.
  - Automated triggers based on user preferences.
  - Timely delivery of notifications.

## 5. Other Nonfunctional Requirements

- **Performance Requirements**
  - Real-time data updates.
  - Responsive user interfaces.
  - Scalability measures for increasing user traffic.
- **Safety Requirements**
  - Compliance with data protection regulations.
  - Encryption of user data.
  - Secure authentication mechanisms.
- **Security Requirements**
  - Regular security audits and testing.
  - Vulnerability assessments.
  - User education on security best practices.
- **Software Quality Attributes**
  - Reliability and stability.
  - Scalability for growth.
  - Maintainability for ongoing support.