SAFEHOME PROJECT

REQUIREMENTS SPECIFICATION

TEAM 3

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1) Project Overview

1.1) Project Purpose

As price of commodities keeps climbing up sharply, the need of two-paycheck couple is also increasing all over the world. According to the statistics from Korean Statistical Information System, the proportion of double-income couples exceeds 30 percents of families in Korea and this rate keeps increasing through the years. It results their house remained vacant in most of the time except the time they are sleeping, so they always worry about unwanted intrusions, and any safety issues such as sudden fire or CO gas when they are not in the house or even they are in the house. Therefore, the need for products which give the homeowner the full control over the house keeps rising.

The goal of SafeHome project is to develop a software which concentrates on preventing unlawful intrusions, while giving the homeowner the full control of the house. SafeHome allows users to manipulate all the sensors in their house and to monitor their house through the cameras installed on essential parts. Homeowner can access sensors and cameras not only through the control panel located in their house, but also through the web application, and this capability allows user to batten down the emergencies, e.g., fire or CO gas, as soon as possible. Therefore, SafeHome can provide users with a high-quality security system along with the home management system.

SafeHome covers following main features:

- Security
- Surveillance

1.2) System Architectures

- Hardware architecture of SafeHome

  SafeHome hardware consists of sensors(window/door sensors, smoke sensors, motion detectors etc), tobis, cameras, a AP(Access point), a cable/ADSL/optical modem, some PCs in the point of view of homeowners. In the point of view of SafeHome company, they provide streaming media servers, web servers, central management systems, file servers to service SafeHome. We draw the hardware architecture diagram(Figure.1) to describe a structure and relations among the devices. A lines and a thunder figure between two devices means they communicate with each other. Inside home, all components including PCs are communicate by wireless. Outside home, It depends on ISP.
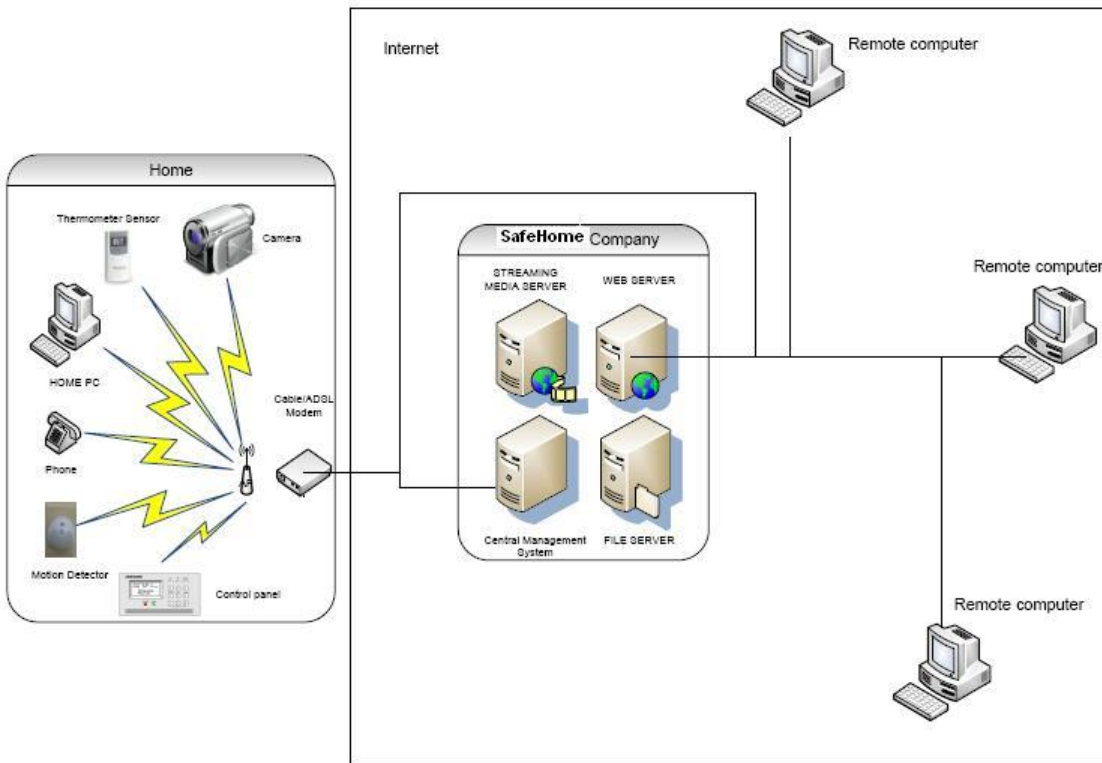
Figure 1. Hardware architecture

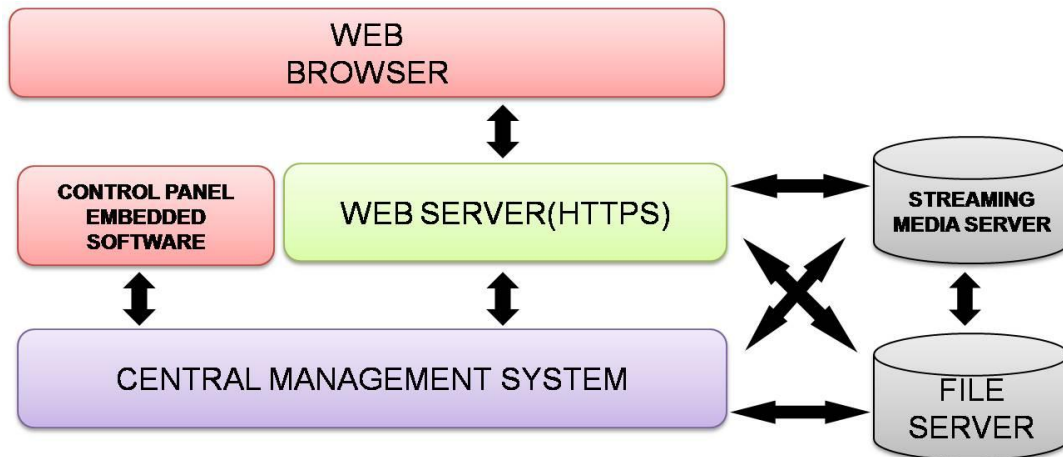■ Software architecture of SafeHome

Figure 2. Software architecture

The whole SafeHome system is comprehensively comprised of 6 software systems, such as a web browser, a control panel embedded software, a web server, a central management system, a stream server, a file server. A user accesses the SafeHome system via both the web browser

and the control panel. When the control panel is used for accessing the SafeHome system, all information and command from the control panel are transmitted to the central management system. Then the central management system processes all data from the control panel in accordance with its process logic. For example, if the incoming data toward the management system contains information about the function "stay", then the management system shall create a data toward the homeowner's house for deactivating certain sensors and cameras. After a successful transmission, the central management system sets the status of physical components(sensors, cameras, etc) of the homeowner's house stored in file server.

When a user accesses a SafeHome system via internet, all behavior he does will be transmitted to the central management system and the status information of sensors, cameras, moving pictures and the other things stored in the file server will be transmitted to be displayed on web pages towards the web server. If the user would like to take a view of real time moving pictures, the web server requests a streaming service to the streaming multimedia server. Then moving pictures transmitted from certain cameras through the streaming server will be displayed on a web page.

1.3) Product Features
The SafeHome consists of two features:

■ Home Security : The home security function provides user with monitoring systems and   alarm system. A homeowner needed to log in to the SafeHome system with his/her id and password and then, homeowner can activate or deactivate the monitoring and alarm system. Followings are home security functions provided by SafeHome and details are to be mentioned later.

- Standard window/door/motion sensor monitoring for unauthorized access

- Monitoring for fire, smoke, and CO levels

- Monitoring for water levels in basement (e.g., flood or broken water heater)

- Monitoring for outside movement

- Change security setting via the internet.

■ Home Surveillance : The home surveillance function mainly focuses on monitoring using cameras which are installed around the house. A homeowner needs to log in to the SafeHome system with his/her id and password and then, homeowner can monitor his/her house through the cameras. Followings are home surveillance functions provided by SafeHome and details are to be mentioned later.

- Connect to one or more video cameras placed inside/outside house

- Control pan/zoom for cameras

- Define camera monitoring zones.

- Display camera views on PC.

- Access camera views via the internet.

- Selectively record camera output digitally.

- Replay camera output.

1.4) Operating Environment

The system operates with one or more PCs connected to internet, various wall-mounted and/or mobile control panels, various sensors, cameras, and appliance/device controllers.

1.5) Users of the Product

User	Description & Characteristics
Homeowner	The one who buy SafeHome product
Maintenance person & visitor	The one who use SafeHome product infrequently

Table 1. Users of SafeHome

1.6) Project Perspective

- SafeHome product provides security features and surveillance features.
- The homeowner can activate/deactivate the security mode via control panel or internet. The system makes phone calls to the homeowner and police and other emergency services in case of emergencies, e.g., unauthorized intrusion, fire, and CO gas.
- The homeowner can view surveillance still pictures or moving pictures of the house via internet. Still pictures or moving pictures can be recorded.

2) Assumptions, Dependencies

2.1) Assumptions

- All sensors and cameras are working well.
- All transmissions among PCs, sensors, and central management system are encrypted.
- Transmissions between central management system and sensors are done via wireless network and transmissions between PCs and central management system are achieved via wireless/wired network.
- All the transmission data will eventually be arrived and never be loss.
- The central management system should never be failed.
- Master account is provided when the homeowner buys SafeHome product. Master account is the id and password provided by manufacturer of the SafeHome product.
- All sensors and cameras are deployed by the member of the SafeHome team when the homeowner buys SafeHome product.
- Device drivers are provided for all sensors and cameras, so homeowner can view information about sensors and cameras.
- Phone numbers of homeowner are stored when the homeowner buys SafeHome product to contact the homeowner in case of emergencies.
- A control panel in which the password is recognized the most quickly shall have the highest priority of use to control security and surveillance functions of the house when there're multiple control panels which a single homeowner is possessed of and at the same time two or more control panels are trying to control.

■ A user who first logged in shalll have the highest priority of use. So If there're multiple users who logged in as a single same ID, then the first user can control security, and surveillance functions of the house.

■ A control panel shall have more priority than web access. Although It's reasonable to compare how many times a control panel and web access are frequently used and give a high priority to what is more frequently used. We don't know yet the statistics. So we just authorize a control panel to control security and surveillance functions of a house when both two try to access a HomeSafe system.

■ Moving pictures shall be recorded. The SafeHome company maintains each customer's all moving pictures and a homeowner can access the stored moving pictures and real-time moving pictures via web access. In order to transmit moving pictures fast without gaps and abnormal pauses and so on, the communication cables should be optical cables.

2.2) Dependencies

Functions	Depends on
Update the homeowner's profile	The master account is provided.
Require the homeowner to change password after each 90 days	The master account is updated by the "Update the homeowner's profile" function and the homeowner hasn't changed his/her password for 90 days.
Send password to the homeowner	The homeowner forgot his password.
Require the homeowner to login for each session	The homeowner quits the website without logging out.
Activate / Deactivate sensors	All sensors are deployed successfully.
Display sensor's information	Device drivers for all sensors are provided.
Arm / Disarm the SafeHome	All sensors are synchronized to be armed / disarmed simultaneously.
Create a new security zone	All sensors are deployed successfully and some of sensors are able to be synchronized to be activated simultaneously.
Update existing security zone	At least one security zones are already created by the "Create a new security zone" function.
Activate / Deactivate security zone	At least one security zones are already created by the "Create a new security zone" function.
View security zone	At least one security zones are already created by the "Create a new security zone" function.
Contact the homeowner in an emergency	System stores phone number of homeowner when the homeowner buys SafeHome product.
Contact the police in an emergency	System stores phone number of police when the homeowner buys SafeHome product.
Contact emergency services	System stores phone number for each emergency service when the homeowner buys SafeHome product.
Display monitoring zone	All cameras are deployed successfully.
Pan selected camera	All cameras are deployed successfully.
Zoom selected camera	All cameras are deployed successfully.
Show thumbnail for each camera	All cameras are deployed successfully.
Record Camera output	Camera is working well and capable of recording.
Replay Camera output	At least one recorded moving images are already stored in the central processor.

Table 2. Dependency table

3) Specific Requirements

3.1) External Interface Requirements
3.1.1) User interfaces

User can access and control Security and Surveillance features of SafeHome system by using web application. The interface of web application should be clear and friendly to all users. Here are some requirements that are very necessary:

- SafeHome web application should run smoothly in almost popular web browsers, including Firefox (above version 1.5), Internet Explorer (above version 7), Opera (above version 9) and Safari (above version 3). It means that all used styles for HTML elements must be displayed correctly.
- All contents in the web pages are easy to read.
- User can choose the font size, zoom-in or zoom-out the web page.

Following is the menu structure for SafeHome web application:
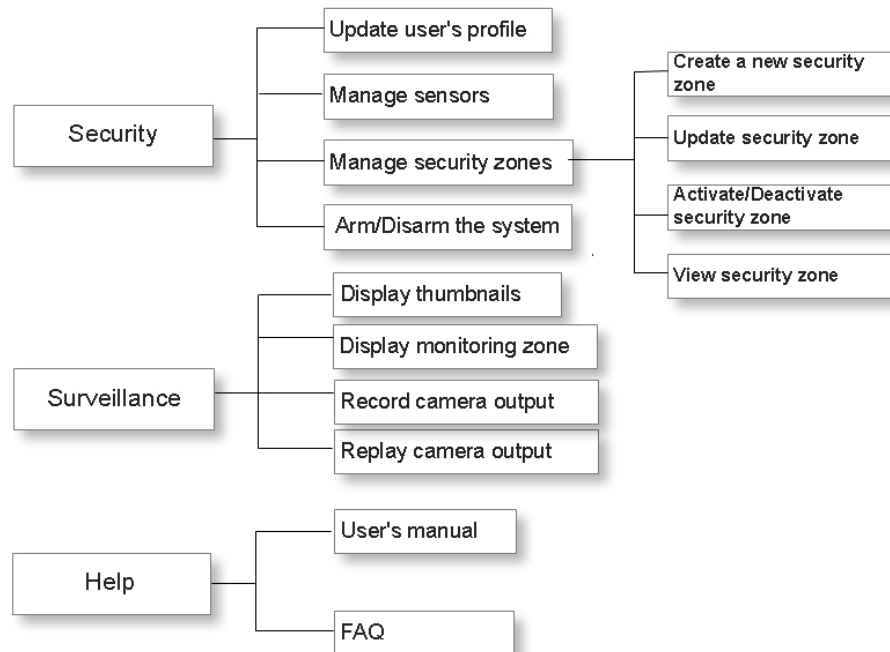

Figure 3. Menu structure for SafeHome

3.1.2) Hardware Interfaces

The purpose of this hardware is that homeowner allows to controlling the home conveniently when homeowner go out. Control panel is installed on the wall of the front door, near front door, at home. There exists 7-function in the SafeHome: "On", "Off", "Reset", "Away", "Stay", "Code", "Panic" in order to control explicitly.

The homeowner gets a four-digit master password at first time. The homeowner changes the password in order to keep the secure. Process password receives a four-digit password from the interact with user function. The password is first compared to the master password stored within the system. If the master password matches, [valid id message = true] is passed to the message and status display function. If there is no match, [valid id message = false] is passed to the message and status display function.

The homeowner observes the SafeHome control panel (Figure 1) to determine if the system is ready for input. If the system is not ready a not ready message is displayed on the LCD display, and the homeowner must physically close windows/doors so that the not ready message disappears. (A not ready message implies that sensor is open; i.e., that a door or window is open.)

Each function requires password except the "panic" function. The password is compared with the valid password stored in the system. If the password is incorrect, the control panel will beep once and reset itself for additional input. If the password is correct, the control panel awaits further action.

If password is consecutive incorrect 5 times, the LCD display show the message, "You should contact manager" and reset the control panel. Before reset the control panel, the control panel is contact the manager through connecting the central processor.
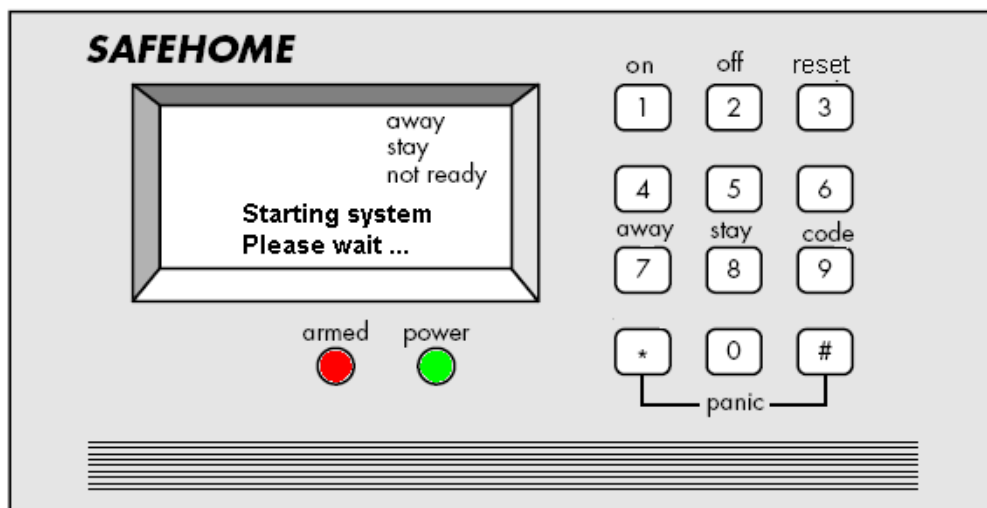
Figure 4. SafeHome Control Panel

Alarm Light

When activation occurs, a red alarm light can be observed by the homeowner.

Power Light

When the control panel turns on, a green alarm light can be observed by the homeowner.

"On" Button of the Keypad

In order to power on the control panel, the homeowner clicks "1" button 4 times.

When the LCD display changes "not ready" to "ready" and changes the message "Starting system Please wait…" to "Please input password : " on the LCD display, input a four-digit password by using the keypad.

"Off" Button of the Keypad

In order to power off the control panel, the homeowner clicks "2" button once when displayed "ready" message on the LCD display.

When the system displays "Confirm the password: "message on the LCD display, inputs a four-digit password by using the keypad.

"Reset" Button of the Keypad

In order to reset the control panel, the homeowner clicks "3" button once. After clicking the button, the control panel displays "Confirm password: "message. Input a four-digit password by using the keypad. The password is compared with the valid password stored in the system. If the password is incorrect, the control panel will beep once and reset itself for additional input. If the password is correct, the control panel power off with "Good bye" message on the LCD display, and power on with "Starting system Please wait…"message on the LCD display during at most 10 seconds.

"Stay" Button of the Keypad

The homeowner selects and keys in *stay*, "7" button, to activate the system. After clicking the button, the control panel displays "Confirm password: "message. Input a four-digit password by using the keypad. If the password is incorrect, the control panel will beep once and reset itself for additional input. If the password is correct, all sensor are activated only perimeter sensors (inside the motion detecting sensors are deactivated).

"Away" Button of the Keypad

The homeowner selects and keys in *away*, "8" button, to activate the system. When click the button, the control panel displays "Confirm password: "message. Input a four-digit password by using the keypad. If the password is incorrect, the control panel will beep once and reset itself for additional input. If the password is correct, system activates all sensors.

"Code" Button of the Keypad

If the homeowner wants to change the password of control panel, the homeowner clicks "9" button once. After clicking the button, the control panel displays "Confirm password: "message. Input a four-digit password by using the keypad. If the password is incorrect, the control panel will beep once and reset itself for additional input. If the password is correct, the LCD display shows the message "Input new password: ", and shows the message "Confirm new password: ". If new password is different with original password and password length is 4, the password is valid. When the homeowner finishes the process to change the password, backs to the "ready" state.

"Panic" Button of the Keypad

The homeowner clicks the panic button in an emergency such as fire, leaking gas, overflow water, injured people and robber. In those cases, the control panel deactivates all sensors inside home.

3.1.3) Communication Interfaces

- All devices in SafeHome system will communicate via wireless protocol (802.11b).
- All computers will communicate with the web server via web protocol(HTTPS).

3.2) Functional Requirements
3.2.1) Security Feature

3.2.1.1) Description and Priority

Home security function is extremely important in SafeHome system. It provides the homeowner with the capability to monitor all actions inside and outside the house by using many types of sensor, including window sensor, door sensor, smoke sensor, motion detector, temperature sensor, toxic gases sensor and water-level sensor. The homeowner can arm or disarm the system, activate or deactivate sensors and view their information to know current situation in his or her house. Besides that, the homeowner can manage security zones, which are created by grouping some sensors so that he or she can view information of many sensors concurrently. If there is an unauthorized access, or any accidents in the house such as fire, toxic gases, overflow water…, the system will raise alarm and contact with the homeowner, the police and other emergency services. In short, when using SafeHome system, the homeowner will feel more secure even when his or her family has to leave the house for a long time.

The homeowner can access Security feature through web application. Firstly, the homeowner uses the master account that the manufacturer provides to login into the website. After that, he or she can change the username, password and other related information.

Priority: Highest

3.2.1.2) Functional Requirements

3.2.1.2.1) Manage User

3.2.1.2.1.1) Update the Homeowner's Profile

- **Requirement Code**

   FR1
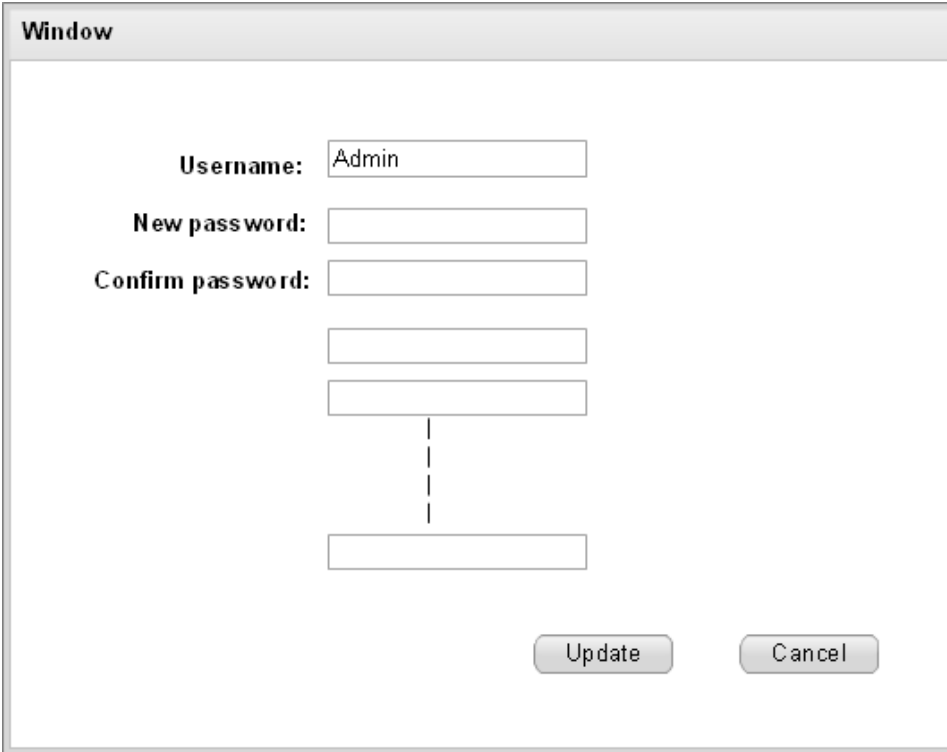
- **Description**

   This sub-feature allows the homeowner to update his or her information by using SafeHome website. For the first time, the homeowner has to use the master account that the manufacturer provides to login into the website. Then, he or she can change the following information: username, first name, last name, password, email, home address, home telephone, office address, office telephone and cell phone.

- **Scenario**

   1) The homeowner logins successfully into the SafeHome website.

   2) The homeowner clicks "Security" menu.

3) The homeowner clicks "Update user's profile" sub-menu.

4) The system displays a new window form with current profile of the homeowner.

Figure 5. The homeowner updates his/her profile

5) The homeowner updates his or her information and then press "Update" button.

6) The system checks the registered information. If the registered information is appropriate, the system will update the homeowner's profile with new information. Otherwise, a warning message will appear and the homeowner is requested to declare information again.

■ **Priority**

Highest

■ **Constraints**

- The homeowner already knows the username and password to login into the SafeHome website.

- The homeowner's profile must include at least the following information: username, first name, last name, password and email. In other words, they cannot be left empty.

- If the homeowner wants to change the password, he or she has to type the new password two times to confirm it. The password must contain at least 8 characters.

■ **Error handling**

- If the information that the homeowner declares is not appropriate, a warning message will appear to require the homeowner to declare again.

3.2.1.2.1.2) Require the Homeowner to Change Password after Each 90 Days

■ **Requirement Code**
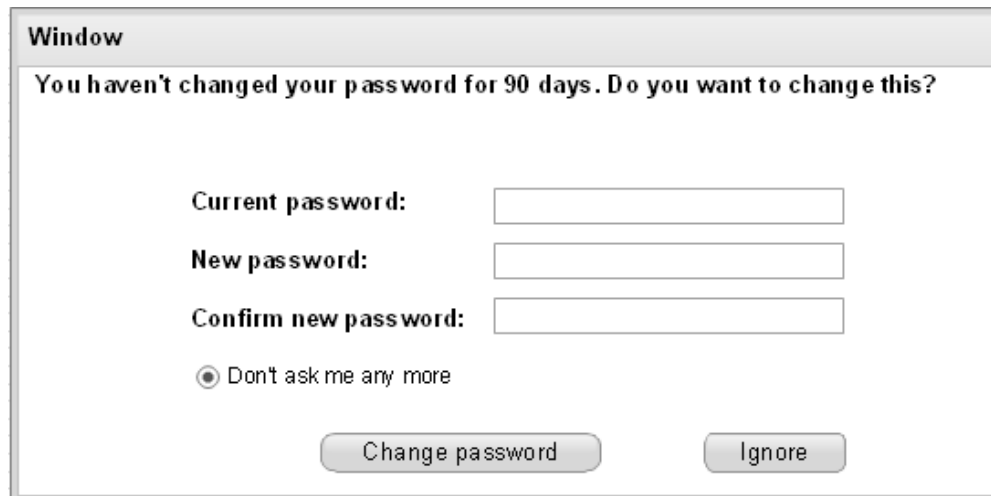
FR2

■ **Description**

If the homeowner does not change his or her password in 90 days, the SafeHome website will request the homeowner to change his or her password. This helps the system be more secure. The homeowner may agree to change the current password or ignore the request from the system.

■ **Scenario**

1) The homeowner logins successfully into the SafeHome website.

2) A warning window appears to inform the homeowner that he or she should change the current password.

Figure 6. A warning window to request user to change the password

3)

a) If the homeowner presses "Change password" button, the system will check information he or she declares. If all information is appropriate, the system will replace the homeowner's current password with the new password.

b) If the homeowner clicks "Ignore" button and doesn't choose the option "Don't ask me anymore", the system still shows a warning window when the homeowner logins into the system again later. If the homeowner clicks "Ignore" button and choose the option "Don't ask me anymore", the system will count the days again.

■ **Priority**

Medium

■ **Constraints**

- All fields, including current password and new password are not allowed to leave empty.

- New password cannot be the same as the current password.

- New password must contain at least 8 characters.

■ **Error handling**

- If any field is left empty, an error message will appear to require the homeowner to declare information again.

- If the new password is the same as the current password or new password's length is smaller than 8, an error message also will appear.

3.2.1.2.1.3) Send Password to the Homeowner

■ **Requirement Code**

FR3

■ **Description**

This sub-feature allows the homeowner to receive his or her password by using web application in case he or she forgets it. To receive the password, the homeowner has to declare the username. If the account associated with this username exists in the database, the system will send the password to the homeowner's email and cell phone.

■ **Scenario**

1) The homeowner opens SafeHome website.

2) The homeowner clicks "Forget your password?" link.

Figure 7. The homeowner can click the link "Forget your password" to get back the password

3) The system displays a new window form and requires the homeowner to type the username.

Figure 8. The homeowner declares the username to receive the password

4) The homeowner types the username.

5) The homeowner clicks "Send password" button.

6) The system looks up the homeowner's information, including email and cell phone number and then sends the password to the homeowner's email and cell phone.

■ **Priority**

   High

■ **Constraints**

 - The homeowner has to type the username exactly.

■ **Error handling**

 - If the system does not find an account with username as the homeowner types, the error message will appear. The homeowner has to type the username again.

3.2.1.2.1.4) Require the Homeowner to Login for Each Session

■ **Requirement Code**

FR4

■ **Description**

If the homeowner is using SafeHome website and then he or she quits the website without using "log out" function, when he or she opens the website again, the system will require the homeowner to re-login.

■ **Scenario:**

1) The homeowner is using SafeHome website.

2) The homeowner quits the website without using "log out" feature.

3) The homeowner opens the website again.

4) The login form appears and the homeowner is required to type username and password again to access the system.

■ **Priority**

High

■ **Constraints**

None

■ **Error handling**

None

3.2.1.2.1.5) Prohibit User from Entering Website If the User Types Wrong Username and Password for 5 Times

■ **Requirement Code**

FR5

■ **Description**

If the user types wrong username and password to login into SafeHome website for 5 times, he or she has to wait for 30 minutes to be able to login again. This makes the system be more secure since nobody cannot access it by guessing the username and password. If the user forgets the password, he or she can get back the current password by clicking the link "Forget your password?".

■ **Scenario**

1) The user opens SafeHome website.

2) In the login form, he or she declares the username and password to enter the system for 5 times, but all of them are not correct.

3) The system displays a message to require the user to wait for 30 minutes to be able to login again. In case that the user wants to use password recovery feature, he or she can click the link "Forget your password?".

Login

You already typed your username and password wrong for 5 times. Please wait 30 minutes to log-in again. If you for get your pass word, you can click "Forget your password?" link below.

Forget your password? Help
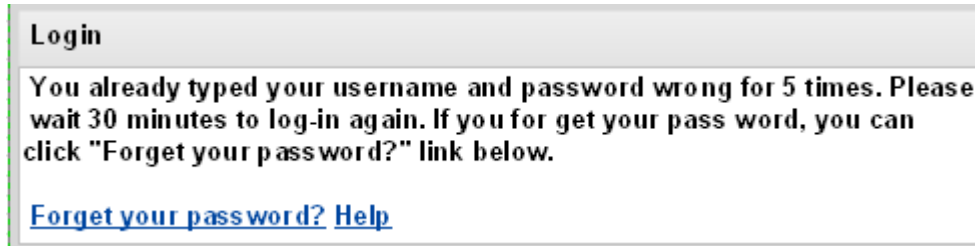
Figure 9. A message when the user types wrong username and password for 5 times

■ **Priority**

High

■ **Constraints**

None

■ **Error handling**

None

3.2.1.2.2) Manage Sensor

3.2.1.2.2.1) Activate/Deactivate Sensors

■ **Requirement Code**

FR6

■ **Description**

This sub-feature allows the homeowner to activate or deactivate sensors by using SafeHome website. There are seven types of sensors that the homeowner can activate or deactivate: window sensor, door sensor, smoke sensor, motion detector, temperature sensor, toxic gases sensor and water-level sensor. To activate one sensor, the homeowner changes its status from "Disabled" to "Enabled". To deactivate it, the homeowner changes its status from "Enabled" to "Disabled".

■ **Scenario**

1) The homeowner logins successfully into SafeHome website.

2) The homeowner clicks "Security" menu.

3) The homeowner clicks "Manage sensor" sub-menu.

4) The system displays a new window form. The homeowner chooses the type of sensor to view. Then he or she presses "Display" button.

5) The system displays all sensors for selected type.

6) The homeowner chooses the status (Enabled or Disabled) for sensors and then presses "OK" button. The system will update their status.

Figure 10. The homeowner activate/deactivate sensors

■ **Priority**

Highest

■ **Constraints**

- In case that the homeowner activates sensors, these sensors can only be activated after 5 minutes because it is more convenient in some cases, for example when the homeowner wants to leave the house, he will has enough time to open the door.

■ **Error handling**

None

3.2.1.2.2.2) Display Sensor's Information

■ **Requirement Code:**

FR7

■ **Description**

This sub-feature allows the homeowner to view sensor's information by using SafeHome website. The homeowner can only view information of activated sensors. The information related to each type of sensor is described below:

- Window sensor: Information about window sensor includes its name and location and its detected result (whether there is unauthorized access through the windows or not).

- Door sensor: Information about door sensor includes its name and location and its detected result (whether there is unauthorized access through the doors or not).

- Smoke sensor: Information about smoke sensor includes its name, location, current smoke level.

- Motion detector: Information about motion sensor includes its name and location. The homeowner can also view the detected objects and their moving directions and speeds.

- Temperature sensor: Information about temperature sensor includes its name, location, current temperature.

- Toxic gases sensor: Information about toxic gases sensor includes its name, location, current toxic gases level.

- Water-level sensor: Information about toxic gases sensor includes its name, location, current water level.

■ **Scenario**

1) The homeowner logins successfully into SafeHome website.

2) The homeowner clicks "Security" menu.

3) The homeowner clicks "Manage sensor" sub-menu.

4) The system displays a new window form. The homeowner chooses the type of sensor to view. Then he or she presses "Display" button.

5) The system displays all sensors for selected type.

6) The homeowner clicks "View" link to see sensor's information.

■ **Priority**

Highest

■ **Constraints**

- The homeowner can only view information of activated sensors. This means that if one sensor is deactivated, the homeowner cannot view its information.

■ **Error handling**

None

3.2.1.2.2.3) Arm/Disarm the SafeHome System

■ **Requirement Code:**

FR8

■ **Description**

This sub-feature allows the homeowner to arm/disarm SafeHome system by using SafeHome website. When the homeowner arms the system, all sensors will be activated. Otherwise, when the homeowner disarms the system, all sensors will be deactivated.

■ **Scenario**

1) The homeowner logins successfully into SafeHome website.

2) The homeowner clicks "Security" menu.

3) The homeowner clicks "Arm/Disarm system" sub-menu.

4) The system displays a new window form. If the homeowner chooses the option "Arm the system" button, the SafeHome system will be armed. If the homeowner chooses the option "Disarm the system", the system will be disarmed.
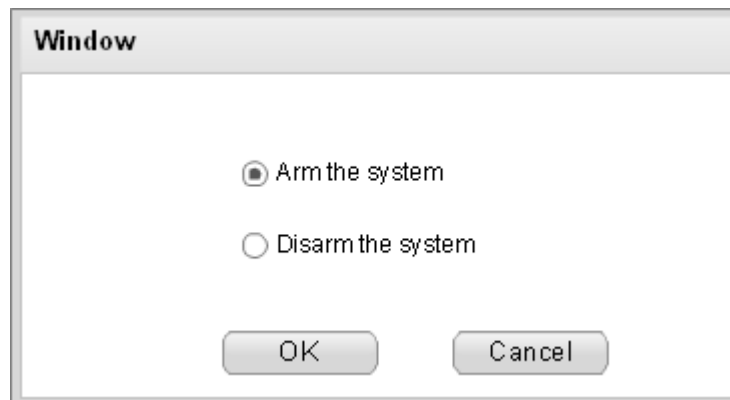

Figure 11. The homeowner arm/disarm the SafeHome system

■ **Priority**

Highest

■ **Constraints**

In case that the homeowner arms the SafeHome system, all sensors can only be activated after 5 minutes because it is more convenient in some cases, for example when the homeowner wants to leave the house, he will has enough time to open the door.

■ **Error handling**

None

3.2.1.2.3) Manage Security Zone

3.2.1.2.3.1) Create a New Security Zone

■ **Requirement Code**

FR9

■ **Description**

This sub-feature allows the homeowner to create a new security zone by using SafeHome website. Security zone is a group of some sensors in seven types: window sensor, door sensor, smoke sensor, motion detector, temperature sensor, toxic gases sensor and water-level sensor. When the homeowner opens one security zone, he or she can view concurrently all information that its sensors provide. To create a new security zone, firstly the homeowner looks at the map of all sensors in the house. Then he or she decides what sensors should be included in the security zone. By default, when one security zone is created, it will be activated. This means that all its sensors are activated.

■ **Scenario:**

1) The homeowner logins successfully into SafeHome website.

2) The homeowner clicks "Security" menu.

3) The homeowner clicks "Manage security zone" sub-menu.

4) The homeowner clicks "Create a new security zone" sub-menu.

5) The system displays a new window form. The homeowner types name of new security zone, look at the map and chooses the sensors he or she wants to add to this security zone. Finally, the homeowner presses "Create" button.

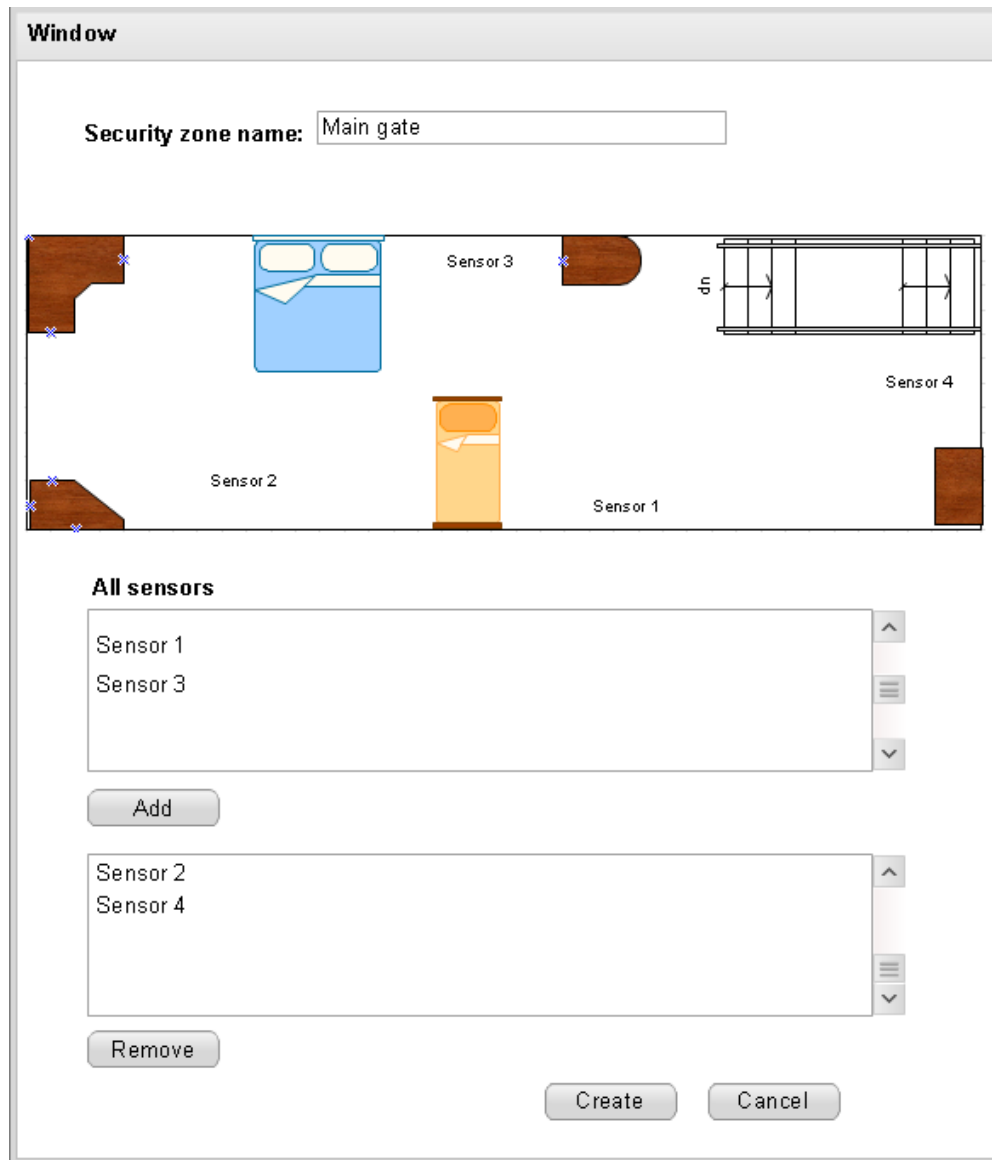7) If all information is appropriate, the system will create a new security zone.

Figure 12. The homeowner creates a new security zone

■ **Priority**

High

■ **Constraints**

- The security zone's name cannot be empty and it should be unique.

- The security zone has at least one sensor.

■ **Error handling**

- If the security zone's name is empty or already exists, an error message will appear and the homeowner is required to type the name again.

- If the homeowner does not add any sensor to the security zone, an error message will appear and the homeowner is require to add sensors again.

3.2.1.2.3.2) Update Existing Security Zone

■ **Requirement Code**

FR10

■ **Description**

This sub-feature allows the homeowner to update existing security zone by using SafeHome website. He or she can change its name, add new sensors to it or remove its current sensors.

■ **Scenario**

1) The homeowner logins successfully into SafeHome website

2) The homeowner clicks "Security" menu.

3) The homeowner clicks "Manage security zone" sub-menu.

4) The homeowner clicks "Update security zone" sub-menu.

5) The system displays a new form. The homeowner chooses the security zone that he or she wants to change and then press "Show" button.

6) The information about the security zone will appear.

7) The homeowner updates the security zone and then presses "Update" button. If all information is appropriate, the system will update the security zone.
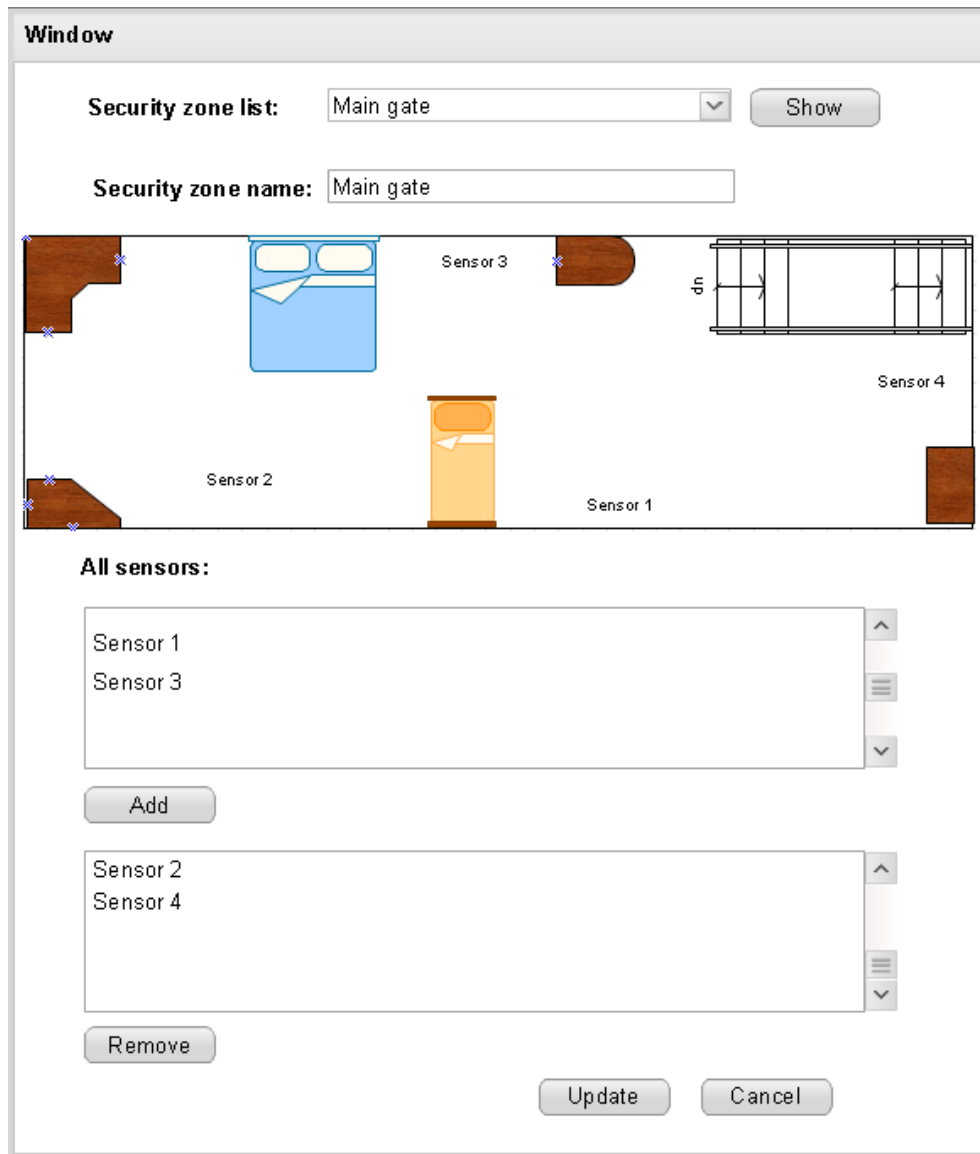
Figure 13. The homeowner updates existing security zone

■ **Priority**

High

■ **Constraints**

The same as in FR9.

■ **Error handling**

The same as in FR9.

3.2.1.2.3.3) Activate/Deactivate Security Zones

■ **Requirement Code**

   FR11

■ **Description**

  This sub-feature allows the homeowner to activate or deactivate security zones by using SafeHome website. To activate one security zone, the homeowner changes its status from "Disabled" to "Enabled". To deactivate one security zone, the homeowner changes its status from "Enabled" to "Disabled". If one security zone is enabled, all its sensors will be activated. Otherwise, if the security zone is disabled, all its sensors will be deactivated.

■ **Scenario**

 1) The homeowner logins successfully into SafeHome website.

 2) The homeowner clicks "Security" menu.

 3) The homeowner clicks "Manage security zone" sub-menu.

 4) The homeowner clicks "Activate/Deactivate security zone" sub-menu.

 5) The system displays a new form that lists all security zones in the system.

 6) The homeowner chooses the security zone that he or she wants to activate/deactivate and then set its status to "Enabled" or "Disabled".

 7) The homeowner clicks "OK" button and the system will update security zones.

Window

Security zones		Enabled	Disabled
Main gate	View	◉	○
Back door		○	◉

OK   Cancel

Figure 14. The homeowner activate/deactivate security zones

26

◼ **Priority**

  High

◼ **Constraints**

  In case that the homeowner activates one security zone, its sensors can only be activated after 5 minutes because it is more convenient in some cases, for example when the homeowner wants to leave the house, he will has enough time to open the door.

◼ **Error handling**

  None

3.2.1.2.3.4) View Security Zones

◼ **Requirement Code**

  FR12

◼ **Description**

  This sub-feature allows the homeowner to view security zones in the system by using SafeHome website. The homeowner can only view activated security zones. When one security zone is opened, the homeowner will see information of all its sensors.

◼ **Scenario**

  1) The homeowner logins successfully into SafeHome website.

  2) The homeowner clicks "Security" menu.

  3) The homeowner clicks "Manage security zone" sub-menu.

  4) The homeowner clicks "View security zone" sub-menu.

  5) The system displays a new form that lists all security zones in the system.

  6) The homeowner chooses the security zone that he or she wants to view by clicking "View" link.

  7) The system will display a new form that lists all information of all sensors in this security zone.

◼ **Priority**

  High

◼ **Constraints**

  The homeowner can only view activated security zones.

◼ **Error handling**

  None

3.2.1.2.4) Deal with Emergencies

3.2.1.2.4.1) Contact the Homeowner in an Emergency

■ **Requirement Code**

   FR13

■ **Description**

   This sub-feature allows the system contact in case of emergency. If there is an unauthorized access or an abnormality with fire, smoke, toxic gases or water level, the system will raise alarm, call the homeowner and also send a warning email to the homeowner.

■ **Scenario**

   1) The sensors detect an unauthorized access or an abnormality with fire, smoke, toxic gases or water level.

   2) SafeHome system raises alarm, calls the homeowner and also sends an email to the homeowner.

■ **Priority**

   Highest

■ **Constraints**

   None

■ **Error handling**

   None

3.2.1.2.4.2) Contact the Police in an Emergency

■ **Requirement Code**

   FR14

■ **Description**

   This sub-feature allows the system contact the police if there is an unauthorized access that the window/door sensors and motion detectors detect.

■ **Scenario**

   1) The sensor detects unauthorized access.

   2) SafeHome system raises alarm and calls the police station.

■ **Priority**

Highest

■ **Constraints**

None

■ **Error handling**

None

3.2.1.2.4.3) Contact an Emergency Services

■ **Requirement Code**

FR15

■ **Description**

This sub-feature allows system contact with police if there is an abnormality with fire, smoke, toxic gases or water level.

■ **Scenario**

1) The sensor detects an abnormality with fire, smoke, toxic gases or water level.

2) SafeHome system raises alarm and calls corresponding emergency services.

■ **Priority**

Highest

■ **Constraints**

None

■ **Error handling**

None

3.2.2) Surveillance Feature

3.2.2.1) Description and Priority

Home surveillance function manages surveillance cameras installed on the first floor. Homeowner can define, rotate selected camera to see more broad range of location, zoom selected camera to see more detail, store a monitoring zone image of selected camera to the SafeHome central management system (Monitoring zone means the observed area for each camera and central management system means server containing control software and web server for SafeHome.), replay monitoring image saved in the SafeHome central processor, and see the thumbnail of all cameras installed on the first floor. If homeowner wants to configure surveillance functions, he/she

should be authorized on the web application of SafeHome. Because implementation of changing monitoring zone is very hard, monitoring zone is fixed. Maximum number of cameras installed at home restrict to 50 because of unambiguous development of SafeHome application. Camera units are connected by using secure wireless network and those functions are for the web application.

3.2.2.2) Functional Requirements
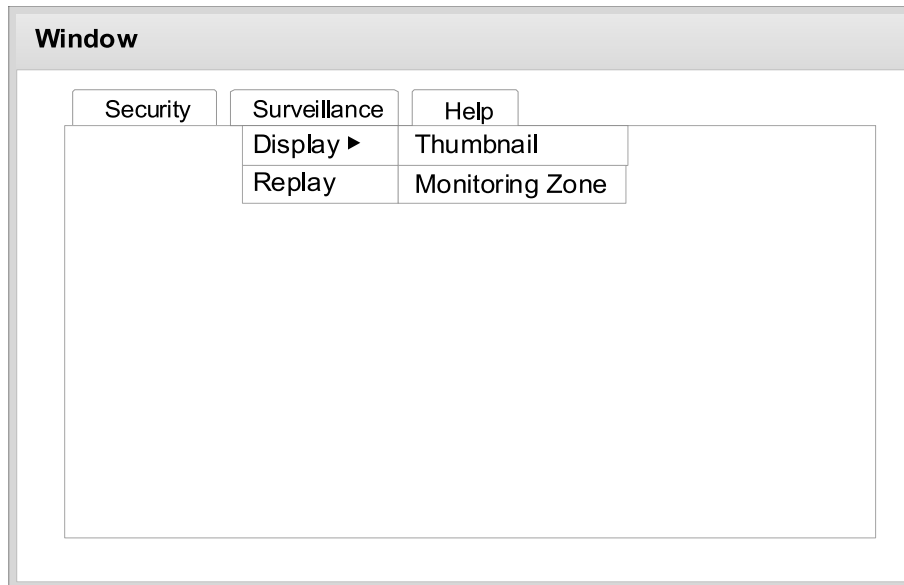
Figure 15. Surveillance menu on the web application

3.2.2.2.1) Control Camera

3.2.2.2.1.1) Display Monitoring Zone

■ **Requirement Code**

FR16

■ **Description**

The goal of this feature is to allow the homeowner to observe surveillance monitoring zone in real-time. In order to see the monitoring zone, follows the menu. *[see Figure 1]* And then, the homeowner can select a camera on the floor plan UI by double-click. The homeowner can see the surveillance images in detail by using the function, "*pan/zoom monitoring zone*". *[see function PS1 and ZS1]*. Size of the display is fixed to 320x240px.
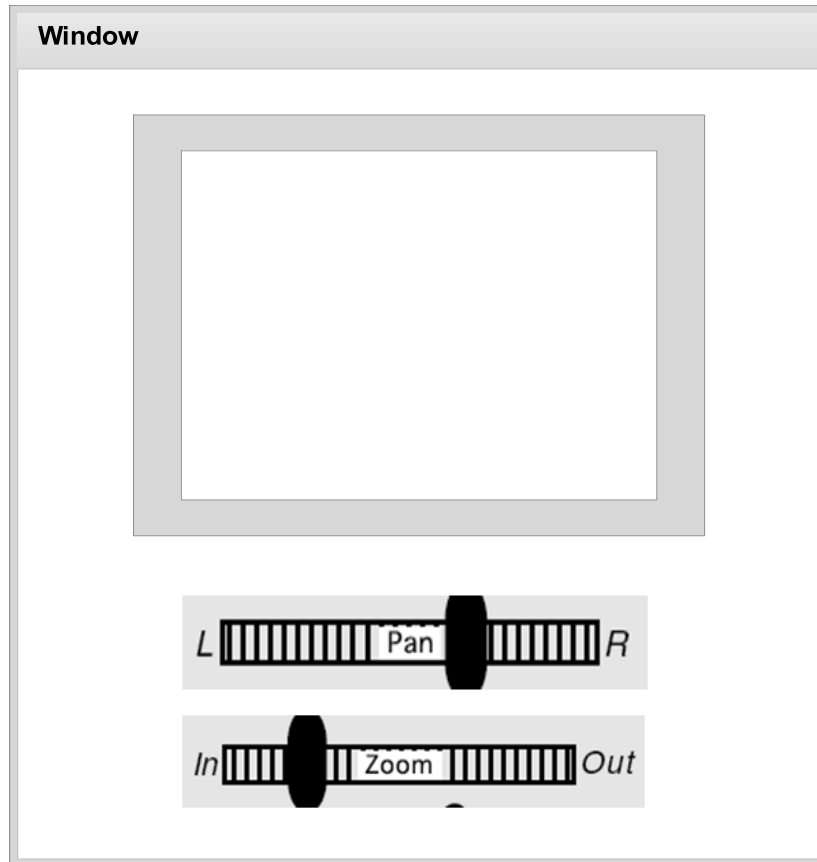
Window

Figure 16. Display monitoring zone window

■ **Scenario**

1) The homeowner logins successfully into the SafeHome.

2) The homeowner clicks **"Surveillance → Display → Monitoring zones"** menu.

3) The homeowner double-click camera that he/she wants.

■ **Priority**

Medium

■ **Constraints**

- The SafeHome system authorizes him/her.
- Cameras should be activating.
- If homeowner deactivates the camera, that image is a picture of "No image".

■ **Error handling**

If selected camera can't display the monitoring zone, display the error message.

3.2.2.2.1.2) Pan Selected Camera

■ **Requirement Code**

FR17

■ **Description**

The goal of this feature is to allow the homeowner to observe more broad surveillance zone through the camera that the homeowner selected. In order to pan selected camera, follows menu, and double-click the camera. There is a panning bar on the bottom of display monitoring zone window of web application interface. Each scale mark means 5 degrees and the both side of the monitoring zone is restricted at an angle of 50 degrees.

Figure 17. Pan bar on the web application

■ **Scenario**

1) The homeowner logins successfully into SafeHome.

2) The homeowner clicks **"Surveillance → Display → Monitoring zones"** menu.

3) The homeowner selects camera that he/she wants.

4) The homeowner drags a candle bar to he/she wanted position either left or right on the bottom of display monitoring zone window web application pan UI.

■ **Priority**

Medium

■ **Constraints**

 - The SafeHome system authorizes him/her.
 - Cameras should be activating.
 - If homeowner deactivates the camera, that image is a picture of "No image".

■ **Error handling**

If selected monitoring zone camera is not changed, display the error message.

3.2.2.2.1.3) Zoom Selected Camera

■ **Requirement Code**

FR18

■ **Description**

The goal of this feature is to allow the homeowner to observe a surveillance zone more in detail through the camera that homeowner selected. In order to zoom in or zoom out selected camera, follows menu, and double-click the camera. There is a zooming bar on the bottom of display monitoring zone window of the web application interface. Each scale mark means level of zoom and the both side of the monitoring zone is restricted 9 levels. Dragging on the left means zoom in, and dragging on the right means zoom out.
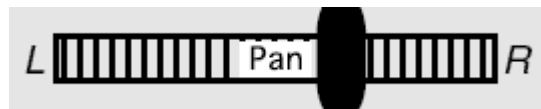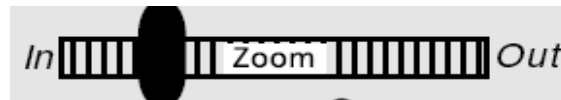

Figure 18. Zoom bar on the web application

■ **Scenario**

1) The homeowner logins successfully into SafeHome.

2) The homeowner clicks "**Surveillance → Display → Monitoring zones**" menu.

3) The homeowner selects camera he/she wants.

4) The homeowner drags a candle bar to he/she wanted position on the bottom of display monitoring zone window of the web application zoom UI.

■ **Priority**

Medium

■ **Constraints**

- The SafeHome system authorizes him/her.
- Cameras should be activating.
- If homeowner deactivates the camera, that image is a picture of "No image".

■ **Error handling**

If selected monitoring zone camera is not zoomed, display the error message.

3.2.2.2.1.4) Show Thumbnail for each camera

■ **Requirement Code**

FR19

■ **Description**

The goal of this feature is to allow the homeowner to observe the status of all cameras. Each status shows at a look on the web application UI, called thumbnail. In order to see thumbnail for each camera, follows menu, and double-click camera. If homeowner wants to see more detail, clicks the image. Then homeowner can observe bigger image like image of *DM1*. Size of the images is fixed to 100x80px.
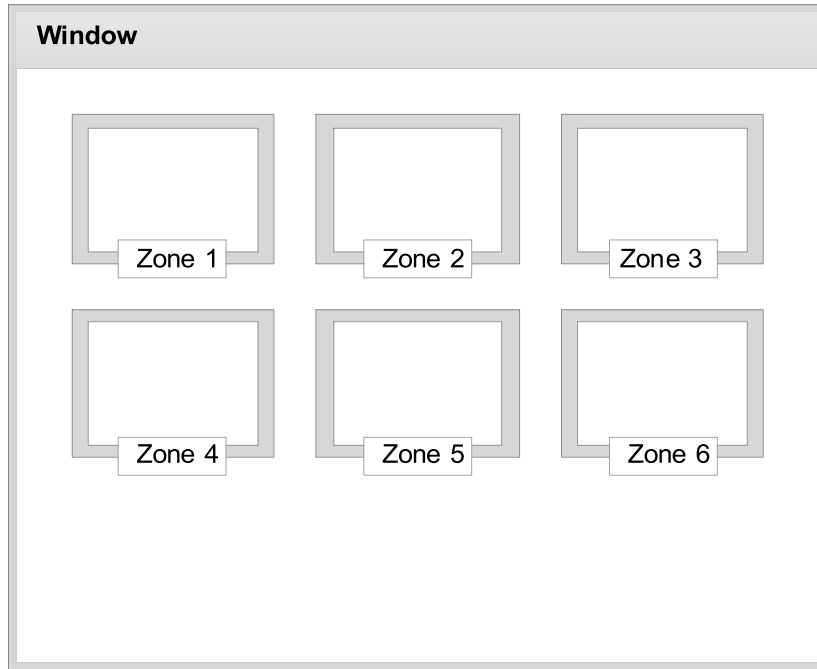
Figure 19. Thumbnail for each camera

■ **Scenario**

1) The homeowner logins successfully into SafeHome.

2) The homeowner clicks "**Surveillance → Display → Thumbnail**" menu.

3) The homeowner checks the images of surveillance camera.

■ **Priority**

   Medium

■ **Constraints**

- The SafeHome system authorizes him/her.
- Cameras should be activating.
- If homeowner deactivates the camera, that image is a picture of "No image".

■ **Error handling**

If some cameras are not viewed, display the error message.

3.2.2.2.1.5) Record Camera Output

■ **Requirement Code**

FR20

■ **Description**

The goal of this feature is to allow the homeowner to record a view of camera in real-time. If homeowner wants to record, he/she should access the monitoring zone and selects a camera. In order to record camera output, follows menu, selects a camera on the floor plan, right-click on the camera, and selects "**Record**". Output of recording saves via the file in the central processor. If homeowner checks the checkbox "Backup in central processor" in the window of control record, the camera output also saves in the central processor. Camera records still images because of size of file. There are 2 seconds intervals on each still image and those make moving image. Maximum consecutive recording time is 8 hours. Those are not encrypted and format of recorded moving images is **H.264**.

Window

Record Monitoring Zone

Date : [   ] year [   ] month [   ] day

Time : [   ] : [   ] ~ [   ] : [   ]

Location : [   ] [...]

◉ Back up in the Central Processor

[Ok]   [Cancel]

Figure 20. Record camera output window

■ **Scenario**

1) The homeowner logins successfully into SafeHome.

2) The homeowner clicks "**Surveillance → Display → Monitoring Zone**" menu.

3) The homeowner selects camera what he/she wants.

4) The homeowner right-click on the camera and clicks "**Record**" menu.

■ **Priority**

   Medium

■ **Constraints**
- The SafeHome system authorizes him/her.
- Cameras should be activating.
- If homeowner deactivates camera, that image is a picture of "No image".

■ **Error handling**

If selected camera is not recorded, display the error message.

3.2.2.2.1.6) Replay Camera Output

■ **Requirement Code**

   FR21

■ **Description**

The goal of this feature is to allow the homeowner to see recorded moving images via the web application or the PC. Recorded moving images are stored in the central management system or the PC. In order to replay camera output, follow menu, and select the file on the file select window. If homeowner wants to see recorded moving images, the H.264 video codec should be installed on the homeowner's manner. Camera output file can view by using this function on the web application, can't view on the any others because moving image has password.

■ **Scenario**

1) The homeowner logins successfully into SafeHome.

2) The homeowner clicks "**Surveillance → Replay output**" menu.

3) The homeowner select file on the file selection window.

■ **Priority**

   Medium

■ **Constraints**
- The SafeHome system authorizes him/her.
- H.264 video codec should be installed on the homeowner's manner.

■ **Error handling**

If file is not open or not replay, display the error message.

3.3) Nonfunctional Requirements
3.3.1) Look and Feel Requirements

- **Content**
- The interface of a control panel shall be intuitive for homeowners to use and shall be command-driven.
- The web site for homeowners shall be menu-driven and familiar to them as if it were a frequently used portal site that homeowners are making use of.
- **Motivation**

To ensure that the appearance of the product conforms to the marketing team expectations.

- **Fit Criterion**
- In the case of a control panel, a sampling of homeowners shall manipulate it within two minutes of their first encounter with it without user manuals or guides.
- In the case of the web site, a sampling of homeowners shall access the web site with familiarity and without any obstacles in using it.

- **Considerations**

None

3.3.2) Usability and Humanity Requirements

This section is concerned with requirements that make the product usable and ergonomically acceptable to its hands-on users.

3.3.2.1) Ease of use

- **Content**
- In the case of a control panel, it shall be easy for 7-year-old children to use.
- In the case of a control panel, it shall help the user to avoid making mistakes.
- A control panel and the web site shall be used by people with no training, and possibly no understanding of English .

- **Motivation**

To guide the software designers toward building systems that meets the expectations of its eventual users.

- **Fit Criterion**
- In the case of the control panel, eighty percent of a sampling of 7-year-old children shall be able to successfully inputting the password, enabling "stay" function and "away" function, "panic" function, and the other functions that appear on the buttons of the control panel.
- One week's use of a control panel and the web site shall result in a total error rate of less than 1 percent.

- **Considerations**

None

3.3.2.2) Learning Requirements

■ **Content**

A control panel shall be able to be used by children and the elder who will receive no training before using it.

■ **Motivation**

To quantify the amount of time that your client feels is allowable before a user can successfully use the product. This requirement guides designers to understand how users will learn the product. For example, designers may build elaborate interactive help facilities into the product, or the product may be packaged with a tutorial. Alternatively, the product may have to be constructed so that all of its functionality is apparent upon first encountering it.

■ **Fit Criterion**

90 percent of a test panel shall successfully complete inputting the password, enabling "stay" function and "away" function, "panic" function, and the other functions that appear on the buttons of the control panel within 2 minutes.

■ **Considerations**

None

3.3.2.3) Understanability and Politeness Requirements

This section is concerned with discovering requirements related to concepts and metaphors that are familiar to the intended end users.

■ **Content**
- The website and the control panel shall use symbols and words that are naturally understandable by the homeowner.
- The website and the control panel shall hide the details of its construction from the homeowner.

■ **Motivation**

To avoid forcing homeowners to learn terms and concepts that are part of the system's internal construction and are not relevant to the homeowners' world. To make the product more comprehensible and thus more likely to be adopted by its intended customers.

■ **Fit Criterion**

90 percent of a test panel shall successfully complete inputting the password, enabling "stay" function and "away" function, "panic" function, and the other functions that appear on the buttons of the control panel within 2 minutes.

■ **Considerations**

None

3.3.2.4) Accessibility Requirements

■ **Content**

The product shall be usable by partially-sighted users.

■ **Motivation**

In many countries it is required that some products be made available to the disabled. In any event, it is self-defeating to exclude this sizable community of potential customers.

■ **Considerations**

Some users have disabilities other than the commonly described ones. In addition, some partial disabilities are fairly common. A simple, and not very consequential, example is that approximately 20 percent of males are red-green colorblind.

3.3.3) Performance Requirements

3.3.3.1) Speed and Latency Requirements

■ **Content**

- Any interface between a user and a control panel shall have a maximum response time of 1 seconds.
- The maximum response time of the web site when a user access it shall have 1 second.
- The response shall be fast enough to avoid interrupting the user's flow of thought.
- The central management system shall poll window sensors every 1 second.
- The central management system shall poll door sensors every 1 second.
- The central management system shall poll smoke sensor every 10 seconds.
- The central management system shall poll motion detector every 1 seconds.
- The central management system shall poll temperature sensor every 15 seconds.
- The central management system shall poll toxic gases sensor every 20 seconds.
- The central management system shall poll water-level sensors every 10 seconds.
- In case of that there is an abnormality with fire, smoke, CO gas or water level, the SafeHome system must inform the nearest fire station the current circumstances of the house within 500 milliseconds.
- In web site, the elapsed time since a user pushs a zoom in/out button until the actual action occurs shall be less than 500 milliseconds.

■ **Motivation**

Some products—usually real-time products—must be able to perform some of their functionality within a given time slot. Failure to do so may mean catastrophic failure (e.g., a ground-sensing radar in an airplane fails to detect an upcoming mountain) or the product will not cope with the required volume of use (e.g., an automated ticket-selling machine). In our case, we must ensure all the physical components and the software components achieve their tasks within a certain period of time to avoid catastrophic failure.

■ **Fit Criterion**
- Any interface between a user and a control panel shall have a maximum response time of 1 seconds.
- The control panel shall respond in less than 1second for 99 percent of the respondence.
- The central management system shall poll window sensors every 1 second for 99 percent.
- The window sensors shall respond in less than 1 second for 90 percent of the interrogations. No response shall take longer than 2.5 seconds.
- The door sensors shall respond in less than 1 second for 90 percent of the interrogations. No response shall take longer than 2.5 seconds.
- The smoke sensors shall respond in less than 10 seconds for 90 percent of the interrogations. No response shall take longer than 12.5 seconds.
- The motion detectors shall respond in less than 1 second for 90 percent of the interrogations. No response shall take longer than 2.5 seconds.
- The temperature sensors shall respond in less than 15 seconds for 90 percent of the interrogations. No response shall take longer than 17.5 seconds.
- The toxic gas sensors shall respond in less than 20 seconds for 90 percent of the interrogations. No response shall take longer than 22.5 seconds.
- The water-level sensors shall respond in less than 10 seconds for 90 percent of the interrogations. No response shall take longer than 12.5 seconds.
- The SafeHome system shall inform the nearest fire station the current urgent circumstances of the house within 500 milliseconds for 99 percent.
- In web site, the elapsed time since a user pushs a zoom in/out button until the actual action occurs shall be less than 500 milliseconds for 90 percent.

■ **Considerations**

None

3.3.3.2) Reliablity and Ability Requirements

■ **Content**
- The central management system shall run without faults. In other words, MTBF shall be infinite. In case maintenance, a spare management system which is capable of the same functions as the original management system shall be prepared to process packets from sensors, cameras, control panels of each homeowner before maintenance begins.
- The control panel embedded system shall run without faults. In other words, MTBF shall be infinite. In case maintenance, new component addition and removal, It could be paused for a short period of time.
- The web server shall run without faults. In other words, MTBF shall be infinite. In the same way like the central management system

■ **Motivation**

It is critical for some products not to fail too often. This section allows you to explore the possibility of failure and to specify realistic levels of service. It also gives you the opportunity to set the client's and users' expectations about the amount of time that the product will be available for use.

■ **Considerations**

None

3.3.3.3) Robustness or Fault-Tolerance Requirements

■ **Content**

The sensors, cameras, control panels shall continue to operate with home PC in case it loses its link to the central management system.

■ **Motivation**

To ensure that the product is able to provide some or all of its services after or during some abnormal happening in its environment.

■ **Considerations**

None

3.3.3.4) Capacity Requirements

■ **Content**

The central management system all the time shall process packets from sensors, control panels, cameras of 100,000 users.

■ **Motivation**

To ensure that the product is capable of processing the expected volumes.

■ **Fit Criterion**

In this case, the requirement description is quantified, and thus can be tested.

3.3.3.5) Scalabilty or Extensibility Requirements

■ **Content**

The central management system shall be capable of processing the existing 100,000 customers. This number is expected to grow to 500,000 within three years.

■ **Motivation**

To ensure that the designers allow for future capacities.

3.3.4) Operational Requirements

3.3.4.1) Expected Physical Requirements

■ **Content**

- For fast and reliable transmission of moving pictures, Optical cables shall be required as communication cables.
- A homeowner shall purchase a backup power supplier by himself or by herself, in case when electric power isn't supplied. So If electric power isn't supplied, the backup power supplier will supply electricity to the physical components of SafeHome Products.
- ARS shall not be provided, in case internet access cannot be connected.

■ **Motivation**

To highlight conditions that might need special requirements, preparations, or training. These requirements ensure that the product is fit to be used in its intended environment.

■ **Considerations**

None

3.3.4.2) Interfacing with Adjacent Systems Requirements

■ **Content**

The web server shall work on the last four releases of the most popular three browsers, i.e. as internet explorer, fire fox, chrome.

■ **Motivation**

Requirements for the interfaces to other applications often remain undiscovered until implementation time. Avoid a high degree of rework by discovering these requirements early.

■ **Considerations**

None

3.3.4.3) Productization Requirements

■ **Content**
- The central management system shall be able to be installed by an untrained user without any instructions.
- The central management system shall be of a size that it can fit onto one CD.

■ **Motivation**

To ensure that if work must be done to get the product out the door, then that work becomes part of the requirements. Also, to quantify the client's and users' expectations about the amount of time, money, and resources they will need to allocate to install the product.

■ **Considerations**

None

3.3.4.4) Release Requirements

■ **Content**
- Each release shall not cause previous features to fail.
- The web site maintenance shall be offered at least three times a month.
- The maintenance of the central management system shall be three times a month.
- The current wireless protocol shall be able to be replaced by a new wireless protocol.
- Any additional components shall be able to be added in the control panel.

■ **Motivation**

To make everyone aware of how often you intend to produce new releases of the product

■ **Fit Criterion**

Description of the type of maintenance plus the amount of effort budgeted for it.

■ **Considerations**

None

3.3.5) Maintainability and Support Requirements

3.3.5.1) Maintenance Requirements

■ **Content**
- Classes shall be abstracted enough for reuse, and each function should be modularized based on high cohesion low coupling.
- The documents for developing systems shall be maintained.

■ **Motivation**

To make everyone aware of the maintenance needs of the product.

■ **Considerations**

None

3.3.5.2) Adaptability Requirements

■ **Content**
- The product is designed to run in houses, but we intend to have a version which will run in office buildings.
- The control panel embedded system is expected to run under the OS which equips with network protocol, device drivers, JVM. In other words, we don't need to do anything to configure environmental setting to implement the control panel embedded system by JAVA.

■ **Motivation**

To quantify the client's and users' expectations about the platforms on which the product will be able to run.

■ **Fit Criterion**

- Specification of system software on which the product must operate.
- Specification of future environments in which the product is expected to operate.
- Time allowed to make the transition.

■ **Considerations**

None

3.3.6) Security Requirements

3.3.6.1) Access Requirements

■ **Content**
- Only the homeowners and the authorized families and relatives can access the control panel and the web server.
- Record everything a homeowner does in the web. In other words, record history including homeowner's IP address for evidences of accidental accidents
- The user's password shall be stored being encrypted by md5 hash function.
- All functions are accessible via the Internet with appropriate password protection
- All information flowing between some PCs and the web server and between the central management system and SafeHome components (e.g. sensors, cameras, control panels) should be secure. In communication between PCs and the web server, Information transmitted by both end nodes shall be secure through HTTPS. For secure communication from cameras, sensor, motion detectors and so on being equipped in a homeowner's house to the central management system and vice versa, we shall ensure link-layer security. But it's very challenges and under discussion. So we shall protect data by attempting to disallow external access. Filtering unauthorized IPs, we shall only make those components that are used for security and surveillance functions communicate with the central management system.
- During web access, a user shall be guaranteed secure access without any illegal and malicious attacks.
- The moving pictures stored in file servers shall be discarded in 3 months. Those homeowners who want to keep some moving pictures permanently shall download and store personally.

■ **Motivation**

To understand the expectations for confidentiality aspects of the system.

■ **Fit Criterion**
- System function name or system data name
- User role/s and/or names of people who have authorization

■ **Considerations**

None

3.3.6.2) Privacy Requirements

■ **Content**
- The web server shall make its users aware of its information practices before collection data from them.
- The web server shall notify customers of changes to its information policy.
- The web server shall reveal private information only in compliance with the SafeHome company's information policy.
- The web server shall protect private information in accordance with relevant privacy laws / the SafeHome company's information policy.

■ **Motivation**

To ensure that the product complies with the law, and to protect the individual privacy of your customers. Few people today look kindly on organizations that do not observe their privacy.

■ **Considerations**

None

3.3.6.3) Immunity Requirements

■ **Content**

The central management system shall only communicate with the authorized IP address.

■ **Motivation**

To build a product that is as secure as possible from malicious interference.

■ **Considerations**

None

3.3.7) Legal Requirements

■ **Content**

Personal information shall be recorded complying with the data protection act.

■ **Motivation**

To comply with the law so as to avoid later delays, law suits and legal fees.

■ **Fit Criterion**

Lawyers' opinion that the product does not break any laws.

■ **Considerations**

None

Appendix A: Traceability Matrix

- **Attached**

Appendix B: Glossary

- **802.11b**

    IEEE 802.11b-1999 or 802.11b, is an amendment to the IEEE 802.11 specification that extended throughput up to 11 Mbit/s using the same 2.4 GHz band. This specification under the marketing name of Wi-Fi has been implemented all over the world. The amendment has been incorporated into the published IEEE 802.11-2007 standard. 802.11 is a set of IEEE standards that govern wireless networking transmission methods. They are commonly used today in their 802.11a, 802.11b, and 802.11g versions to provide wireless connectivity in the home, office and some commercial establishments.

- **ARS(Automatic Response System)**

    A system which presents the caller with a series of choices from which he or she can select. The choices made at any point in the call dictates the choices that are presented next.

- **Camera**

    A optical device that records video data.

- **Central Management System**

    The huge system which processes packets from sensors, cameras, control panels of each homeowner's house and transmits packets to the homeowner's house to access SafeHome and to control security and surveillance functions.

- **Control Panel Embedded System**

    The embedded software which is running on the SafeHome control panel. It makes homeowners access the control panel, arm/disarm the security function for away/stay respectively.

- **File Server**

    the server which stores recorded moving pictures, the status information of sensors.

- **Floor plan**

    FloorPlan is an arrangement of four elements which are walls which is only for visual purpose, rooms associated with surveillance cameras, external entrances associated with security sensors.

- **Home PC**

    The computer located in the house of the homeowner, storing all data except web data and providing exceptional access gate.

■ **Homeowner**
   The user who has the house and purchases the SafeHome Product.

■ **HTTPS**
   Hypertext Transfer Protocol Secure (HTTPS) is a combination of the Hypertext Transfer
   Protocol and a network security protocol. HTTP operates at the highest layer of the TCP/IP
   Internet reference model, the Application layer; but the security protocol operates at lower
   sublayer, encrypting an HTTP message prior to transmission and decrypting a message upon
   arrival. HTTPS has also been known as "Hypertext Transfer Protocol over Secure Socket
   Layer", but now HTTPS may be secured by the Transport Layer Security (TLS) instead of
   Secure Sockets Layer (SSL) protocol.

■ **Master password**
   A password that the manager sent to the homeowner at the first time in the control panel.

■ **Master account**
   A ID and password that the manager sent to the homeowner at the first time in the web
   application.

■ **Monitoring zone**
   The observed area for each camera and central management system means server containing
   control software and web server for SafeHome.

■ **MTBF**
   Mean time between failures (MTBF) is the arithmetic mean (average) time between failures of a
   system. The MTBF is typically part of a model that assumes the failed system is immediately
   repaired (zero elapsed time), as a part of a renewal process.

■ **Priority**
   The execution level of order in Safehome. The function that have high level execute faster than
   low level.

■ **SafeHome Product software**
   The software that manages storing data, sensor and camera setting and external access.

■ **SafeHome Product service team, service team**
   The division of the SafeHome company that provides the password-missing case disposal
   service, the sensor-detection disposal service and so on.

■ **Sensor**

A device that detects specified objects.

■ **Security zone**

A group of some sensors in seven types: window sensor, door sensor, smoke sensor, motion detector, temperature sensor, toxic gases sensor and water-level sensor.

■ **Streaming Media Server**

the server which service real time streaming of moving pictures transmitted from cameras of each homeowner's house.

■ **Thumbnail**

Snapshots provided by the SafeHome Product software to let users know the content of the video file.

■ **WebServer**

The server which provide homeowners the functions, e.g. account management, security and surveillance management of their house.

Appendix C: Figure and Table Index

■ **Figure Index**

■ **Table Index**

Appendix D: Who-did-what list

- Changki Hong
    - Project overview
    - Assumptions and Dependencies
    - Traceability table
- Le Truong Giang
    - User Interface
    - Functional requirements for security feature
- Seul Ki Lee
    - Hardware interface
    - Functional requirements for surveillance feature
- Jong Joo Kim
    - Nonfunctional requirements
    - Communication interface

Appendix E: Meeting records

- Date: 2009.02.18
- Time: 15:00-17:00
- Meeting activities:
- Read SafeHome dialog excerpts from SEPA
- Discuss to understand unclear points about SafeHome system

- Date: 2009.02.21
- Time: 15:00-17:00
- Meeting activities:
- Construct a requirement specification template

- Date: 2009.02.25
- Time: 10:30-12:00
- Meeting activities:
- Building Naming Convention, Definitions, Acronyms and Abbreviations for the Requirement Specification document.
- Assign the project's task to each member.
    - Le Truong Giang: Functional requirements for Security feature
    - Seul Ki Lee: Functional requirements for Surveillance feature
    - Jong Joo Kim: Nonfunctional requirements

- Date: 2009.03.01
- Time: 20:30-22:00
- Meeting activities:
- New member participate in the project.
- Divide the project's tasks again to each member.
    - Changki Hong: Project's overview, Assumptions and Dependencies
    - Le Truong Giang: Functional requirements for Security feature, User interface
    - SeulKi Lee: Functional requirements for Surveillance feature, Hardware interface
    - Jong Joo Kim: Nonfunctional requirements, Communication interface

- Date: 2009.03.05
- Time: 20:30-22:00
- Meeting activities:
- Review first draft version for each member's task
- Clarify some misunderstanding points and remove overlapped sections among all members' documents.

- Date: 2009.03.08
- Time: 20:30-22:00
- Meeting activities:
    - Combine all member' documents.
    - Fix mistakes related to naming convention, definitions, acronyms and abbreviations.

- Date: 2009.03.09

- Time: 10:00-12:00
- Meeting activities:
    - Review the Requirement specification documents.
    - Fix some mistakes related to format and style.
    - Build appendix.

- Date: 2009.03.10
- Time: 10:00-12:00
- Meeting activities:
    - Prepare for the content of presentation.

Appendix F: References

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