



SE4YH SMART ENERGY FOR YOUR HOME REQUIREMENTS DEFINITION DOCUMENT

Version 1.5

Revision History

Date	Version	Description	Author
2015-11-05	1.0	Initial Draft	Marius Schlinke
2015-11-05	1.1	All sections are added	Marius Schlinke
2015-11-07	1.2	Added Use Case Diagram	Marius Schlinke
2015-11-12	1.3	Non-functional requirements added	Elena Kyorova
2015-11-12	1.4	High-level description added	Elena Kyorova
2015-11-12	1.5	Introduction, Background, User stories added.	Nathan Chape

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1 Introduction

1.1 Purpose of this document

The purpose of this document is to specify the requirements of the project both functional and non-functional in detail.

1.2 Document organization

The document is organized as follows:

- Section 1, *Introduction*, describes contents of this guide, used documentation during developing process etc.
- Section 2, *Background and Objectives*, describes the background (i.e. the problem of which the project will address) as well as the goals of the project.
- Section 3, *Requirements*, describes the requirements for the project, functional and non-functional.
- Section 4, *User Stories*, contains the user stories used to describe functionality of the system.

1.3 Intended Audience

- Team
- Supervisors
- Sponsor

The purpose of this document is to both clarify and provide consensus of the projects requirements between the team members, supervisors as well as the sponsor. During development this document serves as a guide for the development team, providing a clear and detailed description of the requirements. It should be noted, however, that the requirements themselves are prone to change during development. If and when this occurs this document will be updated to reflect the new requirements. This document can also be used for verification that the project meets the requirements.

1.4 Scope

This document provides the following:

- Background information of the project including a high level definition.
- Functional and non-functional requirements including a UML and uses cases for the functional requirements
- User stories that examine each use case in greater detail.

1.5 Definitions and acronyms

1.5.1 Definitions

Keyword	Definitions
SE4YH User	The user who will you the SE4YH System.
openHab	Framework for working smart devices.

1.5.2 Acronyms and abbreviations

Acronym or	Definitions
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abbreviation	
SE4YH	Smart Energy for Your Home
FER	Faculty of Electrical Engineering and Computing, University of Zagreb
MDH	Mälardalen Högskola, Sweden
UML	Unified Modeling Language

2 Background and objectives

2.1 Background

Over recent years, smart devices have become more and more prevalent in our homes. Smart devices, once solely the domain of media/communication devices such as TVs and smart phones, have diversified to include other household appliances. Appliances such as, washing machines and refrigerators as well as lighting and climate control. All of which can be monitored/controlled via a local wireless connection. For example, a smart washing machine can be given commands to restrict washing times to the evening. Taking advantage of cheaper energy rates. Another example could be a dishwasher that you can remotely start from your phone while sitting at the office or turning off the lights that you forgot before leaving to work.

2.2 High Level Description of the Project

SE4YH project aims building a secure, flexible system that allow a user to manege and monitor the smart devices that are in user's house. Specific rules are created and applied in order to ensure that the application fits user profile and preferences.

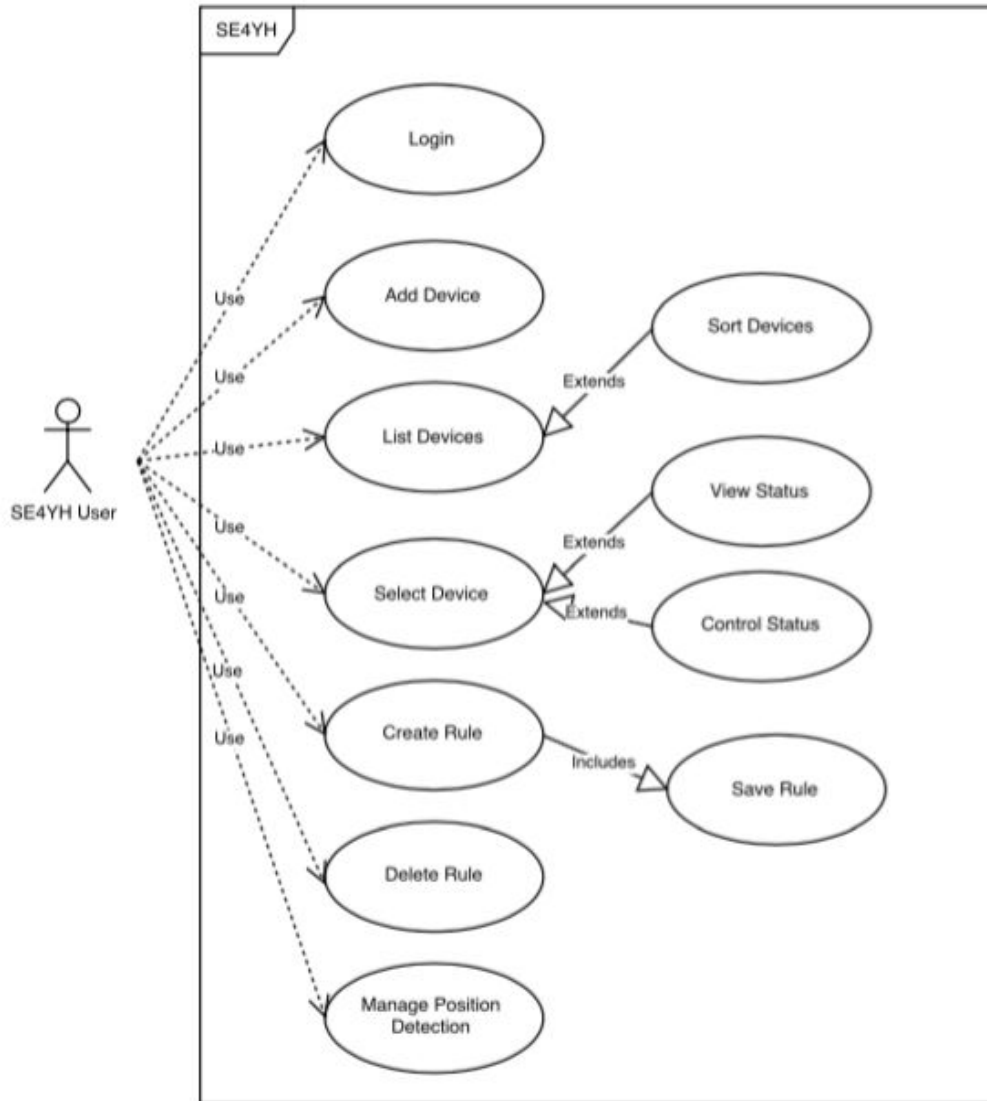
The system will work with a finite number of devices type in the beginning. User will be able to add device and each device will be categorized as part of some room or based on its type (kitchen, bedroom, etc.). The user will be able also to manage the devices depending on their type and "smartness".

3 Requirements

This section provides the functional and non-functional requirements.

3.1 Functional Requirements

This section provides the functional requirements. A UML Use Case Diagram is are used to express the functional requirements.



ID	Use Case Name	Description
UC1	Login	The user can connect to his SE4YH System. Either he is at home or remotely.
UC2	Add Device	The user can add new smart devices. These devices have to be automatically discovered by the systems.
UC3	List Devices	The user can list all his smart devices. He can than choose if he wants to see its status or if he wants to start some actions see UC5 (e.g. turn on/off light)
UC4	Sort Devices	The shown devices can be sorted by the user.
UC5	Select Device	The user can select one smart device.
UC6	View Status	The user can see the possible statuses (e.g. remaining time, temperature, energy consumption)

UC7	Control Status	The user can perform possible actions (e.g. start, stop, pause washing machine)
UC8	Create Rule	The user can assign one or multiple rules to a smart device.
UC9	Save Rule	If the user set up a rule, then the rule is saved and activated for the specific device
UC10	Delete Rule	The user user can delete a rule.
UC11	Manage Position Detection	The user can decide if his position data is send to the SE4YH System or not.

3.2 Non Functional Requirements

Apart from functional requirements, non-functional requirements should be defined.

- User-friendly interface
The system should provide good-looking and intuitive interface which will allow the user quick navigation through rules and devices. All of the main functionalities should be reachable. The user input should be validated.
- Secure connection
The communication between the remote client and the openHab server should be secured in order to prevent malicious attempts to enter in the system.
- Quick system response time
The system response time should be as quick as possible.
- Fault tolerant system
In case of error in one or more component, the system should be able to proceed working. The display messages in case of error should be informative and notification should be send to the support.

4 User Stories

SID	UID	Story	Priority
US1	UC1	As a user I want to be able to login into the application if I am at home	High
US2	UC1	As a user I want to be able to login into the application if I am not at home	Low
US3	UC2	As a user I want to be able to add a new smart device to my network.	High
US4	UC3	As a user I want to be able to see a list of all smart devices currently connected to my network.	High
US5	UC4	As a user I want to be able to sort my list of smart devices based on certain criteria. e.g power consumption, device type etc	Low
US6	UC5	As a user I want be able to select a smart device - from a list of devices.	High
US7	UC6	As a user I want to be able to view the status of a selected smart device.	High

US8	UC7	As a user I want to be able to change the status of a selected smart device. (Perform action/issue command with/to smart device).	High
US9	UC8	As a user I want to be able to define a rule(s) to govern the smart device(s) in my network.	High
US10	UC9	As a user I want to be able to save a rule.	High
US11	UC10	As a user I want to be able to delete a rule.	Med
US12	UC11	As a user I want to enable/disable position tracking.	Low

4.1 Detailed User Stories

Story ID	US1
Story	As a user I want to be able to login into the application if I am at home
Source	Development Team
Detailed Description	When the user starts the client, then he can connect to the system. If he is already connected then the client is showing the main screen.
Validation Criteria	<ul style="list-style-type: none"> • If the user opens the application and he is not connected to the system., then a screen is shown where he can type in xx. • If the user types in some wrong xx, then an error message is shown. • If the user types in correct xx, then the main screen is shown automatically. • If the user opens the application and he is connected to the system, then the main screen is shown.

Story ID	US2
Story	As a user I want to be able to login into the application if I am not at home
Source	Development Team
Detailed Description	The user connects remotely to his network via a WAN connection.
Validation Criteria	<ul style="list-style-type: none"> • If the user opens the application and he is not connected to the system., then a screen is shown where he can type in xx. • If the user types in some wrong xx, then an error message is shown. • If the user types in correct xx, then the main screen is shown automatically. • If the user opens the application and he is connected to the system, then the main screen is shown.

Story ID	US3
Story	As a user I want to be able to add a new smart device to my network.
Source	Development Team
Detailed Description	When a new smart device is detected in the network, a confirmation dialog is displayed asking the user for confirmation to add said device. If a device is not automatically detected the user is able to manually perform a search for the device.
Validation Criteria	<ul style="list-style-type: none"> • If a new smart device is detected the user is asked whether to add it. • If the user is not shown the desired smart device the use can choose to manually search for it. • If a search is performed and no new devices are found, then a error message is shown

Story ID	US4
Story	As a user I want to be able to see a list of all smart devices currently connected to my network.
Source	Development Team
Detailed Description	From the main screen, the user can choose to view a list of all smart devices currently connected to their network.
Validation Criteria	<ul style="list-style-type: none"> • The user is presented a list of all currently connected (online) smart devices in the network. • If there is no connected device(s), then an info message is shown.

Story ID	US5
Story	As a user I want to be able to sort my list of smart devices based on certain criteria. e.g power consumption, device type etc
Source	Development Team
Detailed Description	Via the list view screen the user is able to sort the displayed smart devices.
Validation Criteria	<ul style="list-style-type: none"> • If the user is at the main screen they can select the view connected devices action. • At the list view screen the user can select different criteria by which to sort the list.

Story ID	US6
Story	As a user I want be able to select a smart device - from a list of devices.

Source	Development Team
Detailed Description	Via the list view screen the user is able to select a smart device.
Validation Criteria	<ul style="list-style-type: none"> • If the user is at the main screen they can select the view connected devices action. • At the list view screen the user can select a smart device.

Story ID	US7
Story	As a user I want to be able to view the status of a selected smart device.
Source	Development Team
Detailed Description	An option to view the status is displayed when a device is selected. The status consists of one or more attributes relevant to that smart device. For example, if a light is selected, then the status would display whether the light is on or off. If climate control is selected it could display whether it is on or off, the current temperature as well as the desired temperature.
Validation Criteria	<ul style="list-style-type: none"> • The user is able to select a smart device from the list. • An option to display the status - of selected device - is presented. • The status of a smart device is displayed.

Story ID	US8
Story	As a user I want to be able to change the status of a selected smart device. (Perform action/issue command with/to smart device).
Source	Development Team
Detailed Description	With a smart device selected, the user is able to issue a command/change the status of selected device. e.g. Turn off light, increase temperature, pause dishwasher etc.
Validation Criteria	<ul style="list-style-type: none"> • A user is able to select a smart device • A user can view the status of selected smart device. • Only relevant actions for that particular smart device are displayed i.e. On/Off, Raise/Lower temperature, overload etc.

Story ID	US9
Story	As a user I want to be able to define a rule(s) to govern the smart device(s) in my network.

Source	Development Team
Detailed Description	The user can set rules which determine how and when smart devices in a household are run. An example of this rules could be: <ul style="list-style-type: none"> lights should activate when it's dark the washing machine should only wash when energy rates are low keep overall power consumption to minimum
Validation Criteria	<ul style="list-style-type: none"> The user is able to select the <i>rule</i> screen. The user is able to set conditions that define their rules.

Story ID	US10
Story	As a user I want to be able to save a rule.
Source	Development Team
Detailed Description	Once the user has defined a set of rules the user should be able to name and save them.
Validation Criteria	<ul style="list-style-type: none"> a user is able to define a rule(s) the user can select an option to save the rule

Story ID	US11
Story	As a user I want to be able to delete a rule.
Source	Development Team
Detailed Description	From a list of previously saved rules a user should be able to select one or more and delete them.
Validation Criteria	<ul style="list-style-type: none"> user is able to select a rule from a list of existing rules user is able to delete selected rule

Story ID	US12
Story	As a user I want to enable/disable position tracking
Source	Development Team
Detailed Description	The SE4YH can enable/disable tracking of user(s) mobile devices, e.g. iPhone. This allows the system to know whether: <ul style="list-style-type: none"> The user is in his/her home and if they are, where in the house they currently positioned
Validation	<ul style="list-style-type: none"> The user is able to select their mobile device from the list of smart

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Criteria	<p>devices</p> <ul style="list-style-type: none">• The user is able to select tracking on/off for selected mobile device.
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