ELEN4009 - Software Engineering
Smart Home Power Management System
Software Requirement Specification

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1 Introduction

1.1 Purpose

This document details the system requirements specification for the Smart Home Power Management System. The system design document will be developed from this document.

With the rapidly growing interest in new Internet of Things (IoT) technologies, networks consisting of these devices will become increasingly difficult to manage and control. Additionally, power consumption and monitoring will become a greater concern, especially in emerging markets such as South Africa.

This project aims to provide a flexible software system which is able to remotely control and monitor IoT devices, as well as perform detailed power consumption diagnostics.

1.2 Project Scope

The project is a system that will allow for remote control, monitoring and automation of IoT devices on a Local Area Network (LAN). A client-server architecture will be used since this allows a back-end server to continuously manage devices while allowing for a client to connect on-demand. The front-end will initially be implemented as a web page for simplicity and compatibility with many existing devices (such as cellphones and personal computers).
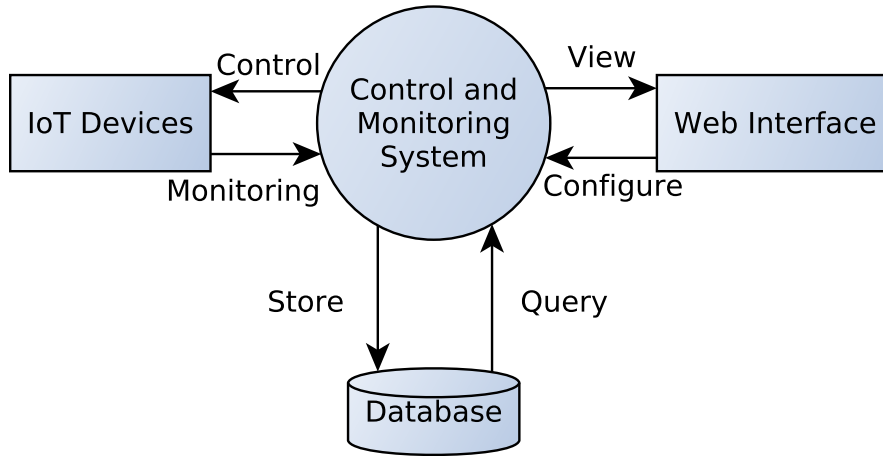
Figure 1: Data flow diagram (DFD) of the system. All data flows are bidirectional

The back-end provides functionality to control and monitor devices, and to log device power consumption. Additionally, the back-end will contain the web server used for interfacing with users.

The front-end will consist of a web-based user interface which will allow secure access to a device dashboard. The dashboard will provide remote control and configuration of devices, as well as access to power consumption data. Addition and removal of IoT devices will also be performed through the dashboard.

2 Project Overview

3 External Interface Requirements

The requirements for the external interface will be illustrated in the following section. The

4 Other Non-Functional Requirements

4.1 Performance Requirements

The smart home power system is an application and system that is designed for efficiency. This means that the application as well as the connecting household components need to respond quickly and in real time.

The application will most likely undergo several updates and changes for the user's benefit. The system is required to update on user command. Updates will include further improvements to the application as well as fixes for issues that arise in operation.

4.2 Safety Requirements

The application as well as the system components need to take certain safety concerns into account.

Due to the fact that the application is essentially controlling most of a home's appliances and electricity usage, it is important that it monitors everything it is controlling to prevent problems that may arise. The application needs to ensure that any device connected in the system does not reach a dangerous level of usage. In this case, the application should either switch off the device in question or notify the user that something is not functioning correctly and needs to be addressed.

4.3 Security Requirements

Due to the fact that the system controls a user's home, it therefore requires security considerations to be taken into account.

The system needs to ensure that only the user has access to the application to prevent external parties gaining control of the connected components within a house. This can be done with a signup, login and authentication process. The components within the house that the application connects with, need to be protected from external parties and therefore they must be explicitly authenticated.

4.4 Software Quality Attributes

The application is web based and needs to be user friendly. The functioning of the application needs to be simple so that no additional documentation or prior knowledge or experience is required.