

# **Software Specification**

# **Requirements**

**For**

# **Safe Home Project**

**Version 1.0 approved**

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**Namal Institute**

**December 17, 2020**

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## Revision History

Name	Date	Reason For Changes	Version
Mahmmodyousuf Wareesha Habib Usama Ali Noor Nabi Shah rukh khan	Dec 17,2020		1.0

# **1. Introduction**

## **1.1 Purpose**

Before starting a project, it is quite necessary to gather requirements for the system that is to be built. In Safe Home, we intended to meet both functional and nonfunctional needs for this project, learn how to work as a team. In this report we have explained the different use cases diagrammatically, and learn how to do project management. We are describing this project through Use cases Diagram that demonstrate how this project will work for us and what its needs will be. This document also provides view of project planning and the functional and nonfunctional requirements are carried out by our Group team.

## **1.2 Document Convention**

This document is for people from all walks of computer science, especially those from Software Development which provides a platform for those who want to learn something. Use cases and UML diagrams provide a bigger picture of a project in an efficient manner.

## **1.3 Intended Audience and Reading Suggestions**

The document is intended to be used by our team members who are implementing this smart project and all those who belong to the field of computer science can read this document and learn from this project by first understanding the introduction and then through a diagram can get clear picture of the project then the functional requirement and the nonfunctional requirements, hardware and software requirements.

- ☐ Chapter 1. Provides the introduction of the document including purpose, document convention and intended readers, project scope.
- ☐ Chapter 2. Includes overall description of the project like operating environment design, communication perspective etc.
- ☐ Chapter 3. Is about external interface like user interface, hardware interface, software interface and communication interface
- ☐ Chapter 4. system features
- ☐ Chapter 5. Non Functional requirement of the system like safety, security requirements
- ☐ Chapter 6. Other requirements.

## 1.4 Product Scope

The vision of this project is to facilitate the home owners by developing a smart home system that Home owners are out of the house, they can control their home to protect their home. They should have some remote access to control their home

### **Functionalities:**

If homeowner puts milk on the stove for boiling and after turning on the stove he forgets to turn off the stove, through safe home system he can turn off the stove from his house through some functionality if someone has turned on the light in their house, they can turn off the light in their house by remote control. This project is very useful for large families having kids. Infact, it is impossible to count the requirements for such a smart house but we can easily categorize it into four functionalities.

### **Home safety:**

The homeowner can easily be notified if there is any short circuit in this home or any emergency case like if there is a fire in the house so that the owner is alerted by an alarm and the owner of the house can put out the fire even if he is in his office.

### **Home Governance:**

This functionality includes home management like turning off electric appliances through web control.

### **Home activities**

This includes home activities that is taking place inside or outside the home and notify the home owner about home status via an alarm.

Any activity outside and inside the home should be known to its owner.

## 1.5 References

<List any other documents or Web addresses to which this SRS refers. These may include user interface style guides, contracts, standards, system requirements specifications, use case documents, or a vision and scope document. Provide enough information so that the reader could access a copy of each reference, including title, author, version number, date, and source or location.>

## 2. Overall Description

### 2.1 Product Perspective

The product on which we are working is **SAFE HOME**. This is new self-contained product. This is some new stuff in market which will have high impact on this generation. Main

purpose of making this product is that there is no such product is available till now in the market and going to make a large impact in the revenue. The other main purpose of the product is using the modern technology for the improvement of common man's life. This product is some sort of wireless box in which user can safe his home using sensors through internet. He (user) can set sensors to avoid any risk. This product is ready to doing wonders in modern era.

## **2.2 Product Functions**

The major functions of the product are given below:

1. User (owner) can set alarm sensors.
2. User (owner) can set furniture layout.
3. System will work on voice.
4. System will check illegal entry in the home.
5. System will check fire and flooding in the house.
6. System will check carbon monoxide level and others in house.
7. System will use wireless sensors to detect each above situation.
8. System will contact the owner's cell phone if detects any risk.
9. System will check smoke, window and door of the house through sensors.
10. System must detect when sensors are not operating.
11. Sensing speed of detecting sensors should be fast.
12. System also follows priority scheme.
13. System will provide prompts.
14. System will be accessed through internet.
15. There will be a way in which user (owner) can reset password if he forgets.
16. System verifies the user first.
17. System can deactivate the sensors.

## **2.3 User Classes and Characteristics**

In case of user case that is clear that if user is adult and know the technology then he can use this product but he also knows that how to set the sensors and how to deactivate the sensors. User characteristics are that he must know the language which he is watching in interface if he doesn't know the language then he can't use the product.

## **2.4 Operating Environment**

Product will work fine in windows and android operating systems. As we know product is built on agile model so its versions and features will be updated in every iteration. Websites are used to access software in windows operating system and app is used to access software in android operating system. Data base will also be used to store the data of user mean user ID and password.

## **2.5 Design and Implementation Constraints**

Design of the product should be in such a way that response time from sensor will be small. Security is also a constraint during implementation of accessing through internet. Memory is also a constraint because how long number is stored or remembered till new key pressed by user during entering password. During designing there is also an issue in my point of view is that can user do parallel tasks mean can he set alarm with also closing the doors at same time. Language was also a constraint during designing because if someone don't know the language English then what can he does.

## **2.6 User Documentation**

User manuals will be given with product installation. Which clears the role of keys present in control panel. Main keys are off, stay and away. Off key is use to exit the product mean closing the system. Stay key is used to activate perimeter sensors and away key is used to activate the all sensors. When the user set the alarm, he will see the red light.

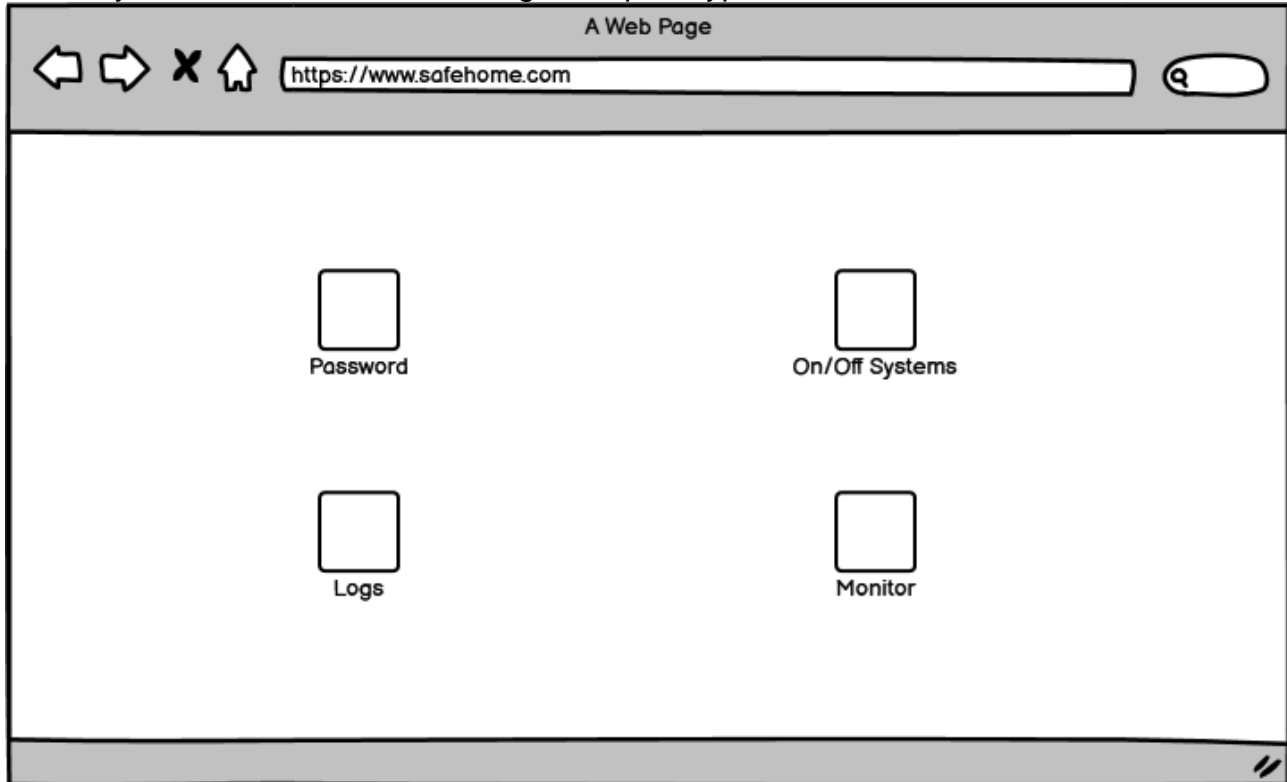
## **2.7 Assumptions and Dependencies**

We are assuming that user has internet access because without internet I think product will not make impact which we are wanting and without internet product is not useful because then we (users) have to set everything physically. We are also assuming that internet is secure because If the internet is not secured then product will be affected badly and do blunders. Product is also depending on data in database to check the valid or legal entry of user in to system if that data is changed without the permission of user then it will also affect the product.

### 3. External Interface Requirements

#### 3.1 User Interfaces

User will use a web application to interact with the safe home system so he can access it from any device he wants to, an image of a prototype is shown below:



The image shows the dashboard of the website which will be used to communicate with the devices installed at home.

This whole web app will be implemented using Django, a python framework developed to make web applications.

#### 3.2 Hardware Interfaces

The web app will be accessible from a computer, mobile or a tablet. There will be a Control Panel installed for the homeowner to manage all the sensors without using his phone or computer when he is at home.

#### 3.3 Software Interface

Software interface of product is web through which user can connect and manage the sensors through internet. Web will be connected with database for verification of user. Software interface should be simple and attractive. Prompts will be shown in software interface in any case of failure.



Web portal for windows and mobile app for android operating system and mobile application will work in same fashion. Connection of web portal or app with database allow reading and modifying the data.

### **3.4 Communications Interfaces**

The system shall send a notification to the user to inform the detection of any risk through sensor.

System shall send a notification to the user when sensors are not operating.

The system shall send a call to confirm the verification of user if user entered password many times.

## 4. System Features

### 4.1 Home Security Function

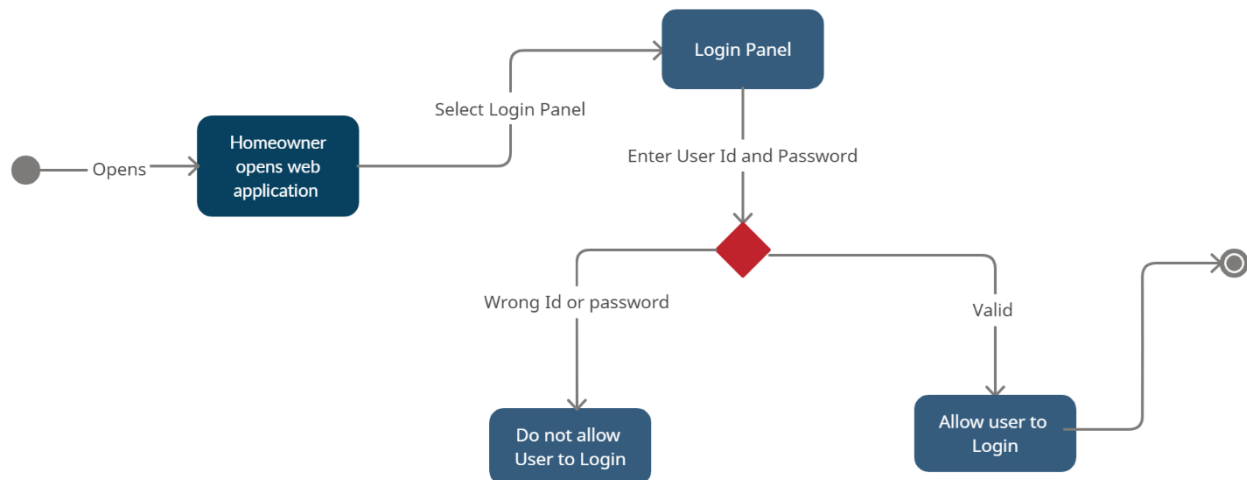
#### 4.1.1 Description and Priority

Home security function will control cameras and sensors. The home security function will protect home from illegal entry, fire, flooding and carbon monoxide level by using sensors and cameras.

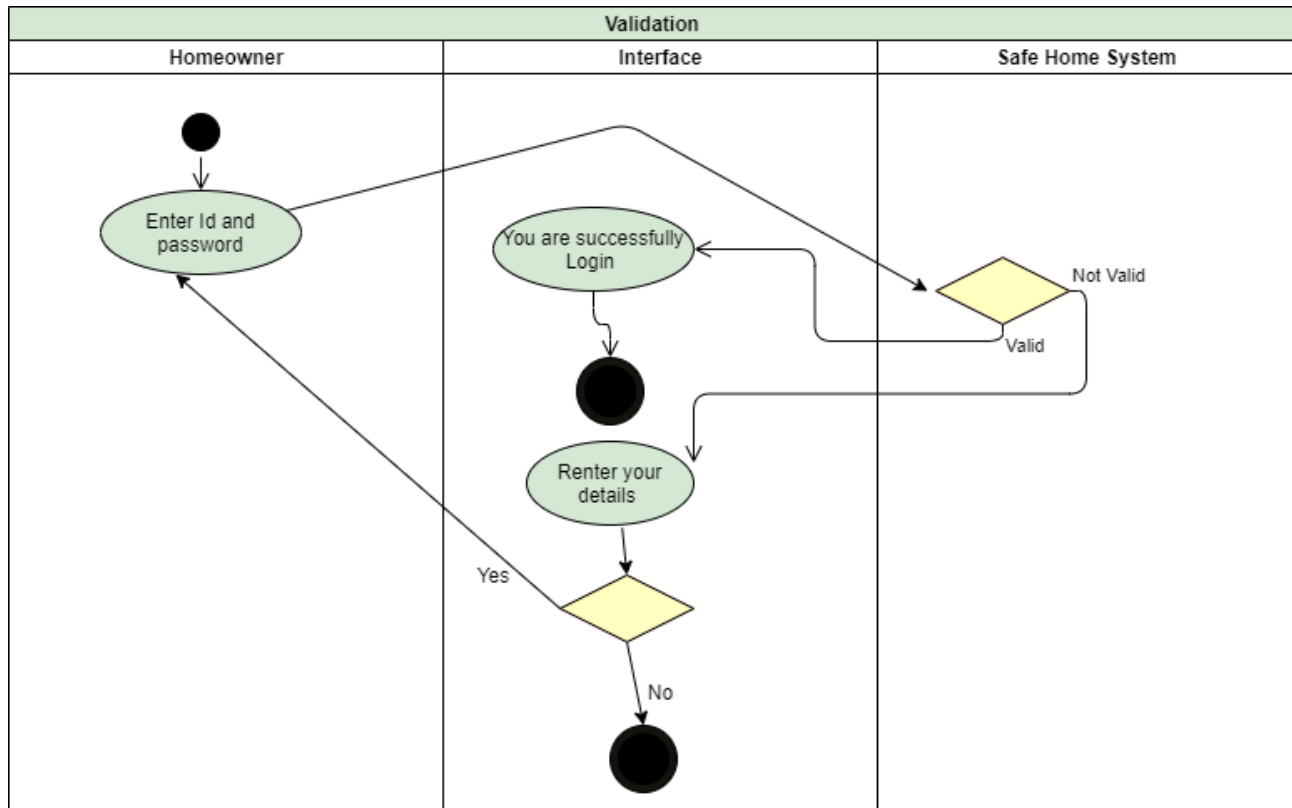
Home Security Function is high priority task to make Home Safe from undesirable situations.

#### 4.1.2 Use Case

#### User Validation



Validation State Diagram



### Swimlane Diagram Validation

**Use case:** User Validation

**Primary Actor:** Safe Home System

**Goal in Context:** Validate user

**Preconditions:**

- Safe Home System is operating well and already configured

**Trigger:** Homeowner wants to login Safe Home Web Application

**Scenario:**

- Homeowner opens web application
- Homeowner enters user id and password for validation
- Safe Home system validates user id and password

**Exception:**

- If user id and password are valid than Safe Home System should allow user
- If user id and password are invalid than Safe Home System should not allow user

**Priority:** cannot be neglected, must be implemented.

**When available:** First increment

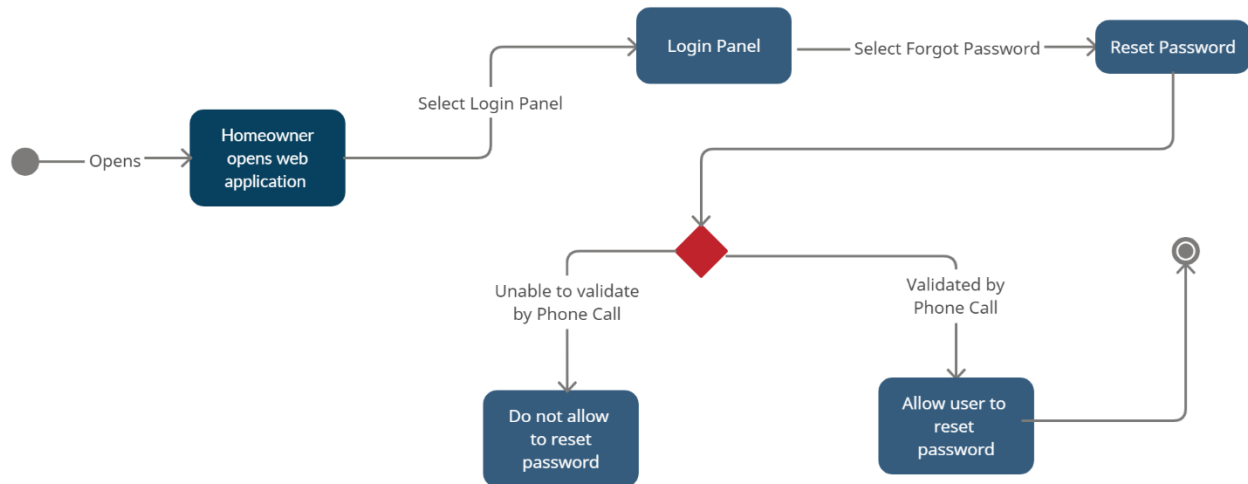
**Frequency of use:** Regular

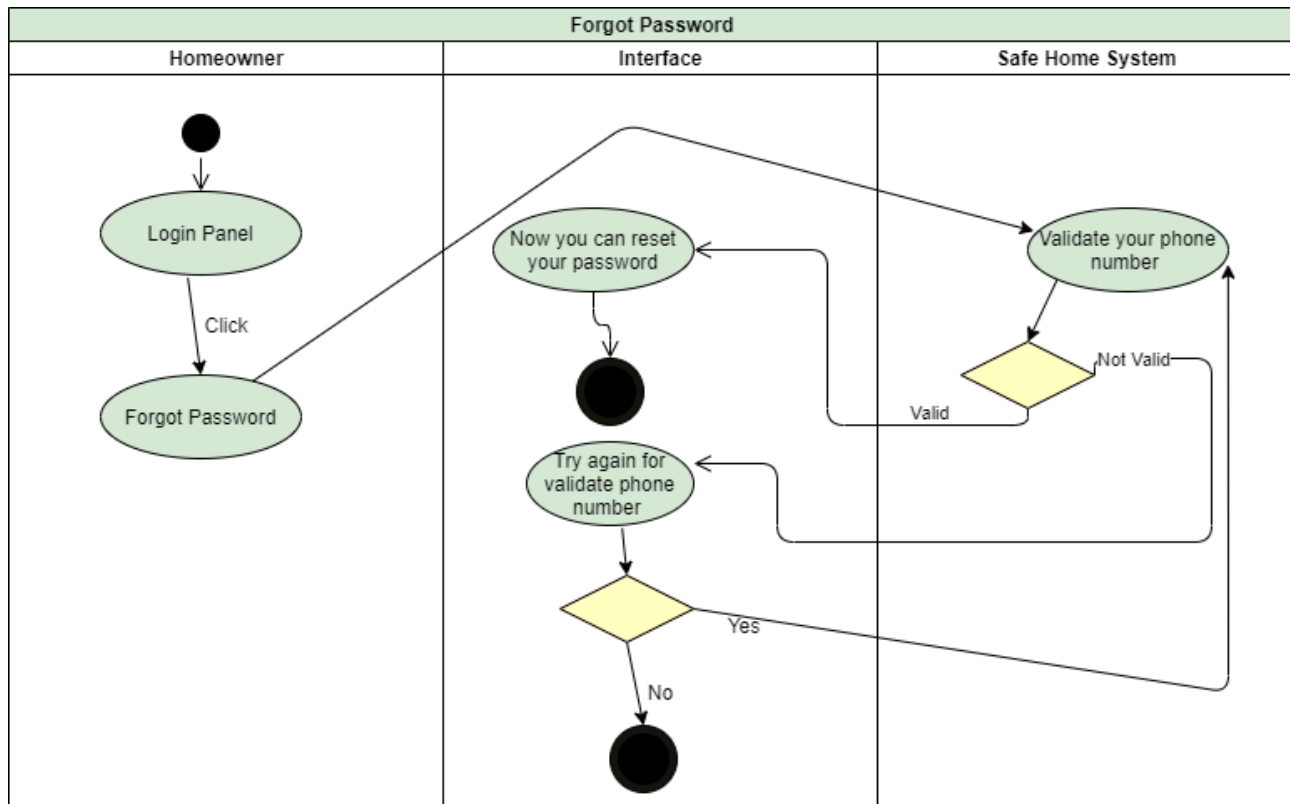
**Channel to actor:** Via Web interface

**Secondary actor:** None

**Channel to secondary actor:** None

**Open Issues:** User id and password before sending should be encrypted. Is hacker can hack the information?

**Forgot password****Forgot Password State Diagram**



Swimlane Diagram Forgot Password

**Use case:** Forgot password

**Primary Actor:** Homeowner

**Goal in Context:** To change password because homeowner forgot password

**Preconditions:**

- Safe Home System is operating well and already configured

**Trigger:** Homeowner forgot password and wants to reset the password

**Scenario:**

- Homeowner opens web application
- Homeowner forgot the password
- Homeowner wants to reset the password

**Exception:**

- Homeowner unable to reset the password because password reset is demanding such things like email etc. which is unable to access at that time

**Priority:** cannot be neglected, must be implemented.

**When available:** First increment

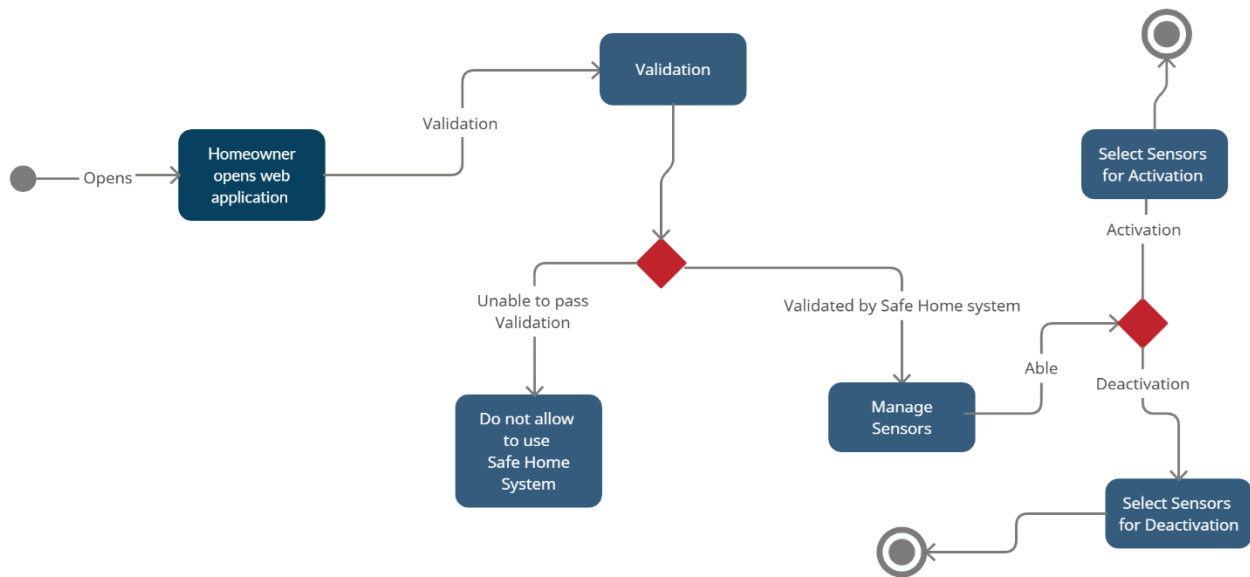
**Frequency of use:** Regular

**Channel to actor:** Via Web interface

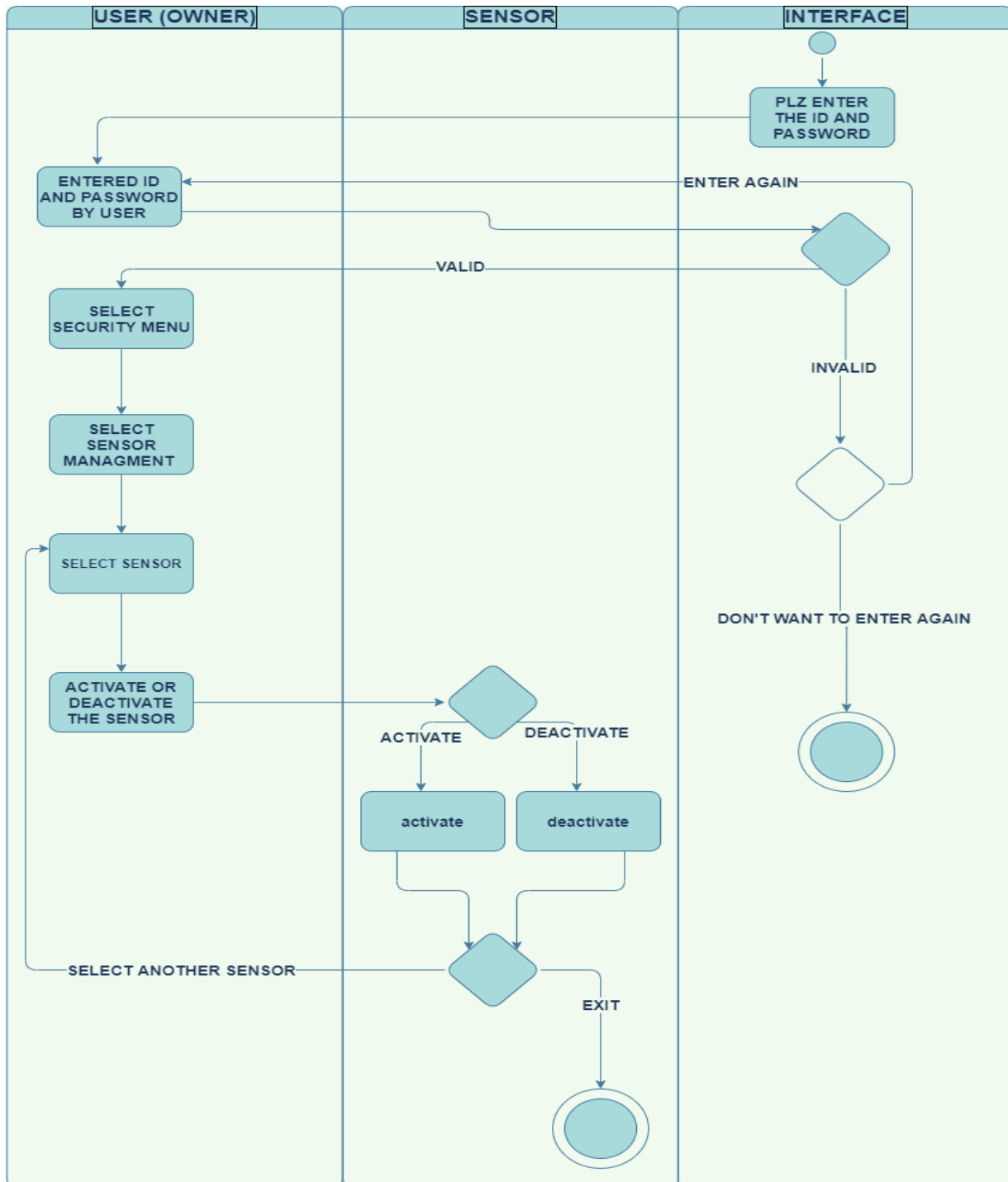
**Secondary actor:** System administrator

**Channel to secondary actor:** System administrator, phone line, email

**Open Issues:** Homeowner unable to reset password due to he lost all of channels to reset the password properly

**Sensors Activation/Deactivation****Sensors Activation/Deactivation State Diagram**





Swimlane Diagram Sensors Activation/Deactivation

**Use case: Sensors Activation/Deactivation**

**Primary Actor:** Homeowner

**Goal in Context:** To activate/deactivate sensors

**Preconditions:**

- Safe Home System is operating well and already configured
- Homeowner is validated properly

**Trigger:** Homeowner wants to activate/deactivate sensors

**Scenario:**

- Homeowner opens web application
- Homeowner validated by user id and password
- Homeowner selects manage security
- Homeowner selects Activate/Deactivate Sensors
- Homeowner should able to activate/deactivate sensors

**Exception:**

- Homeowner enters invalid user id and password
- Safe Home system unable to view some of sensors information

**Priority:** cannot be neglected, must be implemented.

**When available:** First increment

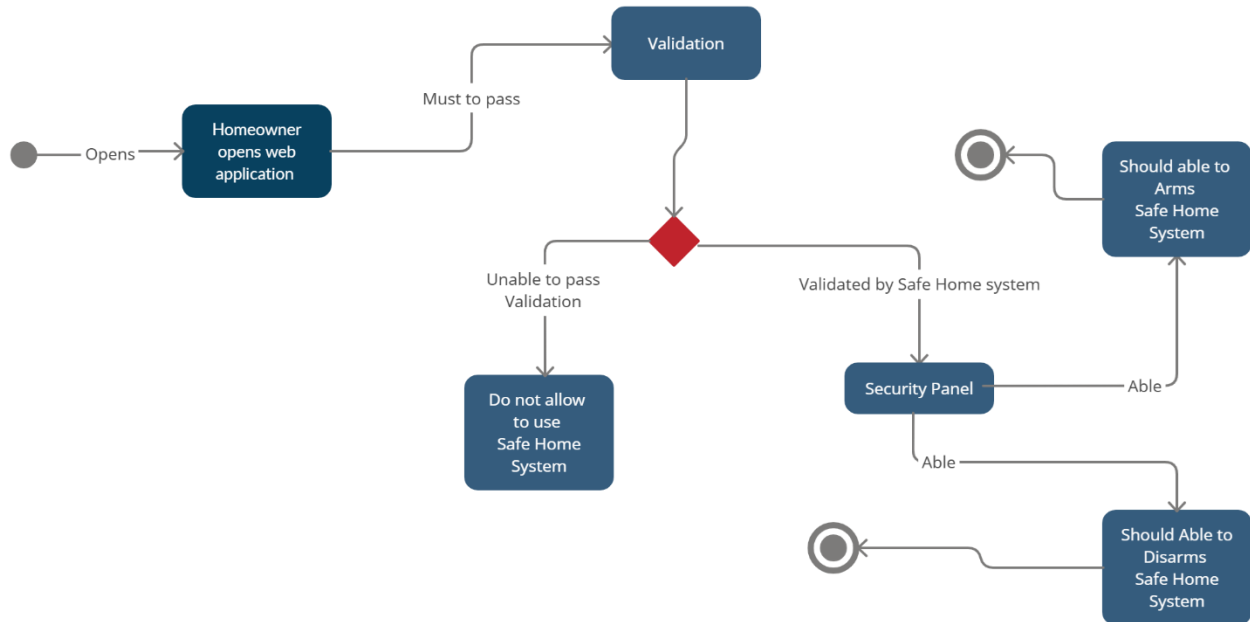
**Frequency of use:** Regular

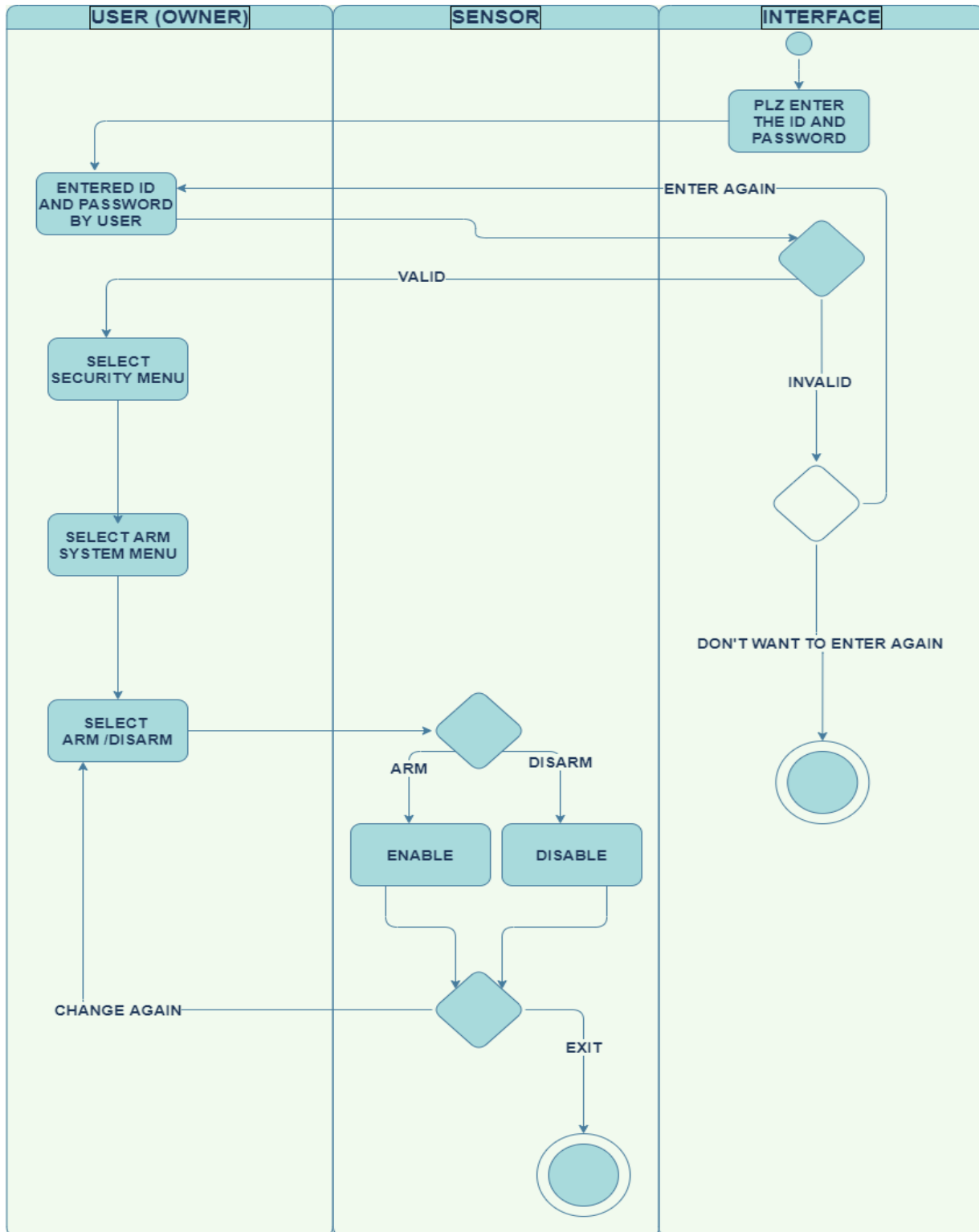
**Channel to actor:** Via Web interface

**Secondary actor:** System administrator, sensor

**Channel to secondary actor:** System administrator, phone line, email

**Open Issues:** Homeowner unable to view the sensors information correctly. How will homeowner will know that sensors are in full working condition?

**Arms/Disarms Safe Home System****Arms/Disarms Safe Home System State Diagram**



Swimlane Diagram Arms/Disarms Safe Home System

**Use case:** Arms/Disarms Safe Home System

**Primary Actor:** Homeowner

**Goal in Context:** Arms/Disarms Safe Home System

**Preconditions:**

- Safe Home System is operating well and already configured
- Homeowner is validated properly

**Trigger:** Homeowner wants to Arms/Disarms Safe Home System

**Scenario:**

- Homeowner opens web application
- Homeowner validated by user id and password
- Homeowner selects security
- Homeowner should able to Arms/Disarms Safe Home System

**Exception:**

- If user id and password are valid than Safe Home System should allow user
- If user id and password are invalid than Safe Home System should not allow user

**Priority:** cannot be neglected, must be implemented.

**When available:** First increment

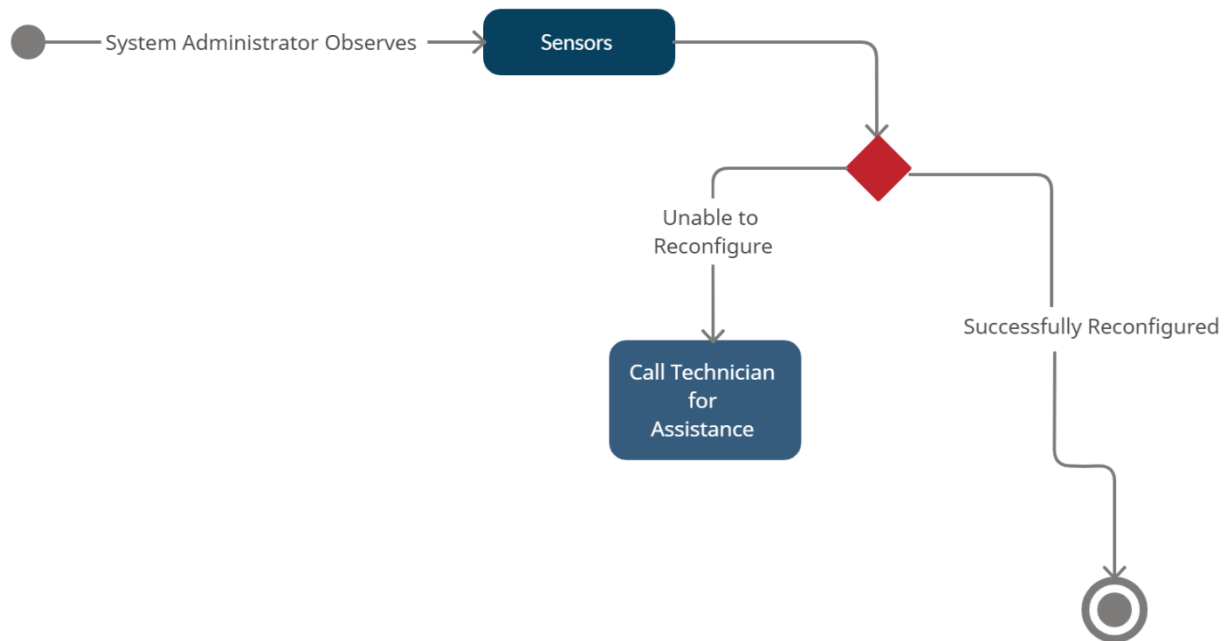
**Frequency of use:** Regular

**Channel to actor:** Via Web interface

**Secondary actor:** System administrator, sensor

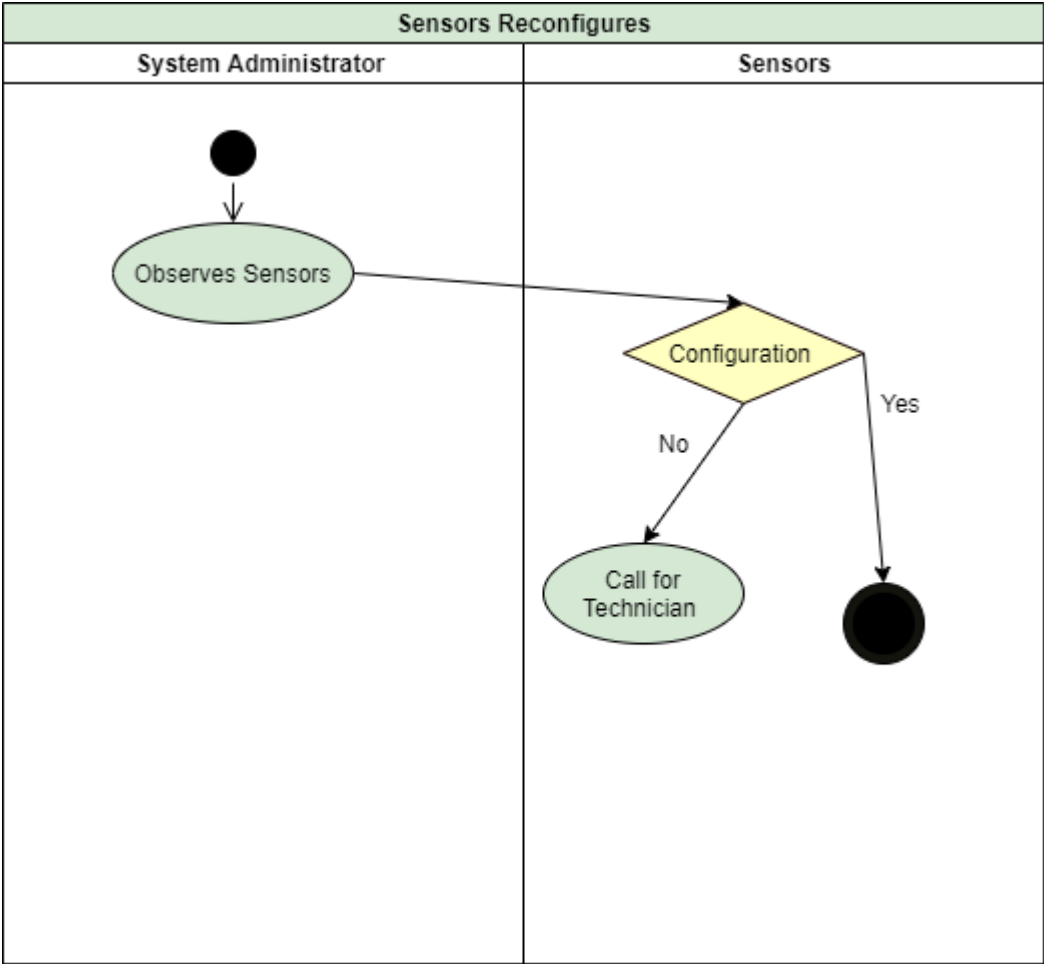
**Channel to secondary actor:** System administrator, phone line, email

**Open Issues:** None

**Reconfigures sensors and system related features**

Reconfigure Sensors State Diagram

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Swimlane Diagram Reconfigures Sensors

**Use case:** Tackling in emergency situation by contacting the homeowner

**Primary Actor:** System (Safe Home System)

**Goal in Context:** tackle the emergency situation through contacting the owner.

**Preconditions:**

- Safe System working smoothly.
- All the sensors are working fine
- System is recognizing all the sensors
- Home owner contact information is available to system.
- There is an illegal access or detect the abnormality with levels of fire, water and smoke.

**Trigger:** System detects an illegal access or system detects the abnormality with levels of fire, water and smoke.

**Scenario:**

- System raises alarm.
- System calls the home owner or contact with other way.

**Exceptions:**

**Priority:** Priority is high. Must be implemented as soon as possible.

**When available:** First increment

**Frequency of use:** Not sure mean occur in certain situations.

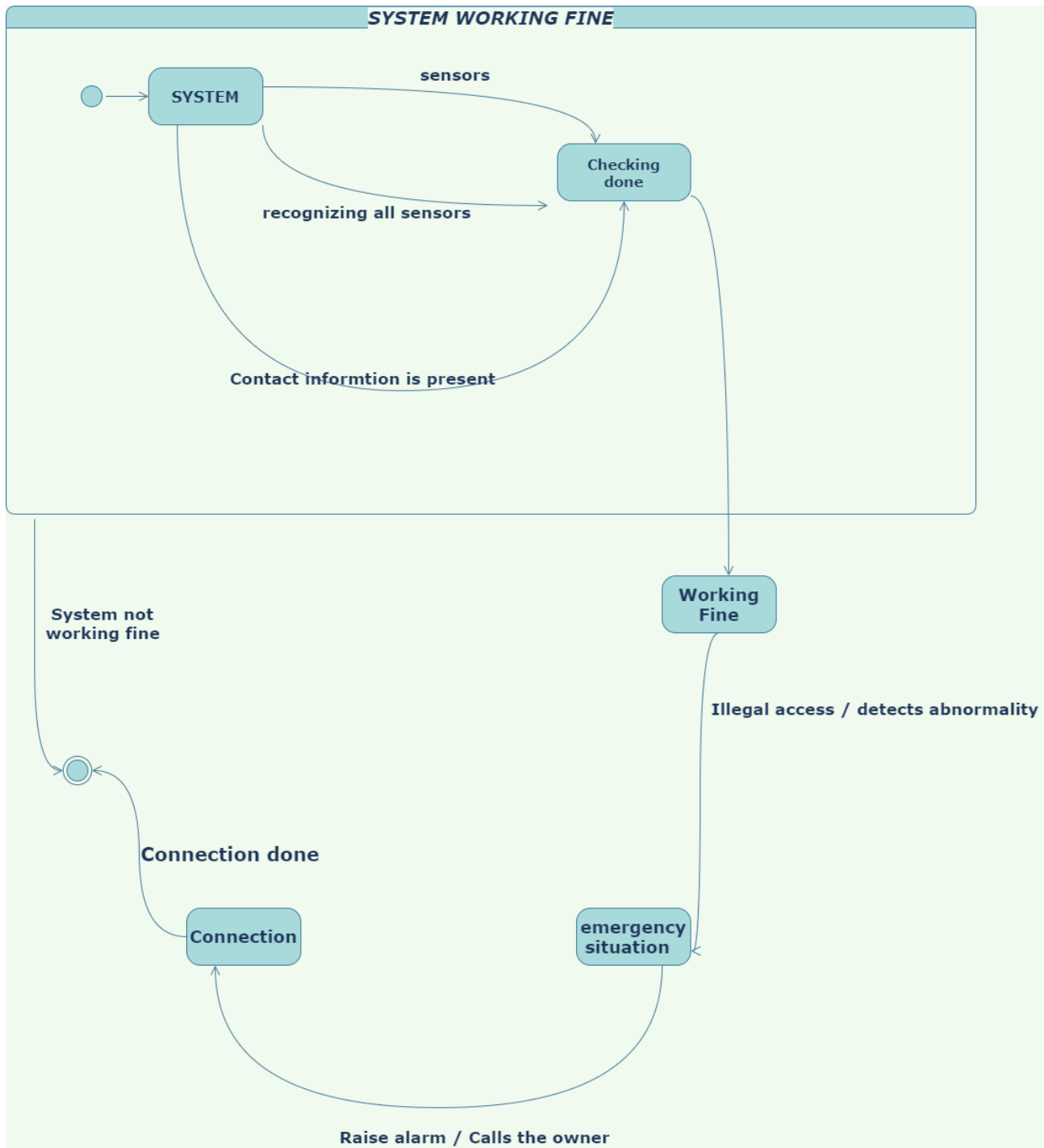
**Channel to actor:** Viacell phone or email.

**Secondary actor:** None

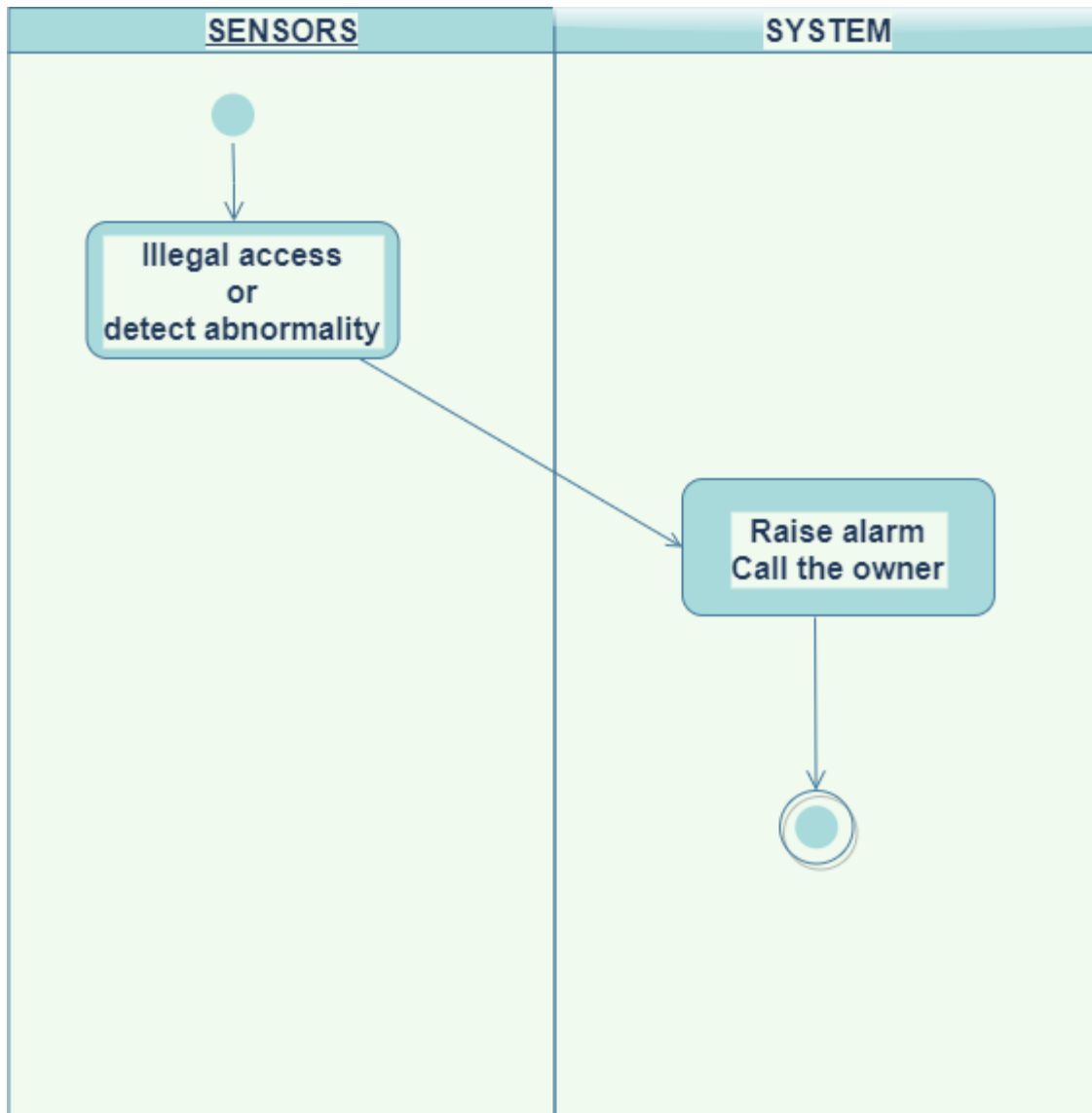
**Channel to secondary actor:**

**Open Issues:**





State diagram.



**Swimlane diagram.**

**Use case:** Checking/Viewing the Security Zone.

**Primary Actor:** Homeowner.

**Goal in Context:** checking or viewing the security zone.

**Preconditions:**

- Safe System working smoothly.
- All the sensors are working fine
- System is recognizing all the sensors
- Legal user is login in the system.

**Trigger:** Owner can view the security zone of the system

**Scenario:**

- Owner logs in the system.
- Owner clicks “Security” in menu.
- Then clicks the “Manage security zone” in security menu.
- Owner view the security zone by clicking on “View the security zone” by clicking on view.

**Exceptions:**

- Owner types enters wrong login information (User ID and password) then he reenters the data again.
- If owner enters wrong information many times then he will wait for some time to login again.
- If owner forgets password then owner can recover password.

**Priority:** Priority is high. Must be implemented as soon as possible.

**When available:** First increment

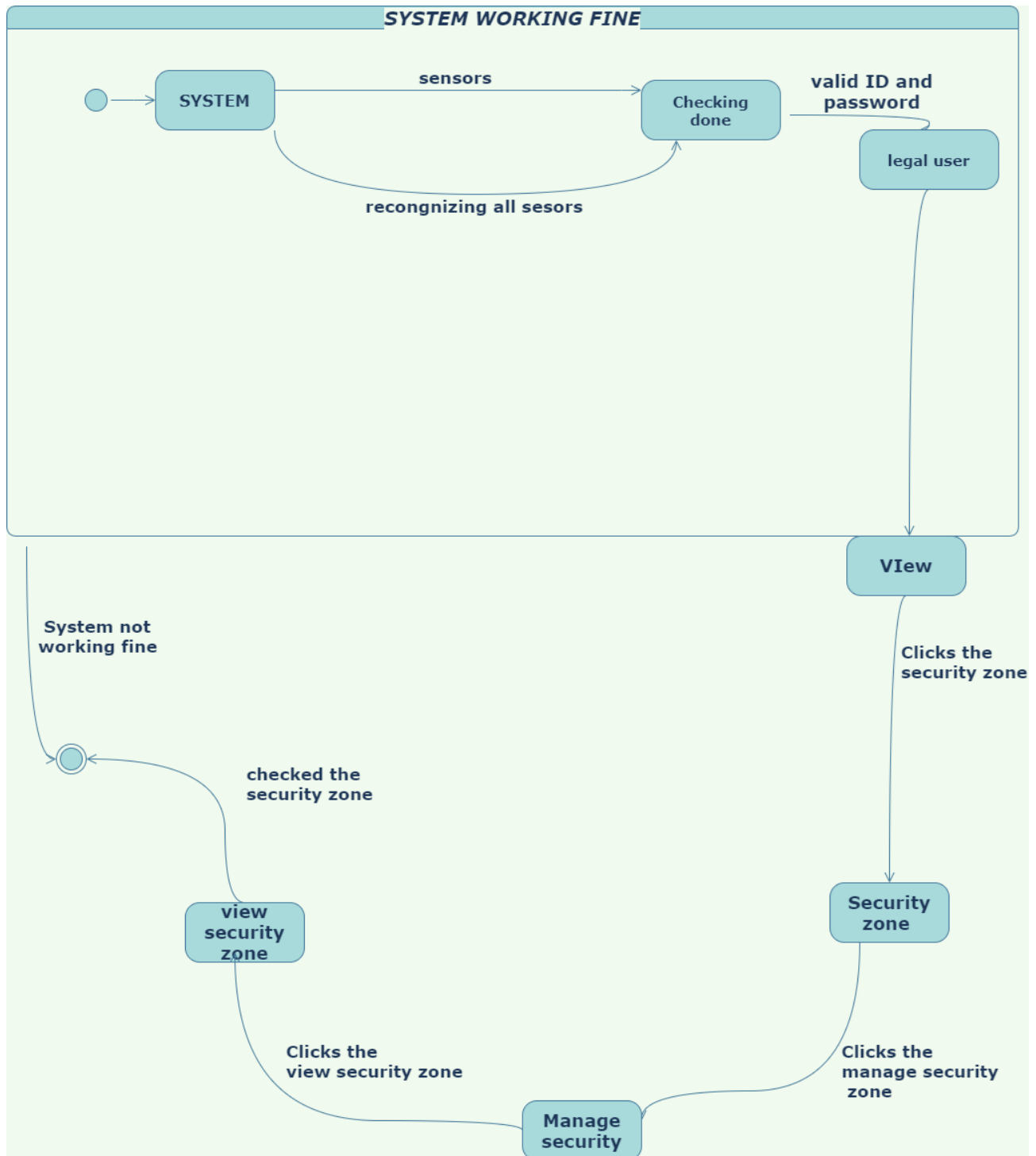
**Frequency of use:** Regularly.

**Channel to actor:** Viaweb application interface.

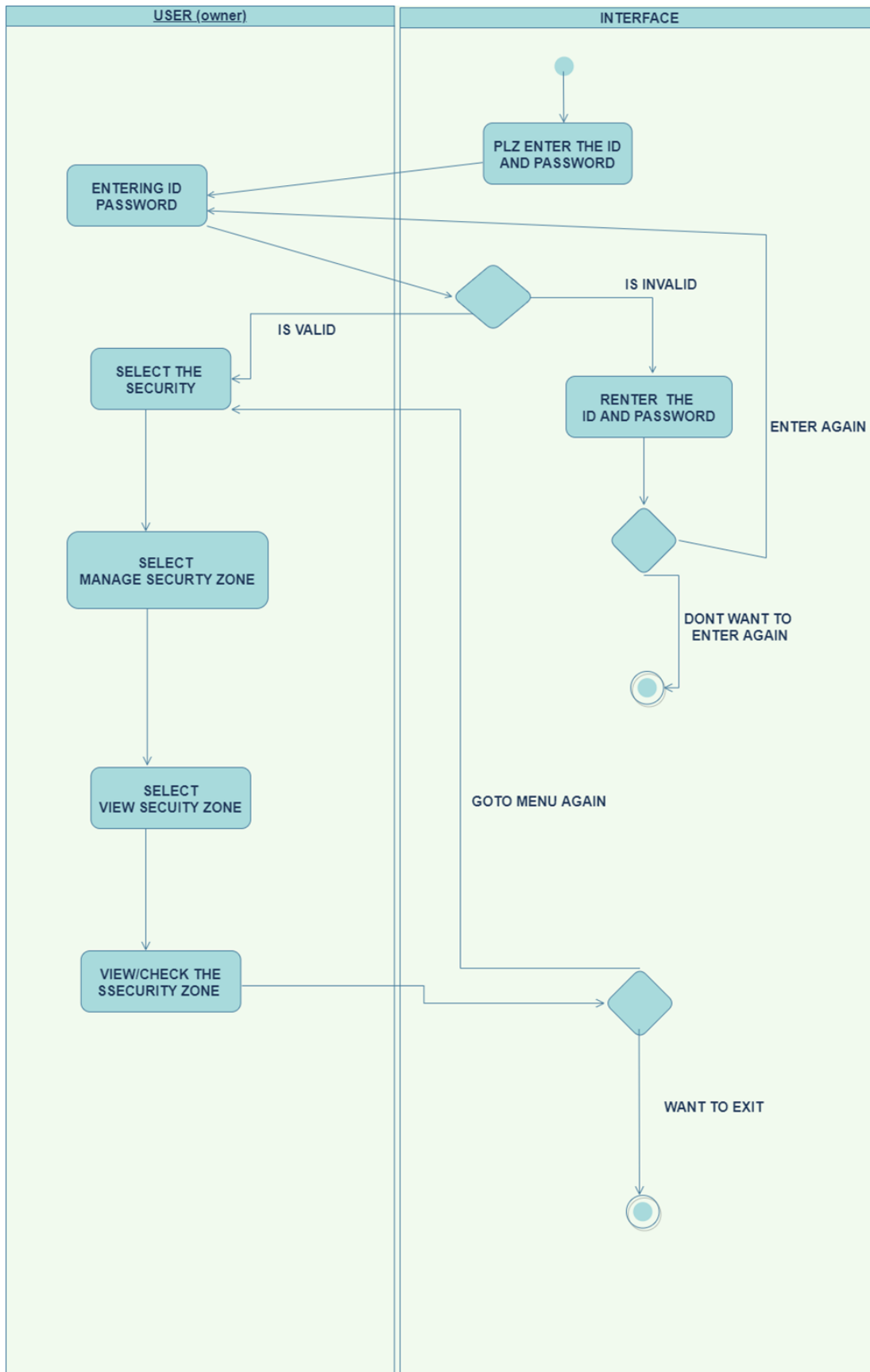
**Secondary actor:** Sensor.

**Channel to secondary actor:** Wireless interface for sensors.

**Open Issues:** None.



State diagram.



**Use case:** Reconfigures sensors and system related features

**Primary Actor:** System Administrator

**Goal in Context:** To configures sensors and related system features for accurate information to make home safe

**Preconditions:**

- Sensors should be connected with system administrator

**Trigger:** System administrator decides to reconfigure sensors

**Scenario:**

- System administrator observes sensor values
- System administrator reconfigures sensors' values for validation

**Exception:**

- System administrator unable to reconfigures sensors due to faulty hardware.\
- Sensors unable to reset

**Priority:** cannot be neglected, must be implemented.

**When available:** First increment

**Frequency of use:** Regular

**Channel to actor:** Via Control Interface

**Secondary actor:** Support technician

**Channel to secondary actor:** Support technician, phone line

**Open Issues:** None

**Contact Police in a situation**

**Use case:** Calling Police

**Primary Actor:** Safe Home System

**Goal in Context:** To call the police in a situation

**Preconditions:**

- Safe Home System is operating well and already configured
- All the sensors are recognized by Safe Home System
- Trespassers detected
- Police Contact details should already be available

**Trigger:** System detects trespassers

**Scenario:**

- System calls police
- System triggers alarms

**Priority:** cannot be neglected, must be implemented.

**When available:** First increment

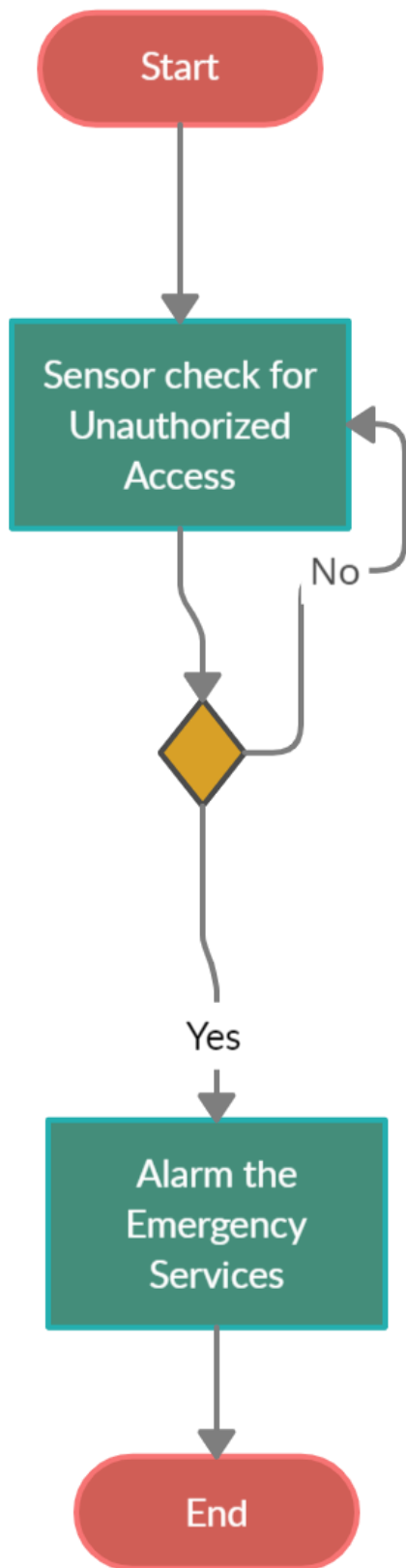
**Frequency of use:** Not Regularly

**Channel to actor:** Via Telephone

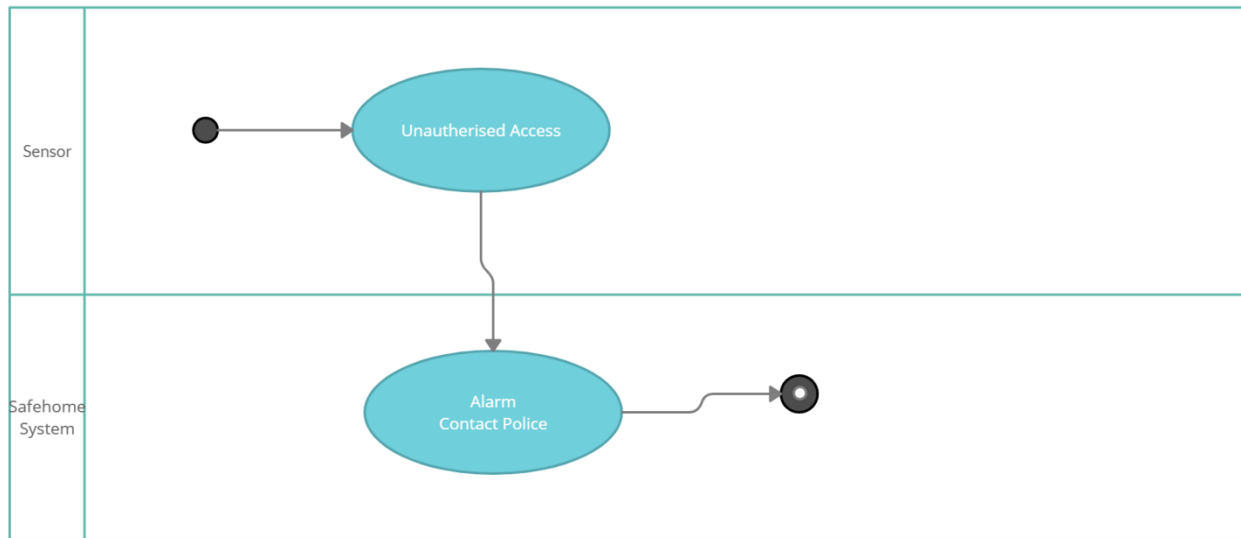
**Secondary actor:** None

**Channel to secondary actor:** None

**Open Issues:** None







### **Calling for Emergency Services**

**Use case:** Calling Emergency Services

**Primary Actor:** Safe Home System

**Goal in Context:** To call the Emergency Services in a situation

**Preconditions:**

- Safe Home System is operating well and already configured
- All the sensors are recognized by Safe Home System
- Abnormal Fire, raise in CO2 Levels or flooding etc
- Emergency Services Contact details should already be available

**Trigger:** System detects raise in CO2, toxic gas or flooding

**Scenario:**

- System triggers alarms
- System calls Emergency Services

**Priority:** cannot be neglected, must be implemented.

**When available:** First increment

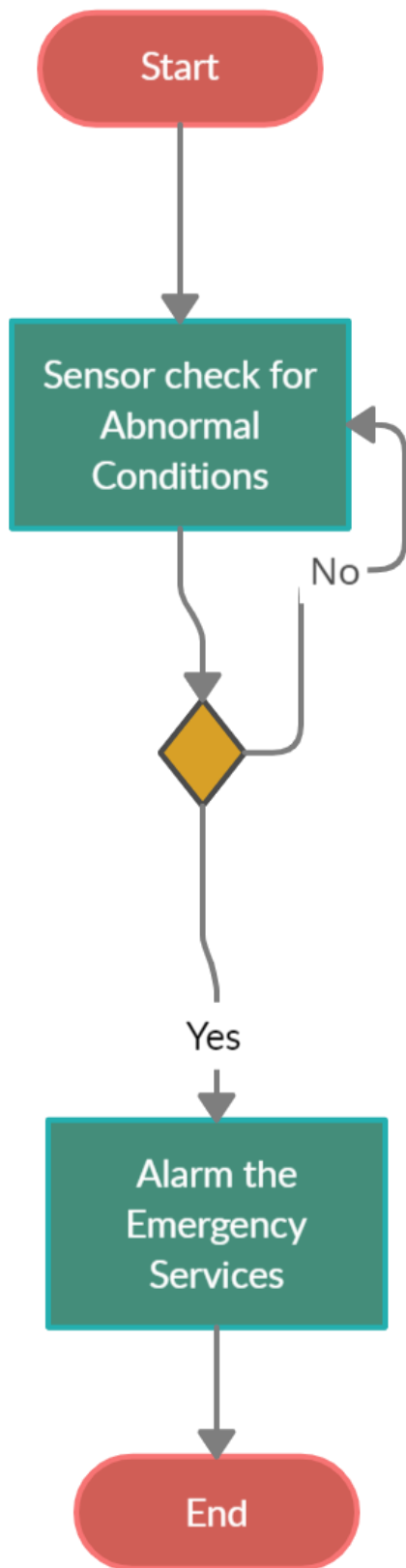
**Frequency of use:** Not Regularly

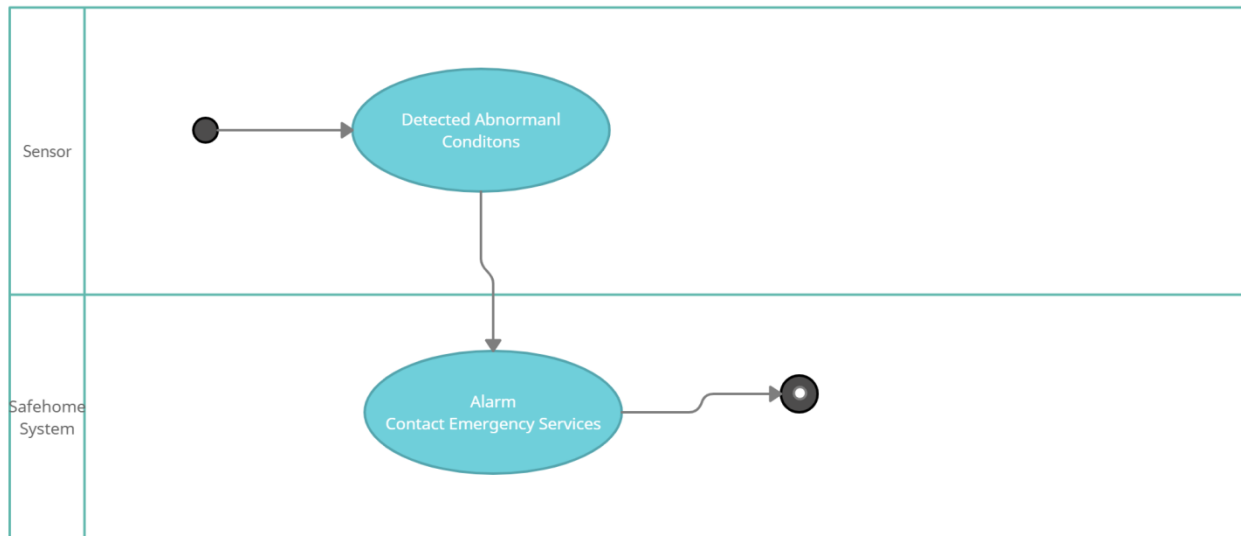
**Channel to actor:** Via Telephone

**Secondary actor:** None

**Channel to secondary actor:** None

**Open Issues:** None





### **Updating Existing security zone**

**Use case:** Updating existing security zone.

**Primary Actor:** The Homeowner

**Goal in Context:** Updating existing security zone.

#### **Preconditions:**

- **Safe Home** must be utilize and manage well.
- Correct user ID and Password must be acquired.

#### **Scenario**

- The homeowner logs into Safe Home system.
- The homeowner writes user ID and password.
- The homeowner clicks on “Security” menu.
- The homeowner clicks “Update Security Zone” sub menu.
- The homeowner looks on its current security zone.
- The homeowner modifies his or her security zone.
- The homeowner look on final updated Zone.

#### **Exception:**

- The homeowner enters wrong user ID and password for more than two time he or she has to wait 30 minutes to login again.

- If the homeowner forgets his password he or she must be able to recover his password.
- If he, by mistake, declare wrong information then he must be able declare again
- If some of the sensors not working than it will show an error message.
- Each security zone has its own sensor

**Priority:** cannot be neglected, must be implemented.

**When available** First increment

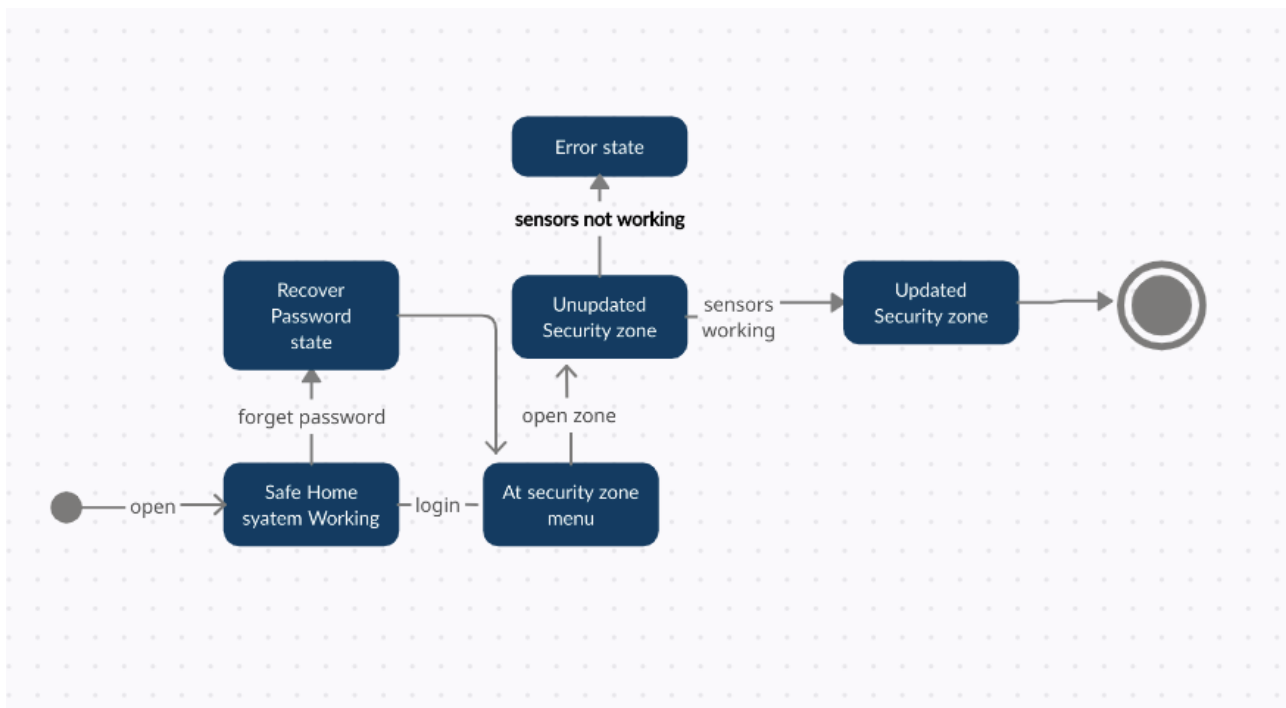
**Frequency of use:** Regular

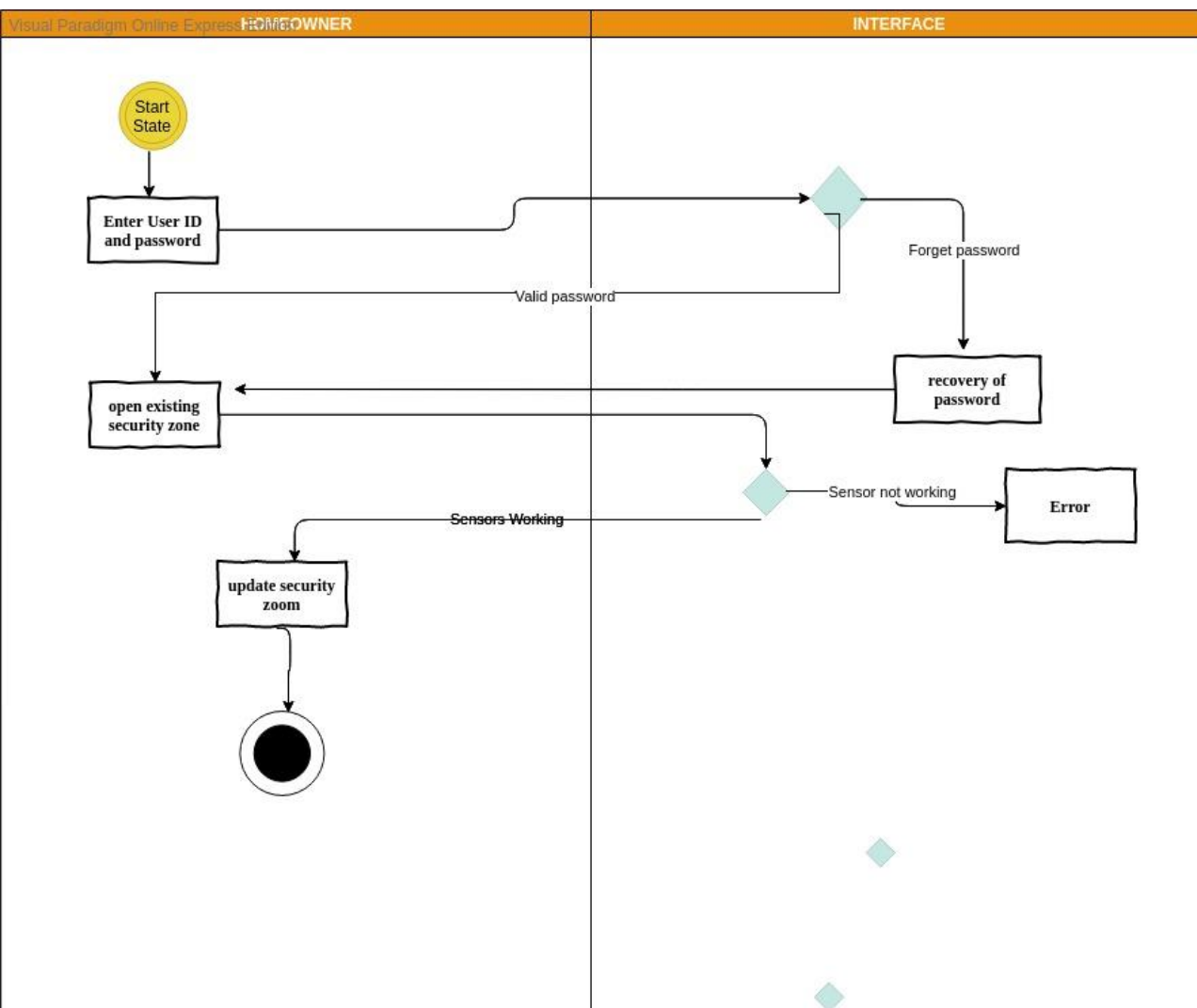
**Channel to actor:** Via Web interface

**Secondary actor:** System administrator

**Channel to secondary actor:** Via Wireless interface, Via phone, email.

**Open Issue:** None





**New security zone**

**Use case:**  
New security zone

**Primary actor:** The

**Preconditions:**

- **Safe Home** must be utilized and manage well.
- User iD and password must be entered
- All sensors must work properly.

**Scenario:**

- The homeowner logs in to SafeHome system.
- The homeowner types user ID and password after that he will clicks on 'security' menu.
- The homeowner clicks on "Manage security zones" sub-menu.
- The homeowner clicks "Create a new security zone" sub-menu.
- The homeowner type the name of a new security zone and clicks create button.

**Exception:**

- The homeowner enters wrong user ID and password for more than two time he or she has to wait 30 minutes to login again.
- If the homeowner forgets his password he or she must be able to recover his password.
- If he, by mistake, declare wrong information then he must be able declare again
- If some of the sensors not working than it will show an error message.
- Each security zone has its own sensor

**Priority:** cannot be neglected, must be implemented.

**When available:** First increment

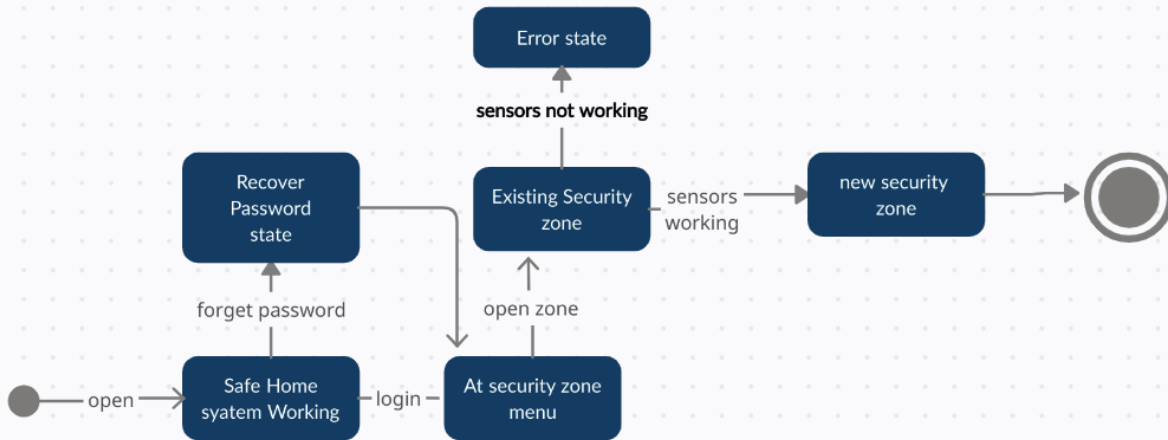
**Frequency of use:** Regular

**Channel to actor:** Via Web interface

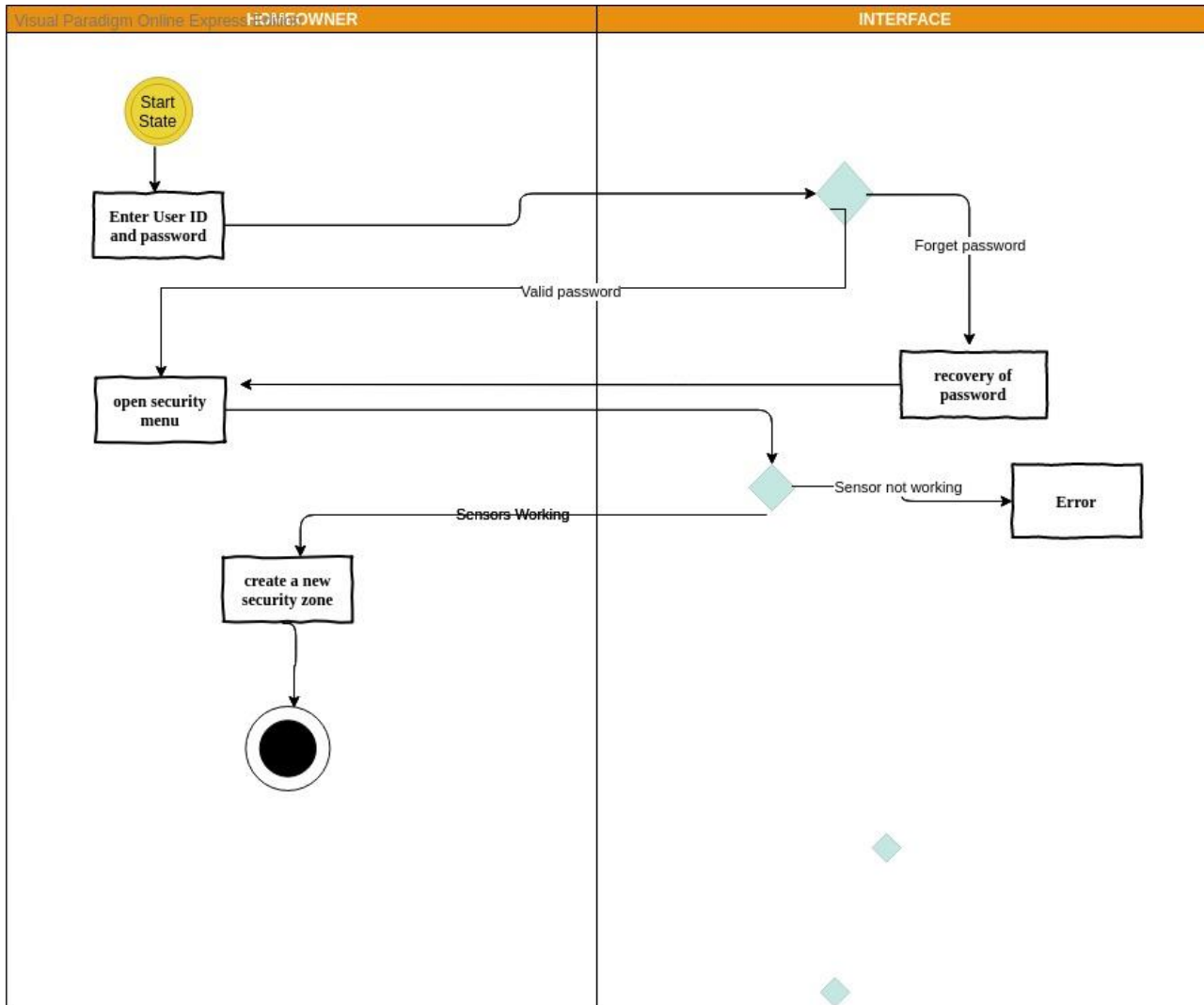
**Secondary actors:** System administrator

**Channel to secondary actor:** Via Wireless interface, Via phone, email.

**Open Issue:** None







Visual Paradigm Online Express Edition

## Able/Disable Security Zone

**Use case:** Able/Disable Security Zone

**Primary actor:** The homeowner

**The goal in Context:** To create a security zone

### **Preconditions:**

- **Safe Home** must be utilized and manage well.
- User iD and password must be entered
- All sensors must work properly.

**Scenario:**

- The homeowner logs in to SafeHome system.
- The homeowner types user ID and password after that he will click on 'security' menu.
- The homeowner clicks on "Manage security zones" sub-menu and then he clicks on Able/Disable Security Zone.
- The homeowner types the name of a new security zone and clicks create button.
- The homeowner selects the security zone he wants to able/disable and clicks able/disable button.

**Exception:**

- The homeowner enters wrong user ID and password for more than two times he or she has to wait 30 minutes to login again.
- If the homeowner forgets his password he or she must be able to recover his password.
- If he, by mistake, declares wrong information then he must be able to declare again.
- If some of the sensors are not working then it will show an error message.
- Each security zone has its own sensor.

**Priority:** cannot be neglected, must be implemented.

**When available:** First increment

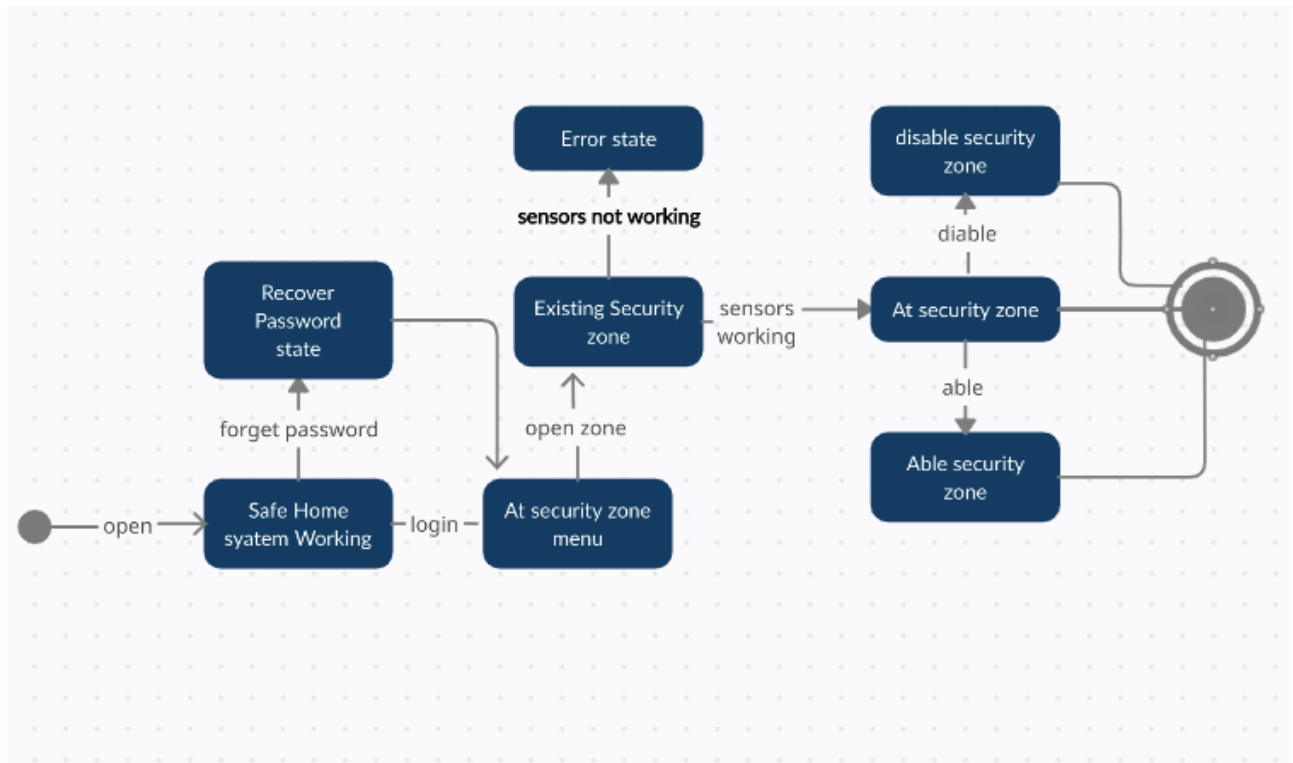
**Frequency of use:** Regular

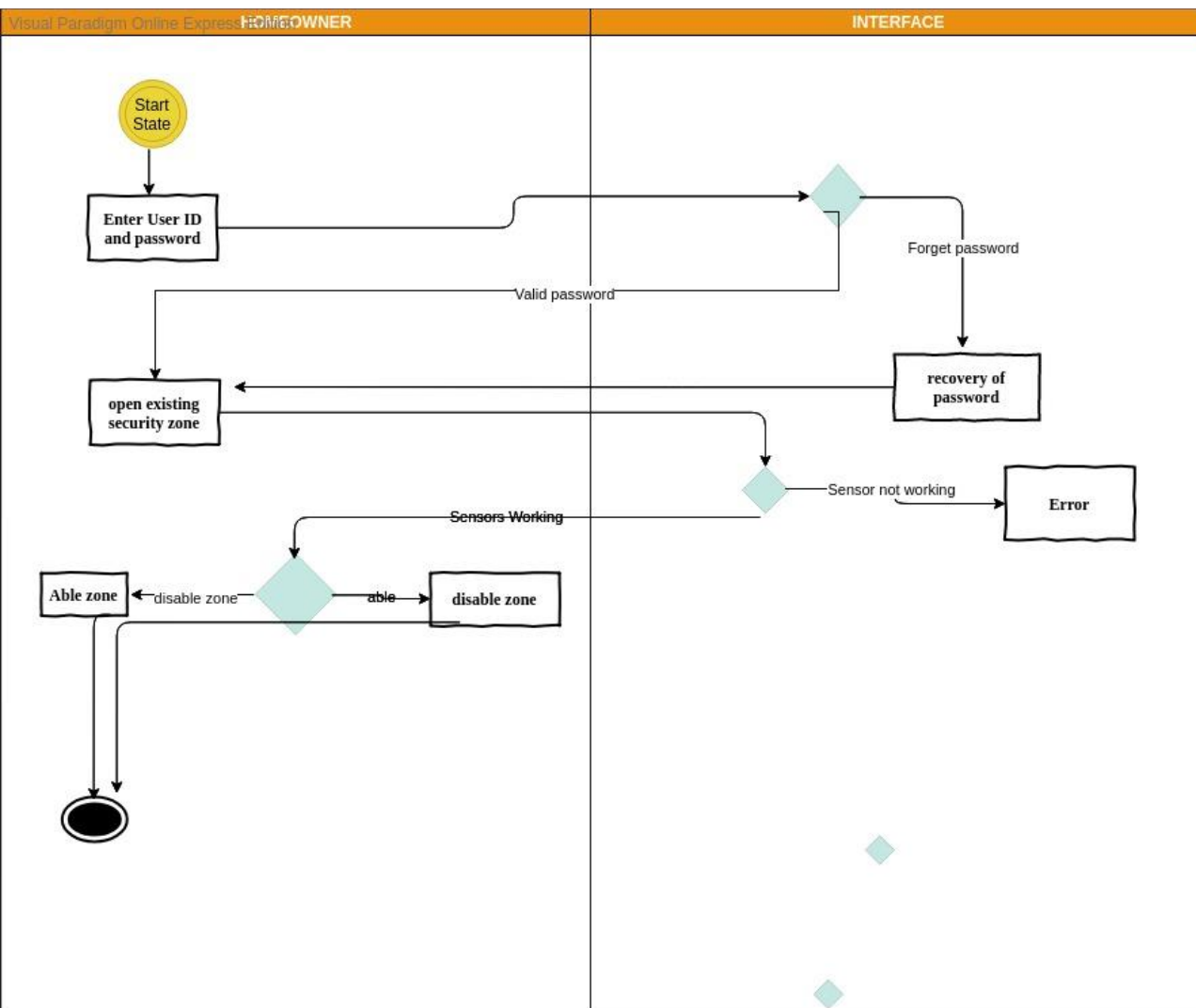
**Channel to actor:** Via Web interface

**Secondary actors:** System administrator

**Channel to secondary actor:** Via Wireless interface, Via phone, email.

**Open issue:** None





### **4.1.3 Functional Requirements**

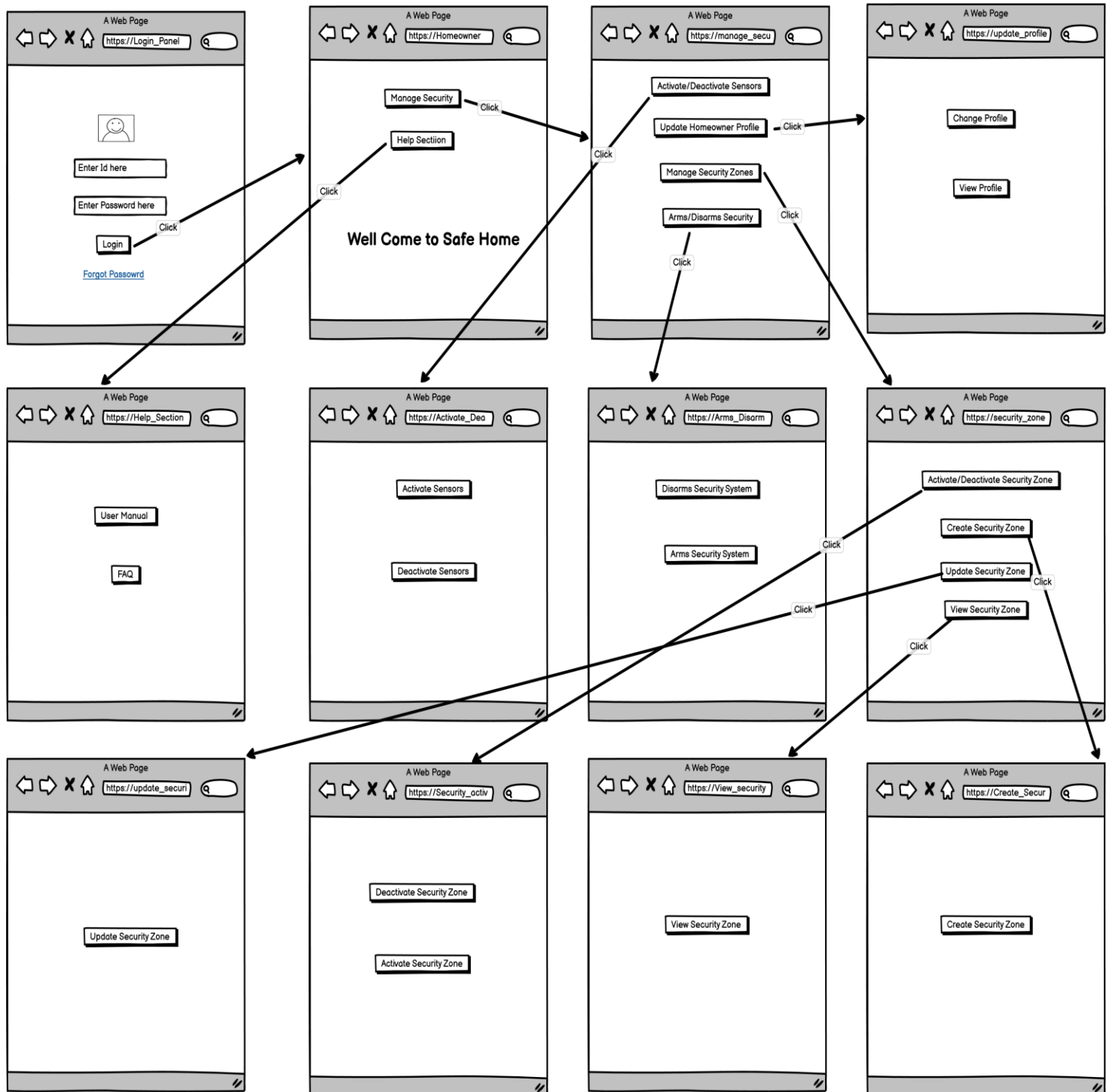
- Homeowner should be able to arm/disarms system
- Homeowner should be able to see Help Section
- Homeowner should be able to activate/deactivate sensors
- Homeowner should be able to update his profile
- Homeowner should be able to manage security zones
- System administrator should able to reconfigures sensors and related system features
- Safe Home System should be able to validate user by user id and password
- Safe Home System should be able to manage emergencies

#### 4.1.4 UML For Safe Home Security Function

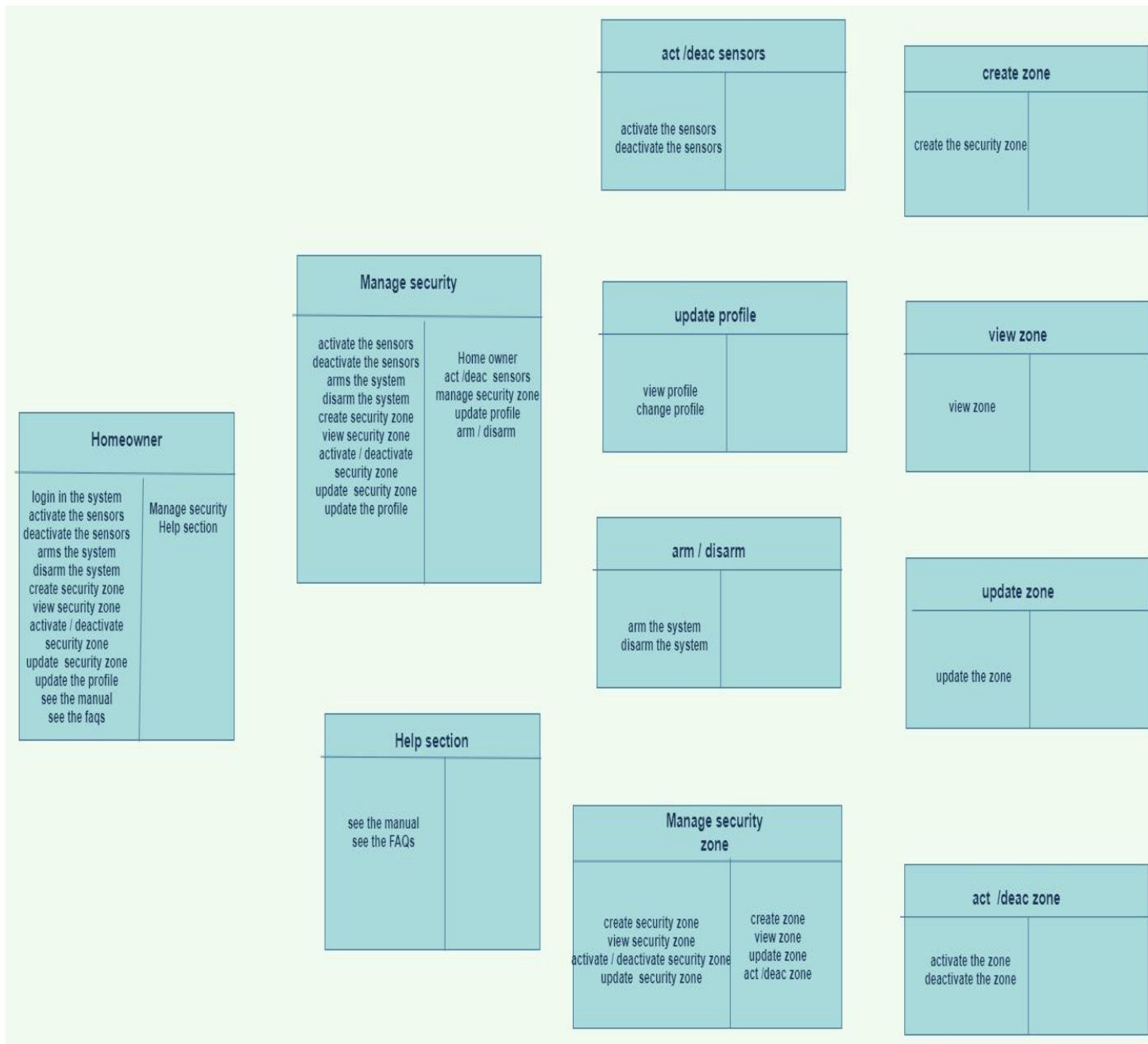


UML Diagram For Safe Home Security Function

### 4.1.5 Wireframes Safe Home Function



### 4.1.5 Class-responsibility-collaboration card





# 1. Other Nonfunctional Requirements

## 1.1 Performance Requirements

For implementing the safe home project the following performance steps are following.

### 1. UML Diagrams:

Uml diagram is the general overview of the project in which the overall picture of our project is clear. In the UML diagram the tasks of the team member also shown.

### 2. USE CASES:

Use case is scenario based work. It consist of many factors like actor primary thing then the given scenario then exceptions then priority that the availability of resources and at last exceptions.

## 1.2 Safety Requirements

Safety requirements also necessary for the project. If the one wire and the bunch of wire is damage then dataflow may disturb and this may cause in big loss. We should use safe materials for the projects like good quality of wires and alarms and cameras.

## 1.3 Security Requirements

Security requirements need the safety of our data. Means our data should be in safe hands and in case of any lose. We may recover it by any methods and where we place our storages.

## 1.4 Software Quality Attributes

### AVAILABILITY:

Our app or interface should be available to the house owner or the people they are living in the home.

### CORRECTNESS:

Our alarm should bell at the right time and other systems should response at the accurate time.

### MAINTAINABILITY:

The home owner should maintain or reset the settings of the app.

**USABILITY:**

Our app should use by the maximum number of home owners.

## **1.5 Business Rules**

The project is done by team working and the according to the different circumstances the different work will be done by team members for example if any team member have low quality PC which have low processing power then we may assign him/her the documentation process.

## **2. Other Requirements**

<Define any other requirements not covered elsewhere in the SRS. This might include database requirements, internationalization requirements, legal requirements, reuse objectives for the project, and so on. Add any new sections that are pertinent to the project.>

### **Appendix A: Glossary**

<Define all the terms necessary to properly interpret the SRS, including acronyms and abbreviations. You may wish to build a separate glossary that spans multiple projects or the entire organization, and just include terms specific to a single project in each SRS.>

### **Appendix B: Analysis Models**

<Optionally, include any pertinent analysis models, such as data flow diagrams, class diagrams, state-transition diagrams, or entity-relationship diagrams.>

### **Appendix C: To Be Determined List**

<Collect a numbered list of the TBD (to be determined) references that remain in the SRS so they can be tracked to closure.>