# Smart Home Automation System (SHAS)

# Use Case Analysis

**CS/SE 6387 Advanced Software Engineering Project**
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## Revision History

| Version | Date | Comment |
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| 1.0 | 2/20/2013 | • Updated Section 1 -4. |

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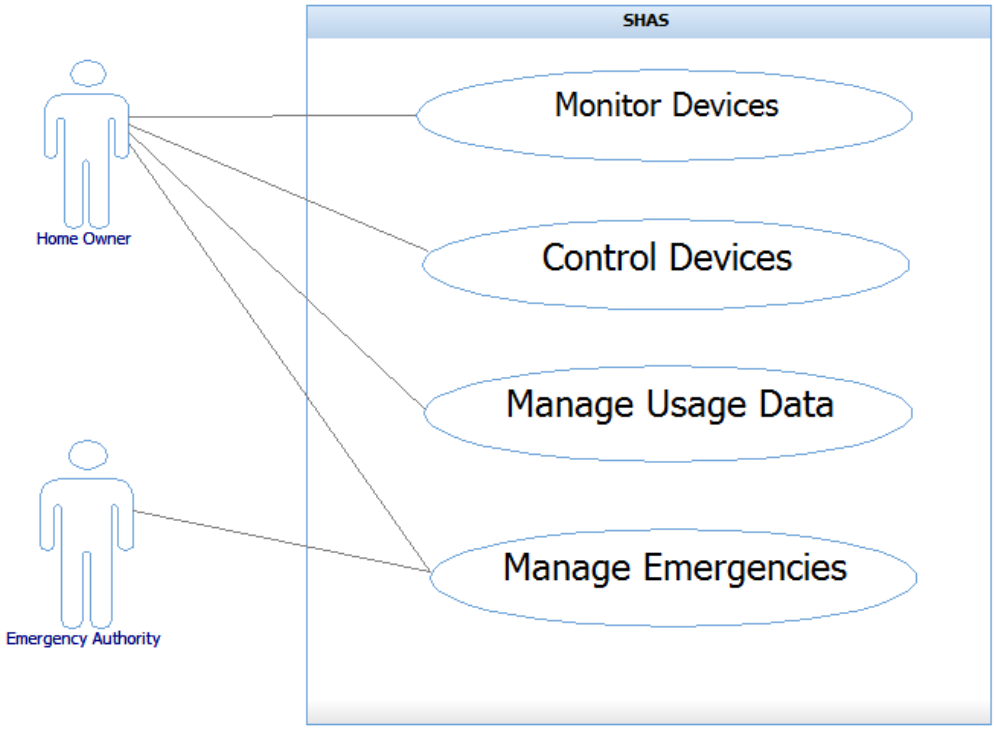
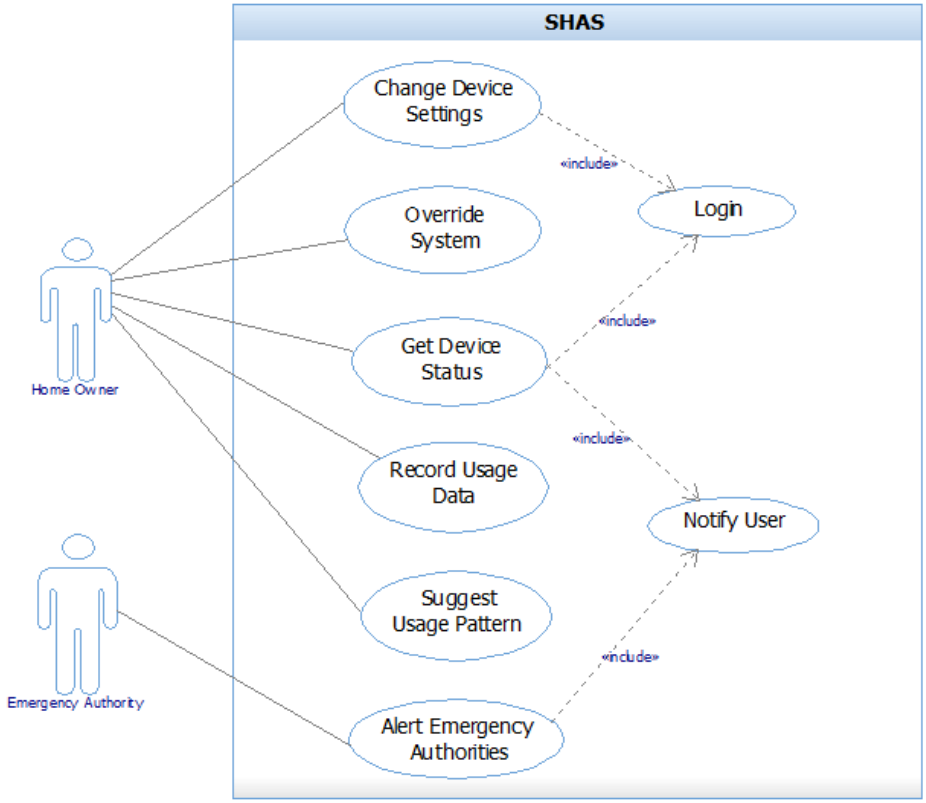
# 1. Use Case Diagrams

## 1.1 Level 0:



## 1.2 Level 1:




# 2. Use Case Description – Level 0

## 2.1 Control Devices

**Name:** Control Devices

**Scope:** SHAS System

**Owner:** Home Owner

**Purpose:**

- Enable the user to control the various devices and appliances in the home through a single unified point of access.
- Give the user the ability to turn on/off devices and also change their settings either on site or remotely through SHAS.
- Improve the quality of living of the user through remote access and intelligent behavior of devices through SHAS

**Data:**

- Credentials – For remote access of devices.
- Device names – User can identify device and control
- Device Commands – User issues them to the devices through interface which is understandable to them.

**Preconditions:**

- The devices and the appliances are already installed in the SHAS enabled House.
- The devices and appliances are already integrated into SHAS system.
- The device and appliances are not malfunctioning.
- The device names are already chosen by the user for each device, which is unique for the user to be able to identify them.
- For remote access, the user needs access to internet enabled computer or smart phone.
- The user has correct credentials to log on to the SHAS Interface for remote access.
- The device commands are already provided and are the means by which the user can issue commands to the devices.

**Post-conditions**:

- The devices would perform the way user desires.
- The devices would be controlled remotely as and where the user desires.
- The devices and appliances will be controlled through the provided commands.
- User can override the entire system and bring it to a complete stop and have totalitarian control over all the devices in the SHAS enabled house.
- User is provided an environment where the user feels that they have complete control over all the devices and appliances in the SHAS enabled house.

**Triggers**:

- The ‘control device’ is used when the user wants to change the device settings, control the devices remotely and when he wants to override the SHAS system.

## 2.2 Monitor Devices

**Name:** Monitor Devices

**Scope:** SHAS System

**Owner:** Home Owner

**Purpose:**

- Enable the user to monitor the all the activities of the SHAS enabled house.
- Notify the user through alerts on various events.
- Provide an environment where the user feels safe.

**Data:**

- Device Status – Various statuses of the devices (e.g., On, Off, Malfunctioning).
- Credentials – For the user to log on to the system.
- Alerts – Notifies user on special events.
- Settings – Monitor functions works with the configuration set by the user, which determines when to alert, whom to alert, what to send as an alert, By what means to alert the user, etc.

**Preconditions:**

- The devices and the appliances are already installed in the SHAS enabled House.
- The devices and appliances are already integrated into SHAS system.
- The device and appliances are not malfunctioning.
- For remote access, the user needs access to internet enabled computer or smart phone.
- The user has correct credentials to log on to the SHAS Interface for remote access.
- The device names are already chosen by the user for each device, which is unique for the user to be able to identify them.
- The device status provided are the ones the user would get if the user requests the status on a device.
- The settings for the 'Monitor Devices' has already been configured.
- The user already has access to status of the devices through the device's LED when the user is on premises.
- The user has one established means of receiving alerts remotely.

**Post-conditions**:

- The user will be able to get the status of all the devices part of the SHAS system in the SHAS enabled house.
- The user will be notified by alerts through established means of remote communication.
- The user will be able to view the devices through the interface during remote access.
- The user will be able to view the status of the devices through device LED when on premises.

**Triggers**:

- When the user wants to view the status of the devices.
- When the user wants to be alerted on special events specified according to configuration.

## 2.3 Manage Usage Data

**Name:** Manage usage data.

**Scope:** SHAS System

**Owner:** Home Owner

**Purpose:**

- Enable the user to view the usage reports generated by the SHAS system
- Suggest usage patterns to the user based on the long data obtained from the user's activities.

**Data:**

- Long Data – Historical data on user's activities.
- Metrics – Reports are generated based on these.
- Credentials – For the user to log on to the system.
- Settings – Configured by the user on what reports to generate, when to generate, what the generated reports should have, whether to alert user when a report is available, when to suggest users on a usage pattern, etc.

**Preconditions:**

- The devices and the appliances are already installed in the SHAS enabled House.
- The devices and appliances are already integrated into SHAS system.
- The device and appliances are not malfunctioning.
- For remote access, the user needs access to internet enabled computer or smart phone.
- The user has correct credentials to log on to the SHAS Interface for remote access.
- The device names are already chosen by the user for each device, which is unique for the user to be able to identify them.
- Collection on usage patterns are already enabled through sensors and meters already installed as part of the SHAS system in the SHAS enabled house.
- The metrics are already chosen by the user for the reports to be generated.
- The user will be able to add old usage reports for useful analysis by the SHAS system.

**Post-conditions**:

- The user will have access to reports on various devices based on their type of device, their usage etc.
- The user will be able to generate reports on the long data obtained from the user's activities.
- The user will be able to configure the "manage usage data" functionality with his preferences on it.
- The SHAS will be able to suggest usage patterns based on the long data.

**Triggers**:

- When the user wants to add previous usage data. (Previous Utility Bills, etc.)
- When the user wants usage reports arbitrarily.
- When the SHAS system has proper usage patterns to suggest the user to conserve and reduce on resources.

## 2.4 Manage Emergencies

**Name:** Manage Emergencies

**Scope:** SHAS System, Emergency Authorities

**Owner:** Emergency Authorities.

**Purpose:**

- Alert emergency authorities upon setting off of established emergencies
- Notify user upon alerting emergency authorities and also on review possible emergencies.

**Data:**

- Credentials – For the user to log on to the system.
- Emergency Contacts – Which emergency authorities to alert.
- Settings – Configured by user on whom to notify during an official emergency alert and whom to notify upon review of a possible emergency.

**Preconditions:**

- One of the emergency sensors, detectors has been set off.
- The possible emergency has already been escalated to an official emergency.
- The user has established channels of communication for him to be notified.
- The settings have been configured on various scenarios and standing instructions, etc. have already been provided by the user.

**Post-conditions**:

- The emergency authorities will be alerted upon official emergencies.
- Possible emergencies will be notified to the user for review.
- The user will be able to configure the “Manage Emergencies”’ settings.

**Triggers**:

- When an emergency detector goes off
- When the user needs to be notified upon a possible emergency.

# 3. Use Case Description – Level 1

## 3.1 Change Device Settings

**Name:** Change Device Settings

**Scope:** SHAS System

**Owner:** Home Owner

**Purpose:**

- To change the settings of the devices to match user's desire.

**Data:**

- The parameters to change on the device and the corresponding values

**Preconditions:**

- The devices function as per the requirement.
- The owner has access to the system.

**Post conditions:**

- The changes are made on the devices as desired and those changes are logged

**Triggers:**

- The change device settings is used when the user wishes to make changes to the settings

## 3.2 Override System

**Name:** Override System

**Scope:** SHAS System

**Owner:** Home Owner

**Purpose:**

- This use case lets the owner to change certain decisions the SHAS makes.

**Preconditions:**

- The owner has the access permission to override

**Post conditions:**

- The user successfully changed the decision the SHAS made

**Triggers:**

- When SHAS makes an undesirable change of state on the appliance, the user would try to override it.

## 3.3 Get Device Status

**Name:** Get Device Status

**Scope:** SHAS System

**Owner:** Home Owner

**Purpose:**

- This gets the current status/state of the smart appliance and gives it to the owner

**Data:**

- The device whose status is required

**Preconditions:**

- The user has access to the system
- The user is currently logged in with the interface

**Post conditions:**

- The status of the device that was requested will be obtained

## 3.4 Login

**Name:** Login

**Scope:** SHAS System

**Owner:** Home Owner

**Purpose:**

- This authenticates the user to access the SHAS system

**Data:**

- User ID
- Password

**Preconditions**:

- The owner has User ID and Password

**Post conditions:**

- The owner could login successfully if the credentials he/she has is correct

**Alternate Flow:**

- If the user types in wrong combinations of ID and Password more than three times, a security question would pop up

**Triggers:**

- When the owner tries to access SHAS using one of the interfaces, he/she has to login

## 3.5 Record Usage Data

**Name:** Record Usage Data

**Scope:** SHAS System

**Level:** User Goal

**Owner:** Home Owner

**Purpose:**

- The activity of each device should be recorded.

**Data:**

- Credentials : The list of all users in the system.

**Preconditions:**

- The devices should be functioning as per the requirement.
- The users should have access to the system.

**Post conditions:**

- Identify the usage for each device.

**Triggers:**

- Every change in status of the device will be recorded

## 3.6 Suggest Usage Pattern

**Name:** Suggest Usage Pattern

**Scope:** SHAS System

**Owner:** Home Owner

**Purpose:**

- This is used to suggest an efficient pattern of usage for a device for the owner from the existing usage data

**Data:**

- Device usage data

**Preconditions:**

- Enough data is present to formulate patterns

**Post conditions:**

- Effective and efficient patterns will be suggested

## 3.7 Notify User

**Name:** Notify User

**Scope:** SHAS System

**Owner:** Home Owner

**Purpose:**

- SHAS tries to send instant notification of certain events and change of status of smart devices to the owner's interface.
- SHAS also sends the state of smart appliances when the users requests to view.

**Preconditions:**

- The owner is currently logged in on the application to get instant notification

**Post conditions:**

- The owner will view the status/state of the device successfully

**Triggers:**

- This use case is triggered when there is an emergency event happening in the house

## 3.8 Alert Emergencies Authorities

**Name:** Alert Emergency Authorities

**Scope:** SHAS System

**Owner:** Emergency Authorities

**Purpose:**

- When there is an emergency outbreak, SHAS tries to send information to the corresponding Emergency Authorities

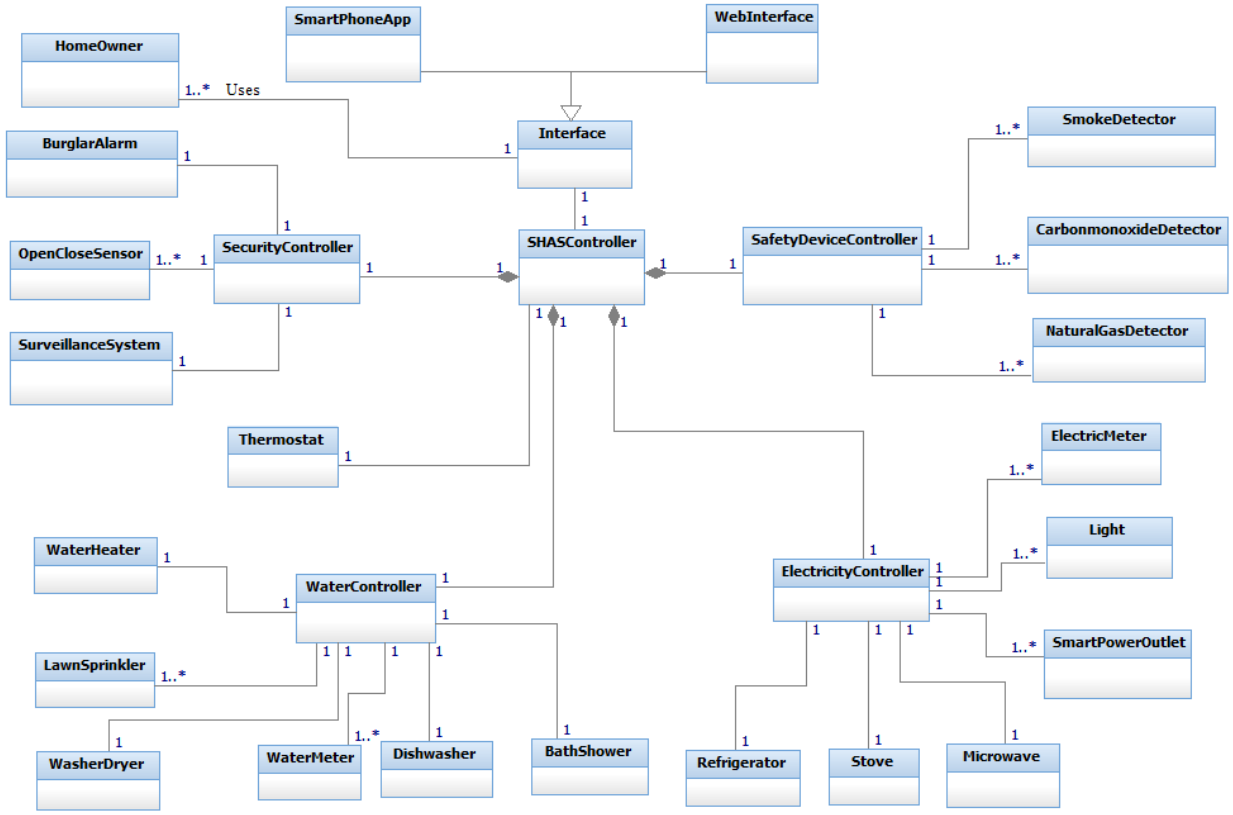
**Preconditions:**

- Emergency event occurred at the house
- The emergency phone numbers are present on the SHAS system

**Post conditions:**

- Emergency Authorities will be notified regarding the emergency outbreak

**Triggers:**

- When there is an emergency event at the house

## 4. Domain Model: