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# Introduction

## Purpose

The purpose of this SRS document is to provide the software functional requirements and other non-functional requirements for the SafeHome project, which is the final project of their CS350 course, carried out by team 2 (consisted with Youngseok Kim and Seokju Hong).

## Intended Audience and Reading Suggestions

Main reader of this document is supposed to be CS350 team 2 members, Youngseok Kim and Seokju Hong, who will implement whole component of the SafeHome. This document is written to help understand whole project clearly, reduce the gap of both’s idea on the project, and encourage collaboration. Another target reader of this document is teaching assistants and professor of CS350, which was held in 2015 spring semester, to evaluate team 2’s work on SRS.

Followings are the brief summary of each chapters.

1. “Chapter 1: Introduction” provides overview of the SafeHome project: the goal of the project, the purpose of this document, the scope of this project, and the outstanding issues.
2. “Chapter 2: Assumptions” provides assumptions used over the SafeHome project design.
3. “Chapter 3: System features” provides brief summary of to-be-implemented features of the SafeHome project, and analysis on assumptions, constraints, use-cases, acceptance criteria of each features.
4. “Chapter 4: Functional requirements” provides the functional requirements of the project, followed by to-be-implemented features with priority.
5. “Chapter 5: Non-functional requirements” provides any requirements other than functional requirements, such as performance requirements, process requirements, quality requirements, and security requirements.
6. Glossary, references, Who-Did-What table and any other information that is needed to understand whole document will be written on appendixes.

## Scope

The goal of this project is to implement home security and surveillance system and software “SafeHome” in an innovative tiny box. Members of team 2 are expected to write documents, make analyze models, and implement the SafeHome project.

The system is expected to serve many features and functions to alarm and prevent possible risks and accidents, such as fire over the house, or any other safety issues or accidents. For example, for fire incident over house, sensors like carbon monoxide sensor or temperature sensor will measure the environment of the house and if SafeHome system decides that fire incident happens in the house, it will alarm whole house, call 119, and send messages to registered contact.

The system serves surveillance system too. To prevent robbery or trespass of strangers, this system includes observation system based on CCTV. If unidentified one approaches to house and tries to enter the house, the system will alarm over the house, call 112, and send messages to registered contacts. Also, it will try to manipulate the door lock components to secure properties of household.

This system also serves web-based dashboards and API’s to let user observe status of the house and control security system of the SafeHome box. A user may want to look over his or her home and see whether things are in good state. Some user may not want to use specific features because of any reasons. To cover those overview/manipulation use cases, the SafeHome project basically serves web-based dashboards. And for more improvements on interfaces, it will also provide API of the dashboard app.

There are many features and functions that will be implemented at the version 1.0, however, as this is a software project, it evolves. More possible risk-preventing features and improvements are expected to be implemented in the software product line.

### Mandated Time Constraints

Phase I: Write SRS documents by Apr. 26

Phase II: Design analysis model by TBA.

Phase III: Construct design model by TBA

Phase IV: Construct and deploy project by TBA

## Outstanding Issues

None to date(Refer last updated date)

# Assumptions

The following are assumptions made in this design:

1. SafeHome box is connected to the internet.
2. SafeHome is expected to update via internet when some security patches are available.
3. Operating temperature of the device is expected to be from -10 degree Celsius to 50 degree Celsius.
4. SafeHome is expected to be connected to the power outlet properly.
5. Assumes critical sensor error happens rarely: monthly sensor check service will be held and broken sensors are changed as soon as possible.

# System Features

## Fire extinguishing system

### General description

When fire accident happens, or some factors that can cause fire are detected by the SafeHome system’s sensors, the SafeHome system have to deal with those cases. For example, suppose someone turned on gas burner and did not turned off for a long time. The SafeHome box have to detect it with its gas sensor, and turn it off. Or, for the another case, if a fire break out at the house, the SafeHome system have to activate spring cooler and any other possible actuators to cease fires, and help people in the house to escape from the house. Like these examples, fire extinguishing system component serves features related to fire breaking out: helping evacuation, ceasing fire, and any possible actions that it can perform.

### Use cases

#### Gas leak alert

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.1.2.1 | Feature Number | 3.1 | Frequency of Use | Rarely |
| Created date | 4/25/2015 | Author | Seokju Hong | Owner | Seokju Hong |
| Updated date | 4/25/2015 | Updated by | Seokju Hong | Revision # | 0 |
| Priority | Medium | | | | |
| Primary actor | SafeHome system, User | | | | |
| Title | Gas leak alert | | | | |
| Preconditions | User has set the configuration to use “Gas leak alert”  Gas leaks from LPG hose and SafeHome sensor detects high level of LPG gas | | | | |
| Postconditions | Gas leak stop and ppm of LPG gas is lower than threshold value. | | | | |
| Main success scenario | 1. SafeHome system records log to SafeHome dashboard system and set status value as “Warning” 2. SafeHome actuator tries to control valve to lower the concentration of LPG. 3. LPG concentration decreases, and ppm value is lower than threshold value. 4. SafeHome system records log to SafeHome dashboard system and set status value as “OK” | | | | |
| Exceptions | 1a. SafeHome gas sensor didn’t detected high level of LPG gas  3a. SafeHome fails to lower the concentration of LPG for 5 minutes(timeout)   * 2a1. The SafeHome system sends message to registered contact that lowering gas level failed. * 2a2. The SafeHome system powers ventilating system on to lower gas level. | | | | |

#### Fire alert

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.1.2.2 | Feature Number | 3.1 | Frequency of Use | Rarely |
| Created date | 4/25/2015 | Author | Seokju Hong | Owner | Seokju Hong |
| Updated date | 4/25/2015 | Updated by | Seokju Hong | Revision # | 0 |
| Priority | High | | | | |
| Primary actor | SafeHome system | | | | |
| Title | Fire alert | | | | |
| Preconditions | User has set configuration to use “Fire alert”  Carbon monoxide concentration value is over threshold value, and temperature value is over threshold value | | | | |
| Postconditions | Fire alarm rings. Registered callbacks called. | | | | |
| Main success scenario | 1. Carbon monoxide concentration value and temperature, which measured from the SafeHome sensors, are over its threshold value. 2. The SafeHome system sends message to 119, and registered contract. 3. The SafeHome system triggers siren over the house. 4. The SafeHome system calls registered callbacks related with the fire alarm system(e.g. use case 3.1.2.3.) and initiate emergency features. | | | | |
| Exceptions | 2a. No registered contact on SafeHome system   * 2a1. The SafeHome system doesn’t send messages. | | | | |

#### Evacuation guide

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.1.2.3 | Feature Number | 3.1 | Frequency of Use | Rarely |
| Created date | 4/25/2015 | Author | Seokju Hong | Owner | Seokju Hong |
| Updated date | 4/25/2015 | Updated by | Seokju Hong | Revision # | 0 |
| Priority | High | | | | |
| Primary actor | SafeHome system, People in the house | | | | |
| Title | Evacuation guide | | | | |
| Preconditions | Fire alert function called. | | | | |
| Postconditions | Evacuation guide lamp turns on. | | | | |
| Main success scenario | 1. Evacuation guide feature works as soon as the fire alert function called. 2. For every door in the house, the SafeHome system evaluates safety level and select doors safe enough to escape. 3. Turn every evacuation guide lamp on that leads to the door selected at step 2. 4. Every people in the house follows the lamp and succeeds to escape. | | | | |
| Exceptions | 2a. There’s no available safe door.   * 2a1. The SafeHome system evaluates safety level for windows. If there are any safe windows, turn every evacuation guide lamp that leads to the window selected on evaluation step * 2a2. If SafeHome still fails to find safe out, retry evaluation after 3 minutes. | | | | |

#### Spring cooler activation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.1.2.4 | Feature Number | 3.1 | Frequency of Use | Rarely |
| Created date | 4/25/2015 | Author | Seokju Hong | Owner | Seokju Hong |
| Updated date | 4/25/2015 | Updated by | Seokju Hong | Revision # | 0 |
| Priority | High | | | | |
| Primary actor | SafeHome system | | | | |
| Title | Spring cooler activation | | | | |
| Preconditions | Fire alert function called | | | | |
| Postconditions | Spring cooler is activated. | | | | |
| Main success scenario | 1. Spring cooler activation function called 2. Activates every spring cooler in the house | | | | |
| Exceptions |  | | | | |

## Door security system

### General description

### Use cases

## Garage security system

## Window security system

## CCTV system

## General description

The SafeHome system provides not only security system, but also surveillance system. The SafeHome security system may send message to registered contact in some cases. But, it can be false-positive as sensor value is not always true. Or, users of the SafeHome system may want to check out if their home is in nice state or not when they got messages. And the robbery case, for example, it need to take a shot of the room to make evidences. Therefore, the SafeHome system includes CCTV-based surveillance system.

### Use cases

#### Add new CCTV

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.5.2.1 | Feature Number | 3.5 | Frequency of Use | Rarely |
| Created date | 4/25/2015 | Author | Seokju Hong | Owner | Seokju Hong |
| Updated date | 4/25/2015 | Updated by | Seokju Hong | Revision # | 0 |
| Priority | High | | | | |
| Primary actor | SafeHome system, user, CCTV | | | | |
| Title | Add new CCTV | | | | |
| Preconditions | CCTV surveillance system is activated.  New CCTV is compatible with the SafeHome system. | | | | |
| Postconditions | New CCTV added to surveillance system. | | | | |
| Main success scenario | 1. User connects CCTV with the SafeHome console. 2. SafeHome system detects new CCTV 3. SafeHome system sends “Hello” message to CCTV. 4. CCTV responds with “OK” to SafeHome system. 5. SafeHome system registers new CCTV and create related database schema. | | | | |
| Exceptions | 2a. CCTV not detected   * 2a1. User tries to reconnect CCTV   4a. “Hello” message from the SafeHome box corrupted   * 4a1. CCTV send “RECONNECT” message to the SafeHome box * 4a2. If it fails for 3 times, the red LED of the CCTV blinks   4b. The SafeHome system did not received OK, or the message from CCTV corrupted   * 4b1. The SafeHome system resends “Hello” message to CCTV. * 4b2. If it fails for 3 times, the red LED of the port where CCTV connected blinks. | | | | |

#### Review CCTV data

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.5.2.2 | Feature Number | 3.5 | Frequency of Use | Often |
| Created date | 4/25/2015 | Author | Seokju Hong | Owner | Seokju Hong |
| Updated date | 4/25/2015 | Updated by | Seokju Hong | Revision # | 0 |
| Priority | High | | | | |
| Primary actor | SafeHome system, user | | | | |
| Title | Review CCTV data | | | | |
| Preconditions | CCTV surveillance system is activated. | | | | |
| Postconditions | Part of the CCTV data is replayed. | | | | |
| Main success scenario | 1. User pushes “review” button on the SafeHome Box 2. User input administrative password to the SafeHome Box. 3. The SafeHome asks user what camera data user will review. 4. User inputs camera number and date/time range. 5. The SafeHome box replays CCTV data recorded in the input range. | | | | |
| Exceptions | 2a. Password does not match for 5 times   * 2a1. Terminate review system and lock review/retrieve function for 30 minutes.   4a. Camera ID is not applicable   * 4a1. Print error message “Camera ID is not applicable.”   4b. Date/time range is not available   * 4b1. Print error message “Datetime range is not available.” | | | | |

#### Retrieve CCTV data

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.5.2.3 | Feature Number | 3.5 | Frequency of Use | Often |
| Created date | 4/25/2015 | Author | Seokju Hong | Owner | Seokju Hong |
| Updated date | 4/25/2015 | Updated by | Seokju Hong | Revision # | 0 |
| Priority | Middle | | | | |
| Primary actor | SafeHome system, user | | | | |
| Title | Retrieve CCTV data | | | | |
| Preconditions | CCTV surveillance system is activated. | | | | |
| Postconditions | Part of CCTV data retrieved to the external memory. | | | | |
| Main success scenario | 1. User pushes “retrieve” button on the SafeHome Box. 2. User connects USB memory to the SafeHome Box. 3. User input administrative password to the SafeHome Box. 4. The SafeHome asks user what camera data user will retrieve. 5. User inputs camera number and date/time range. 6. The SafeHome box copies CCTV data recorded in the input range. | | | | |
| Exceptions | 3a. Password does not match for 5 times   * 3a1. Terminate review system and lock review/retrieve for 30 minutes.   5a. Camera ID is not applicable   * 5a1. Print error message “Camera ID is not applicable.” and go back to step 5.   5b. Date/time range is not available   * 5b1. Print error message “Datetime range is not available.” and go back to step 5.   6a. Available space in the USB memory is not enough   * 6a1. Print error message “Not enough spaces in the memory: only [start time]~[end time] recorded” and terminates. | | | | |

## Web-based monitoring dashboard system

## General description

The SafeHome system serves not only emergency action services, but also system overview dashboard services. It will provide overall statistics of measured data, real-time CCTV data, summary of current status, and many more information to let users monitor their home. It is considered that web-service has the highest accessibility. Because, to use web-based application, what user need is just a web-browser, regardless of the platform. Therefore, this service will be implemented as a web-based services.

### Use cases

#### Login

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.6.2.1 | Feature Number | 3.6 | Frequency of Use | Normal |
| Created date | 4/26/2015 | Author | Seokju Hong | Owner | Seokju Hong |
| Updated date | 4/26/2015 | Updated by | Seokju Hong | Revision # | 0 |
| Priority | High | | | | |
| Primary actor | SafeHome system, user | | | | |
| Title | Login | | | | |
| Preconditions | SafeHome system is online. | | | | |
| Postconditions | User logged in to the SafeHome dashboard system. | | | | |
| Main success scenario | 1. User connects to the web page of the SafeHome system and enters his/her username and password 2. If username and password matches, login succeeds. | | | | |
| Exceptions | 2a. Username is not available or username and password does not match.   * 2a1. Dashboard system prints error message and go back to step 1. | | | | |

#### View system status

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.6.2.2 | Feature Number | 3.6 | Frequency of Use | Normal |
| Created date | 4/26/2015 | Author | Seokju Hong | Owner | Seokju Hong |
| Updated date | 4/26/2015 | Updated by | Seokju Hong | Revision # | 0 |
| Priority | Medium | | | | |
| Primary actor | SafeHome system, user | | | | |
| Title | View system status | | | | |
| Preconditions | User has logged into the SafeHome dashboard system. | | | | |
| Postconditions | Logs are printed into the web page. | | | | |
| Main success scenario | 1. User clicks “View system status” button 2. The SafeHome system filters recent logs whose level is higher than “WARNING” level, and print it out to web page. | | | | |
| Exceptions | 2a. No such log exists.   * Print “OK :)” message instead. | | | | |

#### View real-time CCTV capture

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.6.2.3 | Feature Number | 3.6 | Frequency of Use | Normal |
| Created date | 4/26/2015 | Author | Seokju Hong | Owner | Seokju Hong |
| Updated date | 4/26/2015 | Updated by | Seokju Hong | Revision # | 0 |
| Priority | High | | | | |
| Primary actor | User | | | | |
| Title | View real-time CCTV capture | | | | |
| Preconditions | User has logged into the SafeHome dashboard system.  The SafeHome system is configured properly. | | | | |
| Postconditions | User can see what camera captures real-time. | | | | |
| Main success scenario | 1. User clicks “View CCTV camera” button on the SafeHome system. 2. User selects available CCTV. 3. User can monitor his/her room with CCTV scenes. | | | | |
| Exceptions |  | | | | |

# Functional Requirements //지울지 말지 결정하세요.

## Requirement Notes/Legends

Priority of data in field :

|  |  |
| --- | --- |
| R | Required |
| O | Optional |
| C | Conditionally required |

## Fire extinguishing system

### Gas leak alert

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use Case Number | 3.1.1 | Requirement Number | 3.1.1-R1 | R/O/C | R |
| Created date | 4/26/2015 | Author | Seokju Hong | | |
| Updated date | 4/26/2015 | Updated by | Seokju Hong | | |
| Requirement | MeasureGasLevel | | | | |
| Description |  | | | | |

# Non-functional Requirements

## Performance Requirements

### Network Performance Requirements

* + - 1. SafeHome box must be connected with over 10Mbps internet connection.
      2. Time difference between real-time and live CCTV capture must be less than 5 seconds.

### Storage Requirements

* + - 1. Total capacity of HDD(RAID construction case included) of the SafeHome box must be at least 2TB capacity to keep CCTV data
      2. To prevent system hard disk drive corruption, RAID1 system must be constructed to the SafeHome box. And, the SafeHome box must have hot swap bay to deal with system HDD corruption.

### Memory/Architecture Requirements

* + - 1. For stability of web service and database operations, at least 4GB memory is needed.
      2. Considering upgrade of the SafeHome Box, the architecture of the CPU used in the SafeHome Box must be 64bit.

## Design/Physical Factor Requirements

* + - 1. SafeHome has its own chargeable battery which can make the SafeHome box run for 1~2 days even after power outage happens.
      2. The chargeable battery in the SafeHome Box is charged when the SafeHome Box is connected to the power outlet properly.
      3. The SafeHome Box must operates without its internal chargeable battery when it is connected to the power outlet properly.
      4. SafeHome console is expected to be durable even with free falling with 2 meter height.

### 

## Process Requirements

### Standard Requirements

* + - 1. Platform constraints
         1. The SafeHome system runs over the environment which can works with JRE(Java Runtime Environment) properly.
         2. The SafeHome dashboard web service follows w3c web standards.
         3. The SafeHome dashboard web service must handle secure clients. SafeHome must not serve dashboard application if client uses insecure web browser(i.e. Internet Explorer 6.0)
      2. Modeling convention constraints
         1. UML 2.0 is supposed to be used as a modeling tool.
      3. Repository constraints
         1. Every work progress must be saved in company’s private git repositories, and related resources must be saved in company’s private svn server.
      4. Unit test constraints
         1. Unit test must be performed every day, at midnight.
      5. Code convention constraints
         1. Every JAVA codes must follow Google’s JAVA coding convention.(영석형 레퍼런스 이거로 넣어줘요 <https://google-styleguide.googlecode.com/svn/trunk/javaguide.html>)

## Management Requirements

## Software Quality Requirements

## Security Requirements

### Access Permission

### Privacy

# Change Log

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Source** | **Author** | **Change** |
| 2013/03/11 | Course Preparation | Il-Chul Moon | Initial template development |
|  |  |  |  |
|  |  |  |  |