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team 2

KAIST

Analysis model

SafeHome Project

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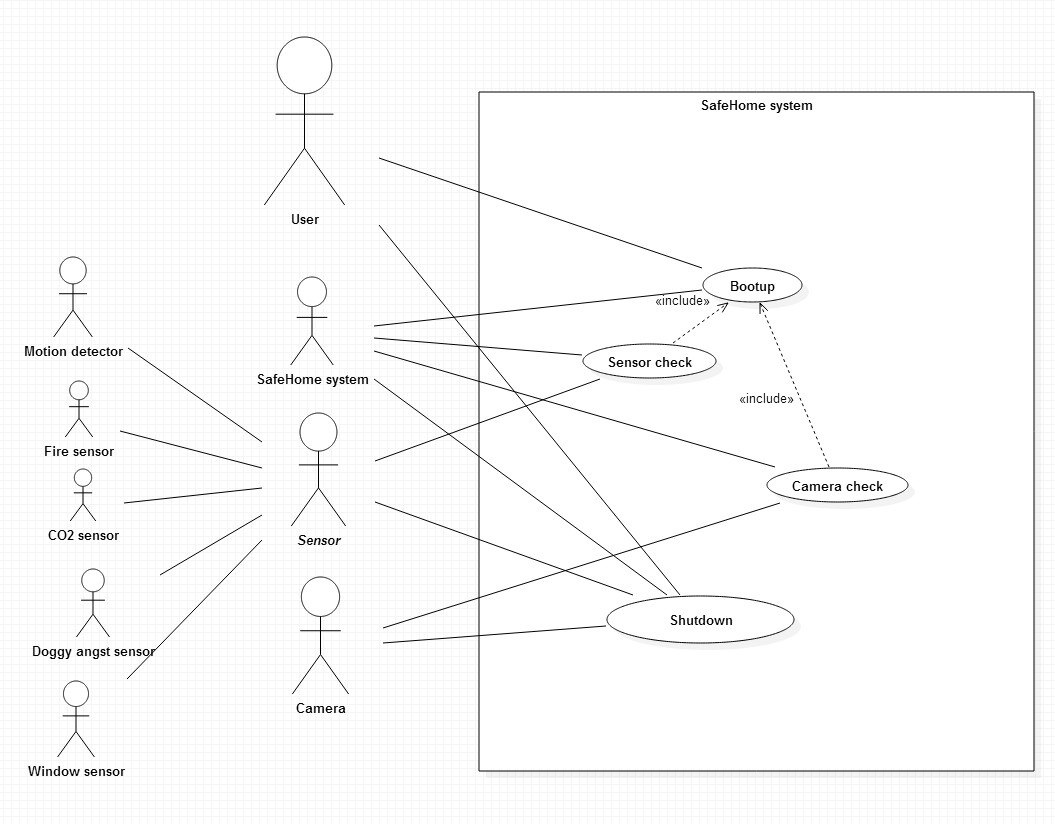
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# Introduction

This document is a SafeHome project Phase 2 which contains analysis model for the SafeHome product. This document contains use-cases, use-case diagrams, and swimlane diagrams. This document is written by Seokju Hong and Young Seok Kim. For some of the system features, revision of the software requirement specification was inevitable, so the authors had to revise the software requirement specification document in order to write this analysis model document. This document is written for the developers as well as professor, TAs and other students. This document is based on the revised software requirement specification document and “Sample SRS overview” document from the professor. All of the diagrams in this document is drawn with StarUML software with limited evaluation license.

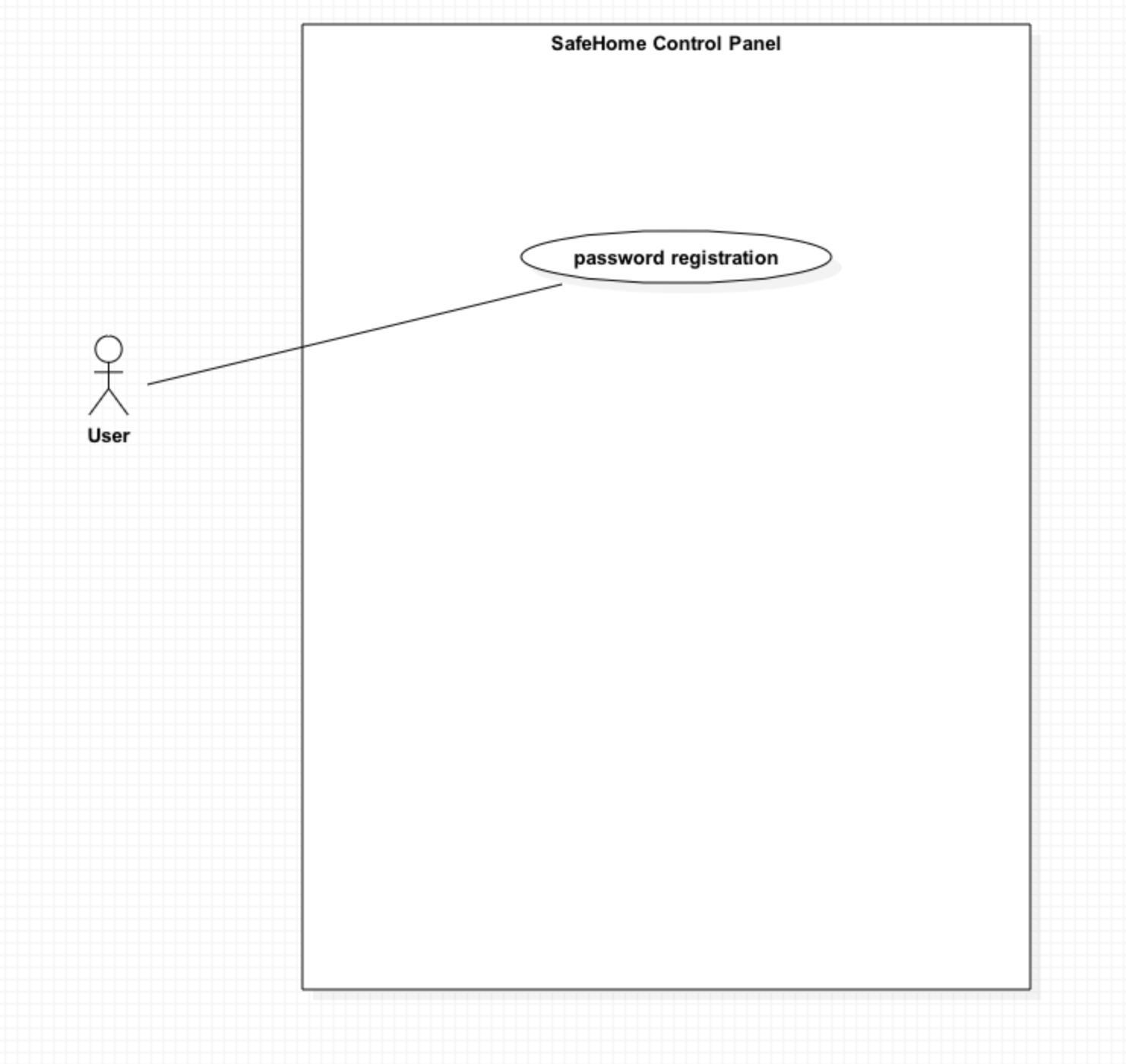
# Use case diagram

## SafeHome bootup/shutdown service

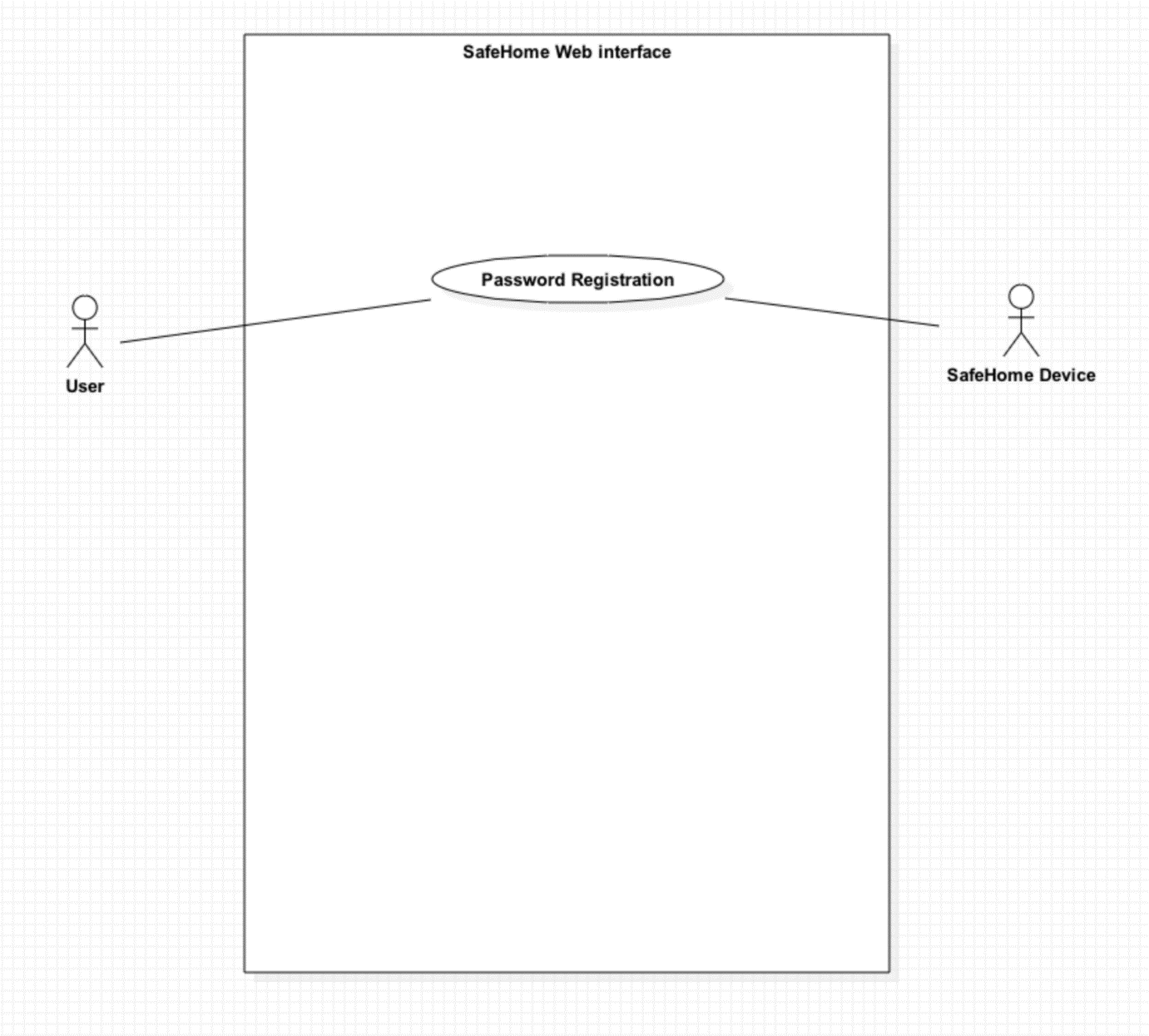


## Configuration service

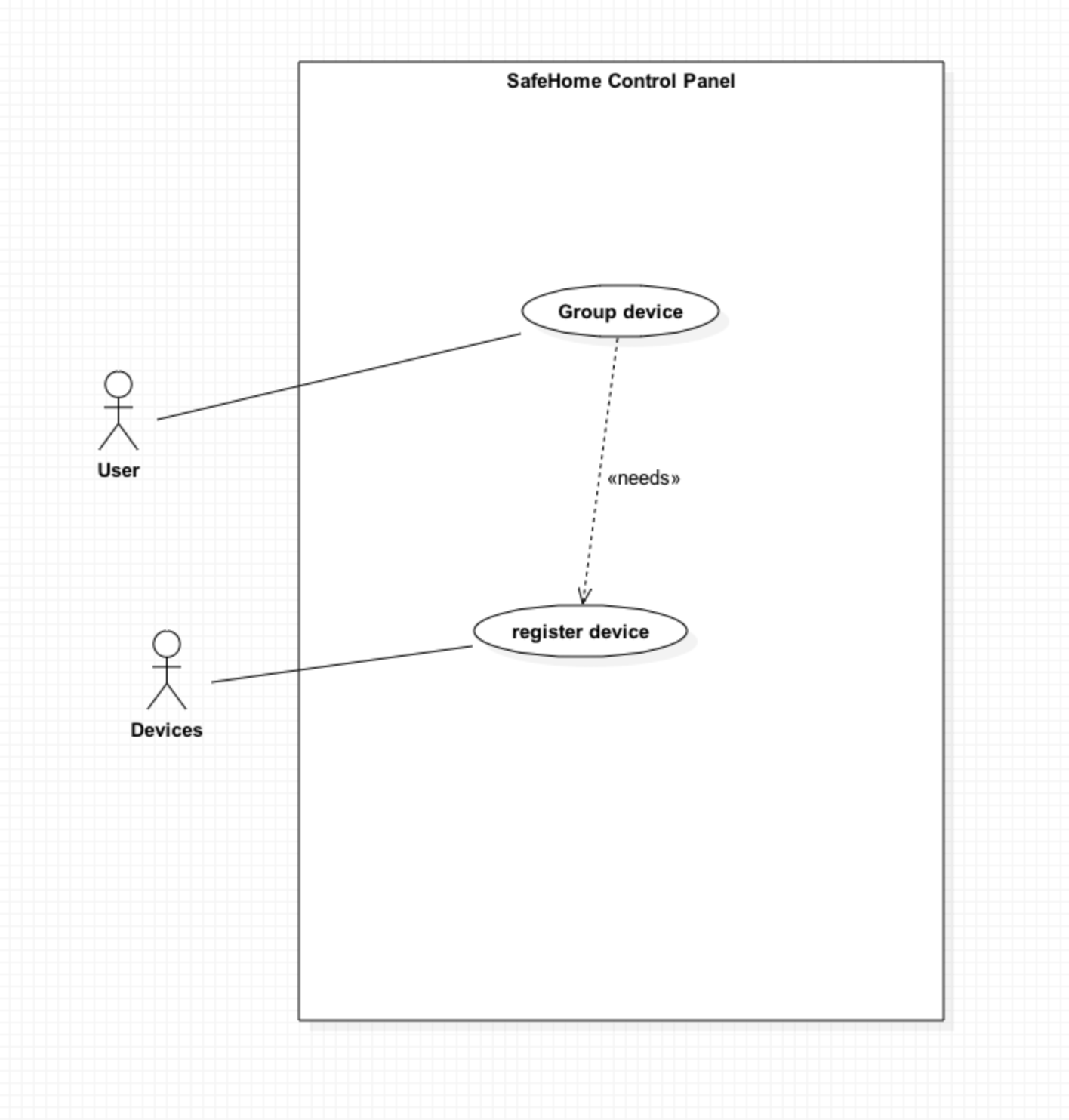
### Password registration



### Password registration (web)



### Grouping devices

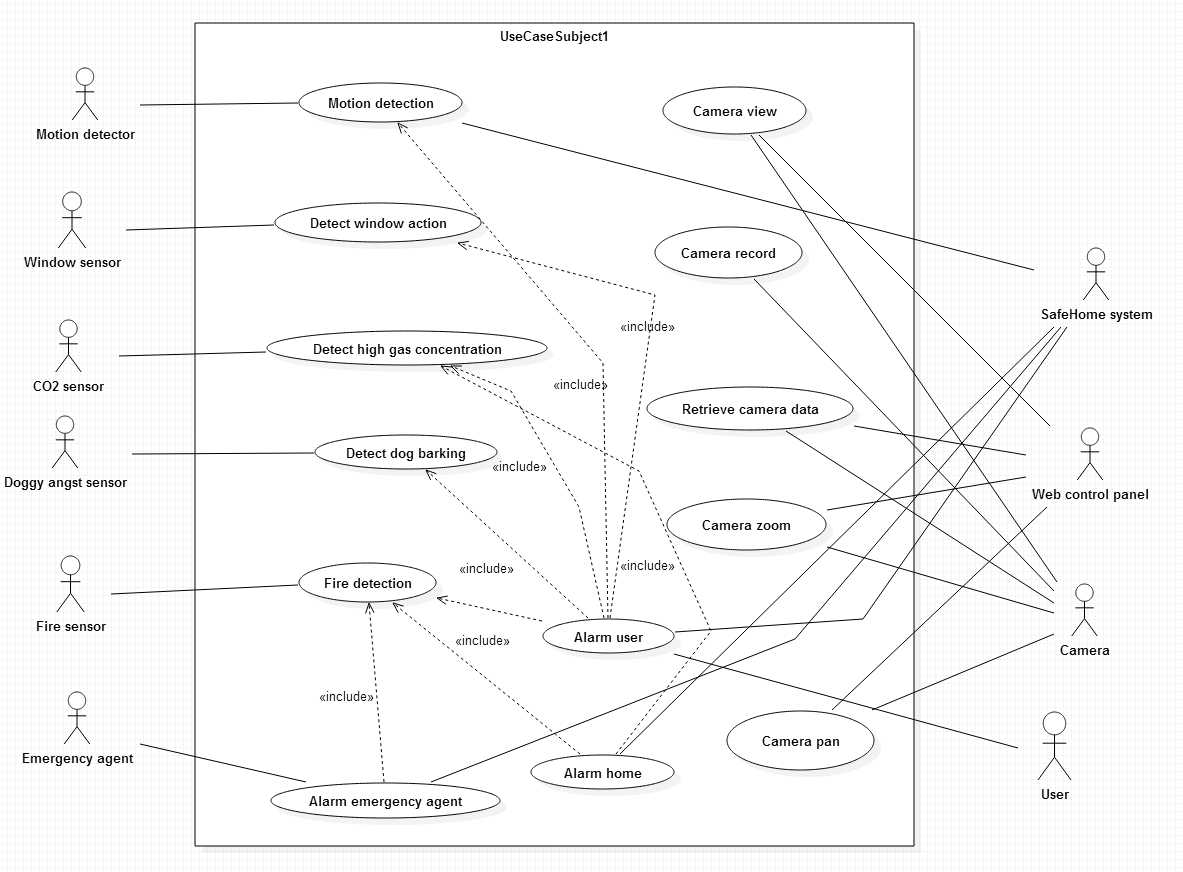


## Real time security service

### Arming-disarming devices and system



### SafeHome security system(sensor and camera actuator part)



# Use cases

## SafeHome bootup/shutdown service

### SafeHome bootup

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.1.1 | Feature Number | 1 | Frequency of Use | Frequently |
| Created date | 5/4/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Seokju Hong | Revision # | 2 |
| Priority | High | | | | |
| Primary actor | SafeHome system, User | | | | |
| Title | Bootup | | | | |
| Preconditions | SafeHome system is currently down. | | | | |
| Trigger | The user presses power button of the SafeHome system. | | | | |
| Postconditions | SafeHome system is booted up and perform sensor checking. | | | | |
| Main success scenario | 1. The user presses power button of the SafeHome system. 2. The SafeHome system checks voltage of connected power source. 3. If power source has enough voltage, SafeHome boots up. | | | | |
| Exceptions | 2a. The SafeHome system is not connected to the power source with proper voltage   * 2a1. The SafeHome system aborts to boot up, and shut down. | | | | |

### Sensor check

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.1.2 | Feature Number | 1 | Frequency of Use | Frequently |
| Created date | 5/4/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | High | | | | |
| Primary actor | SafeHome system, Sensor | | | | |
| Title | Sensor check | | | | |
| Preconditions | SafeHome system is just booted up. | | | | |
| Trigger | Triggered automatically right after booting. | | | | |
| Postconditions | SafeHome system checked all sensors, and perform sensor checking. | | | | |
| Main success scenario | 1. The SafeHome system calls sensor checking method. 2. The SafeHome system sends “MEASURE” message to every sensors. 3. Every sensor sends its current value to the SafeHome system. 4. The SafeHome receives sensors’ message and check every value whether it is in proper range(normal state). | | | | |
| Exceptions | 4a. Sensor value is invalid value or sensor does not send any message to the SafeHome system.(timeout)   * 4a1. The SafeHome system sends “MEASURE” message to the sensor. * 4a2. If checking session fail for 3 times, the SafeHome system makes log about the broken sensor. | | | | |

### Camera check

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.1.3 | Feature Number | 1 | Frequency of Use | Frequently |
| Created date | 5/4/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | High | | | | |
| Primary actor | SafeHome system, Camera | | | | |
| Title | Camera check | | | | |
| Preconditions | SafeHome system just checked every sensor. | | | | |
| Trigger | Triggered automatically right after sensor checking. | | | | |
| Postconditions | SafeHome system checked all cameras and ready to operate every system. | | | | |
| Main success scenario | 1. The SafeHome system calls camera checking method. 2. The SafeHome system sends “HELLO” message to every cameras. 3. Every camera sends “OK” message to the SafeHome system. 4. The SafeHome receives sensors’ message. | | | | |
| Exceptions | 4a. The SafeHome system did not received OK, or the message from a camera corrupted.   * 4b1. The SafeHome system sends “HELLO” message again to the camera. * 4b2. If it fails for 3 times, the red LED of the port where the camera connected blinks and the SafeHome system sends message to user that the camera is broken | | | | |

### Shutdown

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.1.4 | Feature Number | 1 | Frequency of Use | Normal |
| Created date | 5/4/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | High | | | | |
| Primary actor | SafeHome system, Camera, Sensor, User | | | | |
| Title | Shutdown | | | | |
| Preconditions | SafeHome system is operating currently. | | | | |
| Trigger | The user presses power button of the SafeHome system for 3 seconds. | | | | |
| Postconditions | SafeHome system is down. | | | | |
| Main success scenario | 1. The user presses power button of the SafeHome system for 3 seconds 2. The SafeHome system sends “QUIT” message to every sensor and camera. 3. Every sensor and camera sends “OK” message to the SafeHome system and shuts down. 4. If the SafeHome system received “OK” message from every cameras and sensors, the SafeHome system shuts down. | | | | |
| Exceptions | 4a. The SafeHome system did not received OK for 10 seconds.   * 4b1. The SafeHome system forces to shut the sensor or the camera down, and shuts down. | | | | |

## SafeHome configuration service

### 3.2.1. Password registration – Control panel

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.2.1 | Feature Number | 2 | Frequency of Use | Rare, first time only |
| Created date | 5/4/2015 | Author | Young Seok Kim | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | High | | | | |
| Primary actor | SafeHome system, User | | | | |
| Title | Password Registration – Control panel | | | | |
| Preconditions | SafeHome system password is not set | | | | |
| Trigger | User first boots up SafeHome system | | | | |
| Postconditions | SafeHome system password setting is finished | | | | |
| Main success scenario | 1. User first boots up SafeHome system. 2. Password registration screen shows up. 3. User enters valid password and presses ‘done’ button 4. The password is registered to SafeHome system | | | | |
| Exceptions | 3a. User enters invalid password (must be 4 digits)   * 3a1. SafeHome system shows error message – “invalid password” and asks the user to enter password again. | | | | |

### Password registration – Web

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.2.2 | Feature Number | 2 | Frequency of Use | Rare, first time only |
| Created date | 5/4/2015 | Author | Young Seok Kim | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | High | | | | |
| Primary actor | SafeHome system, User | | | | |
| Title | Password Registration - Web | | | | |
| Preconditions | SafeHome system password is set.  Web interface password is not set. | | | | |
| Trigger | User accesses registration page in SafeHome web interface | | | | |
| Postconditions | Safehome Web interface password setting is finished | | | | |
| Main success scenario | 1. User accesses SafeHome web interface 2. User enters SafeHome system password and DeviceID 3. Web interface asks Web interface password. 4. User enters valid web interface password | | | | |
| Exceptions | 3a. User enters invalid password (must be 8 alphanumeric character)   * 3a1. SafeHome system shows error message – “invalid password” and asks the user to enter password again. | | | | |

### Grouping devices

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.2.3 | Feature Number | 2 | Frequency of Use | Rare |
| Created date | 5/4/2015 | Author | Young Seok Kim | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | Medium | | | | |
| Primary actor | SafeHome system, User, devices | | | | |
| Title | Grouping devices | | | | |
| Preconditions | Devices are properly installed to SafeHome system | | | | |
| Trigger | User accesses grouping device screen on SafeHome system | | | | |
| Postconditions | SafeHome devices are grouped together to be manipulated as groups | | | | |
| Main success scenario | 1. User access grouping device screen on SafeHome system 2. User selects 1 or more devices and presses ‘done’ button 3. Selected devices are registered as groups | | | | |
| Exceptions | 2a. User didn’t select any device and press enter   * 2a1. SafeHome system shows error message – “empty group” and asks the user to select devices again. | | | | |

## SafeHome real-time security service



### Arm-system

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.3.1 | Feature Number | 3 | Frequency of Use | Frequently |
| Created date | 5/5/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | High | | | | |
| Primary actor | SafeHome system, Camera, Sensor, User | | | | |
| Title | Arm-system | | | | |
| Preconditions | User logged into the control panel, or logged into the web control panel. | | | | |
| Trigger | Two possible cases:   1. User presses arm-system button on the control panel 2. User presses arm-system button on the web page of the SafeHome system. | | | | |
| Postconditions | Every sensors, cameras are armed. | | | | |
| Main success scenario | 1. The user presses arm-system button on the control panel, or the user presses arm-system button on the web page of the SafeHome system. 2. The SafeHome system checks every sensors and cameras whether it is armed or not. 3. For every sensor/camera that is not armed, call arm function for those disarmed devices. | | | | |
| Exceptions | 3a. Arming a device failed.   * 3a1. Make a log for failed devices that the devices failed to be armed. | | | | |

### Arm-device

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.3.2 | Feature Number | 3 | Frequency of Use | Frequently |
| Created date | 5/5/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | High | | | | |
| Primary actor | SafeHome system, Camera, Sensor, User | | | | |
| Title | Arm-device | | | | |
| Preconditions | User logged into the control panel, or logged into the web control panel. | | | | |
| Trigger | Two possible cases:   1. User presses arm-device button on the control panel 2. User presses arm-device button on the web page of the SafeHome system. | | | | |
| Postconditions | Selected sensor/camera is armed. | | | | |
| Main success scenario | 1. User selects devices that he or she wants to make armed. 2. Call arm function for the selected device (sensor or camera). | | | | |
| Exceptions | 2a. Arming a device failed.   * 2b1. Make a log for failed device that the device failed to be armed. | | | | |

### Disarm-system

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.3.3 | Feature Number | 3 | Frequency of Use | Frequently |
| Created date | 5/5/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | High | | | | |
| Primary actor | SafeHome system, Camera, Sensor, User | | | | |
| Title | Disarm-system | | | | |
| Preconditions | User logged into the control panel, or logged into the web control panel. | | | | |
| Trigger | Two possible cases:   1. User presses disarm-system button on the control panel 2. User presses disarm-system button on the web page of the SafeHome system. | | | | |
| Postconditions | Every sensor, camera is disarmed. | | | | |
| Main success scenario | 1. The user presses disarm-system button on the control panel, or the user presses disarm-system button on the web page of the SafeHome system. 2. The SafeHome system checks every sensors and cameras whether it is armed or not. 3. For every sensor/camera that is armed, call disarm function for those armed devices. | | | | |
| Exceptions | 3a. Disarming a device failed.   * 3a1. The SafeHome system retries to disarm the device. * 3a2. If it fails 3 times, the SafeHome system forces to disarm the device. | | | | |

### Disarm-device

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.3.4 | Feature Number | 3 | Frequency of Use | Frequently |
| Created date | 5/5/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | High | | | | |
| Primary actor | SafeHome system, Camera, Sensor, User | | | | |
| Title | Disarm-device | | | | |
| Preconditions | User logged into the control panel, or logged into the web control panel. | | | | |
| Trigger | Two possible cases:   1. User presses disarm-device button on the control panel 2. User presses disarm-device button on the web page of the SafeHome system. | | | | |
| Postconditions | Selected sensor/camera is armed. | | | | |
| Main success scenario | 1. User selects devices that he or she wants to make disarmed. 2. Call disarm function for the selected device (sensor or camera). | | | | |
| Exceptions | 2a. Disarming a device failed.   * 2b1. The SafeHome system retries to disarm the device. * 2a2. If it fails 3 times, the SafeHome system forces to disarm the device. | | | | |

### Alarm-house

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.3.5 | Feature Number | 3 | Frequency of Use | Rarely |
| Created date | 5/5/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | High | | | | |
| Primary actor | SafeHome system, Sensor, User | | | | |
| Title | Alarm-house | | | | |
| Preconditions | The SafeHome system is currently operating.  There is abnormality with toxic, water level, or fire and corresponding sensor is armed.  Alarming house function is armed. | | | | |
| Trigger | Sensor detects abnormality with its measured value. | | | | |
| Postconditions | Alarm rings over the house. | | | | |
| Main success scenario | 1. The sensor detects abnormalities with fire, toxic, water level, … 2. The sensor calls alarmHouse() function and alarm rings. | | | | |
| Exceptions |  | | | | |

### Alarm-user

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.3.6 | Feature Number | 3 | Frequency of Use | Rarely |
| Created date | 5/5/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | Normal | | | | |
| Primary actor | SafeHome system, Sensor, User | | | | |
| Title | Alarm-user | | | | |
| Preconditions | The SafeHome system is currently operating.  There is abnormality with toxic, water level, or fire and corresponding sensor is armed.  Alarming user function is armed.  User’s contact information is registered to the SafeHome system. | | | | |
| Trigger | Sensor detects abnormality with fire, toxic, water level, … | | | | |
| Postconditions | The user receives SMS message from the SafeHome system. | | | | |
| Main success scenario | 1. The sensor detects abnormalities with fire, toxic, water level, … 2. The sensor calls alarmUser() function. 3. The SafeHome system sends SMS message to the user that there is a problem in the house. | | | | |
| Exceptions |  | | | | |

### Alarm-emergency-agent

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.3.7 | Feature Number | 3 | Frequency of Use | Rarely |
| Created date | 5/5/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | High | | | | |
| Primary actor | SafeHome system, Sensor, User, Emergency agent(119) | | | | |
| Title | Alarm-emergency-agent | | | | |
| Preconditions | The SafeHome system is currently operating.  There is abnormality with toxic, water level, or fire and corresponding sensor is armed.  Alarming emergency agent function is armed.  User’s address information is registered to the SafeHome system. | | | | |
| Trigger | Sensor detects abnormality with its measured value. | | | | |
| Postconditions | Emergency agent receives emergent message from the SafeHome system. | | | | |
| Main success scenario | 1. The sensor detects abnormalities with fire, toxic, water level, … 2. The sensor calls alarmEmergencyAgent() function. 3. The SafeHome system sends message to emergency agents(like 119) that there is a problem in the house. | | | | |
| Exceptions |  | | | | |

### Detect motion

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.3.9 | Feature Number | 3 | Frequency of Use | Everyday |
| Created date | 5/5/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | Normal | | | | |
| Primary actor | Motion detector, SafeHome system | | | | |
| Title | Detect motion | | | | |
| Preconditions | The SafeHome is booted up.  Motion detection feature is armed. | | | | |
| Trigger | Motion is detected by motion detector. | | | | |
| Postconditions | Motion detector calls alarmUser() function. | | | | |
| Main success scenario | 1. Strange object moves around the motion detector. 2. Motion detector detects the object. 3. The motion detector calls alarmUser() function to notify user that there’s something strange moving in the house. | | | | |
| Exceptions | 3a. User alarming feature is not armed.   * Abort alarming user. | | | | |

### Detect window action

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.3.10 | Feature Number | 3 | Frequency of Use | Everyday |
| Created date | 5/5/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | Normal | | | | |
| Primary actor | Window sensor, SafeHome system | | | | |
| Title | Detect window action | | | | |
| Preconditions | The SafeHome is booted up.  Window action detection feature is armed. | | | | |
| Trigger | Any window is opened. | | | | |
| Postconditions | Motion detector calls alarmUser() function. | | | | |
| Main success scenario | 1. Strange object opens window. 2. Window sensor detects that the window is opened.. 3. The window sensor calls alarmUser() function to notify user that the stranger just opened the window.. | | | | |
| Exceptions | 3a. User alarming feature is not armed.   * Abort alarming user. | | | | |



### Camera view

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.3.14 | Feature Number | 3 | Frequency of Use | Normal |
| Created date | 5/6/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | High | | | | |
| Primary actor | SafeHome system, Camera, User | | | | |
| Title | Camera view | | | | |
| Preconditions | User has logged into the SafeHome web page control panel. | | | | |
| Trigger | User clicks “View CCTV camera” button on the SafeHome web page control panel. | | | | |
| Postconditions | User can see what camera captures real-time. | | | | |
| Main success scenario | 1. User clicks “Overview CCTV camera” button on the SafeHome web page control panel. 2. User can monitor his/her entire room by watching thumbnail view of every camera. 3. User selects available CCTV. 4. User can monitor his/her room with CCTV scenes. | | | | |
| Exceptions |  | | | | |

### Camera zoom

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.3.17 | Feature Number | 3 | Frequency of Use | Normal |
| Created date | 5/6/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | Medium | | | | |
| Primary actor | SafeHome system, Camera | | | | |
| Title | Camera zoom | | | | |
| Preconditions | User has logged into the SafeHome web page control panel.  User is using camera viewing feature. | | | | |
| Trigger | User presses zoom button | | | | |
| Postconditions | Selected camera zooms in or out. | | | | |
| Main success scenario | 1. User is using camera viewing feature. 2. User presses zoom button. 3. User presses either zoom in or zoom out button. | | | | |
| Exceptions | 3a. User zoomed in until its limit and user tries to zoom in more.   * 3a1. Abort zoom-in.   3b. User zoomed out until its limit and user tries to zoom out more.   * 3b1. Abort zoom-out. | | | | |

### Camera pan

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.3.18 | Feature Number | 3 | Frequency of Use | Normal |
| Created date | 5/6/2015 | Author | Seokju Hong | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | Medium | | | | |
| Primary actor | SafeHome system, Camera | | | | |
| Title | Camera pan | | | | |
| Preconditions | User has logged into the SafeHome web page control panel.  User is using camera viewing feature. | | | | |
| Trigger | User presses pan button | | | | |
| Postconditions | Selected camera pans left or right. | | | | |
| Main success scenario | 1. User is using camera viewing feature. 2. User presses pan button. 3. User presses either pan right or pan left button. | | | | |
| Exceptions | 3a. User panned left until its limit and user tries to pan left more.   * 3a1. Abort pan-left.   3b. User panned right until its limit and user tries to pan right more.   * 3b1. Abort pan right. | | | | |

# System status reporting service

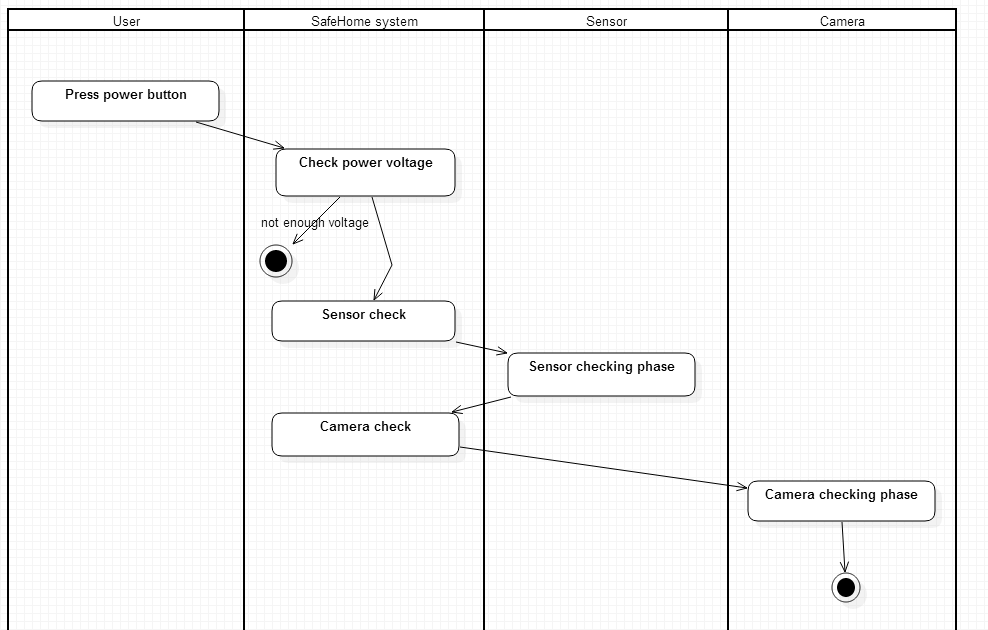
### 3.4.1. Current status report

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Use case Number | 3.4.1. | Feature Number | 4 | Frequency of Use | Normal |
| Created date | 6/5/2015 | Author | Young Seok Kim | | |
| Updated date | 6/5/2015 | Updated by | Young Seok Kim | Revision # | 2 |
| Priority | Medium | | | | |
| Primary actor | SafeHome system | | | | |
| Title | Current system report | | | | |
| Preconditions | User has logged into the SafeHome web page control panel. | | | | |
| Trigger | User presses status button | | | | |
| Postconditions | None | | | | |
| Main success scenario | 1. User presses status button  2. User interface shows the system is idle, armed, turned off, and so on. | | | | |
| Exceptions |  | | | | |

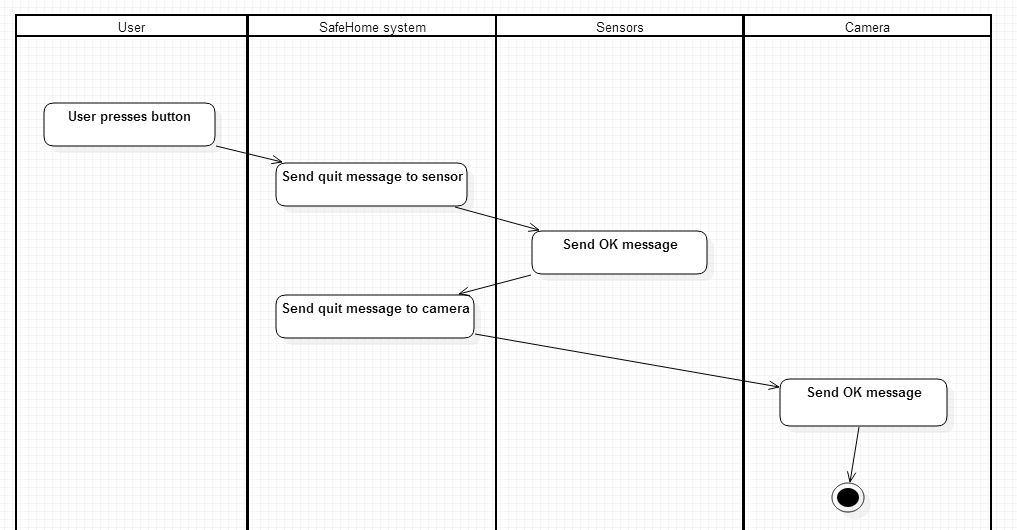
# Swimlane diagram

## SafeHome bootup/shutdown system

### SafeHome bootup

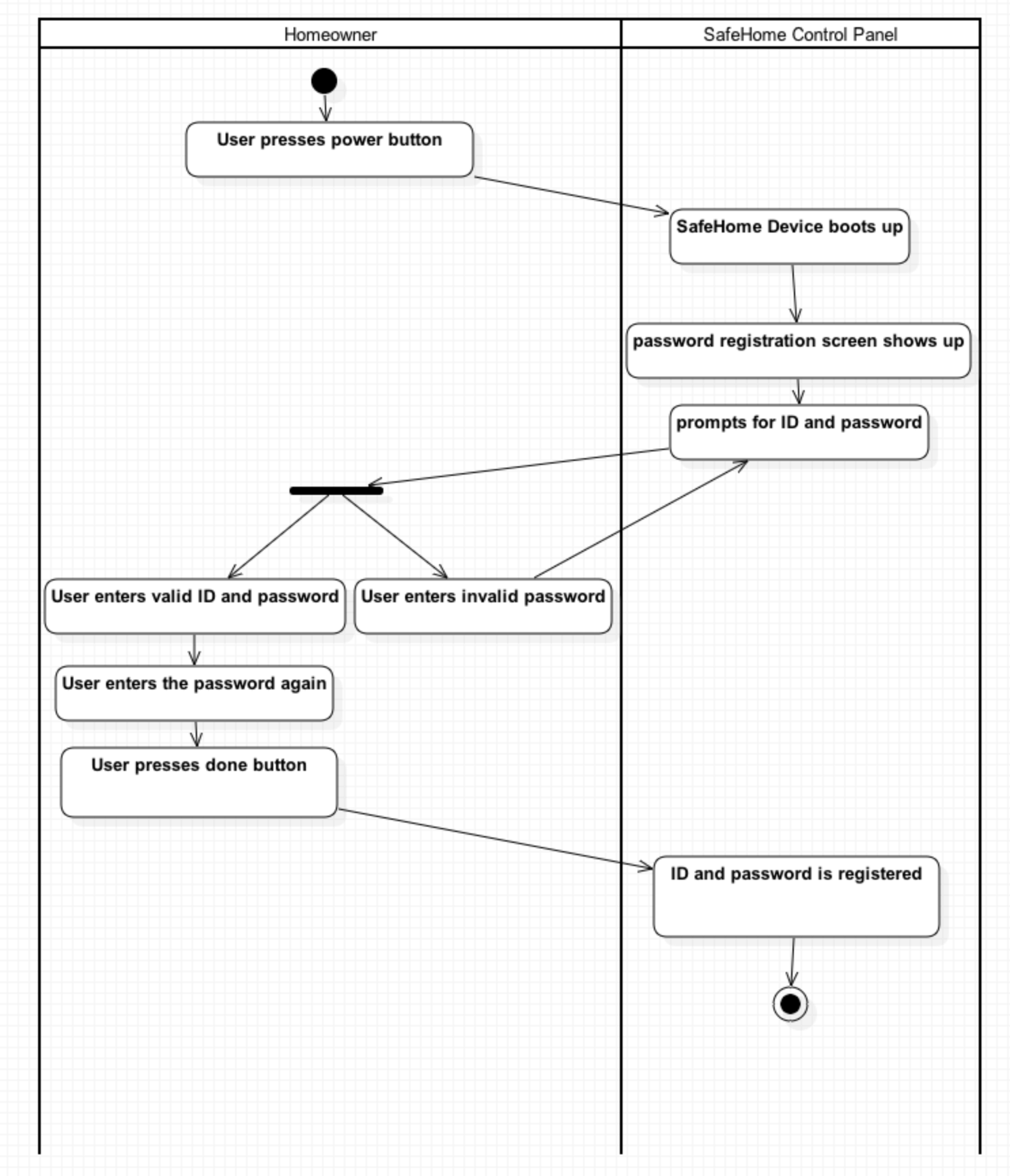


### SafeHome shutdown

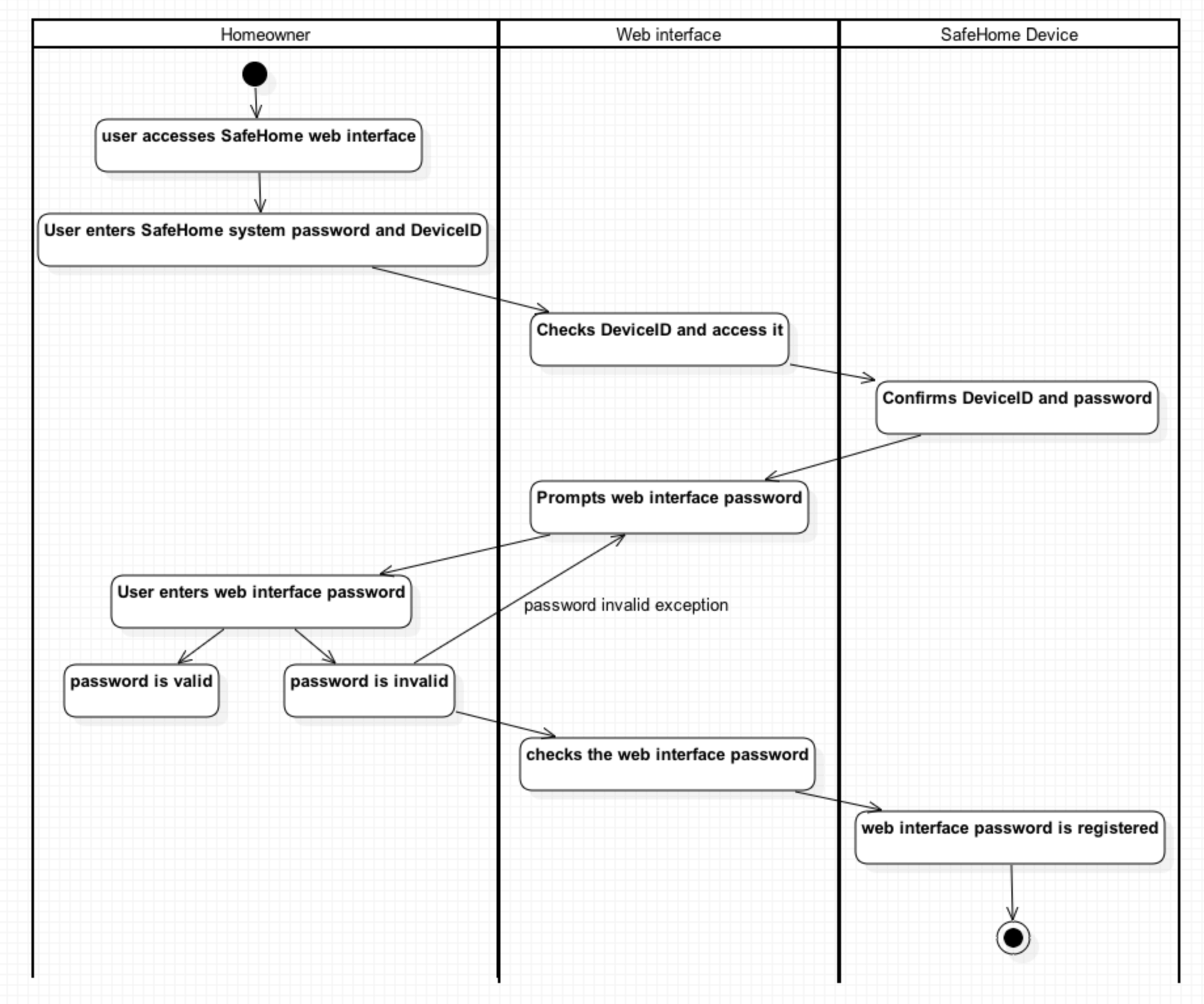


## Configuration service

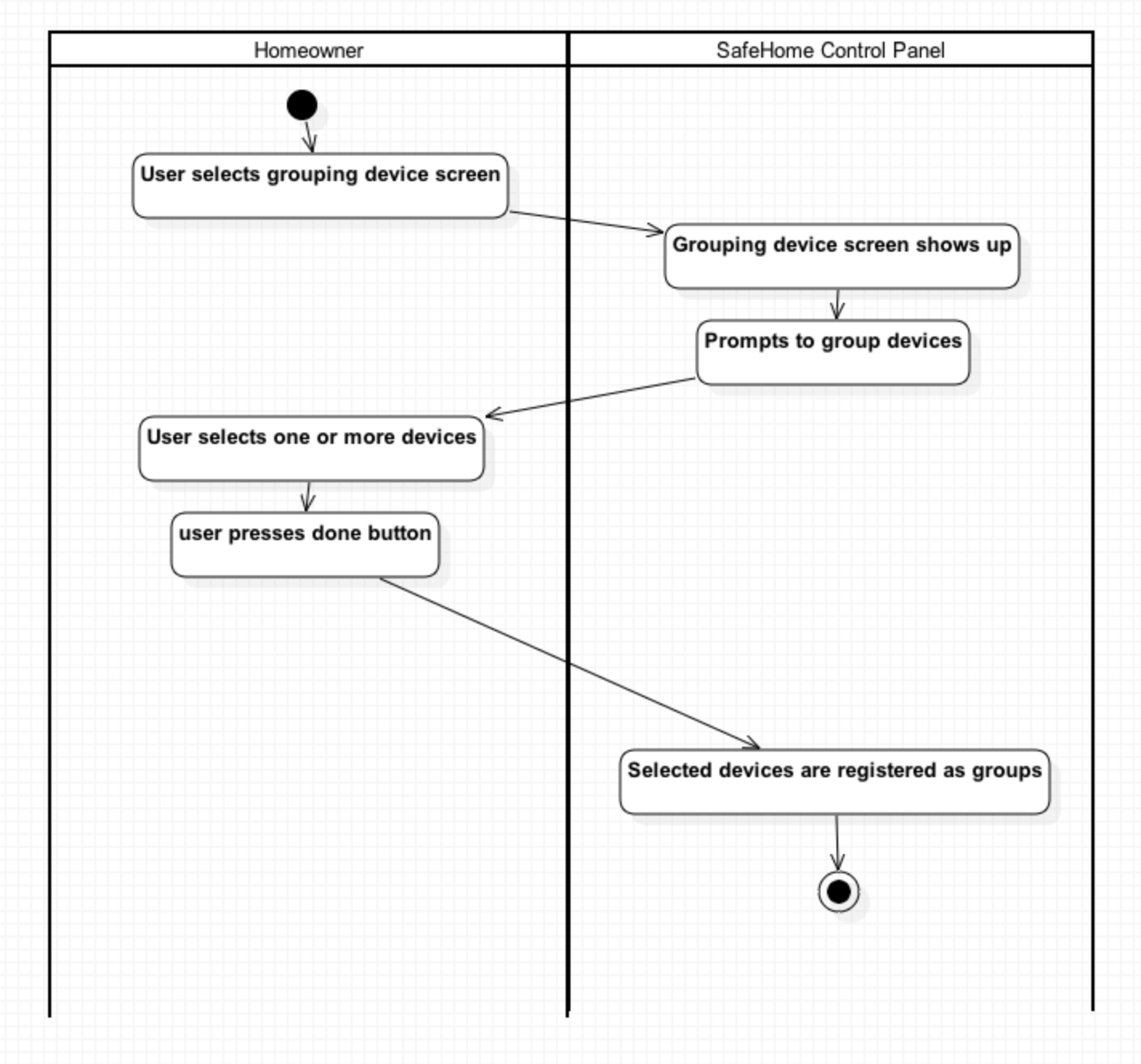
### Password registration



### Password registration (web control panel)

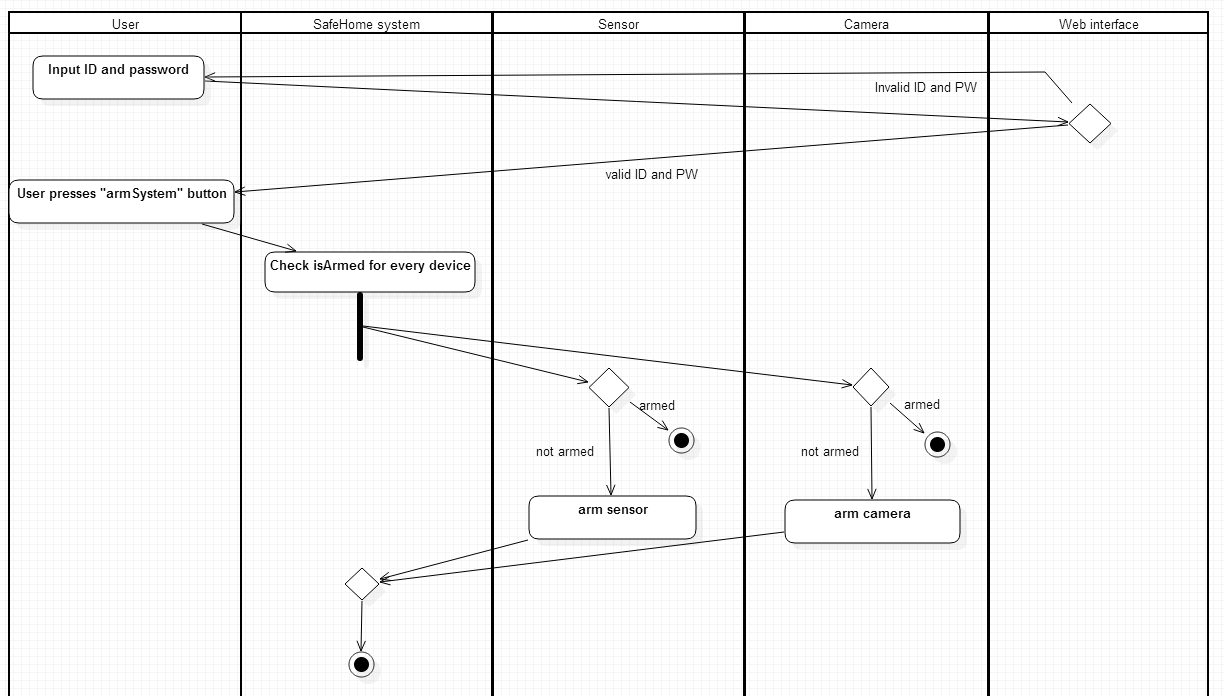


### Grouping devices

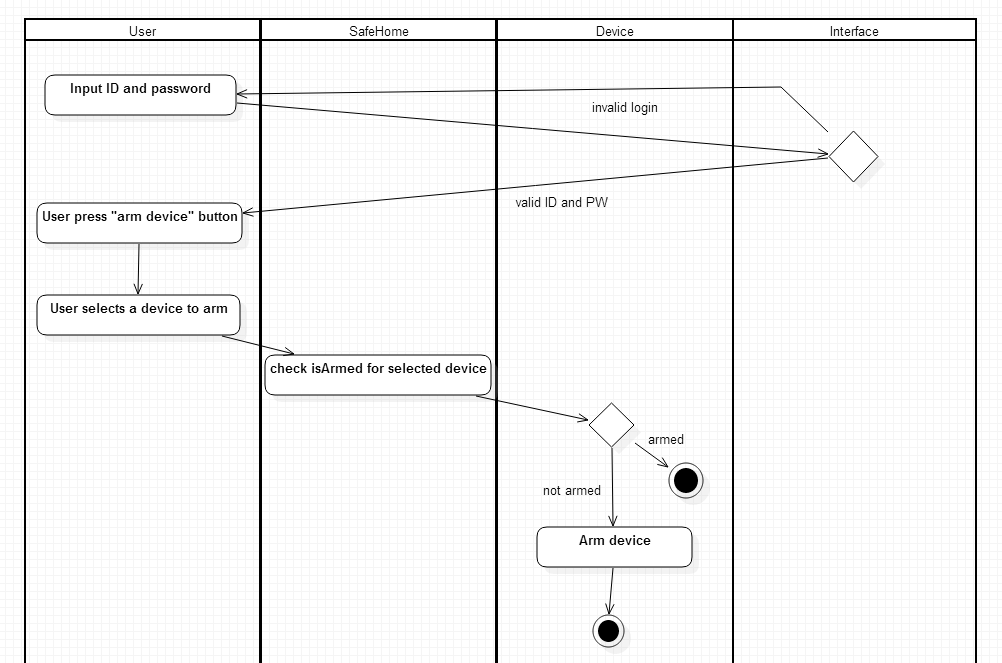


## SafeHome real-time security service

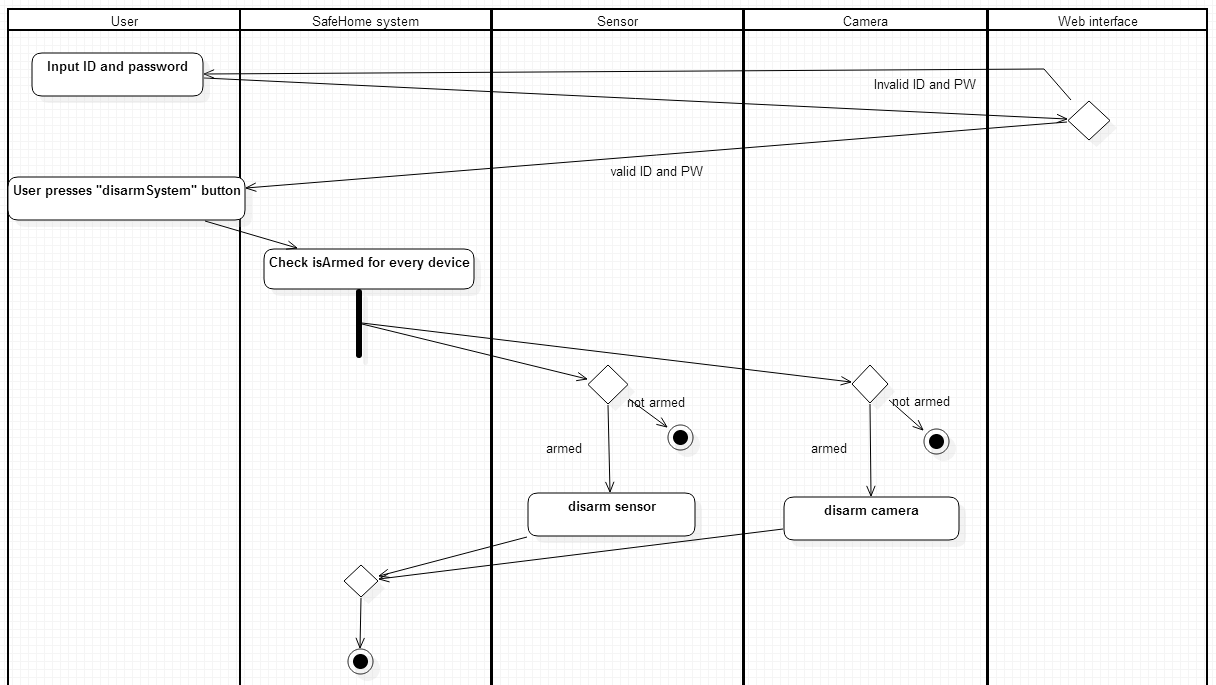
### Arming system



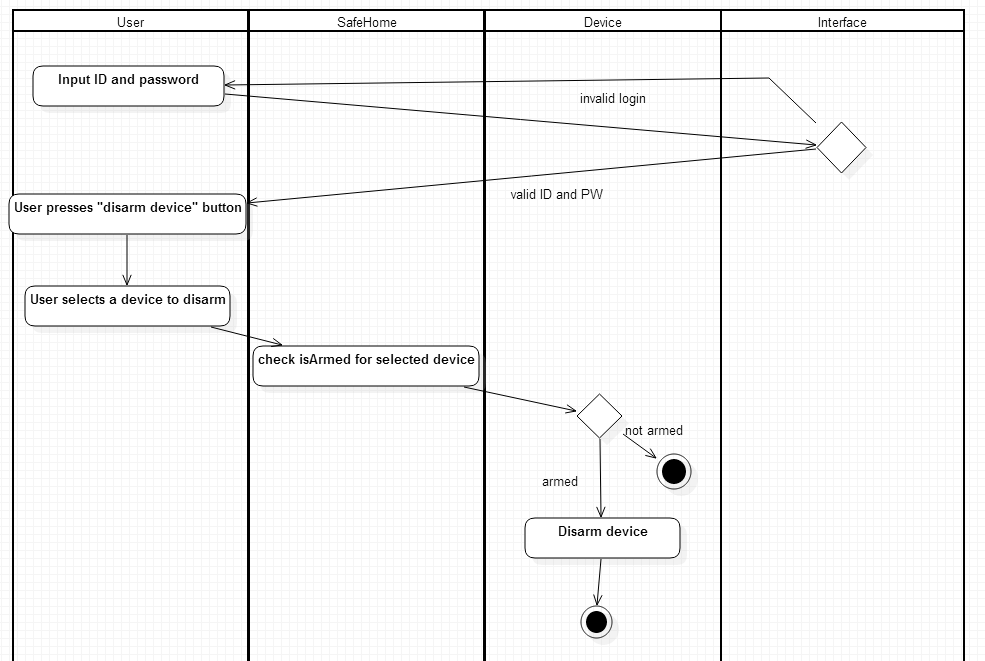
### Arming device



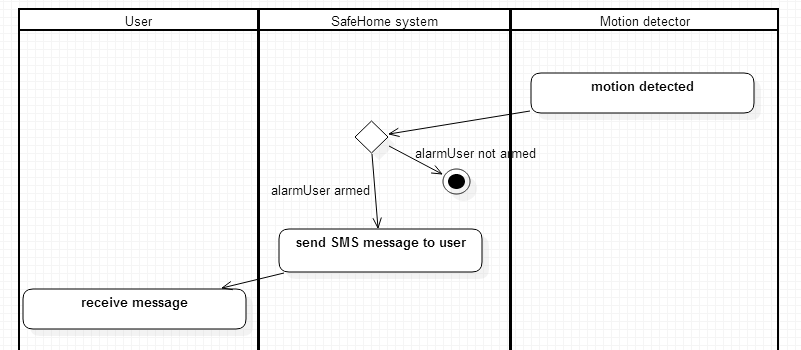
### Disarming system



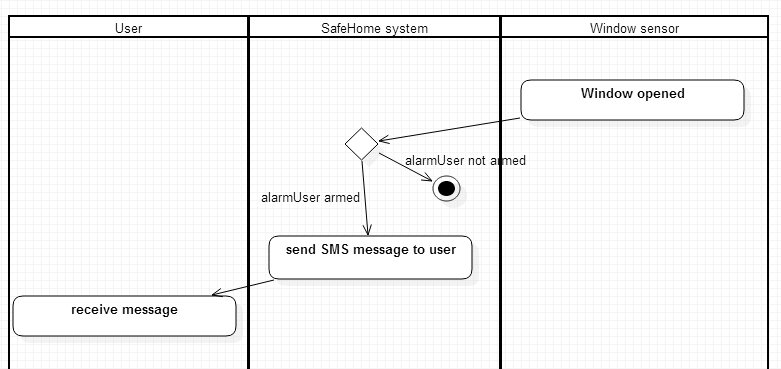
### Disarming device



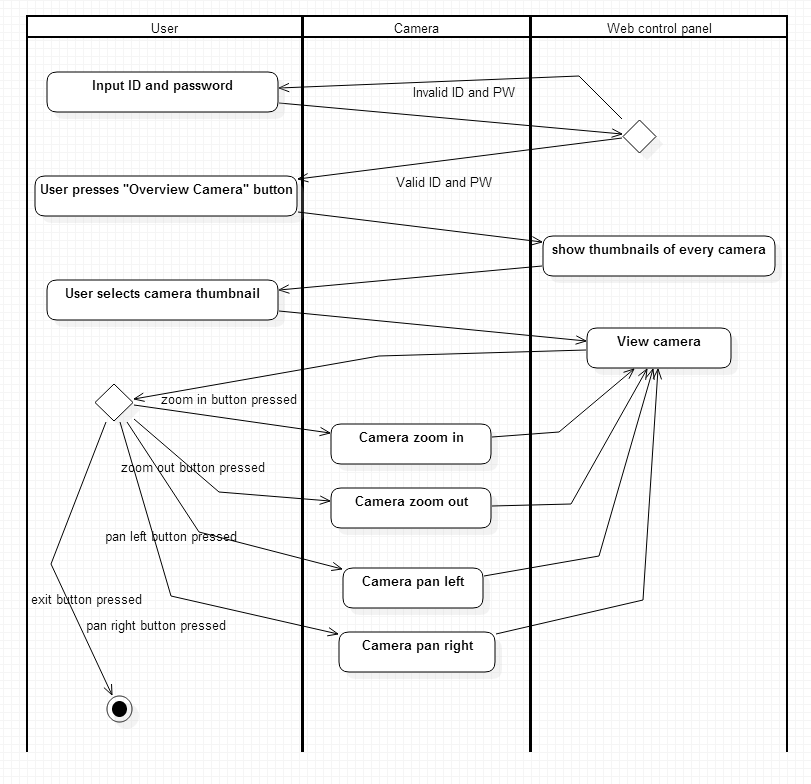
### Detect motion



### Detect window action



### Camera viewing, zooming, panning



# Authorship

**2 - Use cases**

2.1, 2.3 is written by Seokju Hong

2.2, 2.4 is written by Young Seok Kim

**3 - Use case diagram**

3.1, 3.3 is written by Seokju Hong

3.2, 3.4 is written by Young Seok Kim

**4 - Swimlane diagram**

4.1, 4.3 is written by Seokju Hong

4.2, 4.4 is written by Young Seok Kim

# Feature legends

1. SafeHome bootup/shutdown service
2. SafeHome configuration service
3. SafeHome real-time security service
4. User-requested information retrieval service

# Version history

Version 1.0 (2015/05/06)

* Original version submitted

Version 1.1 (2015/05/20)

* Revised version while writing Design model.

Version 1.2 (2015/05/27)

* Reduced version with less scope