

Software Requirements Specifications for SafeHome

Table of Contents

1.	Introduction.....	3
1.1	Purpose	3
1.2	Intended Audience and Reading Suggestion	4
1.3	Project Scope	4
2.	Overall Description.....	4
2.1	Product Perspective	4
2.2	User Class and Characteristics	5
2.3	Operating Environment	6
2.4	User Documentation	6
2.5	Assumptions and Dependencies	6
3.	External Interface Requirements.....	6
3.1	User interfaces	6
3.2	Software Interfaces	18
3.3	Hardware Interfaces	19
3.4	Communications Interfaces	20
4.	System Features	21
4.1	Home Security	21
4.1.1	Use Cases:	21
4.1.2	Fire and Smoke Monitoring.....	25
4.1.3	Arm/Disarm System	25
4.1.4	Reset Password	25
4.1.5	Set Panic Mode	25
4.2	Safe Home Web Service:	26
4.2.1	Use Cases:	26
5.	Functional Requirements	31
5.1	Secure Operation	31
5.2	Secure Display	31
5.3	Secure Password	31
5.4	Secure Check	31
5.5	Observe Operation	31
5.6	Emergency	32

	5.7 Alarm	32
	5.8 Secure the House	32
	5.9 Observe the House	33
	5.10 Configure the System	34
6.	Non-functional Requirements	34
7.	Other Requirements	35
8.	State Diagram.....	36
9.	Swimlane Diagrams	37
10.	CRC Models.....	43
11.	Class Diagrams	45
	11.1 MVC Architecture	45
11.1.1	Model	45
11.1.2	View.....	45
11.1.3	Controller	45
	11.2 Authentication	46
	11.3 Profile	47
	11.4 Surveillance	48
	11.5 Security	49
	11.6 Component Diagram of Complete System	50
12.	References.....	51

1. Introduction

The document describes the analysis of Safe Home System in software engineering. If we do software projects, role of analysis model is important. Analysis model is the first technical representation of a system. In this model text and diagrams are used to describe it in an easy way. It is already known from requirement specifications that safe home system gives the owner of home a control of sensors and cameras etc. Safe Home System Security and surveillance to the owner to control the home effectively and easily even if the owner went out for a long time.



Figure 1: Safe Home

1.1 Purpose

- The purpose of the document is to describe the functional as well as non-functional requirements of the product.
- It describes the software requirements of the product. It also covers the scope of the product and if the document contains the part of the system or sub-system of the product.
- The project is to design and develop the automated home security system.

- The system should provide the security and safety through sensors. For example during fire, theft activities it should ring the alarms.
- The document will provide the description of the problem and side cases of the system and their solutions.

1.2 Intended Audience and Reading Suggestion

By reading this document users, developers, internal and external guides will be able to understand to use the product in an easy way.

1.3 Project Scope

- Project is to install an automated home security system and control it through web app and control panel.
- Benefit of the product is one can control the security system of house sitting anywhere around the world.
- This security system seems to have strong market value as its scope has increased since last few years.

2. Overall Description

2.1 Product Perspective

Safe Home System is an innovative system containing a web app i.e. wireless box and a control panel. Web app will organize in such a way that it is attached to every hardware device fixed around the house for the security system. Web app will mainly make the network system around the house. On the other hand control panel will provide a user interface and will be controlling the

software which is responsible of providing and gathering the data and information regarding security system.

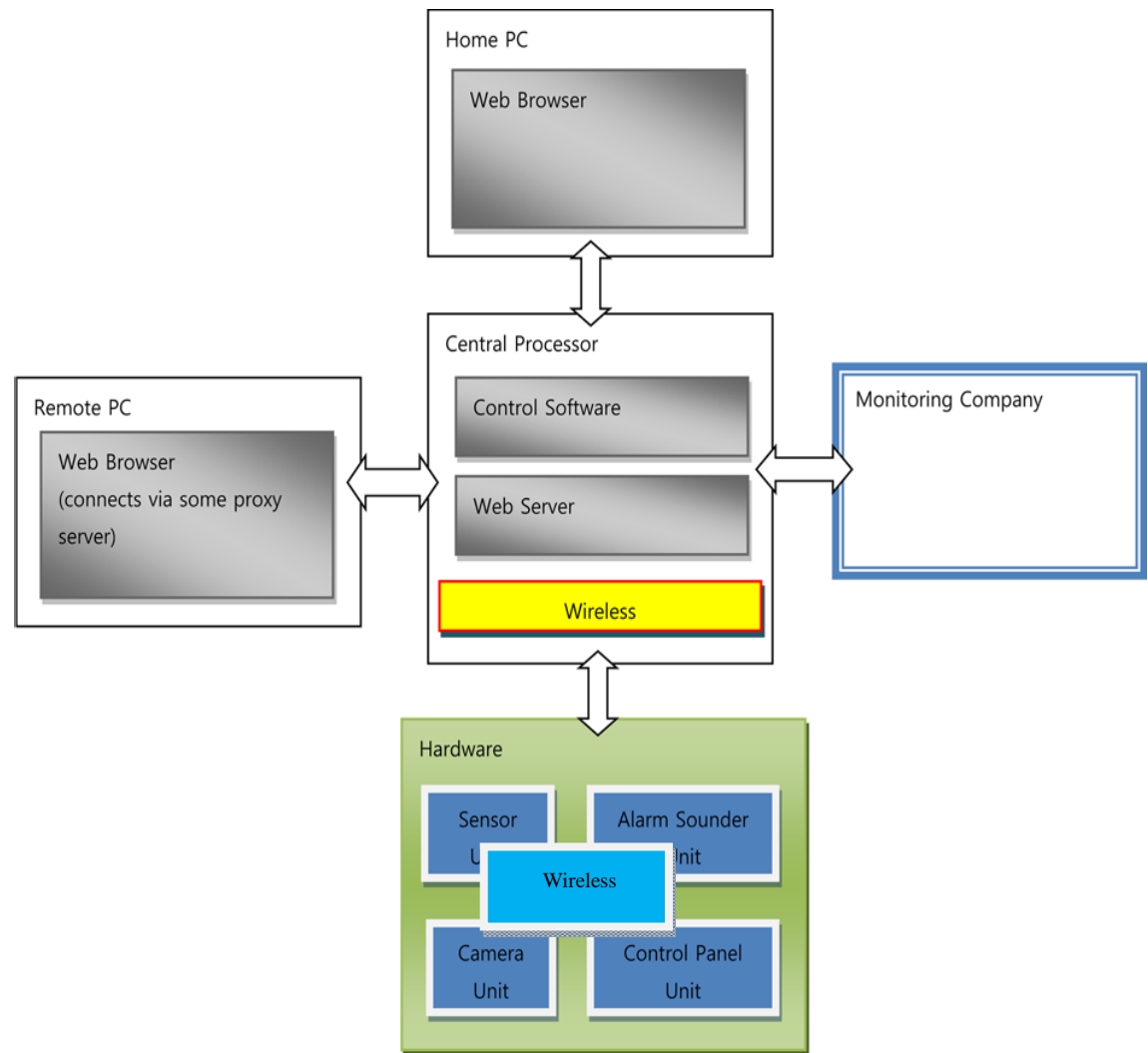


Figure 2: Product Perspective

2.2 User Class and Characteristics

- Home Owner: home owner can perform all the functions of the system having control panel password.
- Web User: web user can control the system if he has web user id and password of control panel. He can perform as an administration to configure the safe home system.
- Company: Monitoring Company can receive alarm from the user or the sensors. It can turn off and on the alarming system according to the requirements of the user.

2.3 Operating Environment

Safe Home System will be operating using some internet or online connections or signals. It will contain some electronic devices connected with software and apps controlling the doors, sensors windows and all other parts. The app or software will receive instructions from owner and then will operate accordingly.

2.4 User Documentation

- User will be provided with a manual which contains the instructions and guidelines.
- The system will be provided with online links that will help to describe the system functions.
- Project shall provide the owner with a soft-copy when he buys the system.
- User will be provided with a user-manual of the systems like cameras, sensors, detectors and alarms.

2.5 Assumptions and Dependencies

- System is well organized and well-defined and ready to use.
- Company can off the system excluding the control panel.
- Company has interface to turn off the alarming system after receiving the alarming message.
- Only single user can access the system at the same time.
- Security is assured by the owner and the company only in case of alarming situation.
- Performance of the system depends on the improvement of the system with the time.

3. External Interface Requirements

3.1 User interfaces

The user of Safe Home can use both software interface and Hardware interface.

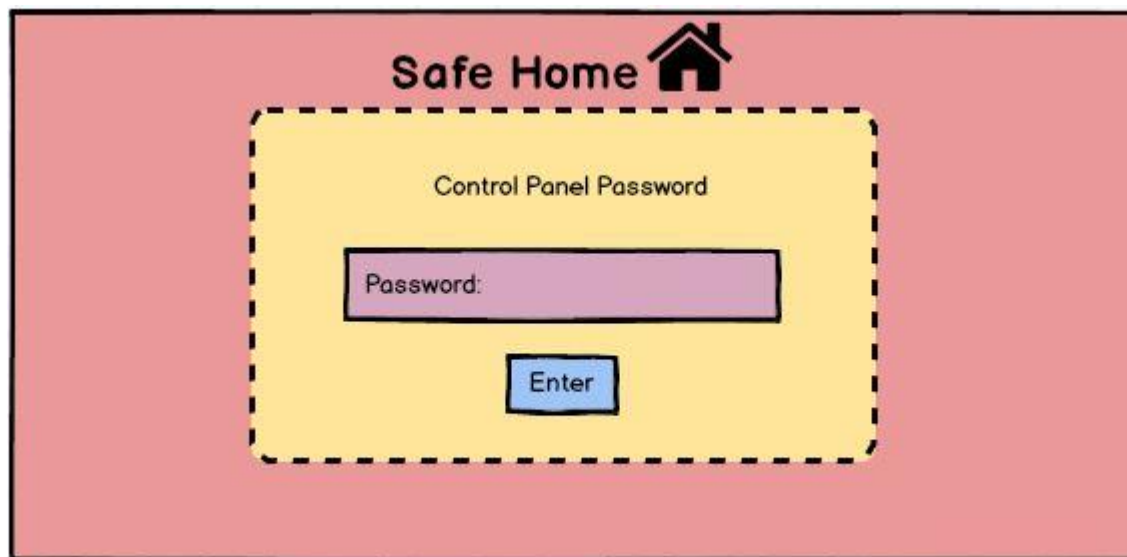


Figure 3: Panel Password




Figure 4: Home Page

Log In

Username:

Password:

[Forgot password](#)

Back 



Log In 

Figure 5: Log In

Safe Home 

Forgot Password

Email:

Verification Code:

New Passwaord:

Confirm Password:

Back

Enter

Figure 6: Forgot Password

Sign Up

Figure 7: Sign Up

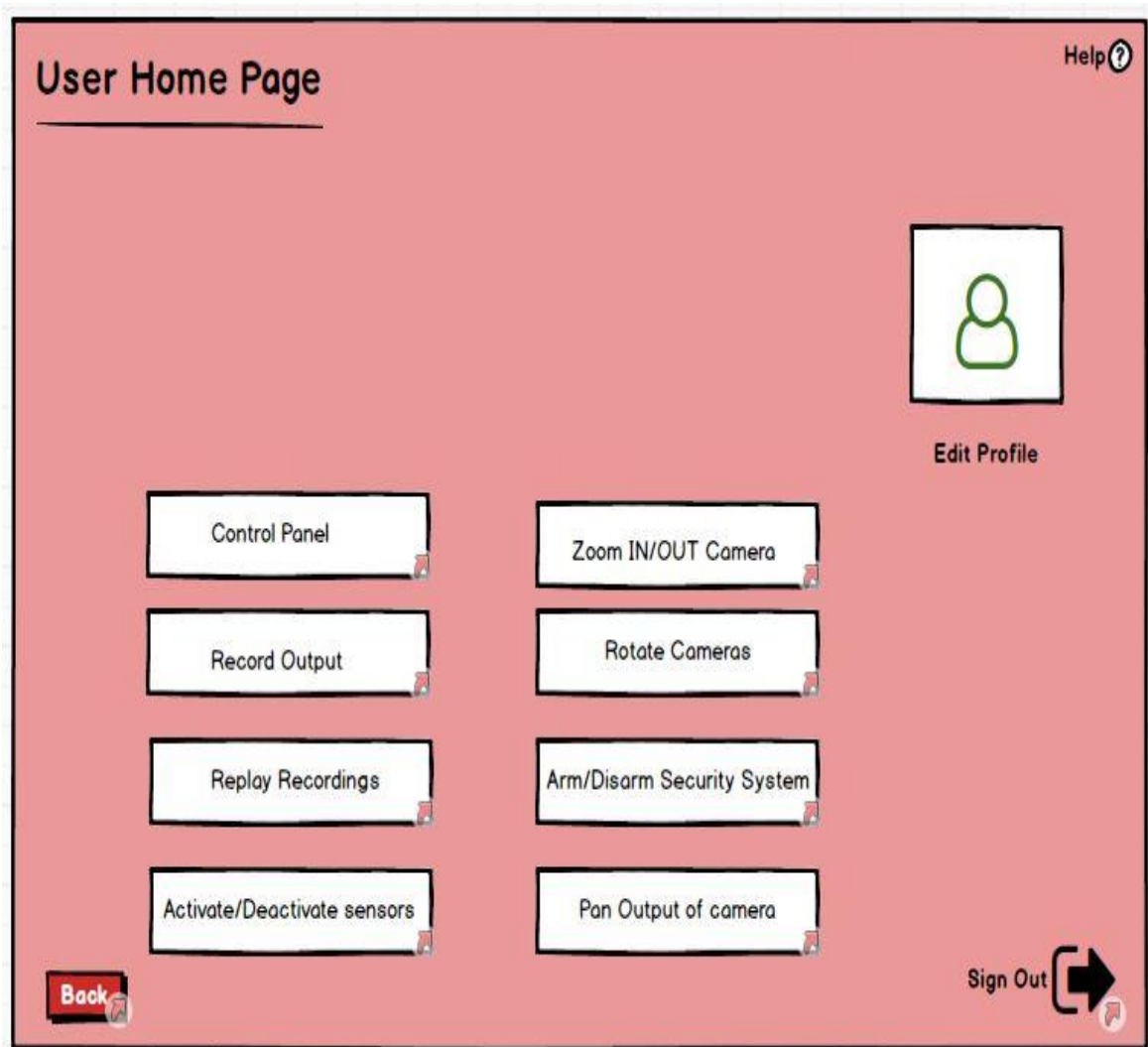


Figure 8: User Home Page

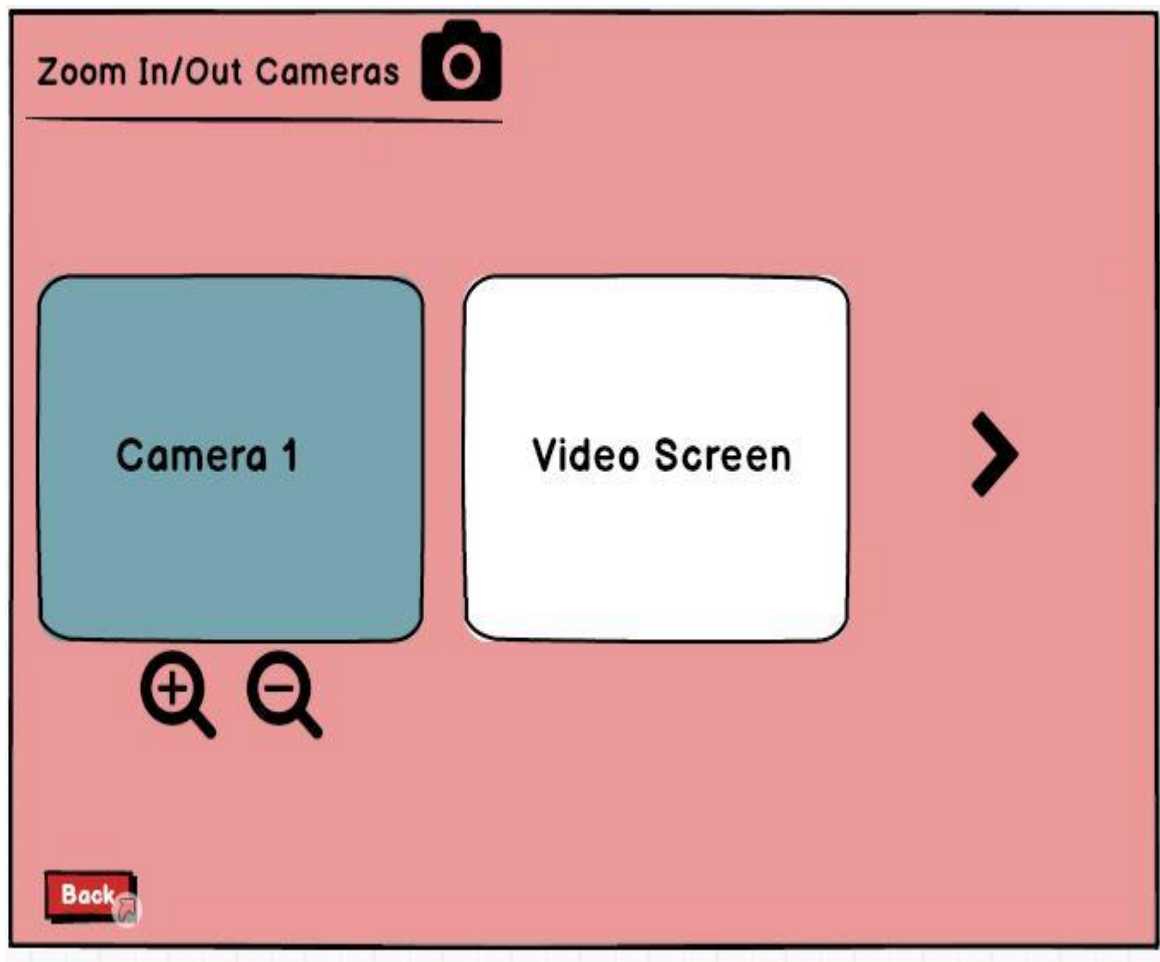


Figure 9: Zoom In/Out Cameras

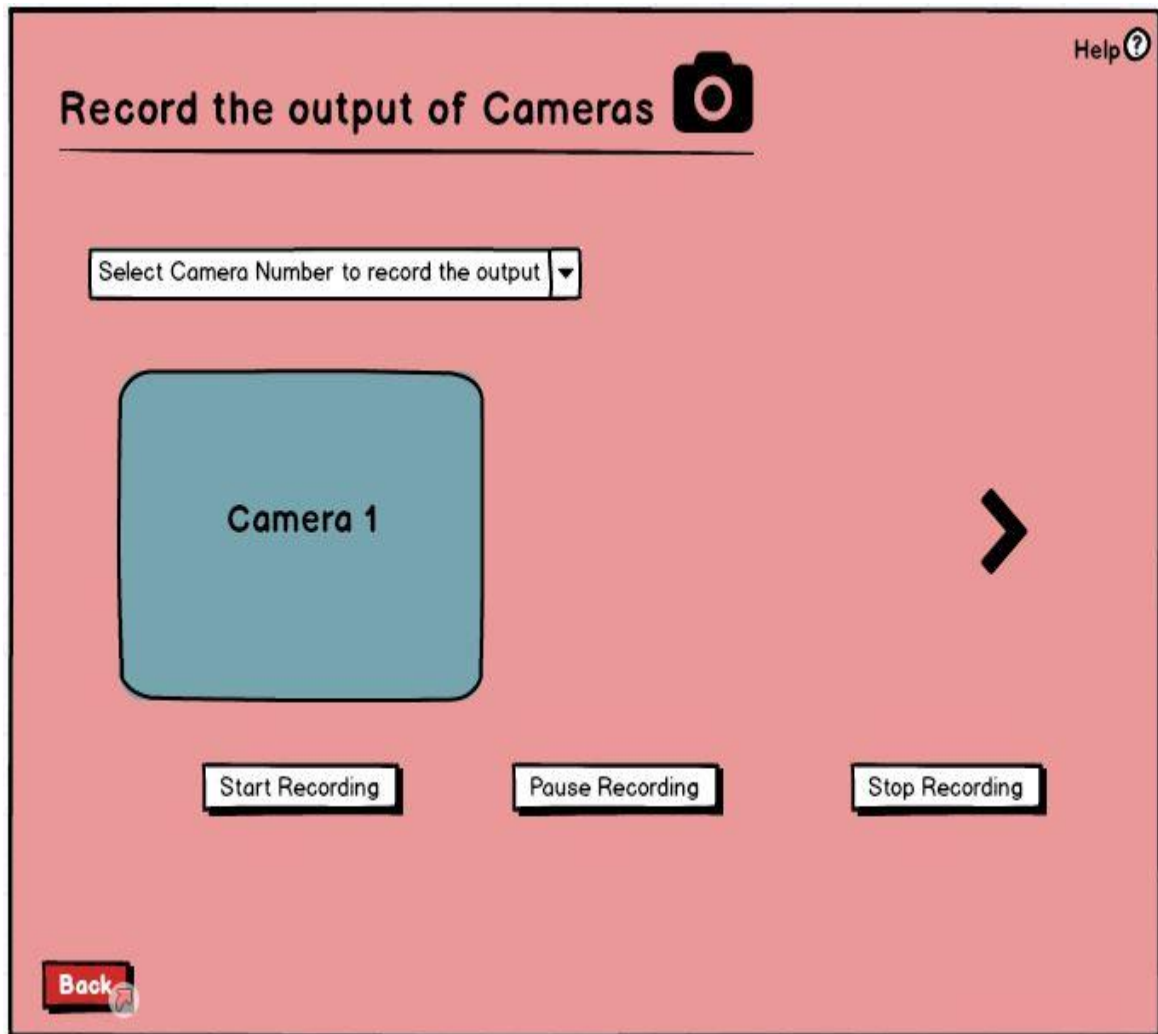


Figure 10: Record the Output of Camera

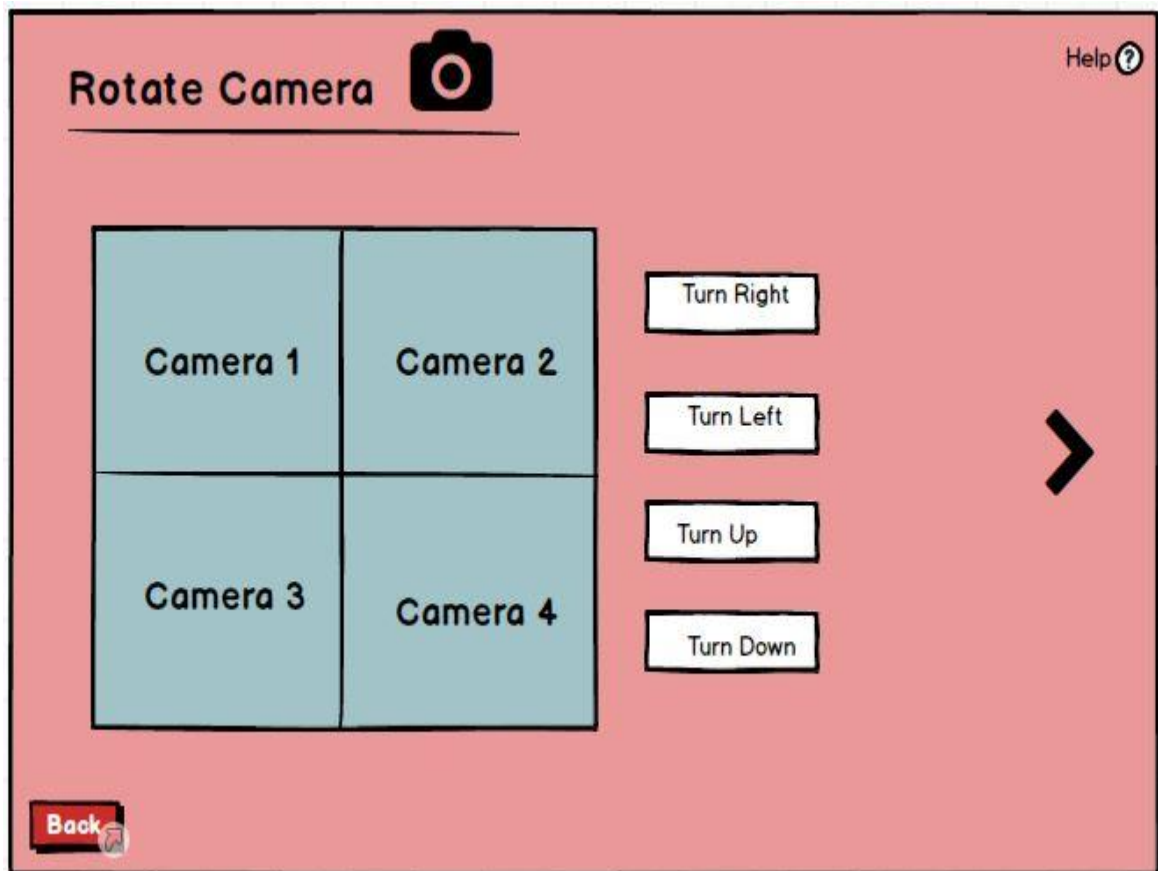


Figure 11: Rotate Camera

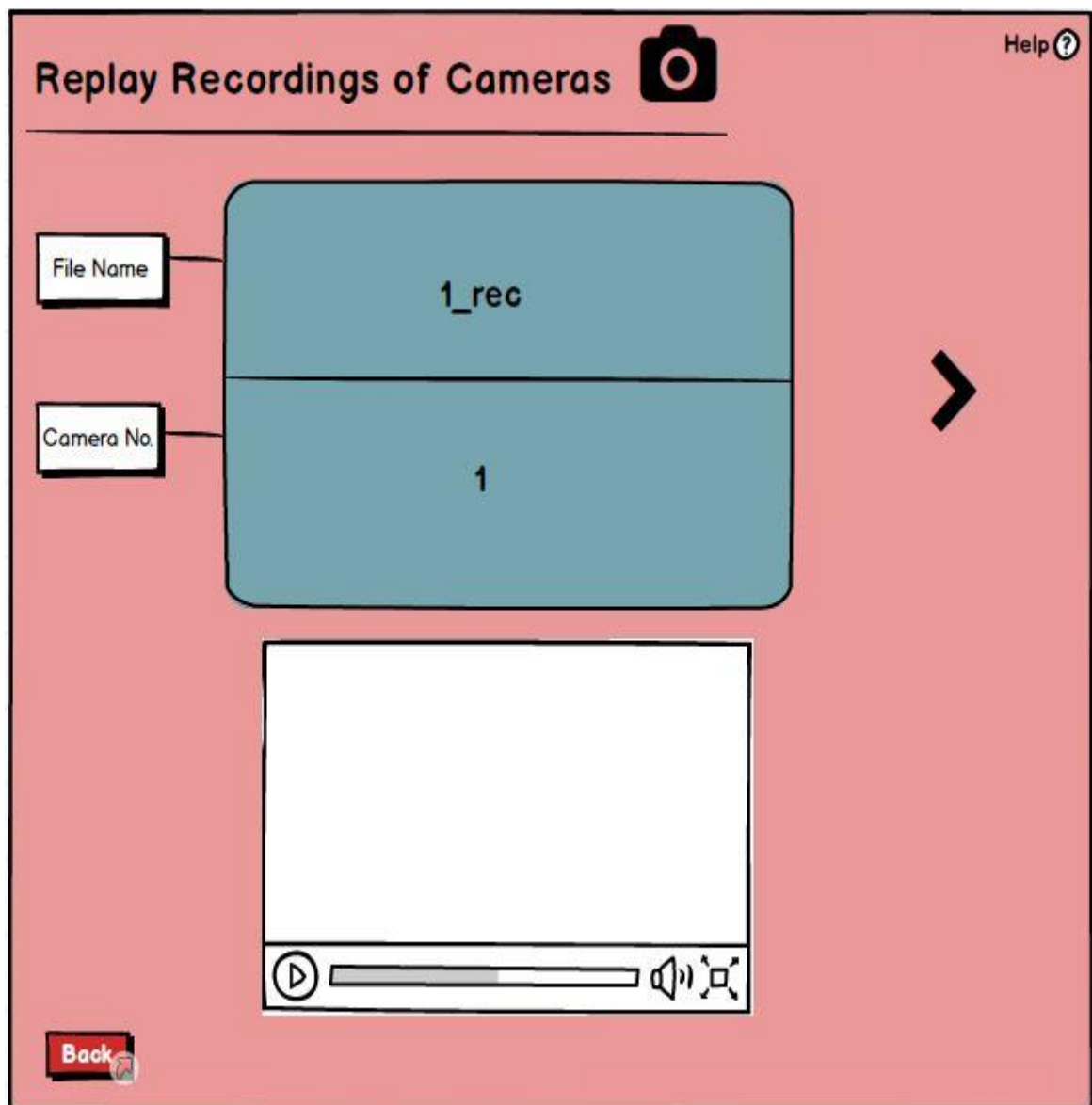


Figure 12: Replay Recordings of Cameras

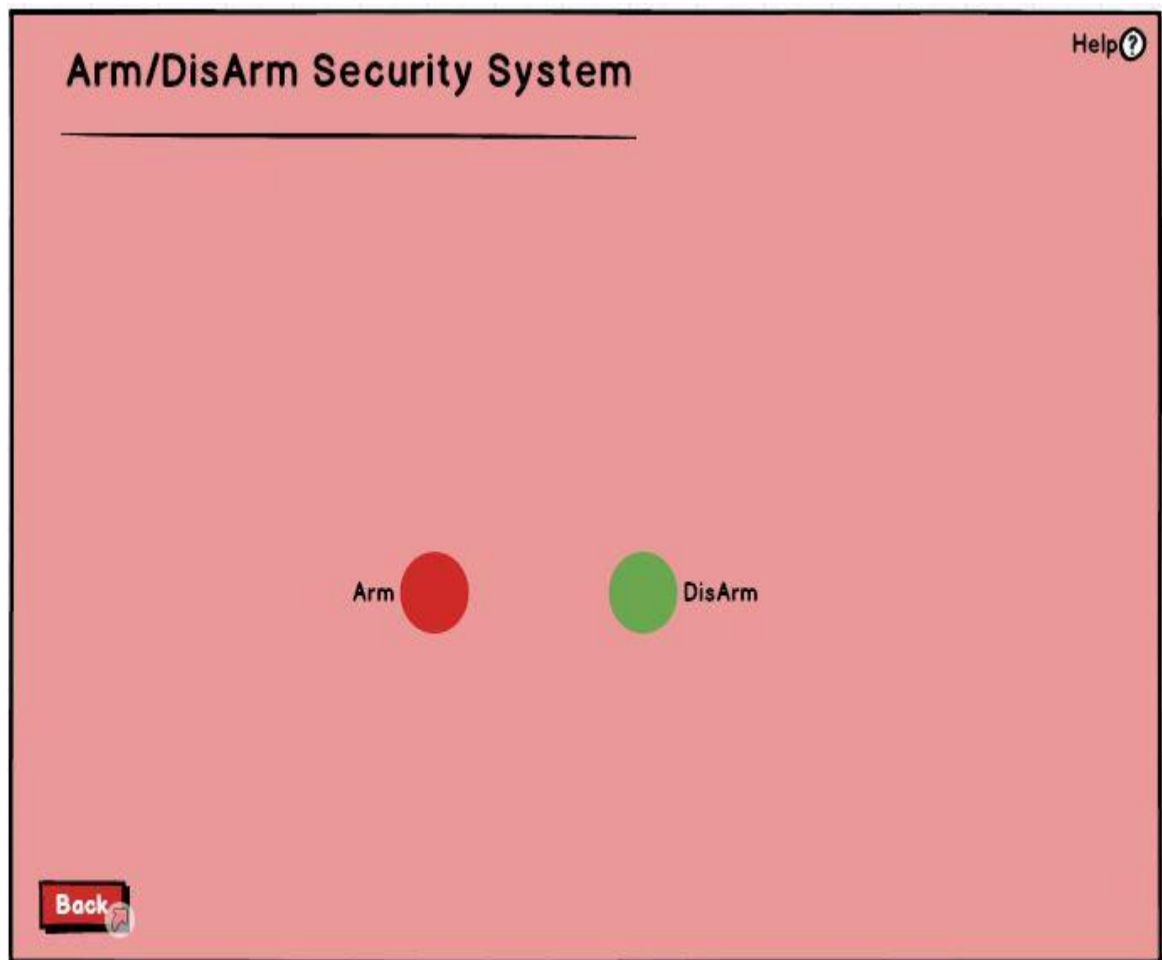


Figure 13: Arm/DisArm Security System

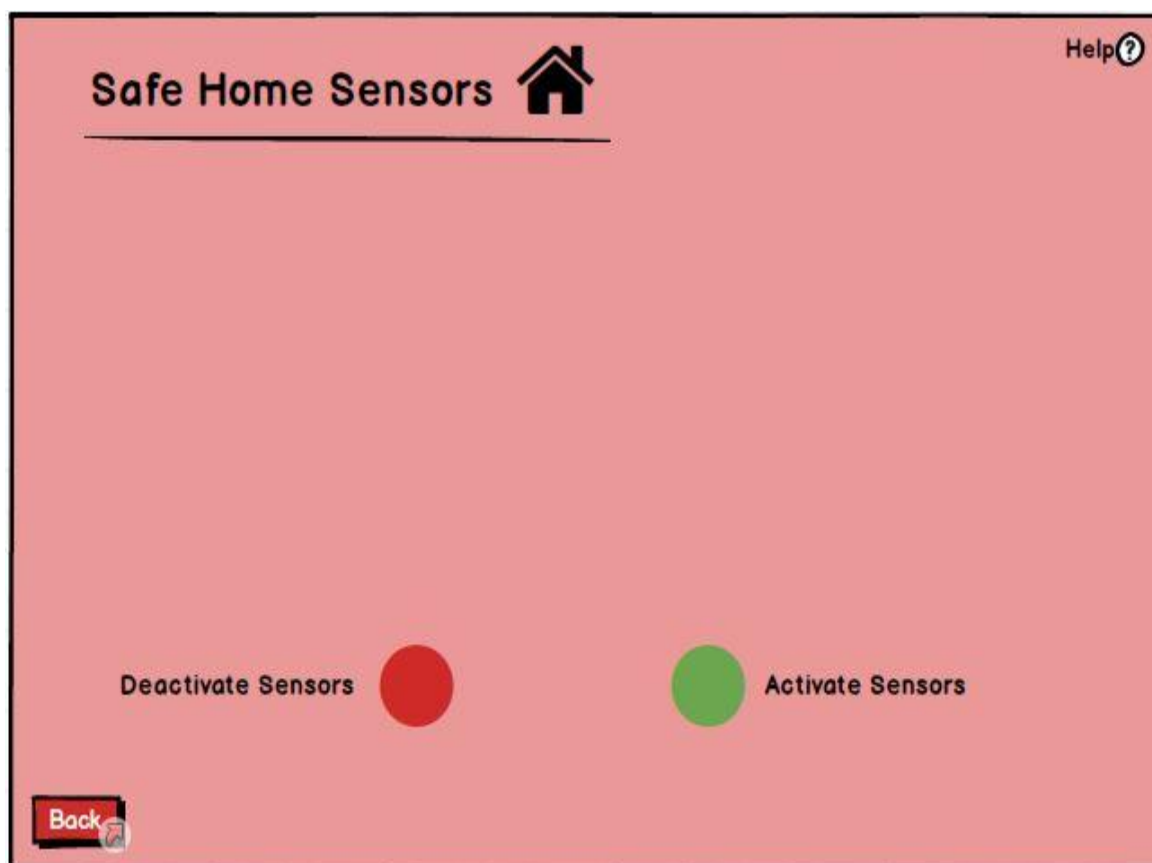


Figure 14: Sensors

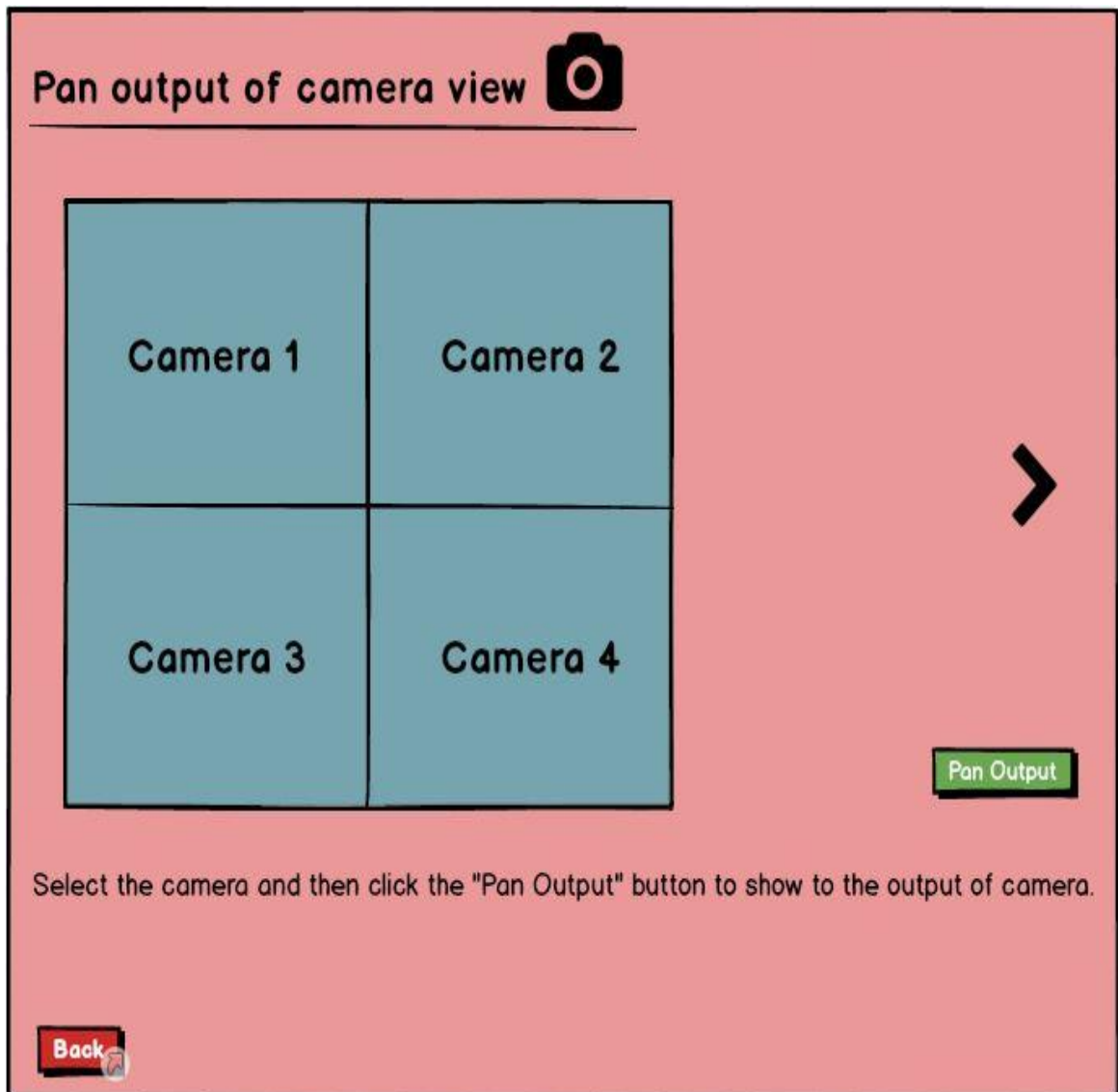


Figure 15: Pan Output of Camera View

3.2 Software Interfaces

- The user of Safe Home uses this software interface through web page. First, user clicks the access menu in menu bar. The window open and required to enter the ID and password. If user enters the valid ID and password, window open and required to enter the control panel password.
- If user enters the valid instrument panel password, he or she will hook up with the Safe Home system, otherwise web-interface of Safe Home requires to enter ID and password again. After connecting the Safe Home system, user can use provided functions by Safe Home.
- If user pushes the monitoring menu, the monitoring window open and user can see the sensor locations, camera locations. If user pushes the view menu and select one video camera, the window that contains the video display open. The controllers of camera to pan and zoom are placed in

the box. The user can watch the entire display of camera simultaneously by another item of view menu.

- User can also arm and disarm several sensors through web interface. The states of sensors easily change by toggle. Red sensors are for to set arm and others sensors are for to disarm. User can select some sensors or deselect some sensors in order that make configure security zone. The safety zone also can include cameras for surveillance. User also can delete the safety zone.

3.3 Hardware Interfaces

- The hardware interface looks like a small LCD display to display information of Safe Home. Keypad to control the Safe Home system is placed in box.
- The homeowner observes the Safe Home instrument panel to work out if the system is prepared 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 disappear. The homeowner uses the keypad to key during a four-digit password. The password is compared with the valid password stored within the system. If the password is wrong, the instrument panel will beep once and reset itself for extra input. If the password is correct the instrument panel expect the further action.
- The homeowner select keys in stay or away to activate the system. The stay activates are perimeter sensors (inside motion detecting sensors are deactivated). Away activates all sensors. When activation occurs, a red alarm light are often observed by the homeowner.

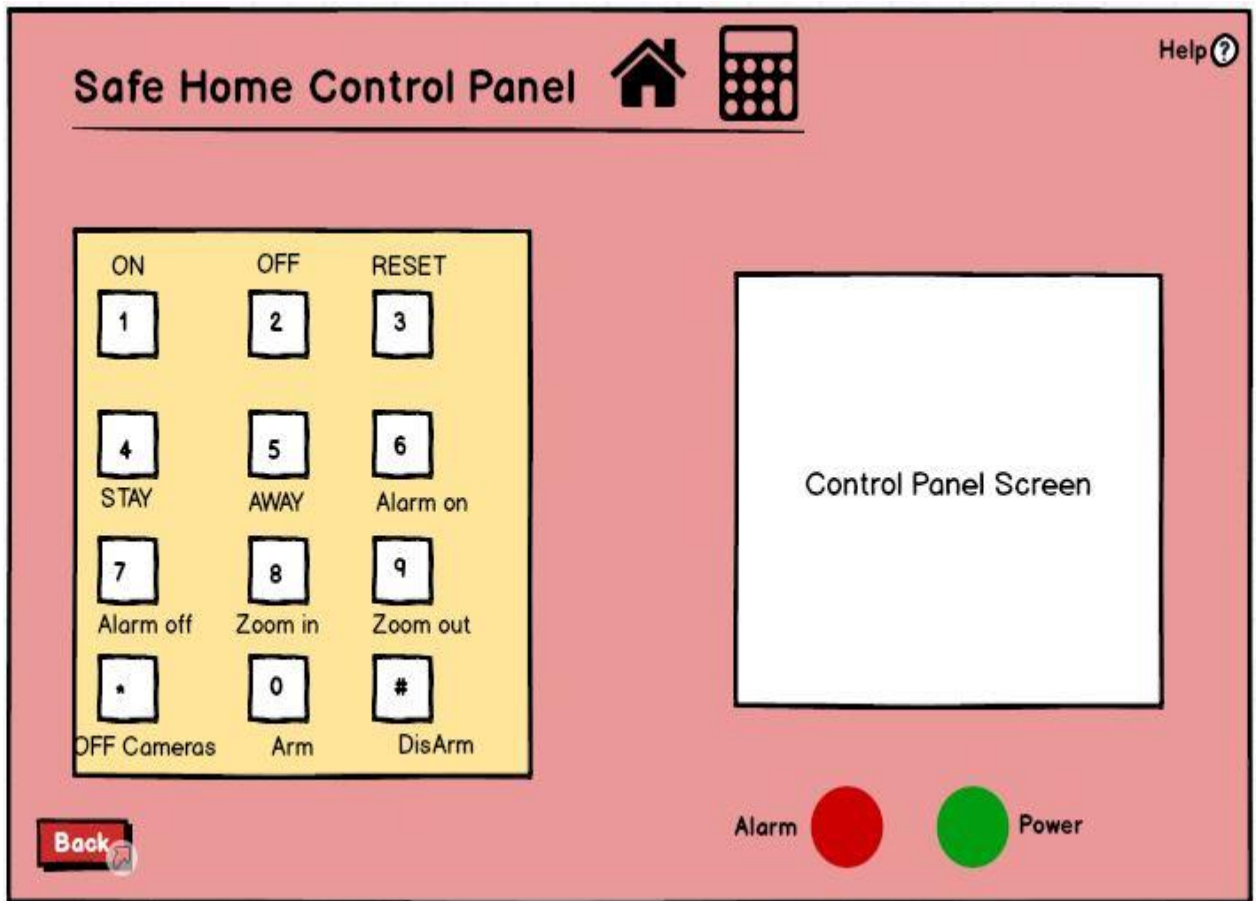


Figure 16: Control Panel

3.4 Communications Interfaces

The Safe Home system uses pic 3 standard to communicate with sensor and central processor. Pic 3 has a maximum raw data rate of 11 Mbit/s and uses the same media access method defined in the original standard. Pic 3 products appeared on the market in early 2000, since pic 3 is a direct extension of the modulation technique defined in the original standard. The dramatic increase in throughput of pic 3 compared to the original standard along with simultaneous substantial price reductions led to the rapid acceptance of pic 3 as the definitive wireless LAN technology. Pic 3 devices suffer interference from other products operating in the 2.4 GHz band. Devices operating in the 2.4 GHz range include: microwave ovens, Bluetooth devices, baby monitors and cordless telephones.

Frequency band	Throughput (typical)	Net bit rate	Range (indoor)
2.4 GHz	4.5 Mbit/s	11 Mbit/s	~38 m

Figure 17: Pic3

4. System Features

4.1 Home Security

The SafeHome system is expected to keep the home safe by monitoring a wide variety of sensors and detectors. It shall automatically alert the monitoring personnel when needed, as well as the home occupants.

4.1.1 Use Cases:

Use cases for SafeHome are given below:

Use Case1:

Goal:

To notify the monitoring personnel about a possible intrusion into the home.

Actors:

Primary: Possible intruder

Secondary: Home Owner, Monitoring Personnel

Assumptions:

- The home owner has enabled the monitor windows and doors options.
- The home owner enables this during night time or when away with family.

Constraints:

- The enablement can only be done if all windows and doors are closed.

Pre-conditions:

- The monitor windows and doors options are not set.

Primary Scenario:

- The home owner decides to take his entire family out for a considerable amount of time, so he or she closes all the windows and doors.
- The home owner, outside with his family, enables the monitoring of windows and doors remotely using a remote control.

- A door or window opens by a possible intruder as detected by the magnetic switch while the options are enabled, thus alerting SafeHome to send a notification to the monitoring personnel so that they can phone the police. An alarm bell goes off in the home, perhaps scaring the possible intruder.

Exceptions:

- The family goes to bed for the night, expecting no visitors.
- The home owner enables the monitoring of windows and doors using the control panel inside the house then goes to bed.
- The monitoring option for windows or doors fails to enable because a window or door is not shut, so the home owner checks and shuts the appropriate opening(s) and is finally able to enable the monitoring options.

Post-conditions:

- Personnel are alerted of intrusion (and informed it was a false alarm if the correct pin is entered to disable the alarm, otherwise, the police are phoned).
- If the alarm doesn't stop after five minutes, the monitoring personnel disable it.

Use Case2:

Goal:

To warn the home owner that there is fire and smoke in the house. To notify the monitoring personnel of fire and smoke so that they can contact the fire department.

Actors:

Primary: Fire's Smoke, Smoke Detector

Secondary: Home Owner, Monitoring Personnel, Fire Fighters

Assumptions:

- Monitoring for fire and smoke is enabled at all times; it cannot be disabled.
- The smoke detector senses the smoke and is responsible for the very loud electronic horn to wake people up, where there is smoke, there is a fire.

Pre-conditions:

- A fire has started in the home, regardless where the home owner may be.

Primary Scenario:

- The fire produces smoke and sets off the smoke alarm with a loud electronic horn.
- SafeHome detects the smoke alarm distress and notifies the monitoring personnel, who in turn call the fire department. The home owner is also contacted.

Exceptions:

- SafeHome falls victim to the fire already before the monitoring personnel can be notified about the fire.

Post-conditions:

- Fire fighters have a better chance of fighting the fire when arriving earlier.

Use Case3:

Goal:

To arm/disarm the security system by the control panel

Actors:

Primary: Home Owner

Assumptions:

No assumptions

Constraints:

No constraints

Pre-conditions:

The security system is not armed.

Primary Scenario:

- A home owner inputs a four digit password.
- The security system validates the password. If it's correct, the control panel waits for additional input from the home owner.
- The home owner push the button "stay", "away", or "off".

Exceptions:

- After the home owner inputs the full password, if the password is incorrect, the control panel will beep once and wait for input of password again.
- If the time gap between each input digit is longer than 2 second, the control panel will reset itself for new input of password. It will beep three times.
- If the home owner pushes the button the "stay", the security system will become stay mode. The control panel beeps twice and a stay light becomes on, all outside motion detecting sensors are activated. All windows, doors sensors and inside motion detecting sensors are deactivated. The security system turns on the red alarm light to indicate that SafeHome has been armed.
- If the home owner pushes the button the "away", the security system will become away mode. The control panel beeps three times and away light becomes on; all sensors are activated. The security system turns on the red alarm light to indicate that SafeHome has been armed.
- If the home owner pushes the button the "off", the security system will be disarmed. All sensors are deactivated.

Post-conditions:

- In stay or away mode, the system awaits the home owner's password input
- In Off mode, the system exempts the home owner from validation process of the password. The home owner could pushes the button "stay", "away", or "off".

Use Case4:

Goal:

To reset password used in the control panel.

Actors:

Primary: Home Owner

Assumptions:

No assumptions

Constraints:

No constraints

Pre-conditions:

No pre-conditions

Primary Scenario:

- A home owner input a four digit password.
- The central processor validates the password.
- The home owner pushes the button “reset”
- The control panel beeps once.
- The home owner inputs a new four digit password.
- The central processor stores the new password.
- The control panel beeps twice.

Exceptions:

- After the home owner inputs the full password, if the password is incorrect, the control panel will beep once and wait for input of password again.
- If the time gap between each input digit is longer than 5 second, the control panel will reset itself for new input of password. It will beep three times.
- If the home owner inputs wrong password three times in a row, see Set Panic Mode.
- If the time gap between each input digit is longer than 5 second, the control panel will reset itself for new password. It will beep three times.

Post-conditions:

- The new password replaces the previous one. The home owner can use the new one from this time.

Use case5:**Goal:**

To set panic mode in the control panel.

Actors:

Primary: Home Owner

Assumptions:

- Security system is set to stay mode.

Constraints:

No constraints

Pre-conditions:

No pre-conditions

Primary Scenario:

- A home owner pushes the button “*” and “#” at the same time.
- The control panel keeps beeping until the home owner inputs password.

Exceptions:

- If the input password is incorrect, the control panel keeps beeping.
- If the input password is incorrect two times in a row, the central system sends the urgent message to the previously defined police station.
- If the input password is correct, the control panel stops beeping and the security system turns to stay mode.

Post-conditions:

- No post-conditions

4.1.2 Fire and Smoke Monitoring

The central processor’s control software shall notify about the house ID, the current time, and the smoke detector location in the home to the monitoring personnel in the event that the smoke detector detects a fire.

4.1.3 Arm/Disarm System

The control panel allows the home owner to arm/disarm the security system.

4.1.4 Reset Password

The control panel allows the home owner to reset 4 digits password.

4.1.5 Set Panic Mode

The control panel allows the home owner to set panic mode in case of emergency.

4.2 Safe Home Web Service:

Using the SafeHome Web service, a home owner can utilize the full functionality of SafeHome such as the ability to monitor camera zones and configure cameras and sensors. Moreover, the home owner can access this secure Web service from a remote place via the Internet through the SafeHome corporate site.

4.2.1 Use Cases:

Use Case6:

Goal:

To enter SafeHome web service from any remote location through the Internet.

Actors:

Primary: Home owner

Assumptions:

No assumptions

Constraints:

- The computer a home owner uses must have Internet web browser.

Pre-conditions:

- System must be completely configured; a home owner must obtain appropriate user ID and password.

Primary Scenario:

- A home owner enters ID (shorter than eight characters in length).
- The home owner enters password (at least eight characters in length).
- The system displays all major function buttons and the current floor plan.

Exceptions:

- If ID or password is incorrect, a warning message will be displayed, and then the home owner will be required to input ID and password again.

Post-conditions:

- Logging into the web service is successful, so the system displays all major function buttons and the current floor plan.

Use Case7:

Goal:

To pan output of camera view placed throughout the house from any remote location through the Internet web service.

Actors:

Primary: Home owner

Assumptions:

No assumptions

Constraints:

No constraints

Pre-conditions:

- After a home owner starts to use Accessible Camera View, this use case is available.

Primary Scenario:

- A home owner pushes the button “Left” to move the camera view to left or pushes the button “Right” move the camera view to right.

Exceptions:

No Exceptions

Post-conditions:

- The display of the selected camera shows the moved view.

Use Case8:

Goal:

To zoom in/out output of camera view placed throughout the house from any remote location through the Internet web service.

Actors:

Primary: Home owner

Assumptions:

No assumptions

Constraints:

No constraints

Pre-conditions:

None

Primary Scenario:

- A home owner pushes the button “Zoom In” to zoom in the camera view or pushes the button “Zoom Out” to zoom out the camera view.

Exceptions:

No exceptions

Post-conditions:

- The display of the selected camera shows the zoomed in/out view.

Use Case9:

Goal:

To record output of each camera

Actors:

Primary: Home owner

Assumptions:

No Assumptions

Constraints:

No constraints

Pre-conditions:

None

Primary Scenario:

- The home owner clicks into the check box of each camera.
- The home owner pushes the button “Save”.

Exceptions:

- When the check box is already selected, if the home owner clicks into the check box, check box is deselected.
- If the home owner goes to another page from current page without saving, modified item will not be saved. And it doesn't influence current recording condition. (i.e. Use case terminates without post conditions.)

Post-conditions:

- The selected cameras start to record and unselected cameras stop recording and save the record file.

Use Case10:

Goal:

To replay record of camera output.

Actors:

Primary: Home owner

Assumptions:

No assumptions

Constraints:

No constraints

Pre-conditions:

None

Primary Scenario:

- displays a replaying window that is identified by the camera ID

Exceptions:

None

Post-conditions:

- The selected record will be played.

Use Case11:

Goal:

To activate/deactivate sensors selectively via SafeHome web service.

Actors:

Primary: Home owner

Assumptions:

No assumptions

Constraints:

No constraints

Pre-conditions:

- This use case is available after Log into SafeHome Web Service is done successfully.

Primary Scenario:

- A home owner clicks the button “Activate/Deactivate sensors” on the menu bar
- The web service displays the sub-menu consisting of status of all sensors and buttons to activate/deactivate each sensor.
- The home owner clicks the button “On” to activate a sensor she or he wants
- The central processor activates the selected sensor

Exceptions:

- If the home owner clicks the button “off” to activate a sensor she or he wants. And then the central processor deactivates the selected sensor.

Post-conditions:

- Even if the selected sensors belong to specific zones, the result whether they are on/off is totally dependent on the latest change.

Use Case12:

Goal:

To arm/disarm the security system by SafeHome web service.

Actors:

Primary: Home owner

Assumptions:

No assumptions

Constraints:

No constraints

Pre-conditions:

None

Primary Scenario:

- A home owner can choose the mode of the security system among Stay, Away, Off, or Panic.

Exceptions:

None

Post-conditions:

- The mode of the security system will change to the choice among Stay, Away, Off, or Panic.

Use Case 13:

Goal:

To rotate the camera from website.

Actors:

Primary: Home owner

Assumptions:

No assumptions

Constraints:

No constraints

Pre-conditions:

None

Primary Scenario:

None

Exceptions:

None

Post-conditions:

None

Use Case 14:

Goal:

To open control open in website of safe home from remote distance through internet.

Actors:

Primary: Home owner

Assumptions:

No assumptions

Constraints:

No constraints

Pre-conditions:

User is logged in. System is installed on.

Primary Scenario:

A home owner clicks on the “Control Panel” and it is open. Home owner can control the Safe Home.

Exceptions:

None

Post-conditions:

Home owner can manipulate the control panel via internet.

5. Functional Requirements

5.1 Secure Operation

The system shall operate this feature functionalities independently with “Observe the house” feature. This system should ensure the house owner that installed system installed is secured in every way.

5.2 Secure Display

The system should Display its current status (Current Activities). And also check the other tasks (operation) if there are any. This system should also allow multiple control panel interfaces. And another thing, when the system is powered on or off, it will check the connection status with sensor attached devices and whether the camera is ready or not.

5.3 Secure Password

In the control panel, a four-digit password should be entered. And there will be two levels of passwords. The ID and password only. The system shall ask the password for every request from the control panels.

5.4 Secure Check

This System will check all operations or tasks which are been performed are secure or not. Always keep recognizing the members of house. In case of any intruders in the house the system should operate accordingly to actions installed in the system.

5.5 Observe Operation

The system shall operate this feature’s functionalities independently with the “Secure the

house” feature. It shall allow only one web user operating on this feature at a time. The system should also encrypt the images during transference.

5.6 Emergency

The system should also allow the user with a one-click function to report an emergency situation with the identities of the viewed cameras. The system should also allow the user to send a message to cancel an emergency request that he/she has sent before.

5.7 Alarm

The system should allow all alarm connections to ring and blow when there is any situation when there is emergency and intruder situation in one click and also automatically.

5.8 Secure the House

The home owner whose identity is verified can arm/disarm the house, using control panel or web interface, with the door sensors, window sensors, motion detector, fire, smoke level sensors. If an intruder or an accident is detected, the system shall alarm and inform the monitoring company. Home owner can request for alarm sound. Home owner can also control this using web service. Use Case diagram for secure house is given below:

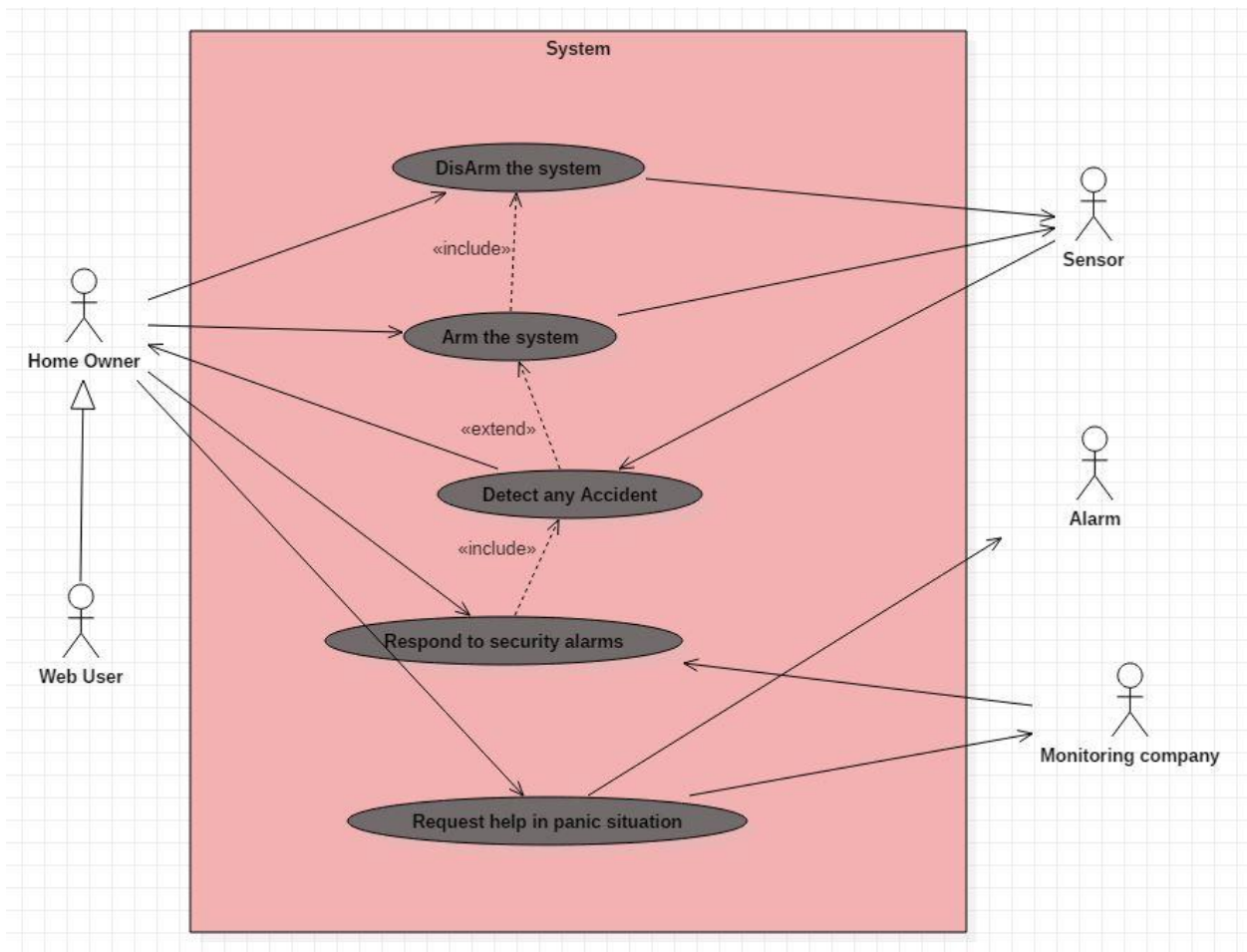


Figure 18: Use Case Diagram for secure home

5.9 Observe the House

The home owner can observe inside and outside the house. The home owner can choose the cameras to view as well as zoom or pan the displays. Moreover, home owner can also record and play the recording of cameras stored in storage place.

Home Owner can control these all functions locally or remotely. Use case diagram is given below:

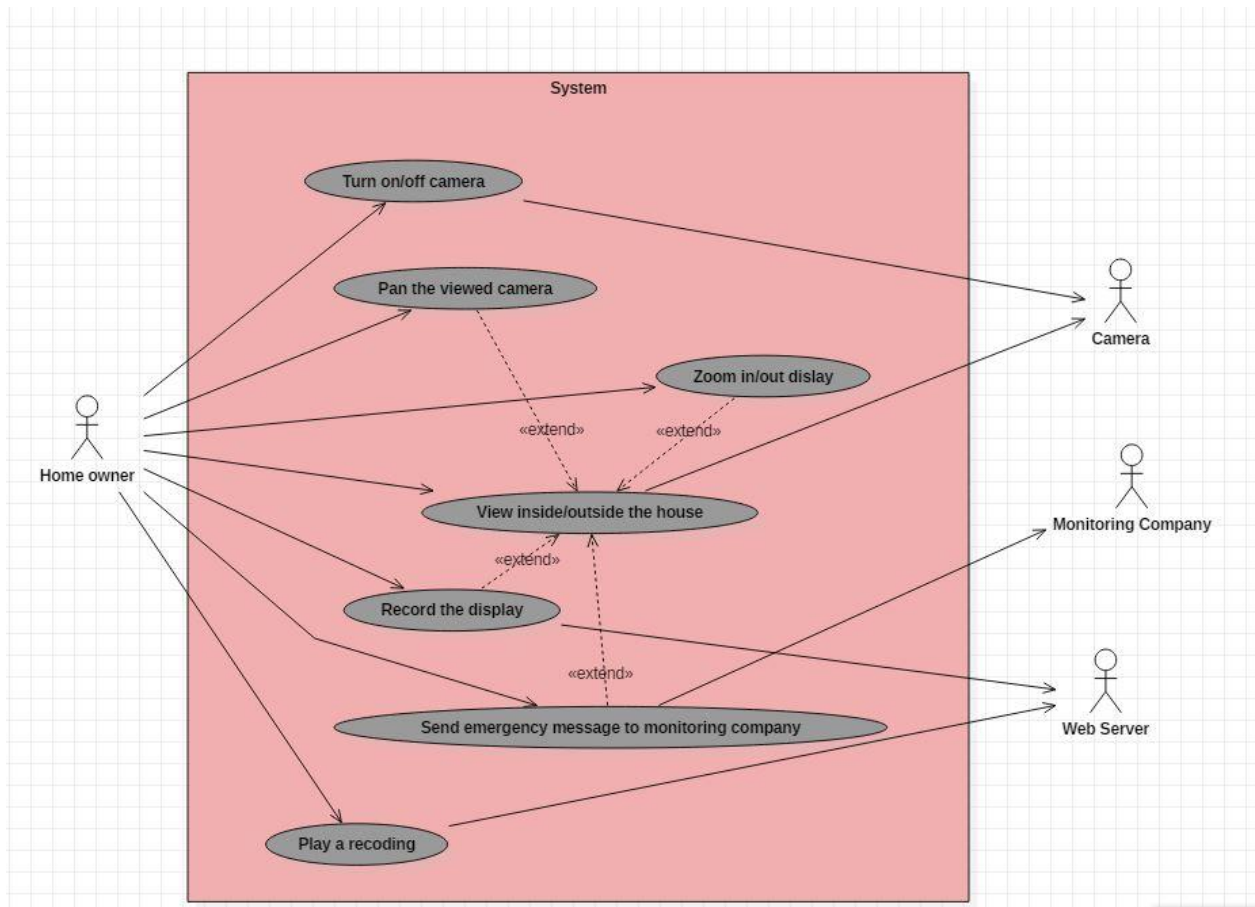


Figure 19: Use Case Diagram of Observe the House

5.10 Configure the System

Home owner can dynamically redefine the security or surveillance zone. Home owner can also manage his/her account information and passwords. Use case diagram is given below:

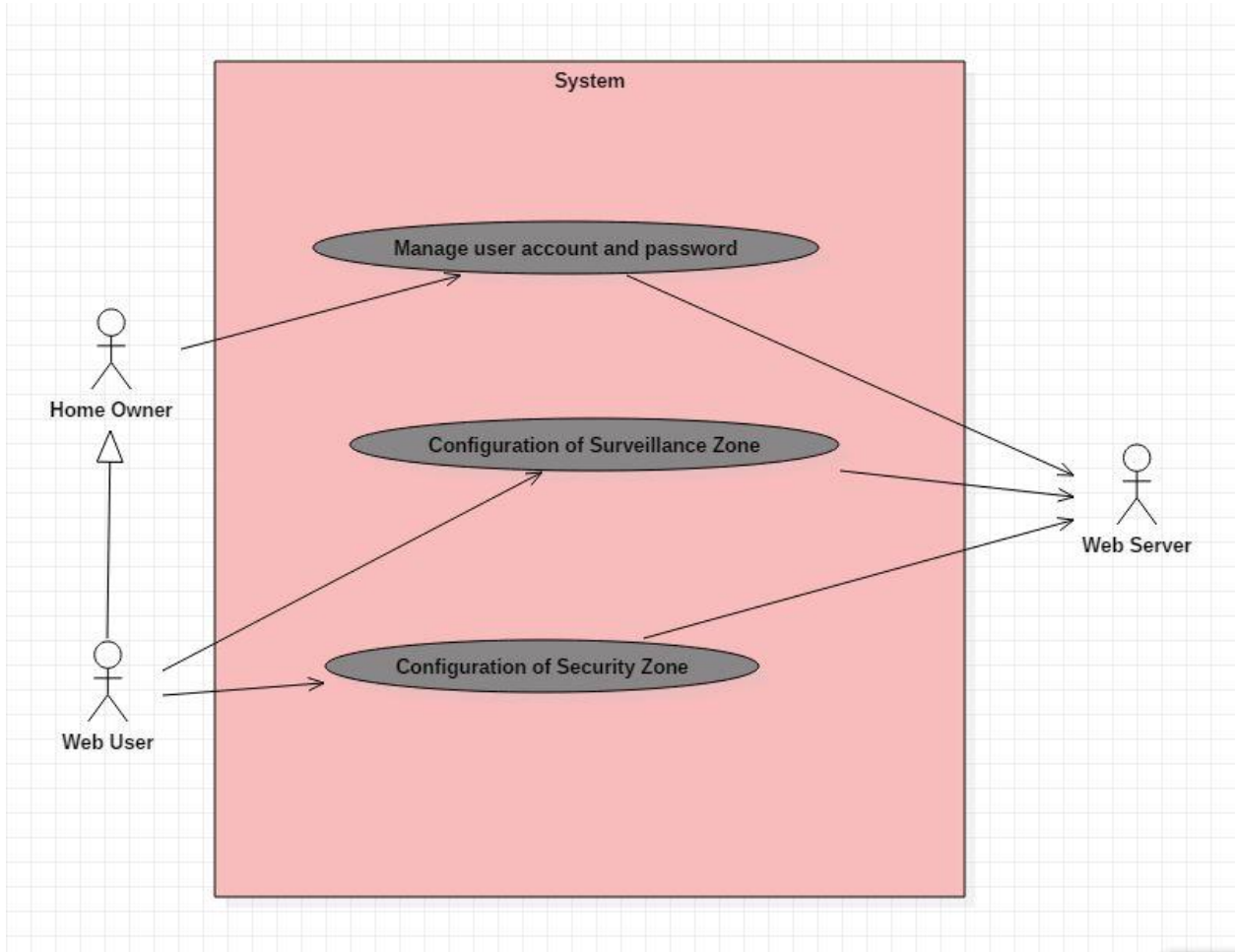


Figure 20: Use Case Diagram of Configure System

6. Non-functional Requirements

- Cameras' displays should be no more than 3 seconds later than the real-time.
- The time between detecting an intruder or an accident and alarming the case shall be within 1 second.
- With the local network, the system should reply the user's requests within at most 3 seconds.
- The system shall be able to run 24 hours a day, 7 days a week.
- Security tasks have the highest priority to other tasks. That means whenever there is a detection event, the event shall be reported immediately regardless of what feature the user is operating.

- The system shall back up the camera records every month to the secondary storage. The secondary storages are then kept in the company and used if necessary.
- Connection from remote control shall be lead through a proxy server provided by a reliable company/organization.
- Information on web access to system shall be stored and monitored by the monitoring company to detect web hacking.
- Security protocols shall be used in communications in networking.
- With the web interface, data shall be encrypted before transferring on the network line.
- When the Internet connection is broken, the system shall ask the home owner for changing to telephone line.
- Regardless of the user's IT capability, drawing of the house's floor plan shall be serviced.
- The system shall be able to store at least 1000 hours of camera record.
- Secondary storage shall always be available for moving out the old records

7. Other Requirements

- **Correctness** – whether it satisfies the requirements in smart home vision document.
- **Flexibility** – what proportion we will expend the functions of smart home.
- **Interoperability** - effort needed to couple software and therefore the hardware.
- **Maintainability** - simple maintenance for disabilities and old people.
- **Reliability** - factors required to determine the specified reliability of the system.
- **Reusability** - extent to which it are often reused for people.
- **Testability** - effort needed to check to make sure performs as intended.
- **Availability** - factors required to ensure an outlined availability level for the system, for instance, how long the UPS can hold.

8. State Diagram

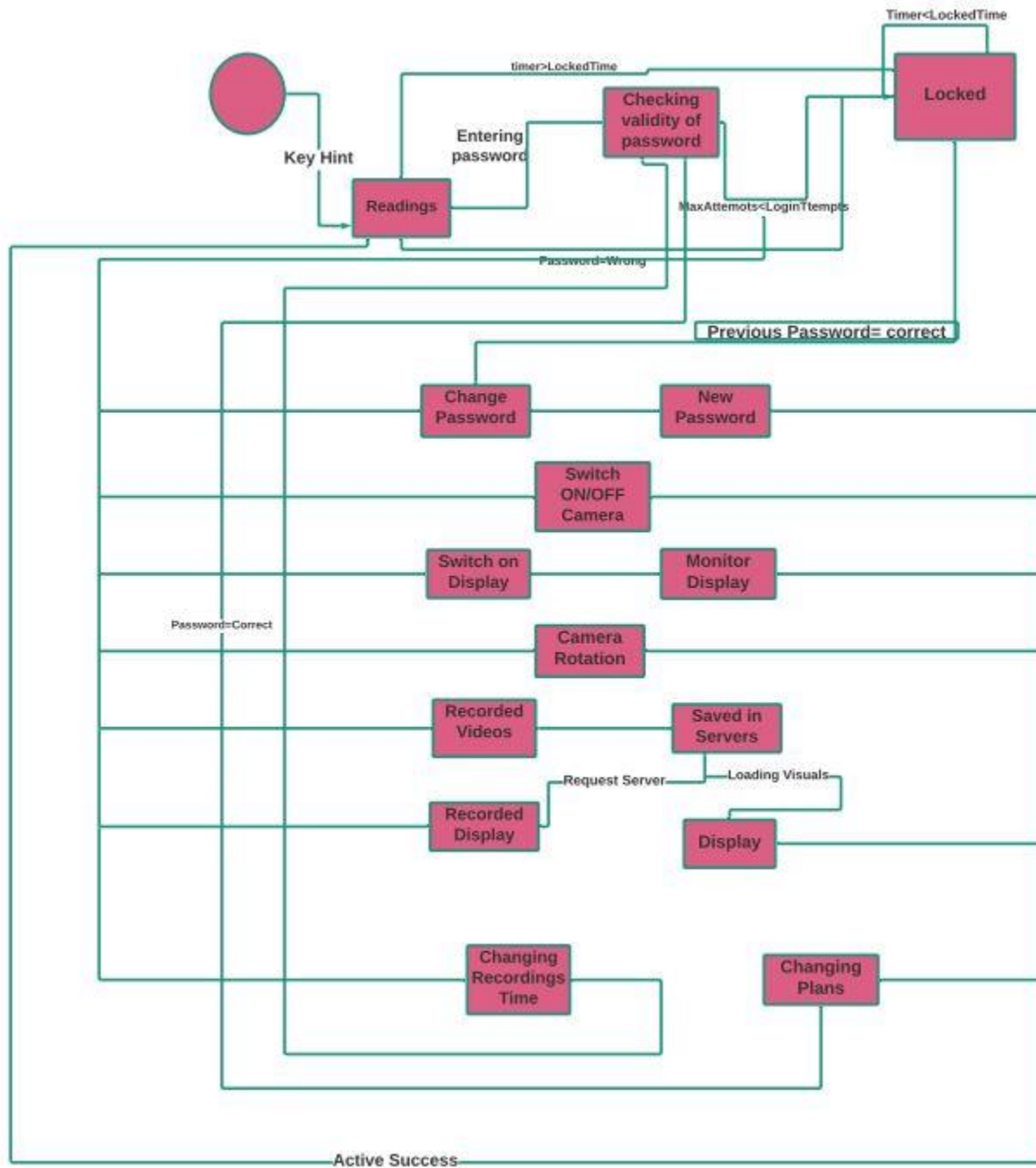


Figure 21: State Diagram

9. Swimlane Diagrams

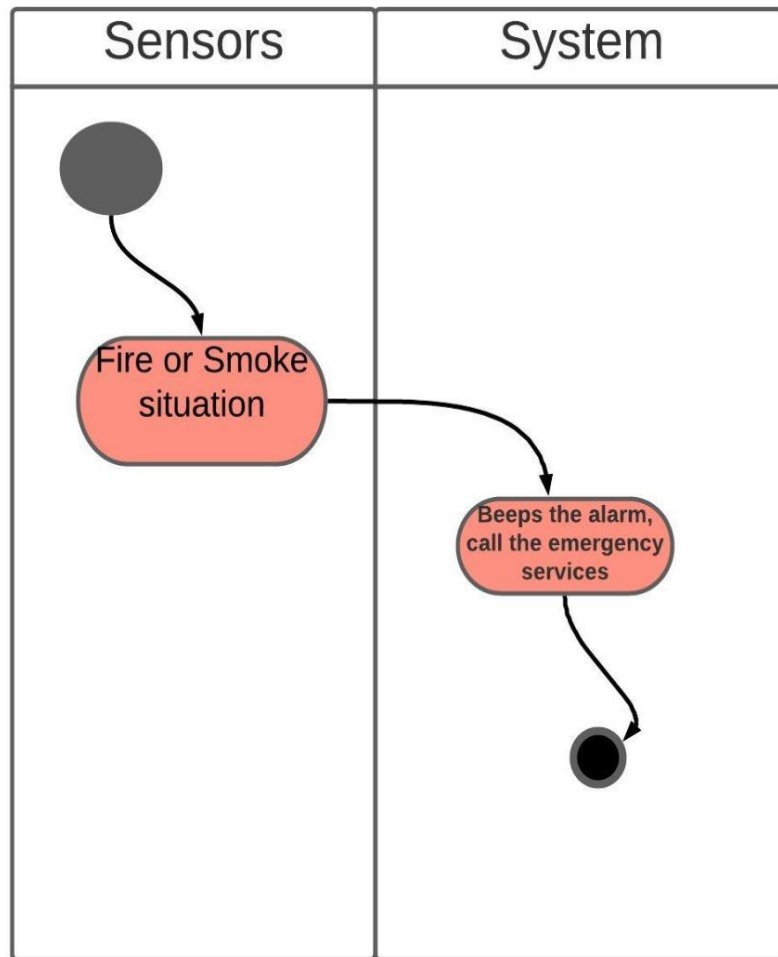
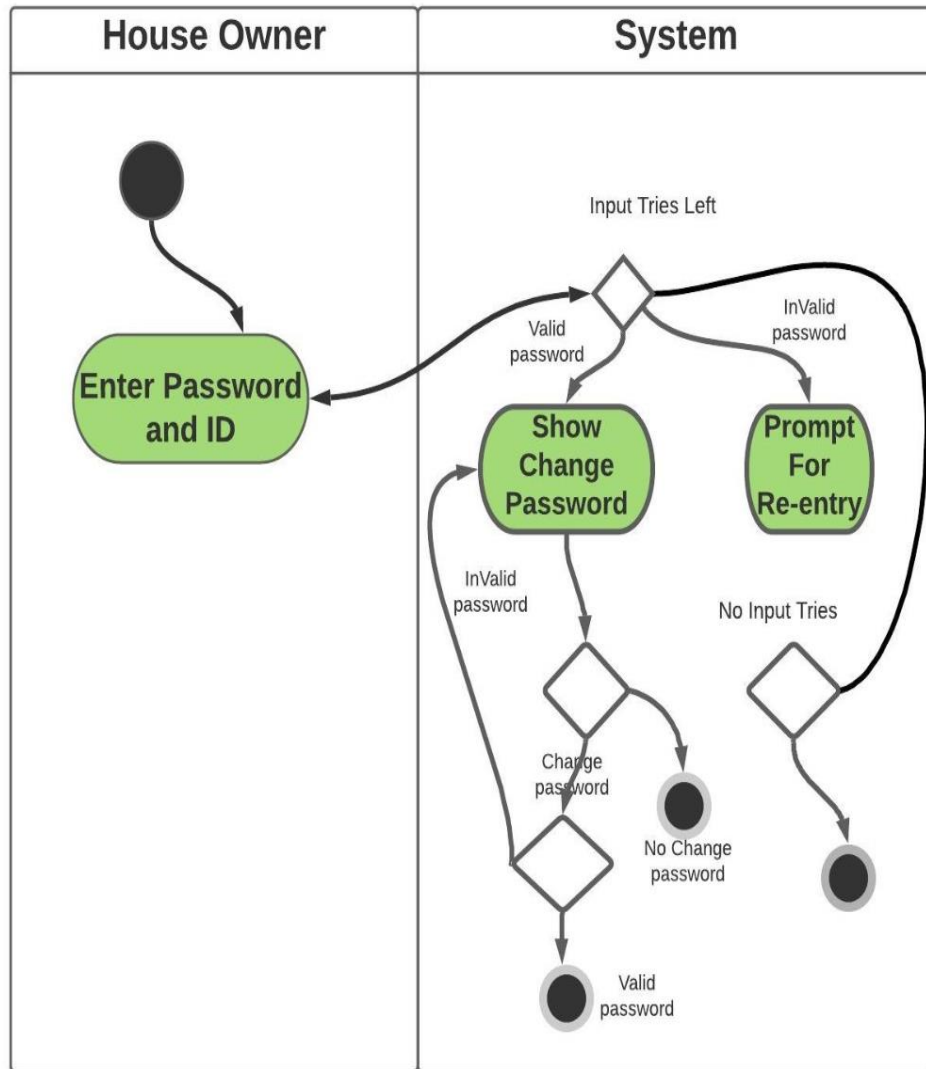
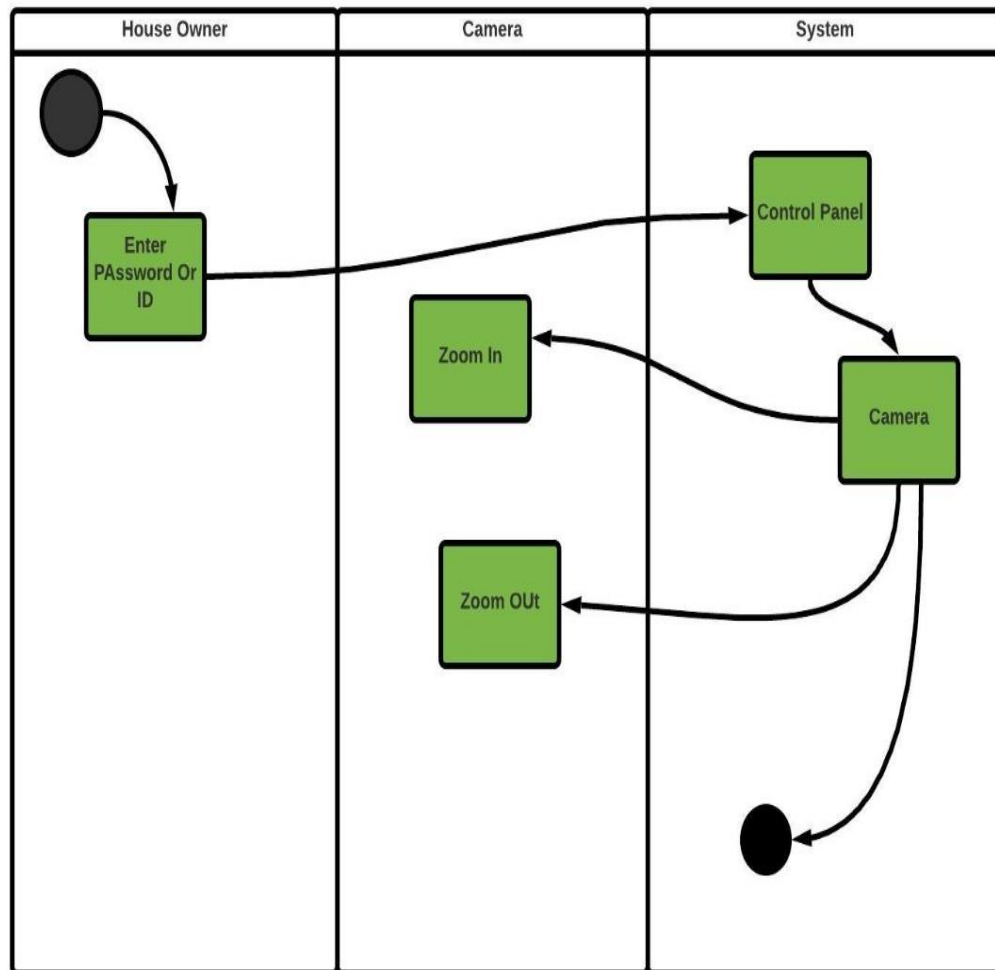


Figure 22: Use Case 2

**Figure 23: Use case 4**

**Figure 24: Use Case 8**

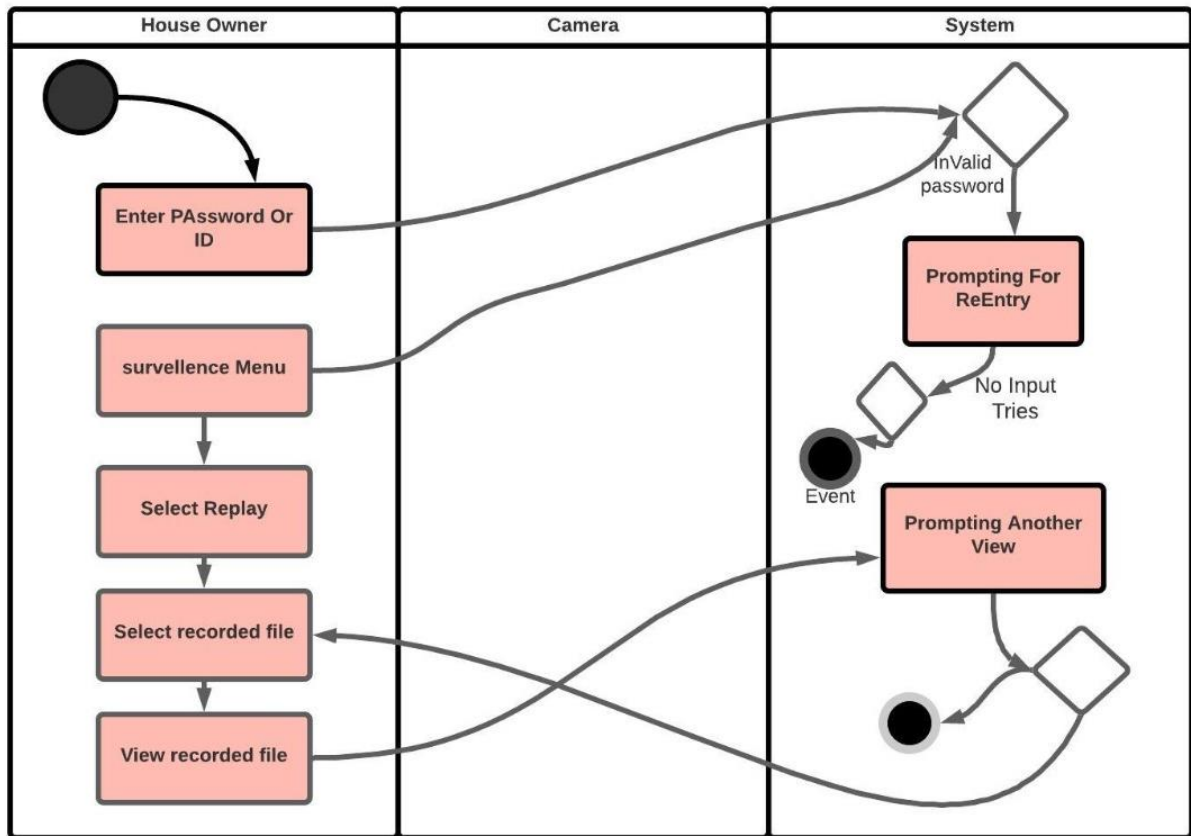


Figure 25: Use case 10

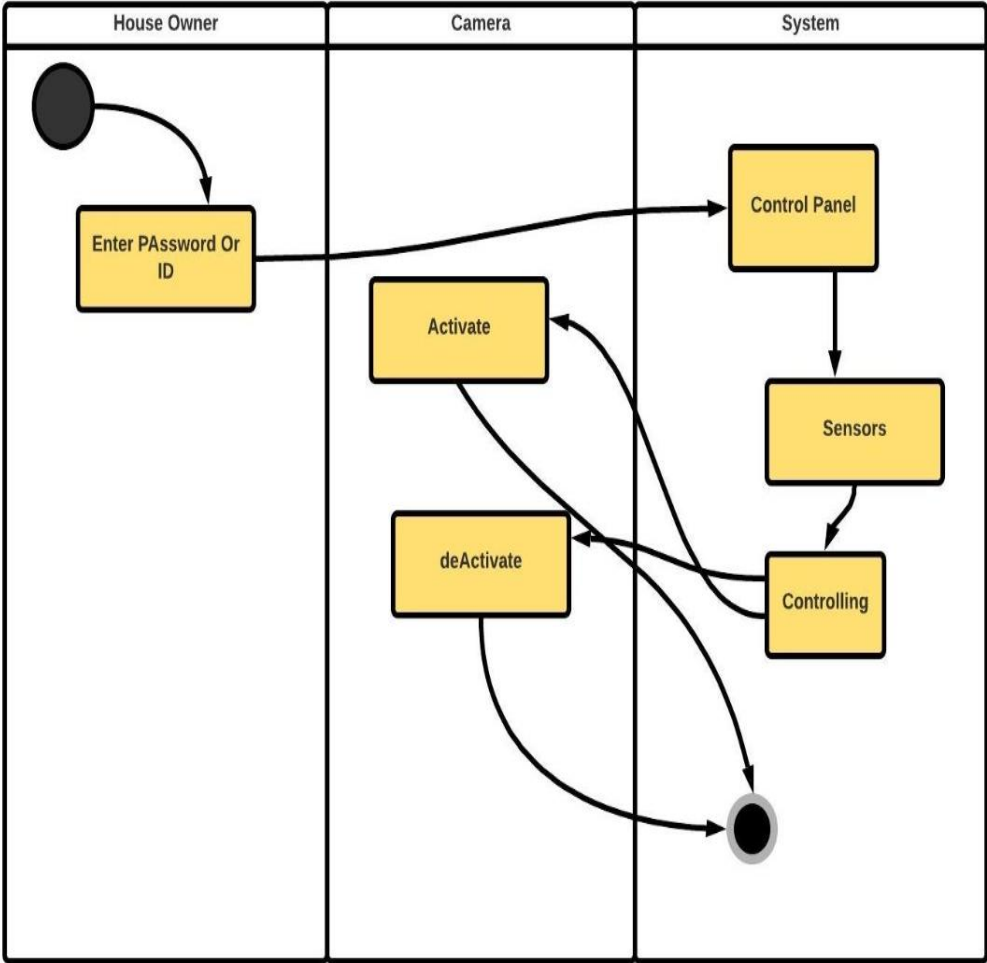
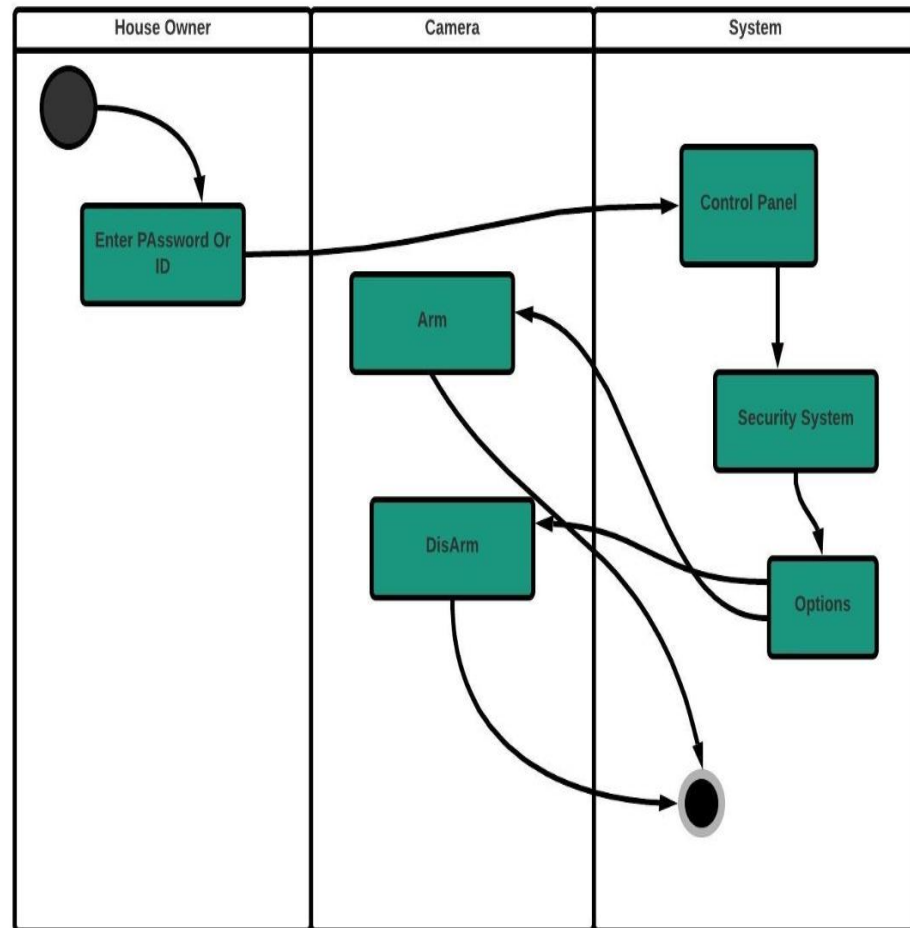


Figure 26: Use Case 11

**Figure 27: Use case 12**

10. CRC Models

CRC Models or CRC cards are Class-responsibilities-collaborations models. At the top of CRC cards name of class and below the name of class left side contains responsibilities and right side contains collaborations.

System	
<ul style="list-style-type: none"> • *Responsibilities* • Validates Password. • Change password • Beeps the emergency alarm 	<ul style="list-style-type: none"> • *Collaborations*

Figure 28: CRC for System

WebServer	
<ul style="list-style-type: none"> • *Responsibilities* • ID • password • Control Security System via Internet 	<ul style="list-style-type: none"> • *Collaborations* • Home owner

Figure 29: CRC for WebServer

Control Panel	
<ul style="list-style-type: none"> • *Responsibilities* • Helps to control the Camera • To on/off alarm • To zoom in/out video • Control panel is used to arm/disarm security system. 	<ul style="list-style-type: none"> • *Collaborations* • Camera • sensors • Actor

Figure 30: CRC for Control Panel

HomeOwner	
<ul style="list-style-type: none"> • *Responsibilities* • Email • Name • Username • Password • Home owner can play recordings. • Home owner can sound alarm. • Home owner can on/off and zoom in/out cameras. • Home owner can arm/disarm security system. • Home owner can activate/deactivate sensors. 	<ul style="list-style-type: none"> • *Collaborations* • Camera • Control Panel • Sensors

Figure 31: CRC for HomeOwner

Camera	
<ul style="list-style-type: none"> • *Responsibilities* • Camera ID • To record and play the video of home. • Rotation of cameras(Up, Down, Right, Left) • Pan output of camera view 	<ul style="list-style-type: none"> • *Collaborations* • Control Panel • Alarm

Figure 32: CRC for Camera

Sensor	
<ul style="list-style-type: none"> • *Responsibilities* • Detects an accident or intruder. • Detect emergency situation. 	<ul style="list-style-type: none"> • *Collaborations* • Alarm

Figure 33: CRC for Sensor



Figure 34: CRC for Monitoring_Company

11. Class Diagrams

11.1 MVC Architecture

During designing the class models, we followed the MVC (Model, View and Controller) architecture. MVC separates the business logic and presentation layer from each other. It was traditionally used for desktop graphical user interfaces (GUIs). MVC architecture has three components which are described in detail below:

11.1.1 Model

The model component stores data and its related logic. It represents data that is being transferred between controller components or any other related business logic. For example, a Controller object will retrieve the customer info from the database. It manipulates data and send back to the database or use it to render the same data.

11.1.2 View

A View is that part of the application that represents the presentation of data. Views are created by the data collected from the model data. A view requests the model to give information so that it resents the output presentation to the user. The view also represents the data from chats, diagrams, and table. For example, any customer view will include all the UI components like text boxes, drop downs, etc.

11.1.3 Controller

The Controller is that part of the application that handles the user interaction. The controller interprets the mouse and keyboard inputs from the user, informing model and the view to change as appropriate. A Controller send's commands to the model to update its state. The controller also sends commands to its associated view to change the view's presentation (For example scrolling a particular document).

We made the four major components of **Safe Home**. Details of each component is given below:

11.2 Authentication

When the user log in or sign up into the website, user is authenticated every time. Model classes in that component check that the user is already logged in or not by getting information from the database. If a user forgot the password then he can also get the new password or verification code from the administrations. Picture of authentication class model is given below:

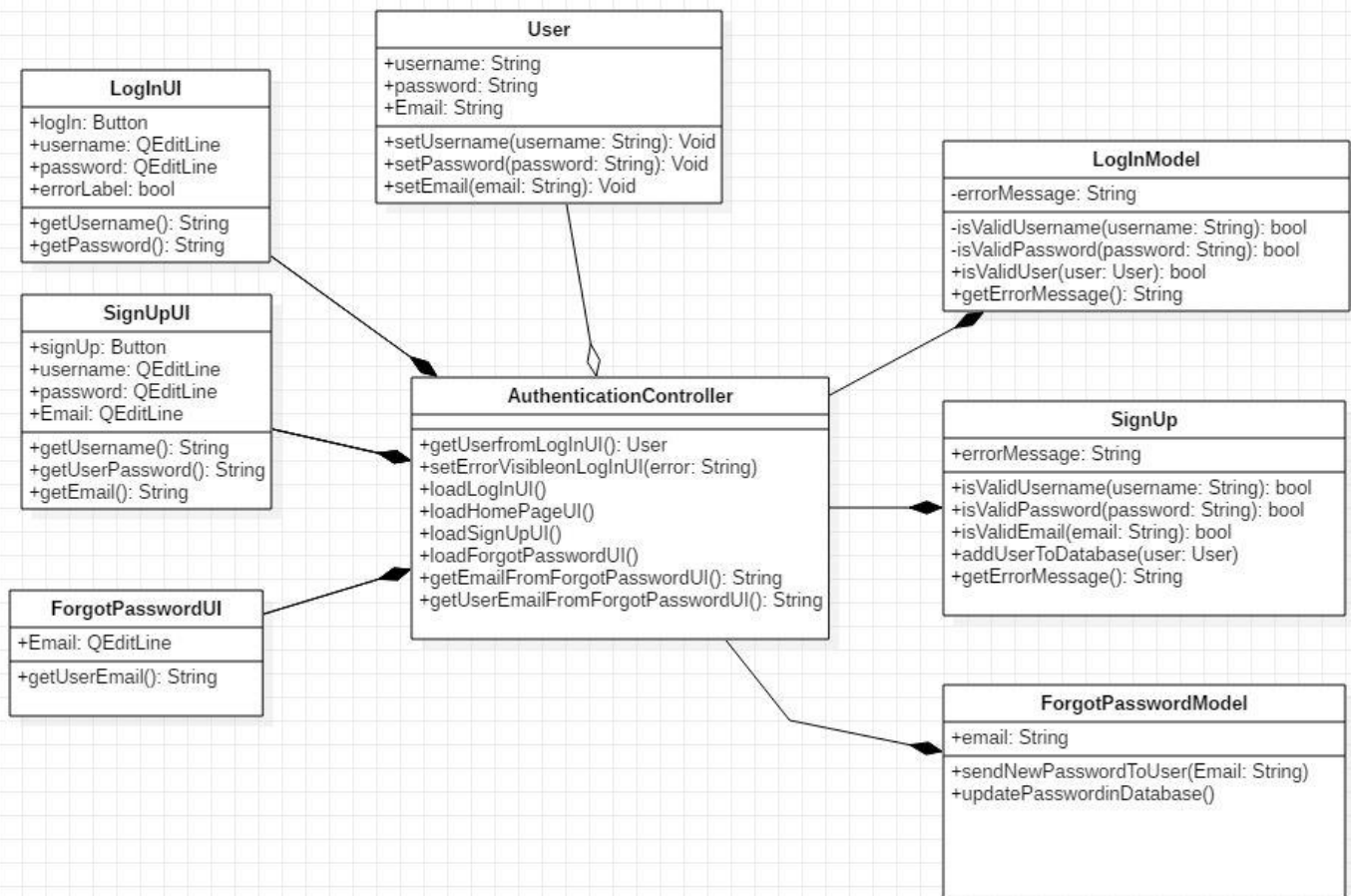


Figure 35: Authentication Class Model

11.3 Profile

We manage the information of the users in profile. User can edit the profile, change the password, add new account and can also switch the accounts. Picture of profile class model is given below:

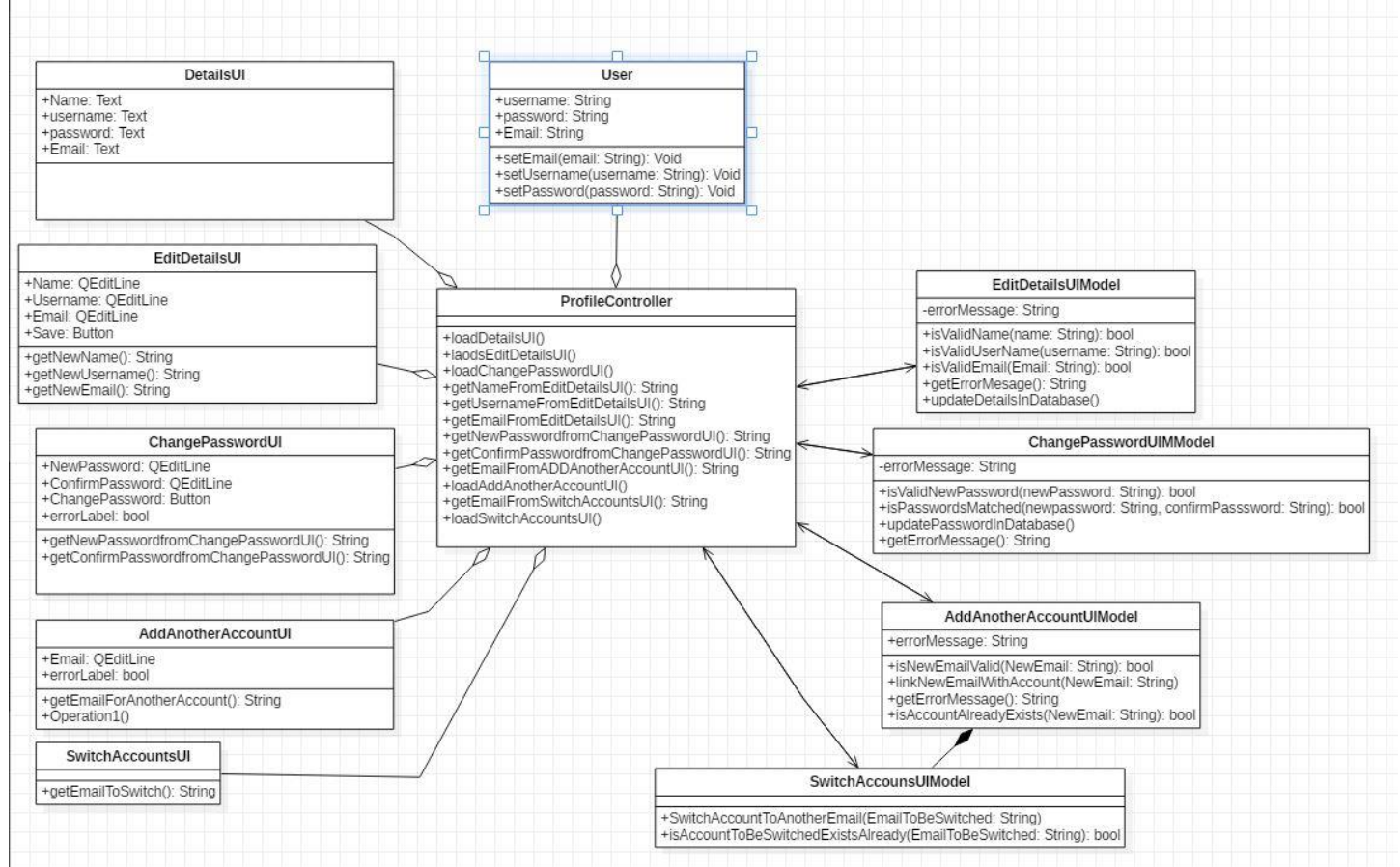


Figure 36: Profile Class Model

11.4 Surveillance

In surveillance component, we observe the house and may other devices. We zoom in and zoom out the cameras of house, rotate the cameras, record the output of camera, replay the recordings of cameras. Picture of Surveillance component is given below:

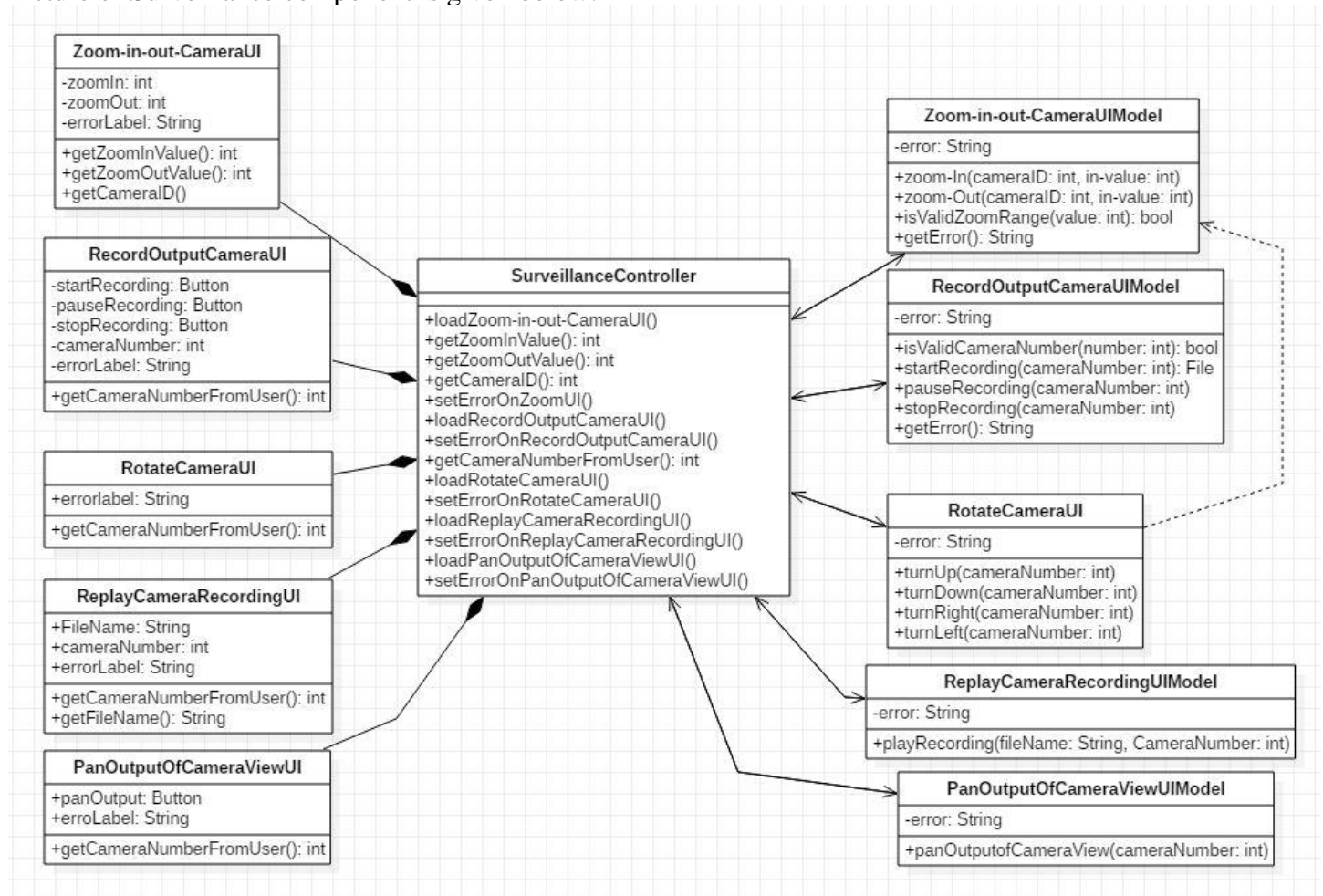


Figure 37: Surveillance Class Model

11.5 Security

In security system, we can make our home system secure by adding the sensors, removing sensors. We can also create the security zones and delete the security the zones. Picture of Security class model is given below:

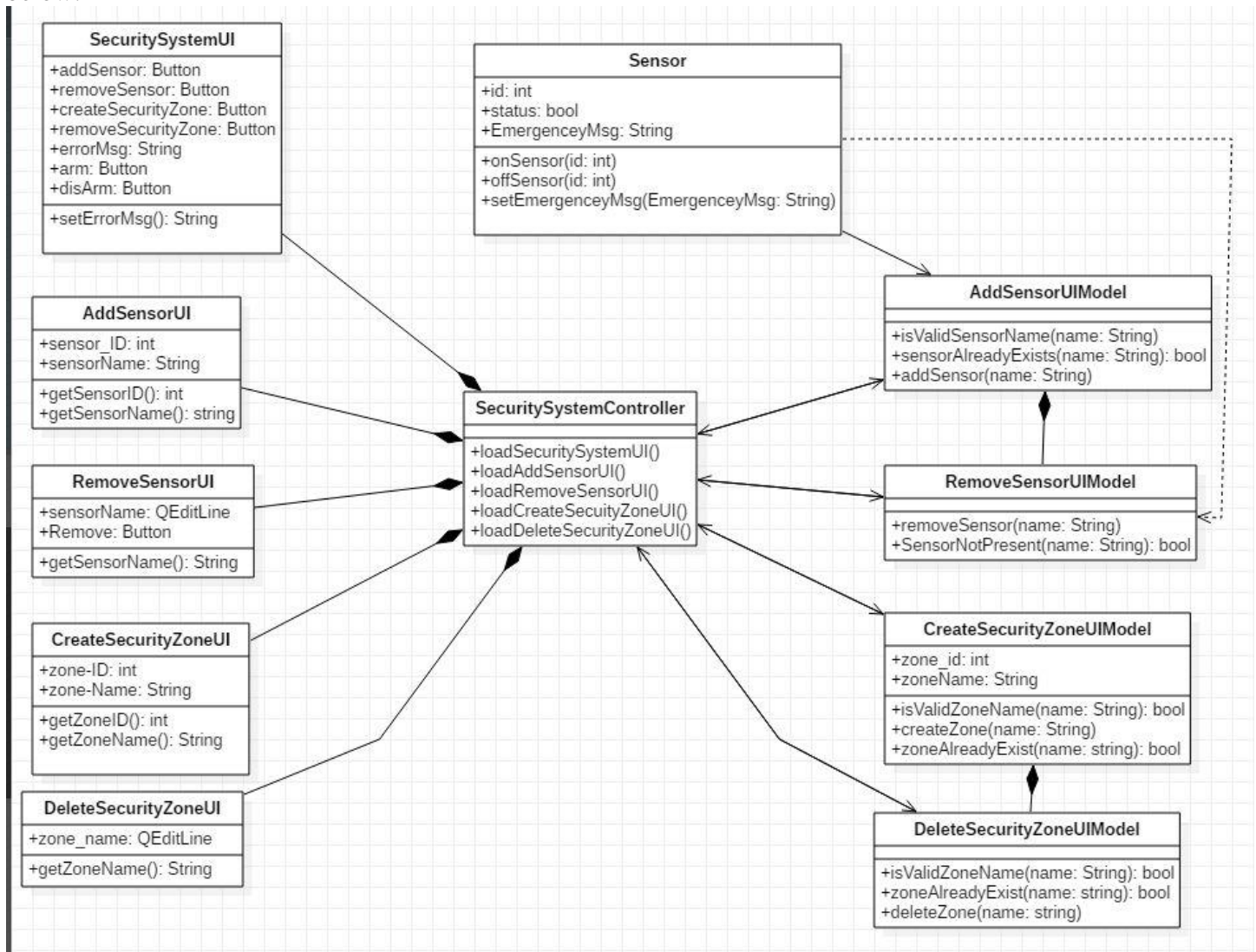


Figure 38: Security Class Model

11.6 Component Diagram of Complete System

A component diagram, also known as a UML component diagram, describes the organization and wiring of the physical components in a system. Component diagrams are often drawn to help model implementation details and double-check that every aspect of the system's required functions is covered by planned development. Our component diagram is given below:

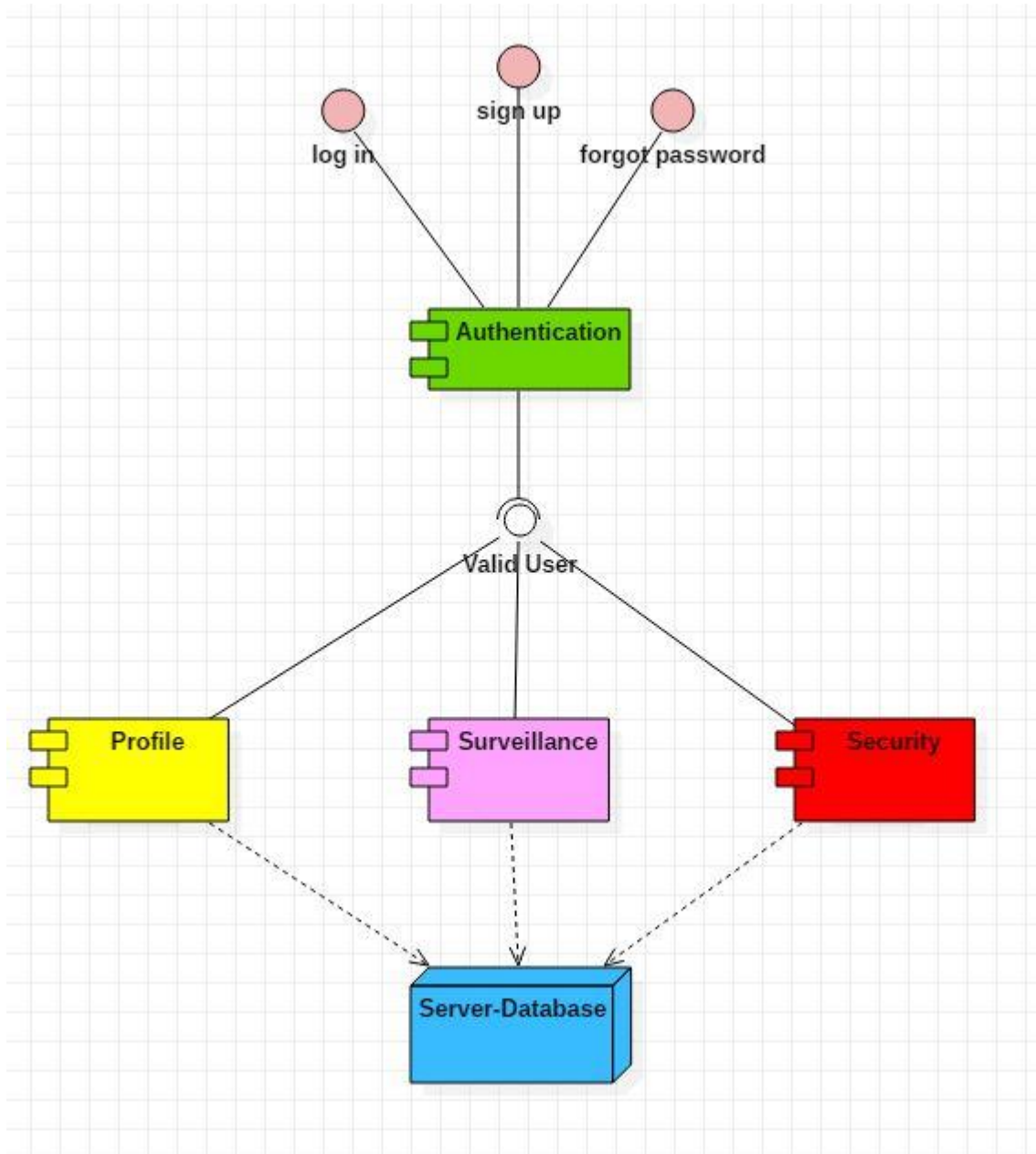


Figure 39: Component Diagram of Complete System

12. References

- <https://youtu.be/l94yQrAFtUM>
- <https://echeung.me/crcmaker>