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**Bachelor of Science (Honours)  
Software Development**

**Home Automation System  
Requirement Specification**

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## Abstract

The purpose of this document is to provide a detail of the functional requirement specification of the Home Automation System. The functionalities are outlined as core components on the system and describe each component requirement in detail. This document first presents an overview of Home Automation System and then given out a structure of whole system that presents the key modules.

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## 1. Introduction

Home automation system based on home as a platform, it can manage appliances, sensors in order to provide an ability to remote control, security monitoring, entertainment, energy-saving through communication networks make people experience a more safe, comfortable, smart and fashion home. The appliances are also controlled more efficiently, reasonably and conveniently.

## 2. Overview

This home automation system that mainly involves modules includes appliances control, security monitoring, entertainment and sensors control. Those module's requirements will be described in detail in the 3rd chapter. The different functions will be covered in each of the modules.

### 2.1 Goal

The goal of the home automation system is to implement the smart home mobile app, which makes it more convenient for family members to control appliances, let members easily understand the appliance status, improve safety by security monitoring and experience a better life and fun.

### 2.2 Structure

The overview of the project structure diagram which according to the project goal is shown below.

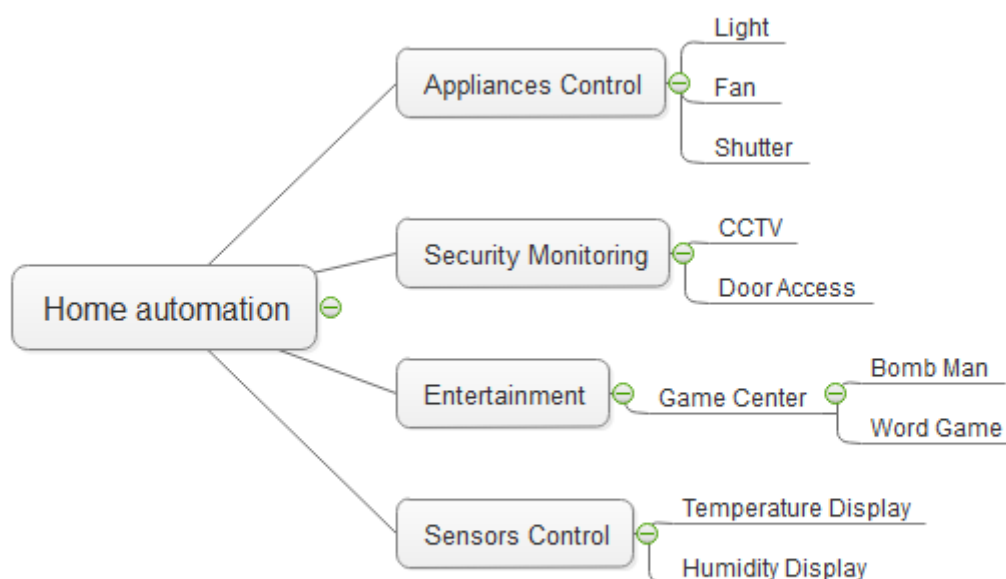


Figure 1 structure

### 2.3 Function List

There outlined the functions of each module as a global view in the home automation project.

Project Name	Modules	Devices	Functions	Priority	Description
Home Automation	Appliances Control	Light	Switch on / off	High	By UI button
			Switch on / off by voice	High	
		Fan	Turn on / off	Medium	
			Adjust speed	Low	
		Shutter	Move to left / right	Medium	
			Pause	Medium	
	Security Monitoring	CCTV	Turn on / off	Medium	
		Door access	Doorbell button on / off	High	
			Doorbell on / off	High	
			e-locker lock / unlock	High	
	Camera on / off		High		
	Sensors	Temperature	Display in real-time	Medium	
		Humidity	Display in real-time	Medium	
	Entertainment	Game centre	Bomb man	Low	C++ project in 3 <sup>rd</sup> year
Word game			Low	Python project 3 <sup>rd</sup> year	

## 2.4 Workflow

There are two types of workflow that are action trigger workflow by mobile app and sensor automate workflow by sensor itself routine in the system.

For examples, the light is switched on or off that needs to click the button where in the mobile app to trigger an event to control the light, that obviously belong to action trigger workflow. On the other hand, if the mobile app needs to show the temperature and humidity measurement that should be continuously send the data from sensor to the mobile app, this action from sensor is automating workflow through a small piece interval of time.

### 2.4.1 Action trigger workflow

Action trigger workflow via local network (LAN)

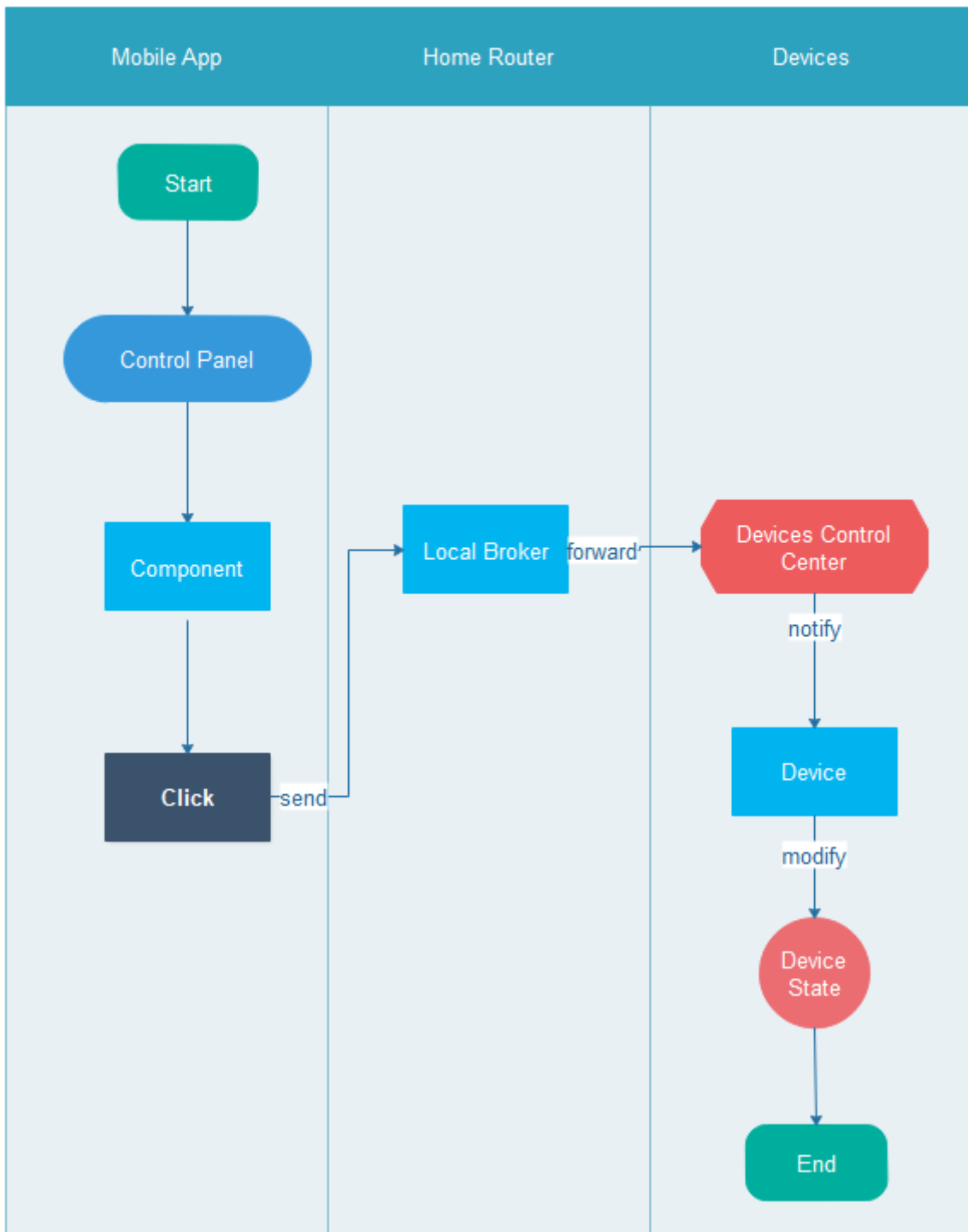


Figure 2 action trigger workflow via LAN

Action trigger workflow via Internet (WAN)



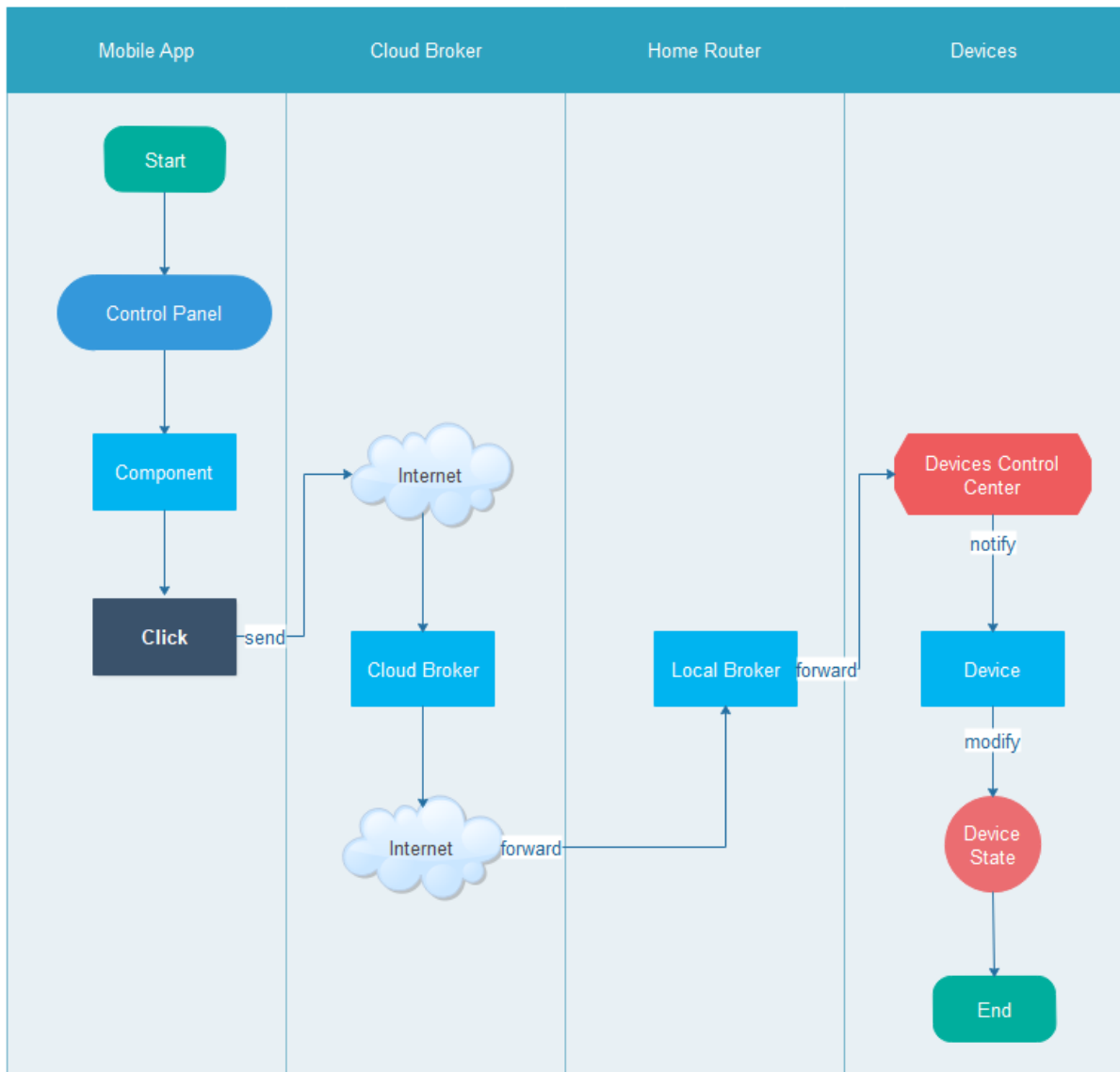


Figure 3 action trigger workflow via WAN

#### 2.4.2 Sensor automate workflow

Sensor automate workflow via local network (LAN)

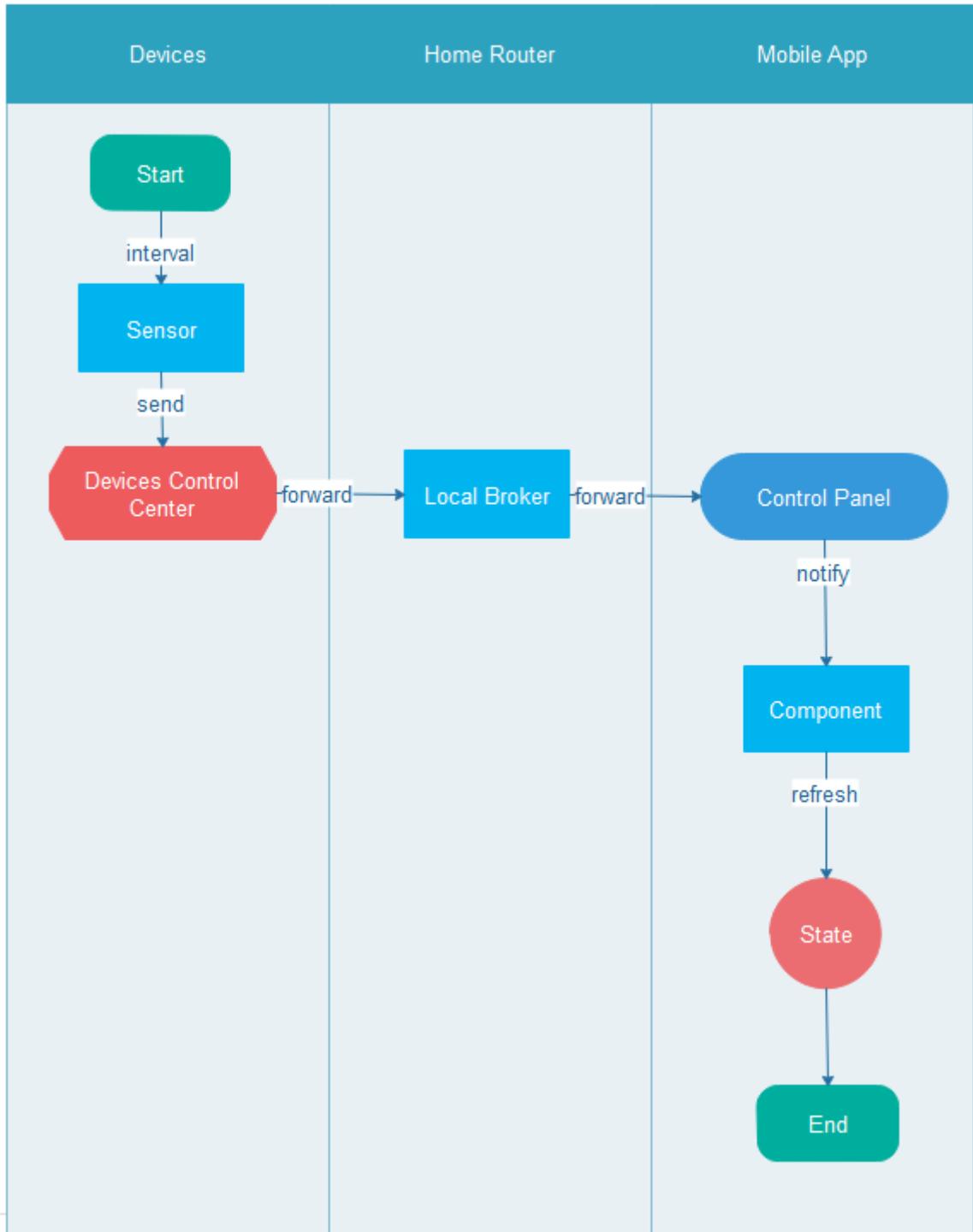


Figure 4 sensor automate workflow via LAN

Sensor automate workflow via Internet (WAN)

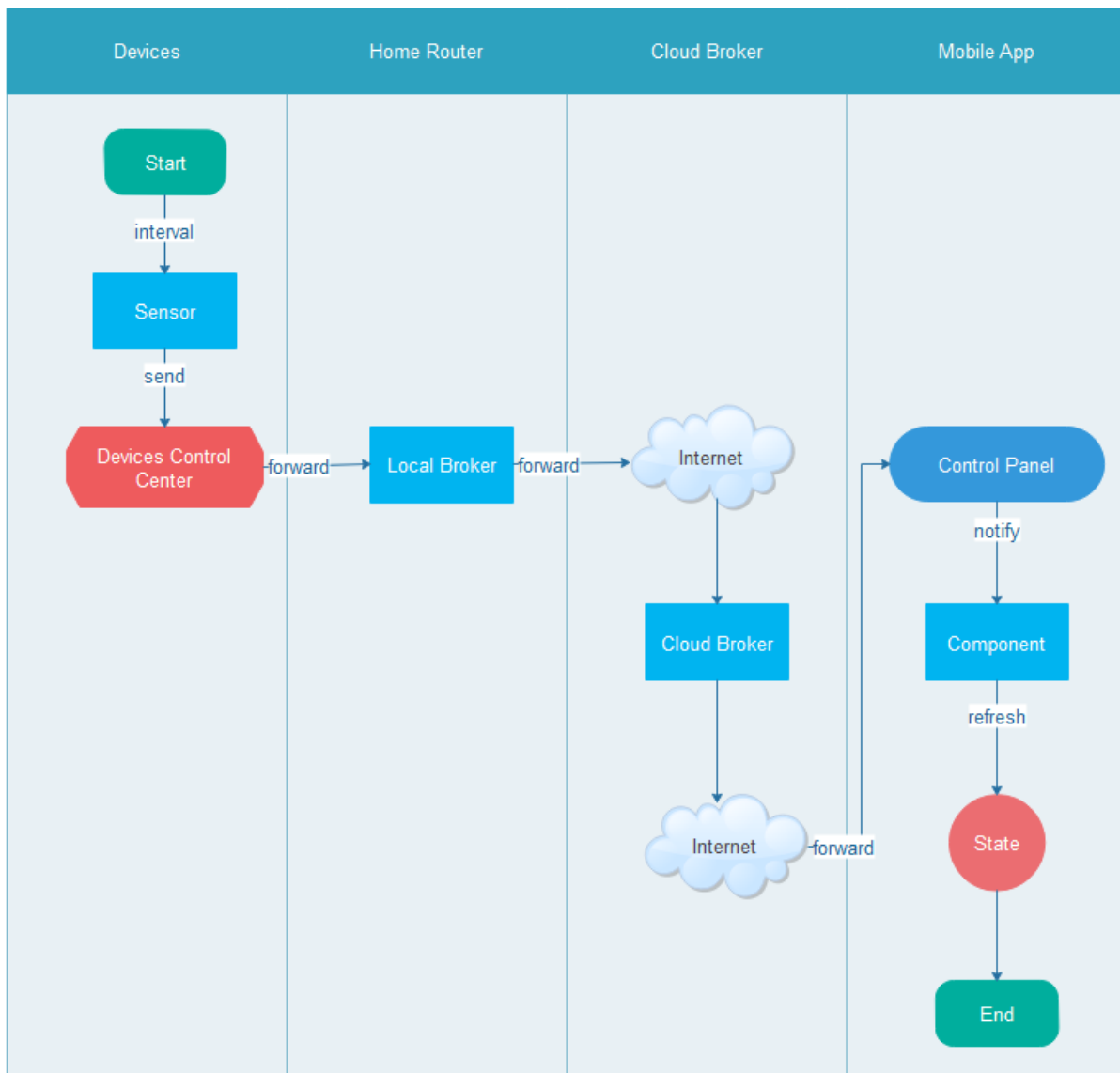


Figure 5 sensor automate workflow via WAN

### 3. Functional Requirement

This chapter will detail the requirement specification with each of functions which are listed in the [2.4 section](#).

The home page is introduced that gives a subsystem navigator to the householder. Due to the [2.1 section Goal](#) in this document described the scope of this project. So, the functional requirement only describes the detail on the 'Remote Control' subsystem. It is not going to introduce other two subsystems which are 'Data Statistical' and 'Device Configuration'.

The device control panel will be shown up on the screen when the 'Remote Control' is clicked. In this screen, the householder can manage the appliances, sensors, security monitoring and enjoy in the entertainment.

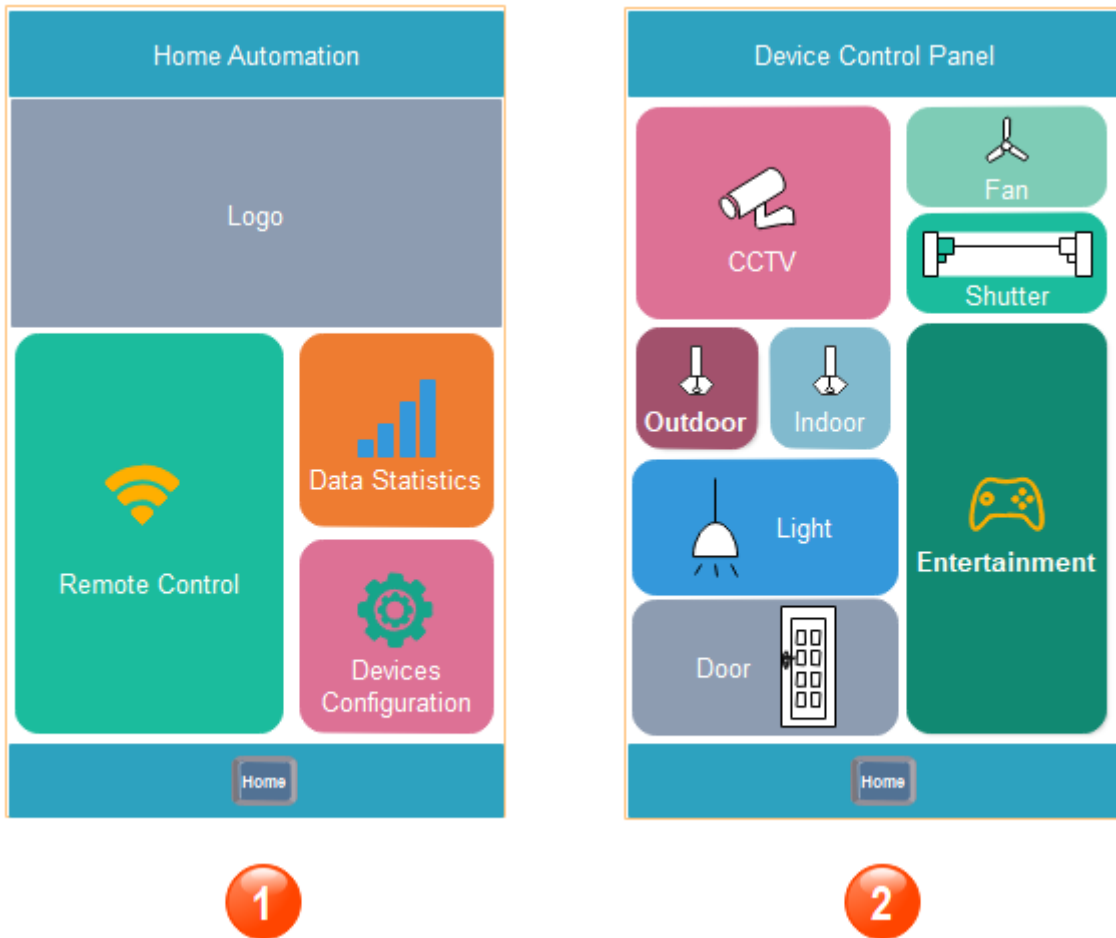


Figure 6 home screen

### 3.1 Appliance control

In general, the appliances control was widely applied in the home automation field that will be given more convenience to manage them for the householder.

#### 3.1.1 Light

The light module that manages its status is to turn on or off. There are two ways to control the light that respectively are controlled by the UI button and Voice. In addition, the light should work on the local network or internet which the mobile app communicates to.

##### 3.1.1.1 Turn Light On

###### User Story

As a householder, I want to have a switch button on the UI of the mobile app, so that I can turn the light on via my mobile app.

## User Interface

The mobile app UI design diagram below. The light control option should be chosen When the householder is going to control the light.

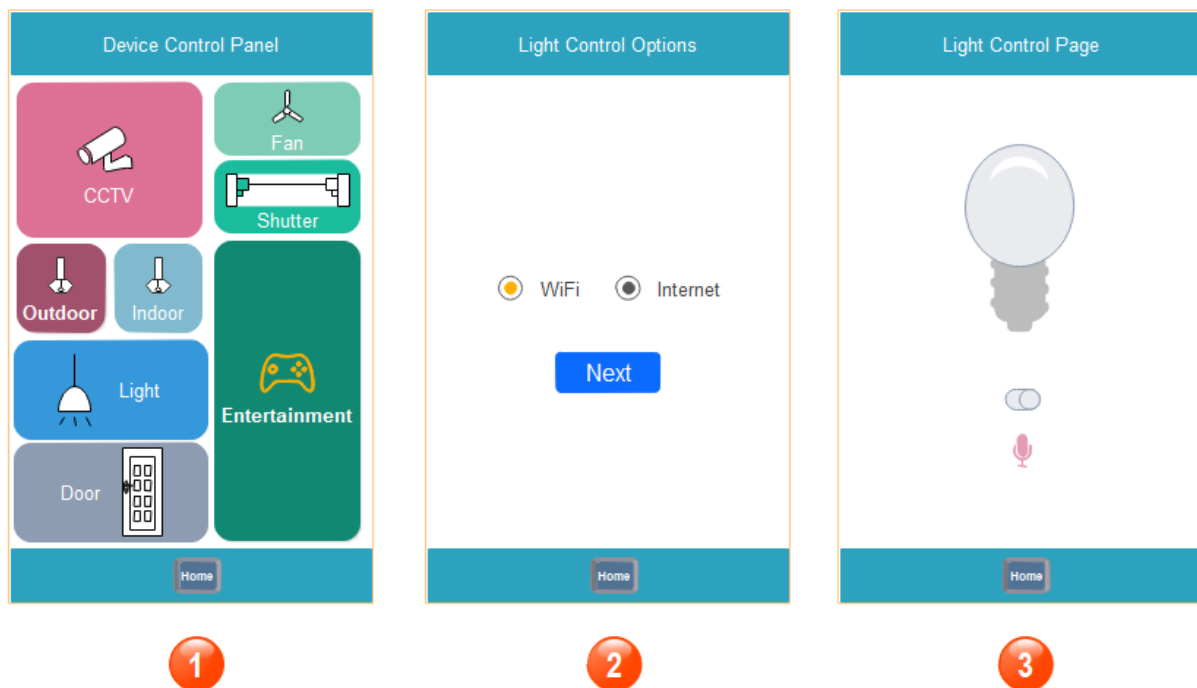


Figure 7 light operation screen

## Prerequisite

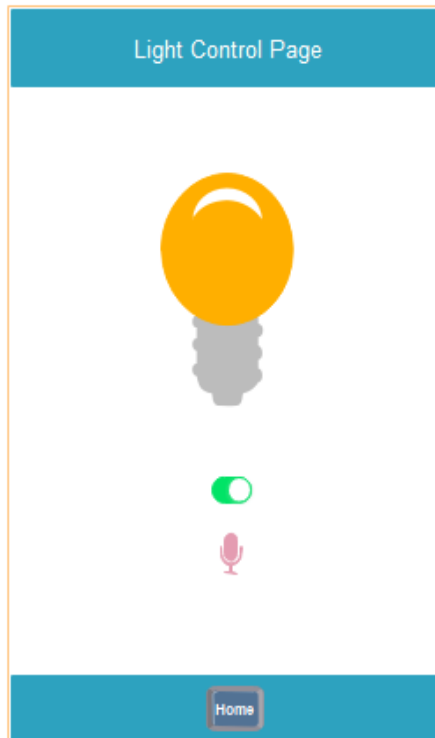
- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Light Control Page should show on the screen through navigator:
  - Remote Control -> Light -> Light Control Options -> Light Control Page
- iv. The light status that should be turned off already.

## Description

When the Light Control Page has been already shown on the screen, the householder could click the switch button to turn on the light.

## Post requisite

- i. After the householder clicked the switch button, then the bulb image should change the colour to indicate bulb is on.
- ii. The switch button also should be enabled.
- iii. Meanwhile, the table light in the real-world should be on.



*Figure 8 light control page*

### 3.1.1.2 Turn Light Off

#### User Story

As a householder, I want to have a switch button on the UI of the mobile app, so that I can turn the light off via my mobile app.

#### User Interface

The mobile app UI design diagram below. The light control option should be chosen When the householder is going to control the light. The bulb should be on if you want to turn it off on the light control page.

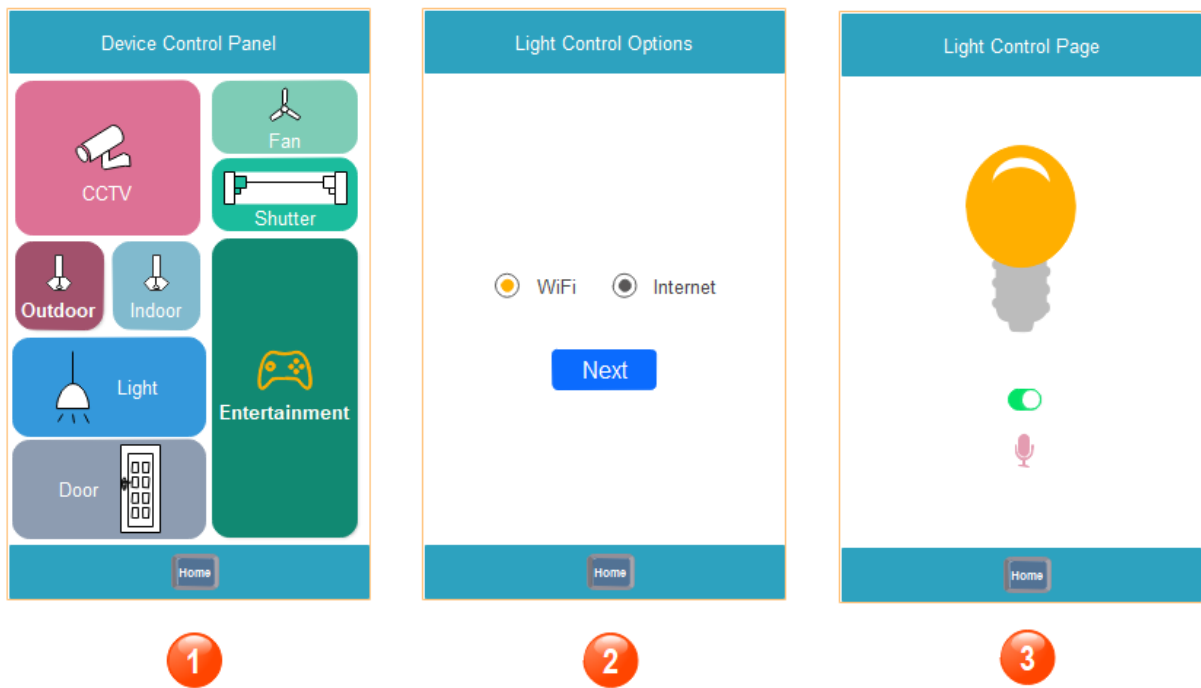


Figure 9 light on operation via Wi-Fi

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Light Control Page should show on the screen through navigator:
  - Remote Control -> Light -> Light Control Options -> Light Control Page
- iv. The light status that should be turned on already.

#### Description

When the Light Control Page has been already shown on the screen, the householder could click the switch button to turn off the light.

#### Post requisite

- i. After the householder clicked the switch button, then the bulb image should change the colour to indicate bulb is off.
- ii. The switch button also should be disabled.
- iii. Meanwhile, the table light in the real-world should be off.

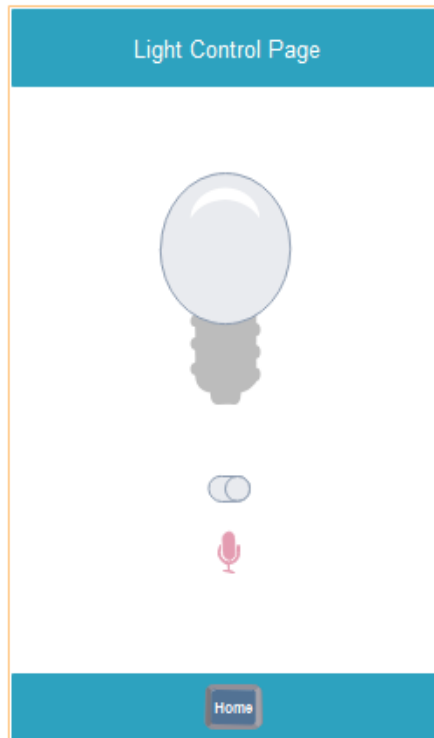


Figure 10 light turn off screen

### 3.1.1.3 Turn Light On via Voice

#### User Story

As a householder, I want to have a voice button on the UI of the mobile app, so that I can turn the light on when I speak to my mobile app.

#### User Interface

The mobile app UI design diagram below. The light control option should be chosen When the householder is going to control the light. The voice button next to the switch button on the light control page.



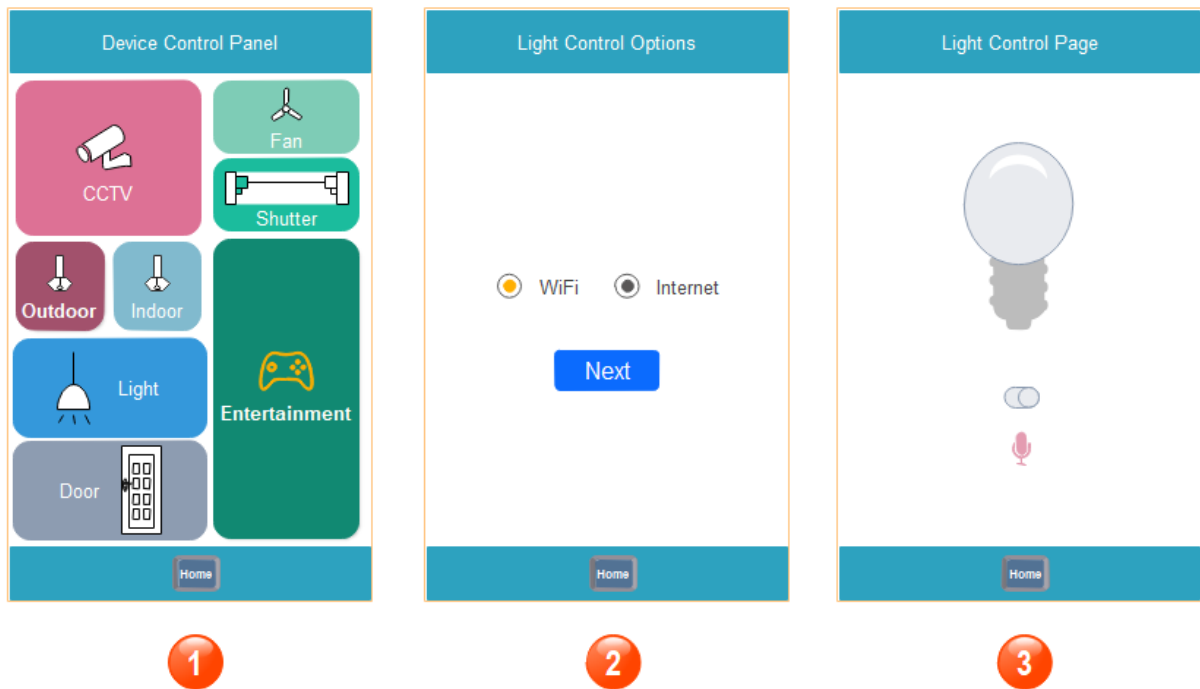


Figure 11 light turn on via voice screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Light Control Page should show on the screen through navigator:
  - Remote Control -> Light -> Light Control Options -> Light Control Page
- iv. The light status that should be turned off already.

#### Description

When the Light Control Page has been already shown on the screen, the householder could click the voice button to record the key word 'Light on' that the human speaks loudly out.

#### Post requisite

- i. After the householder clicked the voice button and speak out the key word 'Light on', then the bulb image should change the colour to indicate the bulb is on.
- ii. The switch button also should be enabled, and the voice button should be highlight.
- iii. The content which the householder spoke out should be printed on the screen.
- iv. Meanwhile, the table light in the real-world should be on.

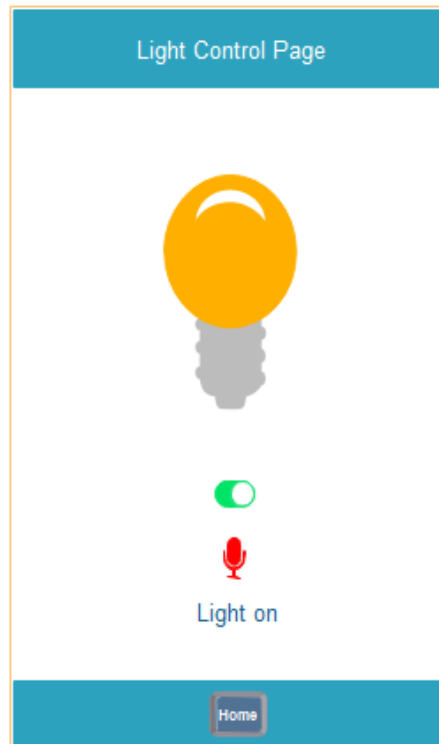


Figure 12 light turn on via voice screen

#### 3.1.1.4 Turn Light Off via Voice

##### User Story

As a householder, I want to have a voice button on the UI of the mobile app, so that I can turn the light off when I speak to my mobile app.

##### User Interface

The mobile app UI design diagram below. The light control option should be chosen When the householder is going to control the light. The voice button next to the switch button on the light control page.

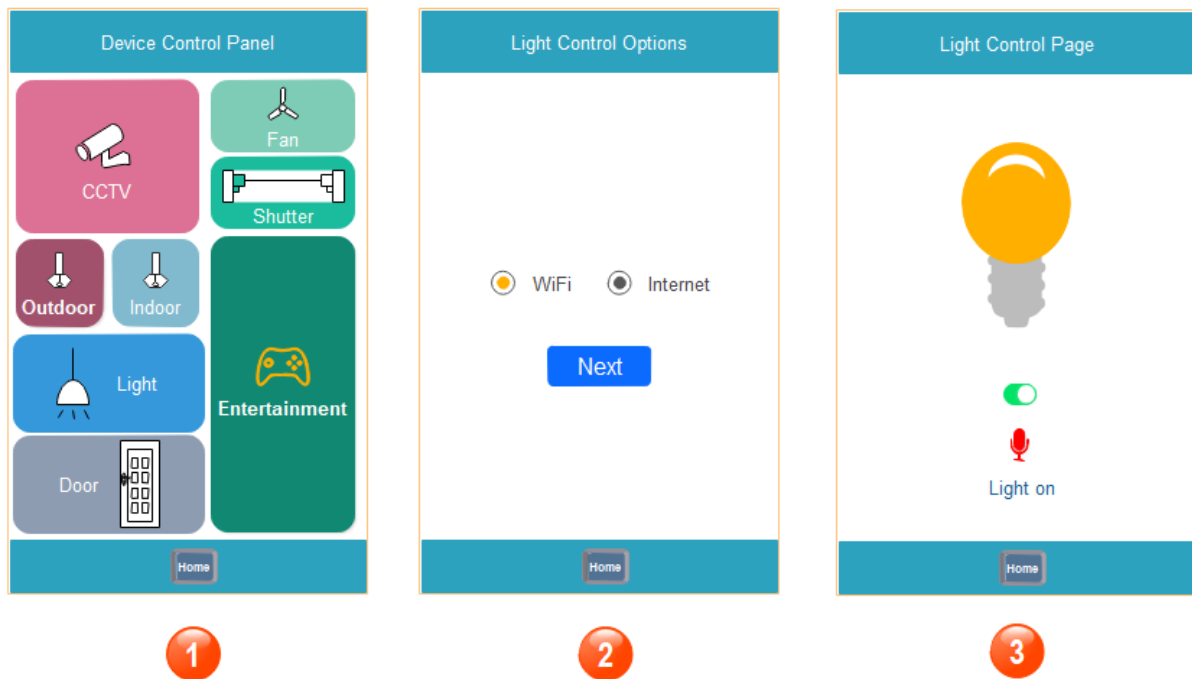


Figure 13 light turn off via voice screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Light Control Page should show on the screen through navigator:
  - Remote Control -> Light -> Light Control Options -> Light Control Page
- iv. The light status that should be turned on already.

#### Description

When the Light Control Page has been already shown on the screen, the householder could click the voice button to record the key word 'Light off' that the human speaks loudly out.

#### Post requisite

- i. After the householder clicked the voice button and speak out the key word 'Light off', then the bulb image should change the colour to indicate the bulb is off.
- ii. The switch button also should be disabled, and the voice button should be highlight.
- iii. The content which the householder spoke out should be printed on the screen.
- iv. Meanwhile, the table light in the real-world should be off.

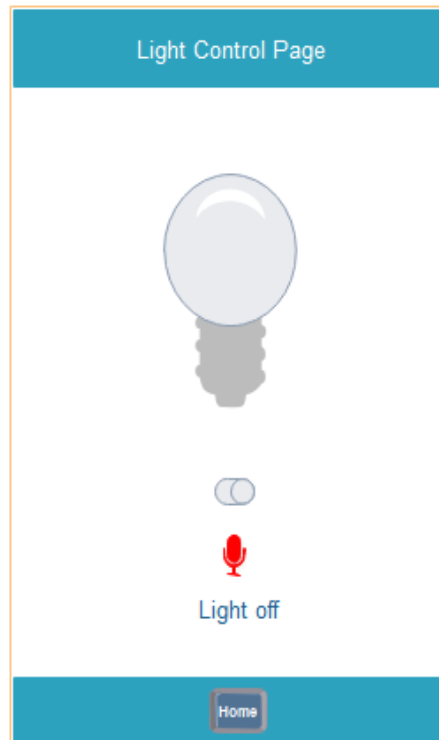


Figure 14 light turn off via voice screen

### 3.1.2 Fan

The Fan module that manages its status is to turn on, turn off and adjust its running speed that will notify the fan in the real-world to execute the corresponding action. In this module, the communication between the mobile app to the fan in the real-world through Wi-Fi.

#### 3.1.2.1 Turn Fan On

##### User Story

As a householder, I want to have a switch button on the UI of the mobile app, so that I can turn the fan on with default running speed in the real world.

##### User Interface

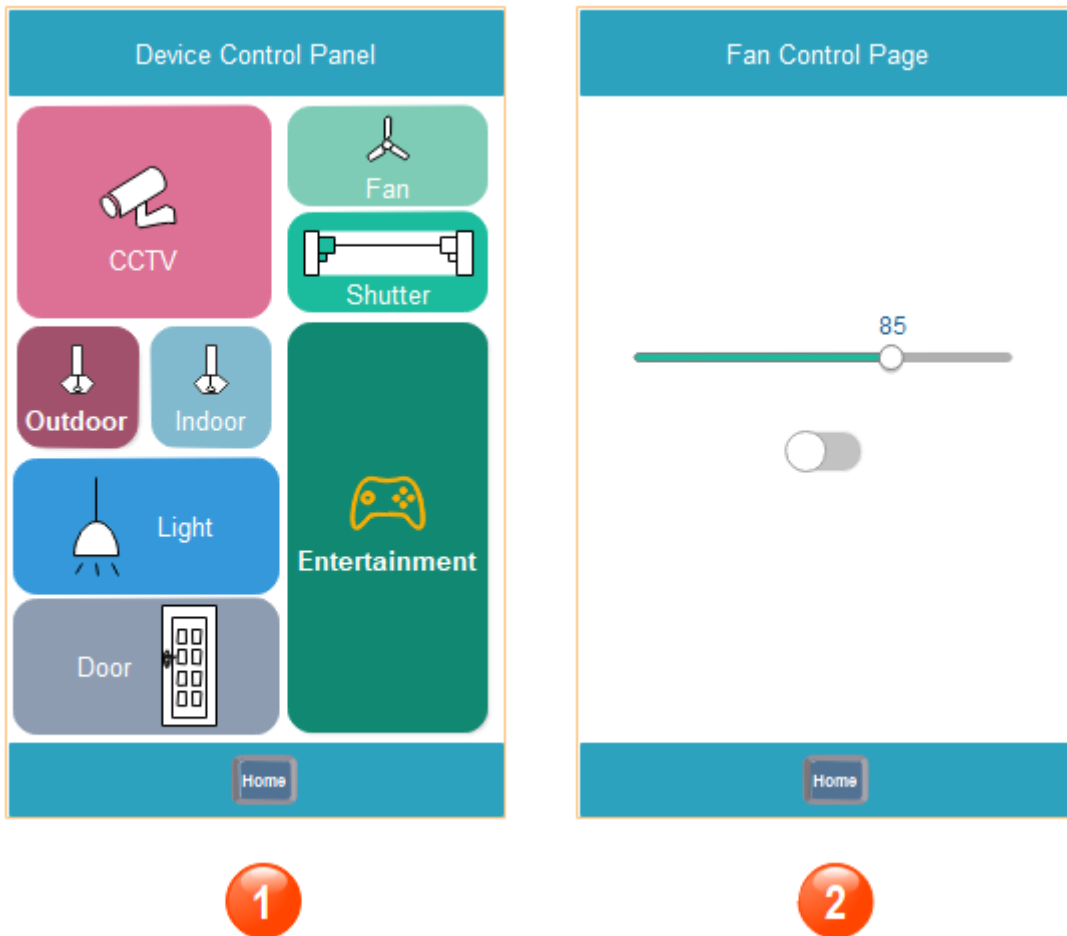


Figure 15 fan operation screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Light Control Page should show on the screen through navigator:
  - Remote Control -> Fan -> Fan Control Page
- iv. The Fan status that should be turned off already.
- v. The Fan default running speed has already been configured in app.

#### Description

When the Fan Control Page has been already shown on the screen, the householder can click the switch button to turn on the Fan.

#### Post requisite

- i. After the householder clicked the switch button on the screen in the mobile app, then the fan in the real-world should run with set up speed.
- ii. The switch button status should be enabled on the screen.

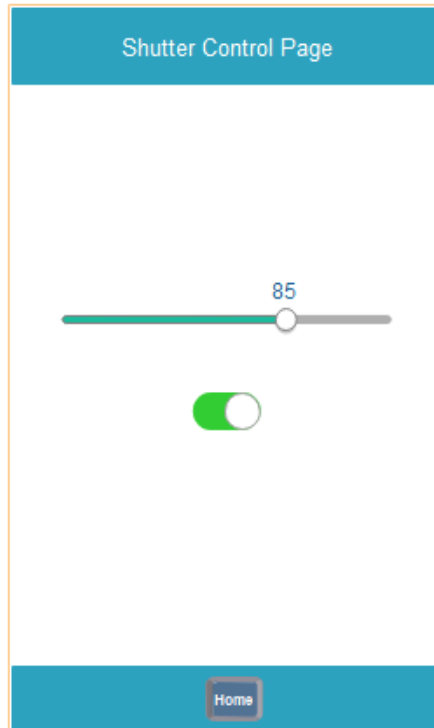


Figure 16 fan control panel

### 3.1.2.2 Turn Fan Off

#### User Story

As a householder, I want to have a switch button on the UI of the mobile app, so that I can turn the fan off with default running speed in the real world.

#### User Interface

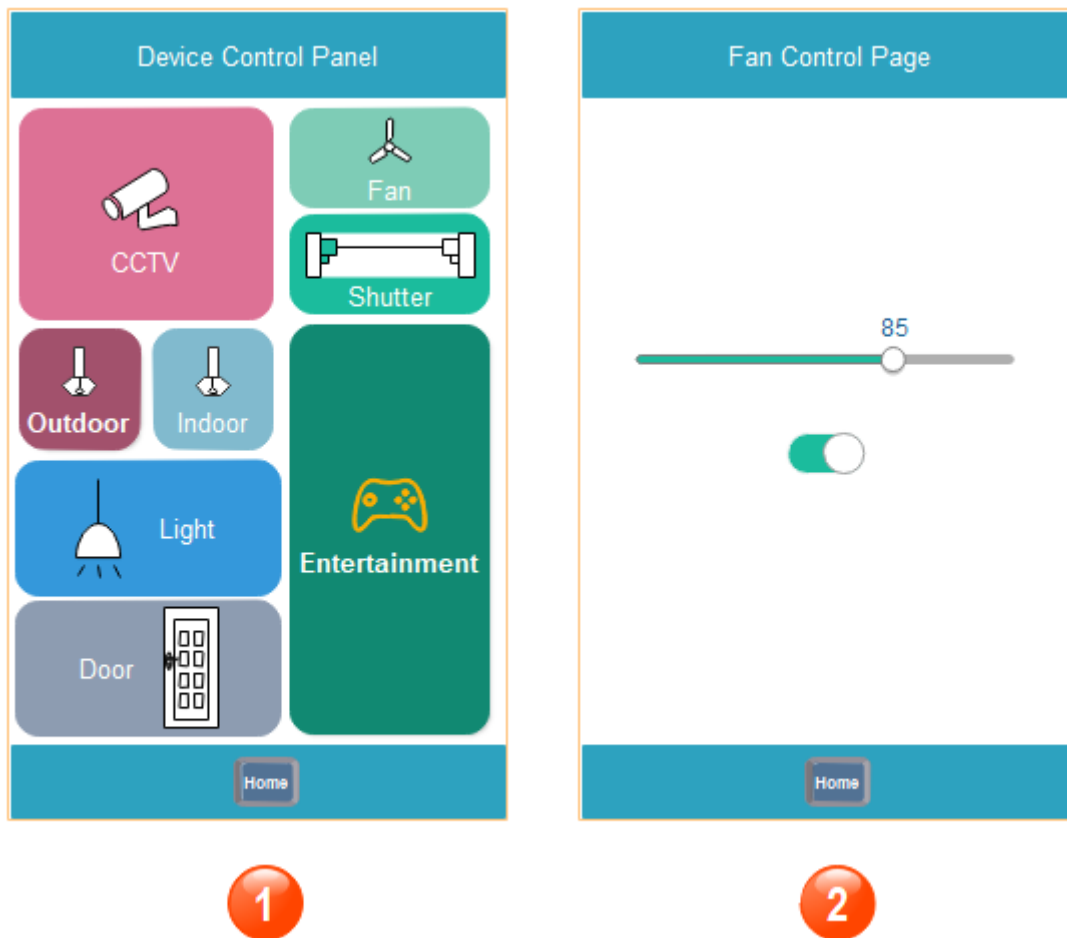


Figure 17 fan turn off screen

#### Prerequisite

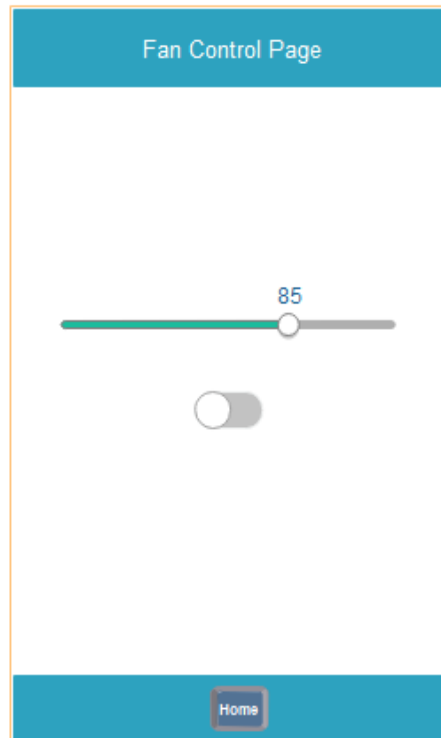
- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Light Control Page should show on the screen through navigator:
  - Remote Control -> Fan -> Fan Control Page
- iv. The Fan status that should be turned on already.

#### Description

When the Fan Control Page has been already shown on the screen, the householder can click the stop button to turn off the Fan.

#### Post requisite

- i. After the householder clicked the switch button on the screen in the mobile app, then the fan in the real-world should stop running.
- ii. The switch button status should be disabled on the screen.



*Figure 18 fan control panel screen*

### 3.1.2.3 Adjust Fan Speed

#### User Story

As a householder, I want to have a slidable progress bar on the UI of the mobile app, so that I can adjust the speed to the fan in the real world through sliding the progress bar.

#### User Interface



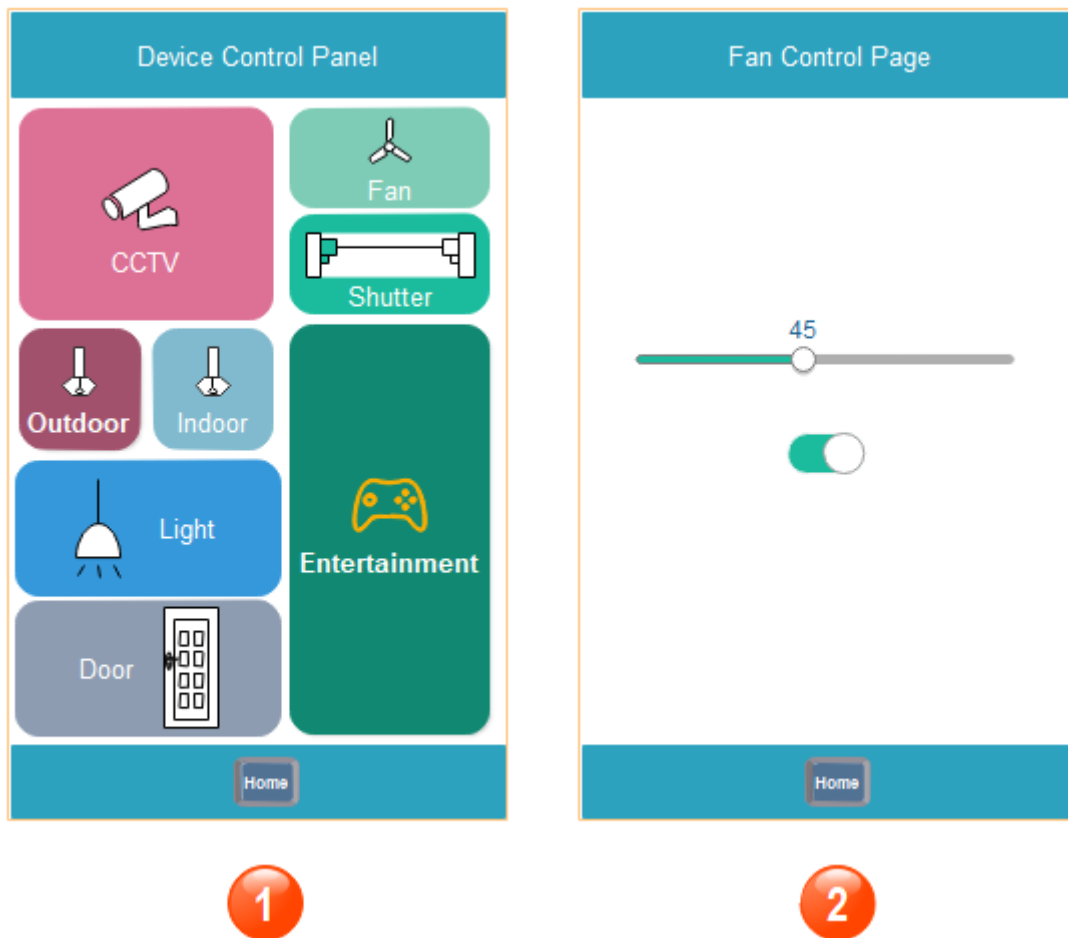


Figure 19 adjust fan speed screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Fan Control Page should show on the screen through navigator:
  - Remote Control -> Fan -> Fan Control Page
- iv. The Fan status that should be turned on already.
- v. The Fan default running speed has already been configured in app.
- vi. The fan running speed should be shown up on a progress bar that can be slid.

#### Description

When the Fan Control Page has been already shown on the screen, the householder can slide the progress bar to adjust the speed to the fan.

#### Post requisite

- i. After the householder slide on the progress bar on the screen in mobile app, then the progress bar should display the corresponding metric value.

- ii. Meanwhile, the fan in the real-world should be also actually running on the expected speed which was specific by mobile app.
- iii. In this phase, the switch button status always keeps enabled.

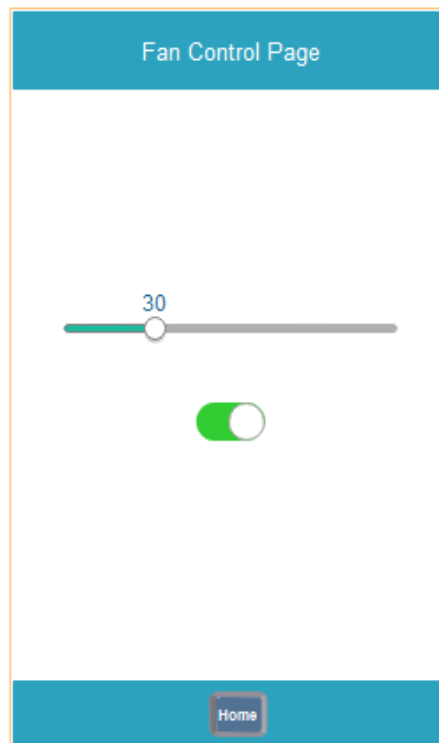


Figure 20 adjust fan speed screen

### 3.1.3 Shutter

The shutter module that manages its status is to move to left, move to right and pause the shutter running that will notify the shutter in the real-world to execute the corresponding action. In this module, the communication between the mobile app to the shutter in the real-world through Wi-Fi.

#### 3.1.3.1 Move to Left

##### User Story

As a householder, I want to have a left arrow button on the UI of the mobile app, so that I can control the shutter moving to the left side in the real world.

##### User Interface

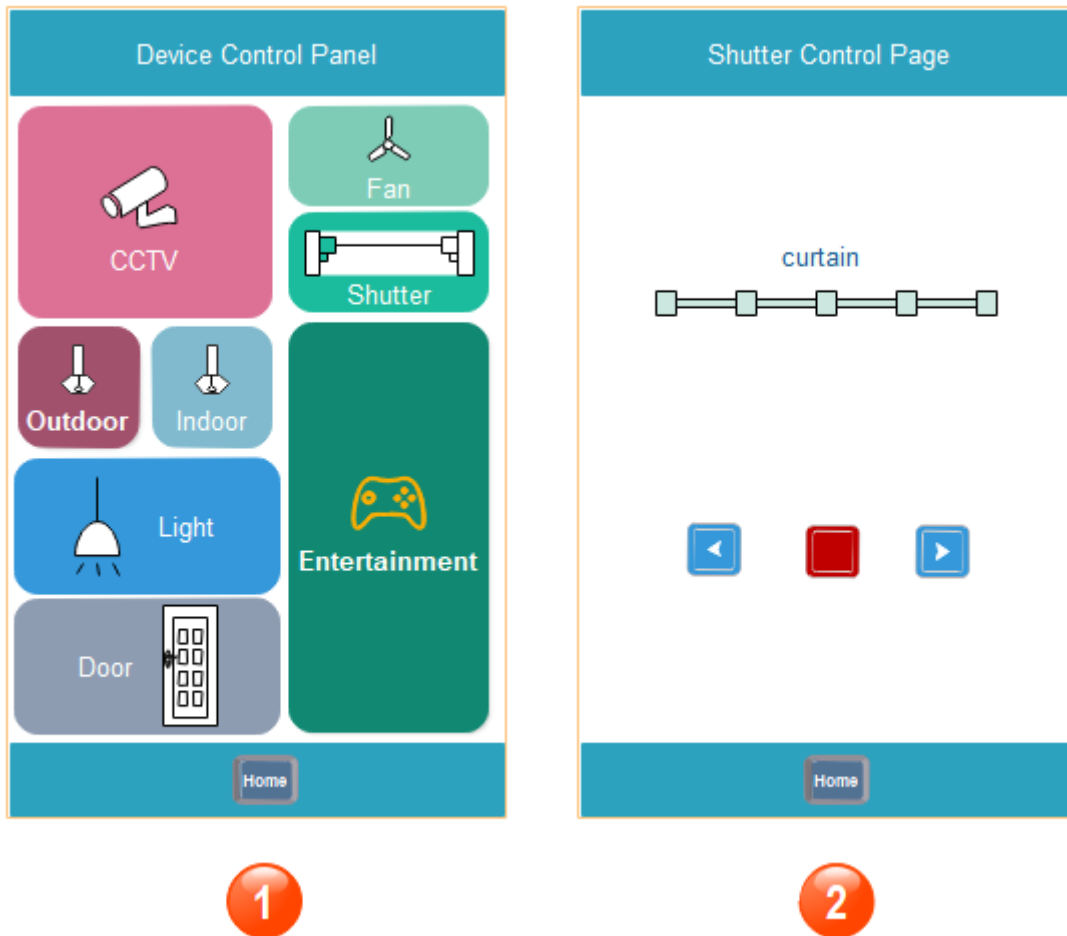


Figure 21 shutter operation screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Shutter Control Page should show on the screen through navigator:
  - Remote Control -> Shutter -> Shutter Control Page
- iv. The left arrow button on the screen should be available.

#### Description

When the Fan Control Page has been already shown on the screen, the householder can click the left arrow button to move the curtain to left.

#### Post requisite

- i. After the householder click the left arrow button on screen in mobile app, then the shutter in real-world should be running and goes left.
- ii. Meanwhile, the left arrow button should be disabled on the screen, but the right arrow button and pause button should be available if they are disabled.

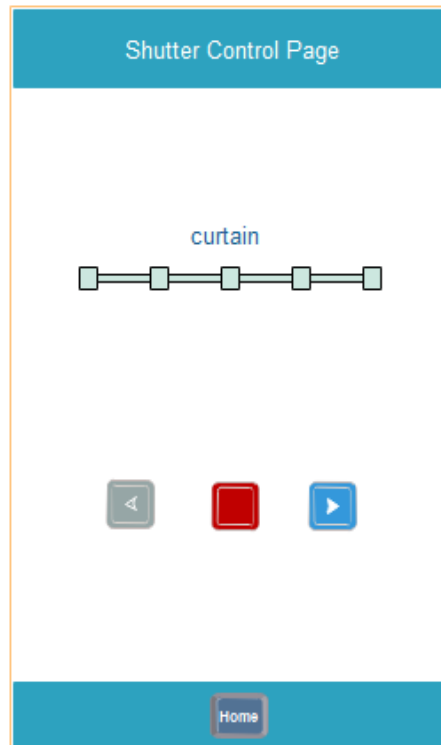


Figure 22 shutter control panel screen

### 3.1.3.2 Move to Right

#### User Story

As a householder, I want to have a right arrow button on the UI of the mobile app, so that I can control the shutter moving to the right side in the real world.

#### User Interface

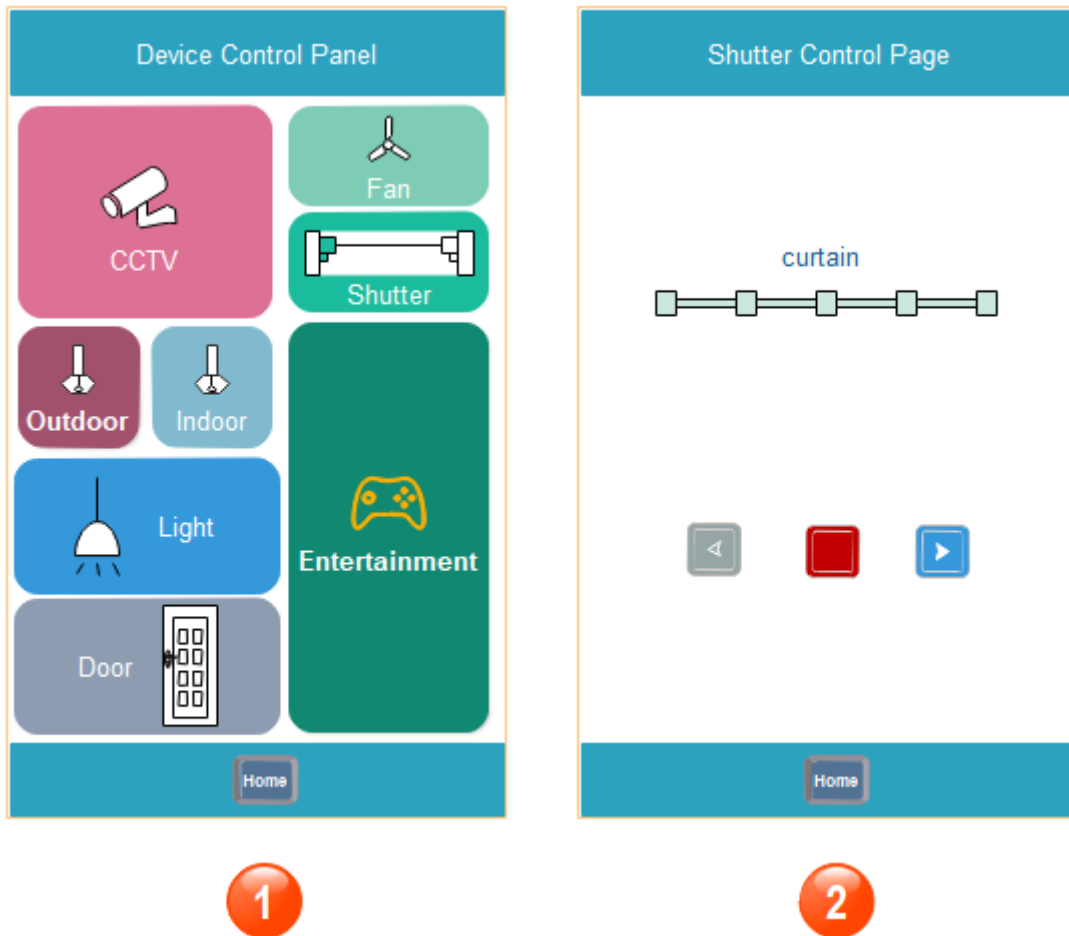


Figure 23 shutter operation screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Shutter Control Page should show on the screen through navigator:
  - Remote Control -> Shutter -> Shutter Control Page
- iv. The right arrow button on the screen should be available.

#### Description

When the Shutter Control Page has been already shown on the screen, the householder can click the right arrow button to move the curtain to right.

#### Post requisite

- i. After the householder click the right arrow button on screen in mobile app, then the shutter in real-world should be running and goes right.
- ii. Meanwhile, the right arrow button should be disabled on the screen, but the left arrow button and pause button should be available if they are disabled.

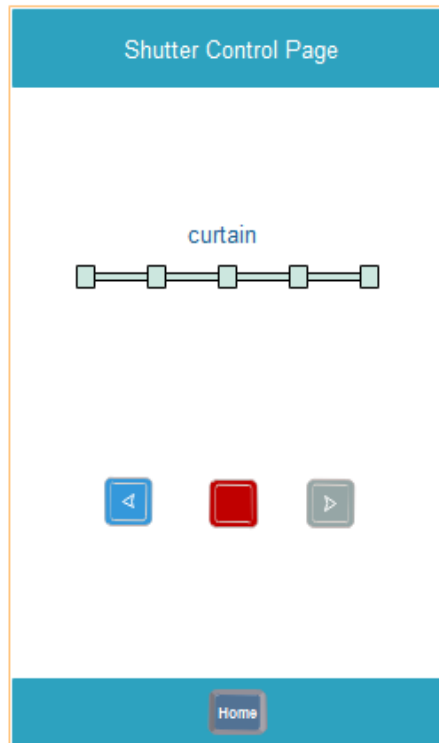


Figure 24 shutter control page screen

### 3.1.3.3 Turn Shutter Pause

#### User Story

As a householder, I want to have a pause button on the UI of the mobile app, so that I can control the shutter to stop in the real world.

#### User Interface

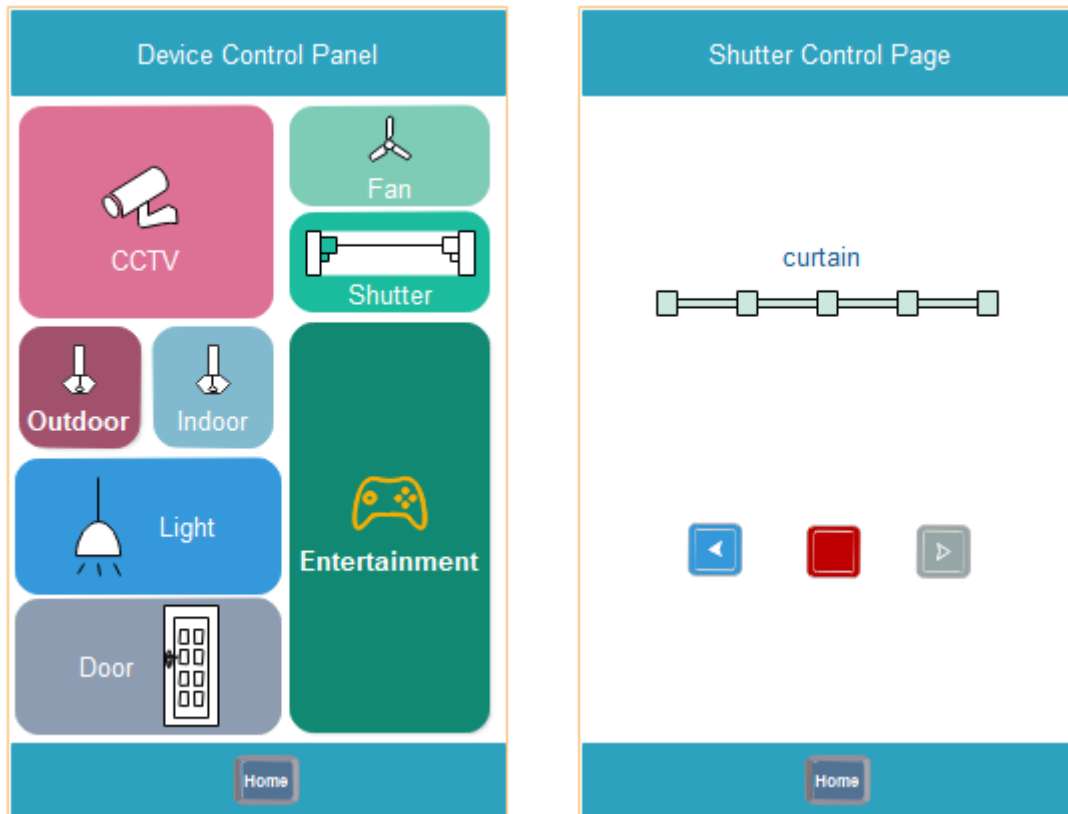


Figure 25 shutter operation screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Shutter Control Page should show on the screen through navigator:
  - Remote Control -> Shutter -> Shutter Control Page
- iv. The Shutter keeps running and the pause button status is available.

#### Description

When the Shutter Control Page has been already shown on the screen, the householder can click the pause arrow button to stop the curtain.

#### Post requisite

- i. After the householder clicks the pause button on the screen in the mobile app, then the shutter in real-world should be stopped running.
- ii. Meanwhile, the pause button should be disabled on the screen, but the left arrow button and right arrow button should be available if they are disabled.

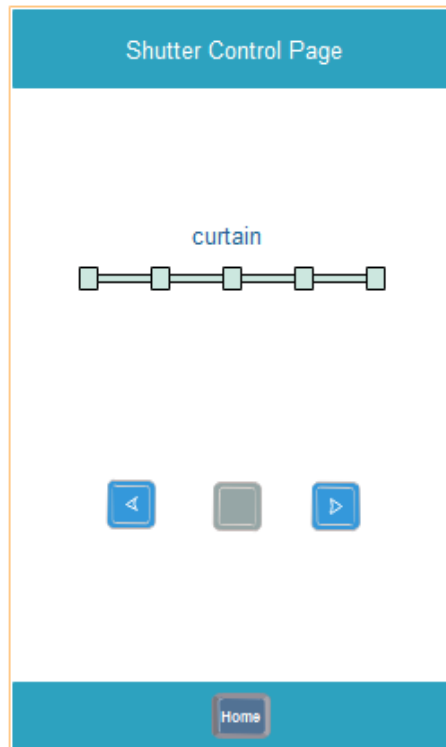


Figure 26 shutter control page screen

## 3.2 Security Monitoring

### 3.2.1 CCTV

The CCTV module that manages its status is to turn on and turn off that will notify the CCTV in the real-world to execute the corresponding action. In this module, the communication between the mobile app to the CCTV in the real-world through Wi-Fi.

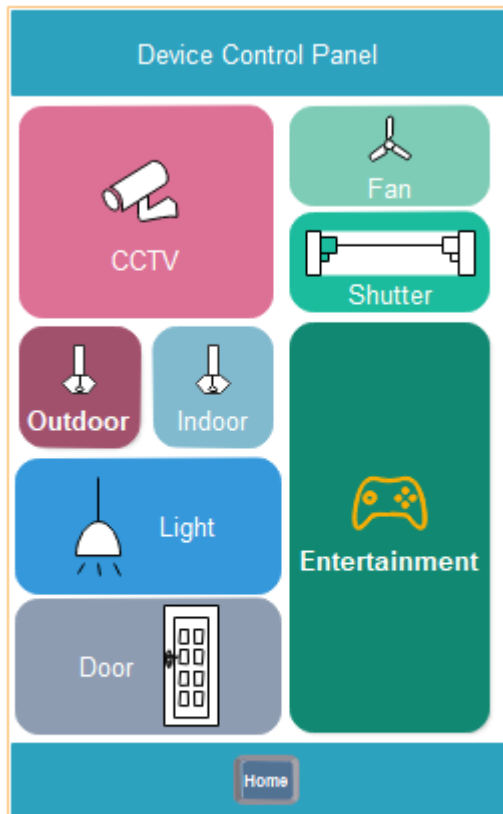
#### 3.2.1.1 Turn CCTV On

##### User Story

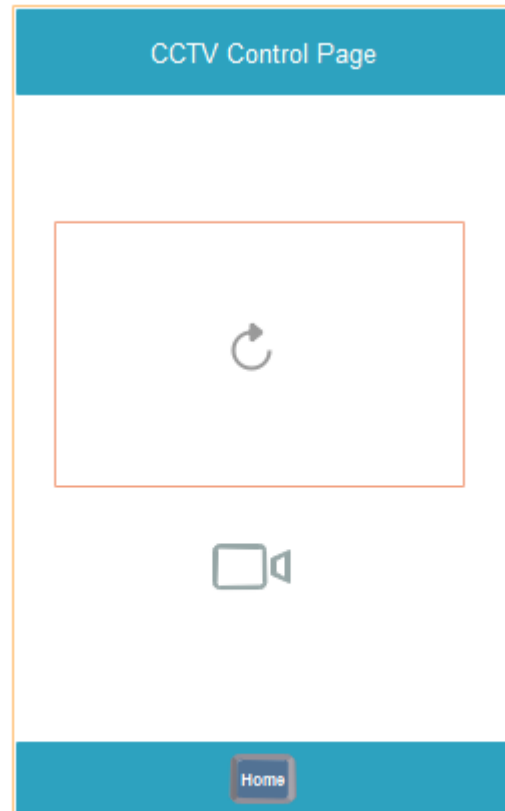
As a householder, I want to have a video-on button on the UI of the mobile app, so that I can turn the CCTV on in real world.

##### User Interface





1



2

Figure 27 cctv operation screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The CCTV Control Page should show on the screen through navigator:
  - Remote Control -> CCTV -> CCTV Control Page
- iv. The video button on UI screen that status is available.
- v. The video display window on the screen in the mobile app should display that is waiting for connecting status.

#### Description

When the CCTV Control Page has been already shown on the screen, the householder can click the video-on button to turn on the CCTV.

#### Post requisite

- i. After the householder clicks the video button on the screen in the mobile app, then the CCTV camera in the real-world should be notified to turn on.

- ii. Once the CCTV camera in the real-world turn on, the video display window should live the view which the CCTV camera captured in real-time.
- iii. Meanwhile, the video button should be enabled on the screen to indicate that status is connected currently.

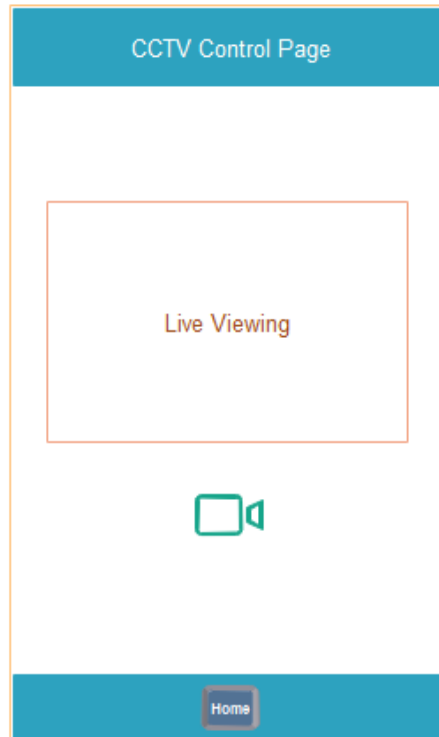


Figure 28 cctv control page screen

### 3.2.1.2 Turn CCTV Off

#### User Story

As a householder, I want to have a video-off button on the UI of the mobile app, so that I can turn the CCTV off in real world.

#### User Interface

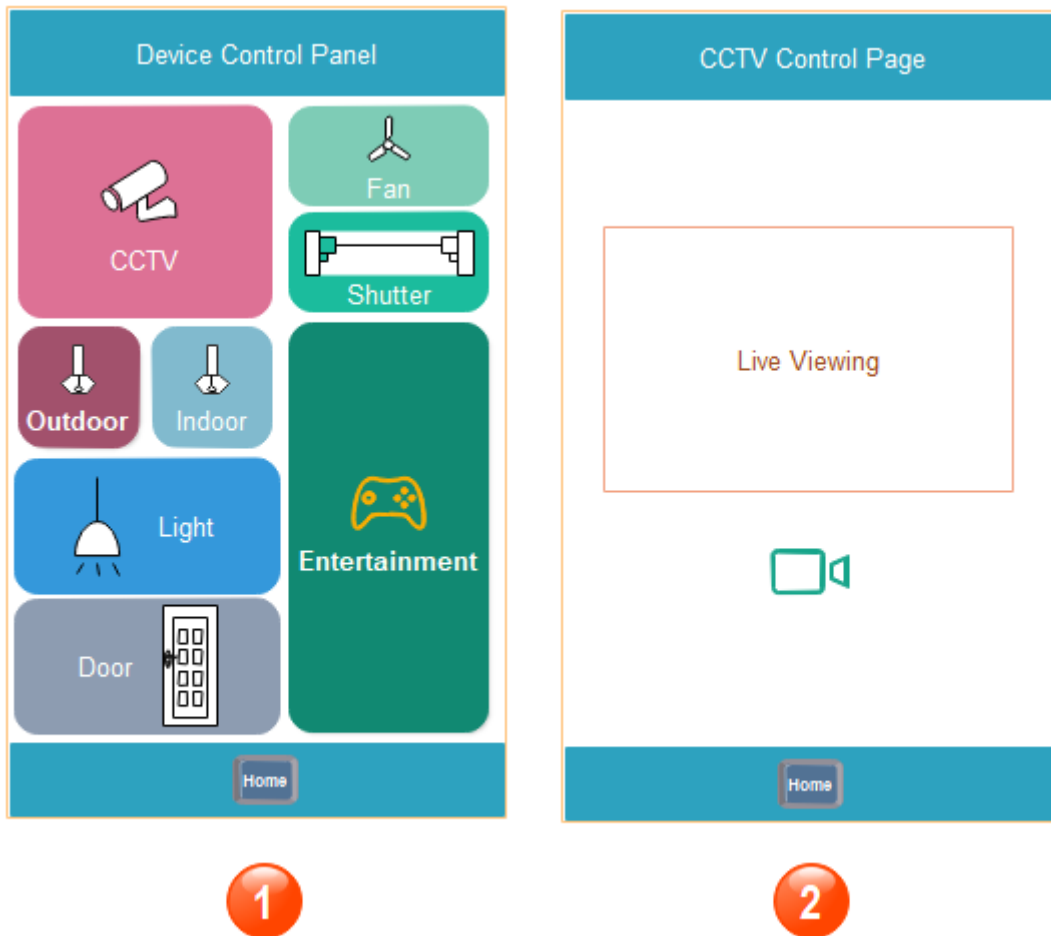


Figure 29 cctv operation screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The CCTV Control Page should show on the screen through navigator:
  - Remote Control -> CCTV -> CCTV Control Page
- iv. The video button on the UI screen that status is enabled that indicates that status is connected to the CCTV camera currently.
- v. The video display window on the screen in the mobile app should live the view that is captured by CCTV camera in real-time.

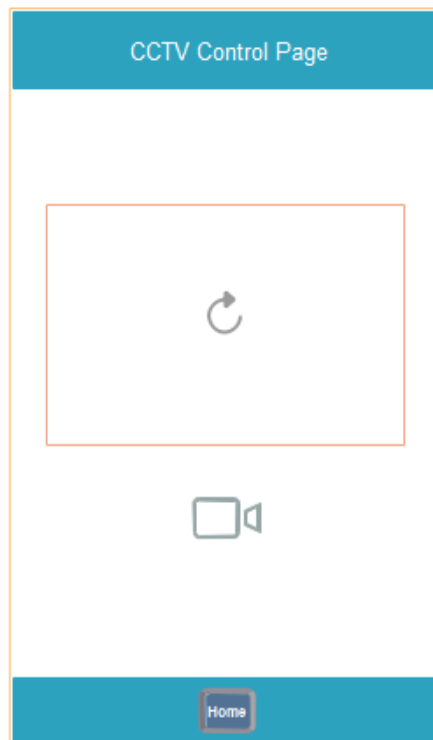
#### Description

When the CCTV Control Page has been already shown on the screen, the householder can click the video-off button to turn off the CCTV.

#### Post requisite

- i. After the householder clicks the video button on the screen in the mobile app, then the CCTV camera in the real-world should be notified to turn off.
- ii. Once the CCTV camera in the real-world turn off, the video display window should display right now the status which is waiting for connect.

- iii. Meanwhile, the video button should be off on the screen to indicate that status is not connected currently.



*Figure 30 cctv control page screen*

### 3.2.2 Door Access

The door access module that manages its status is to lock the locker, unlock the locker, view who knocked on the door that will notify the door access in the real-world to execute the corresponding action. In this module, the communication between the mobile app to the door access in the real-world through Wi-Fi.

#### 3.2.2.1 Doorbell Button Pressed

##### User Story

As a visitor, I want to have a doorbell button on the door, so that I can press down the doorbell button to notify the householder to know right now I am at the door.

##### User Interface

The doorbell button is a device on the door ready for the visitor, so that is unnecessary as a component on the mobile app.

##### Prerequisite

- i. The door button should be a device on the door.

- ii. The door button is able to interact to the doorbell.
- iii. The door button is able to be pressed.
- iv. The door button is able to be released.

#### Description

When the visitor has been already stood at in front of the door, the doorbell on the door can be found easily then pressed for several seconds by the visitor.

#### Post requisite

- i. When the door button is pressed, it will remain pressed until the visitor releases it.
- ii. Meanwhile, The doorbell will be notified to remain noisy.

#### 3.2.2.2 Doorbell Button Released

#### User Story

As a visitor, I want to release the doorbell button after the button has already been pressed down for several seconds, so that I can keep relaxing.

#### User Interface

The doorbell button is a device on the door ready for the visitor, so that is unnecessary as a component on the mobile app.

#### Prerequisite

- v. The door button should be a device on the door.
- vi. The door button is able to interact to the doorbell.
- vii. The door button is able to be pressed.
- viii. The door button is able to be released.

#### Description

When the visitor has been already stood at in front of the door and the doorbell on the door pressed for several seconds by the visitor, the visitor can release the button.

#### Post requisite

- iii. When the door button is released, it will remain normal that can be pressed again.
- iv. Meanwhile, the doorbell will be notified to remain quiet.

#### 3.2.2.3 Doorbell On

### User Story

As a householder, I want to have a doorbell on the door, so that I can hear the doorbell ring after a visitor press down the doorbell button.

### User Interface

The doorbell is a device on the door ready for the visitor, so that is unnecessary as a component on the mobile app.

### Prerequisite

- i. The doorbell should be a device on the door.
- ii. The doorbell is able to interact to the door button.
- iii. The doorbell is able to noise.

### Description

When the Doorbell Button on the door has been already pressed by the visitor, the doorbell can ring in real-time that can be heard by the householder.

### Post requisite

- i. The doorbell should keep noisy if the visitor keeps pressing the door button down.

### 3.2.2.4 Doorbell Off

### User Story

As a householder, I want to stop the doorbell ringing right now after the doorbell button was released, so that I can keep relaxing.

### User Interface

The doorbell is a device on the door ready for the visitor, so that is unnecessary as a component on the mobile app.

### Prerequisite

- iv. The doorbell should be a device on the door.
- v. The doorbell is able to interact to the door button.
- vi. The doorbell is able to noise.

### Description

When the visitor releases the doorbell button on the door, the doorbell can stop noise right now.

#### Post requisite

- ii. The doorbell should keep noisy until the visitor releases the door button.

#### 3.2.2.5 E-Locker Unlock

#### User Story

As a householder, I want to have a lock button on the UI of the mobile app, so that I can unlock the door through my mobile app by clicking the button.

#### User Interface

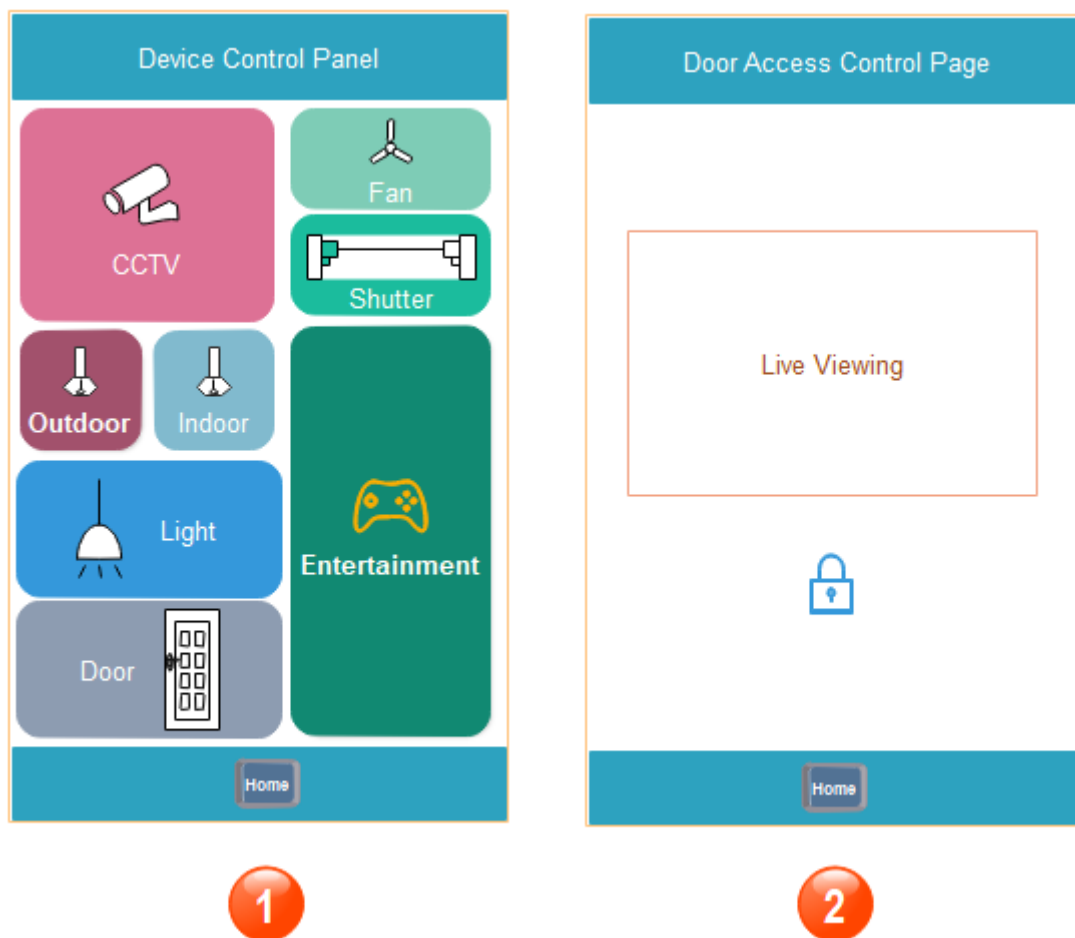


Figure 31 door access operation screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Door Access Control Page should show on the screen through navigator:
  - Remote Control -> Door -> Door Access Control Page
- iv. The locker button status should be locked.

### Description

When the Door Access Control Page has been already shown on the screen, the householder can click the lock button to unlock the door.

### Post requisite

- i. After the householder click the lock button on the screen in the mobile app, then the e-locker in the real world should be notified to unlock the door and the e-locker keeps unlock status.
- ii. The locker button status should be kept unlocked.

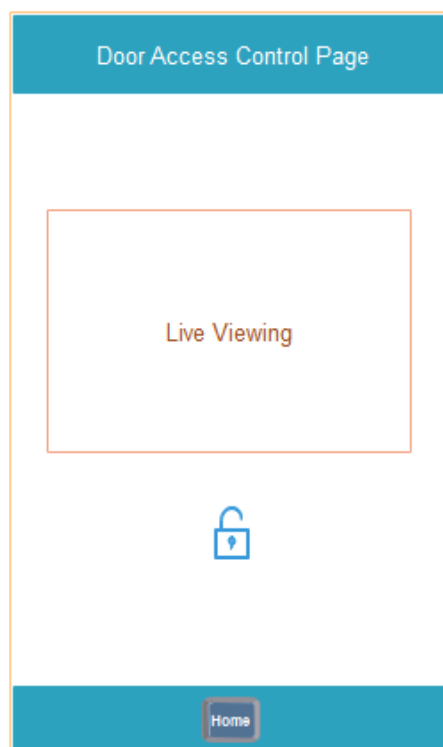


Figure 32 door access control page screen

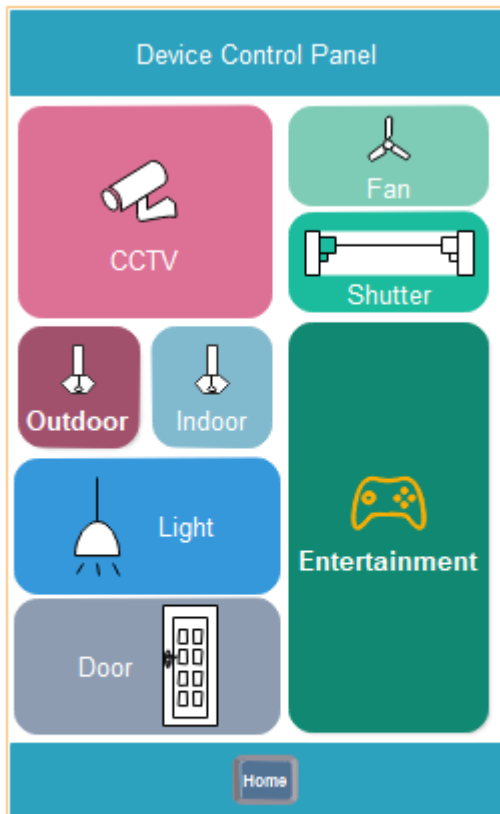
### 3.2.2.6 E-Locker Lock

#### User Story

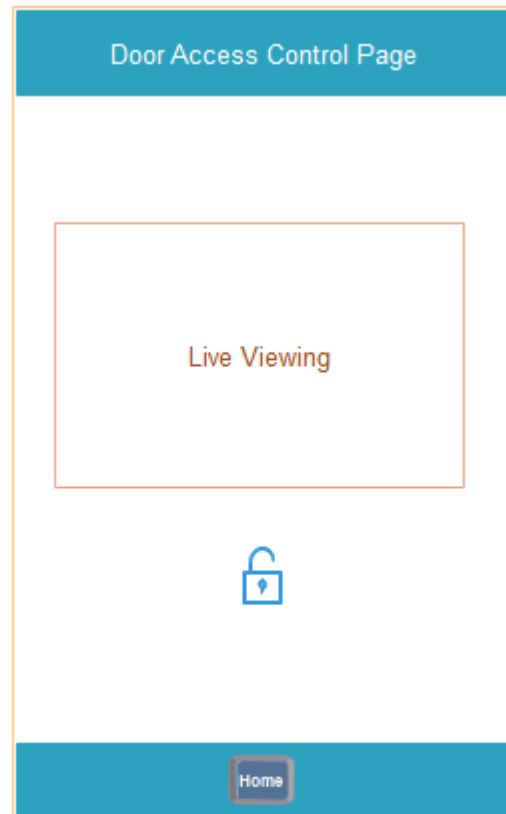
As a householder, I want to have a lock button on the UI of the mobile app, so that I can lock the door through my mobile app by clicking the button.

#### User Interface





1



2

Figure 33 door access operation screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Door Access Control Page should show on the screen through navigator:
  - Remote Control -> Door -> Door Access Control Page
- iv. The locker button status should be unlocked.

#### Description

When the Door Access Control Page has been already shown on the screen, the householder can click the locker button to lock the door.

#### Post requisite

- i. After the householder click the locker button on the screen in the mobile app, then the e-locker in the real world should be notified to lock the door and the e-locker keeps unlock status.
- ii. The locker button status should be kept locked.

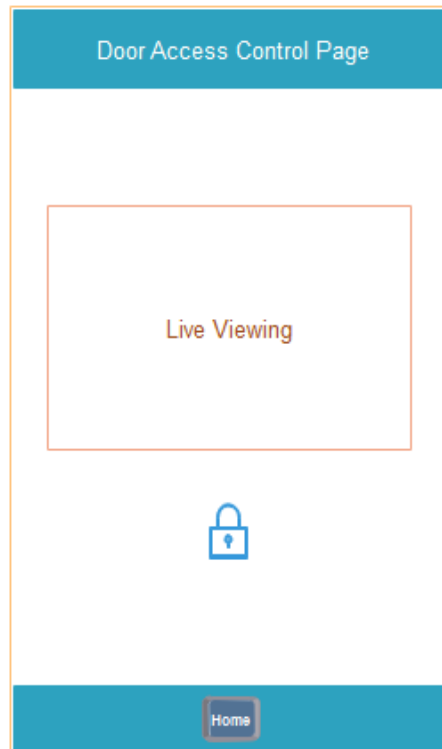


Figure 34 door access control page screen

### 3.2.2.7 Turn Door Camera On

#### User Story

As a householder, I want to have a camera view window on the UI of the mobile app, so that I can turn on the camera to see the visitor who is at the door through my mobile app.

#### User Interface

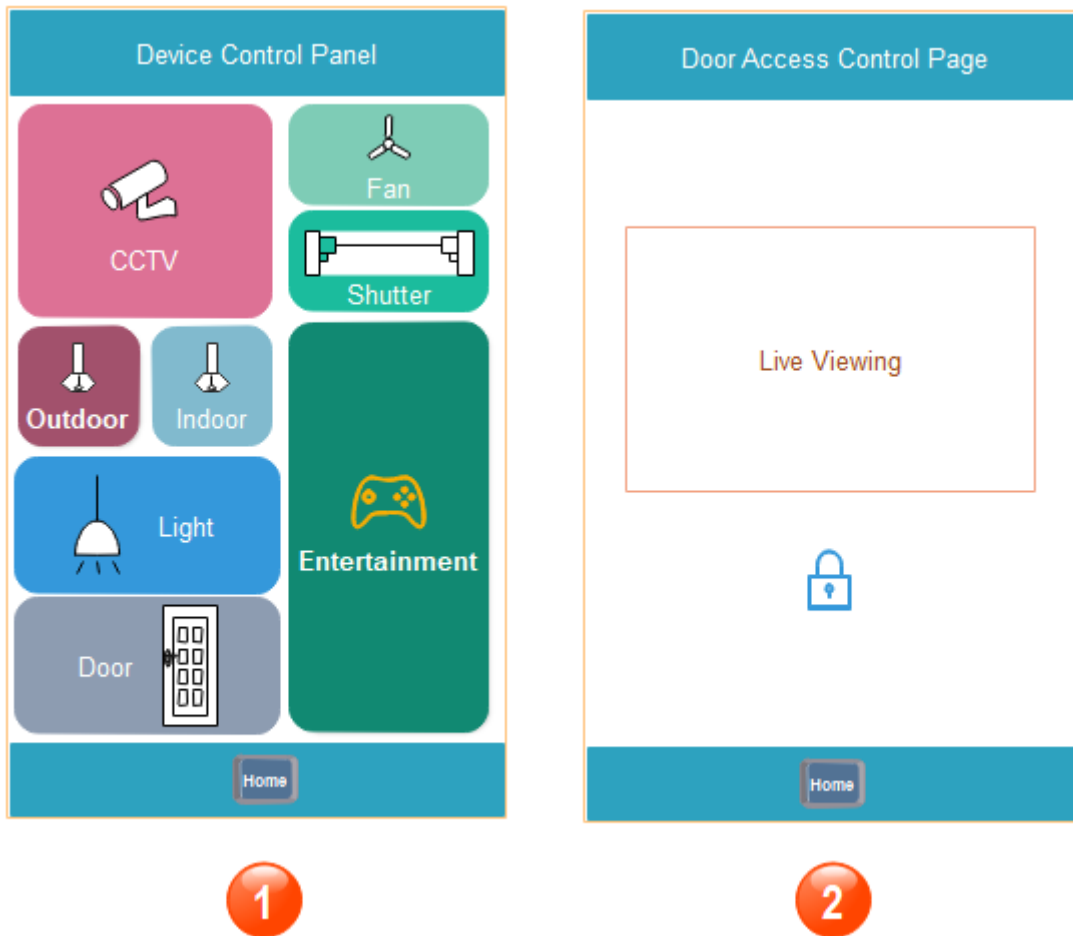


Figure 35 door access operation screen

#### Prerequisite

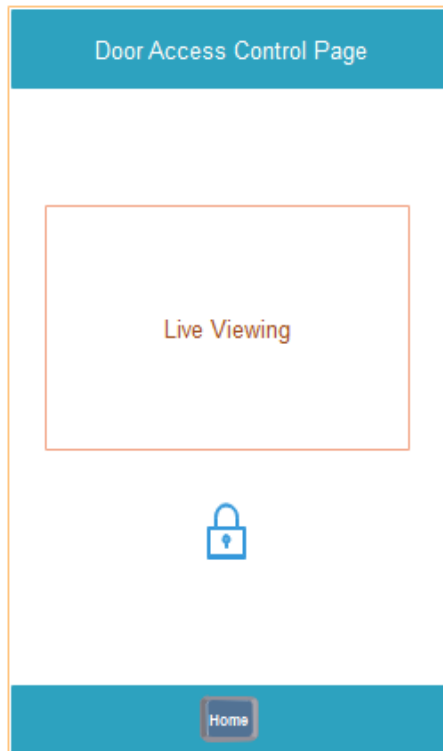
- v. The mobile phone should connect directly to Wi-Fi or Internet.
- vi. The mobile app should be running that is shown on the screen.
- vii. The Door Access Control Page should show on the screen through navigator:
  - Remote Control -> Door -> Door Access Control Page

#### Description

When the Door Access Control Page has been already shown on the screen, then the mobile app notifies the door access to turn on the camera on the door. Meanwhile, the householder can view the video live the view who is at the door when the Door Access Control Page screen is loaded.

#### Post requisite

- i. After the householder enter the Door Access Control Page screen in the mobile app, then the door access camera in the real-world should be notified to turn on.
- ii. Once the door access camera in the real-world turn on, the video display window should live the view which the door access camera captured in real-time.



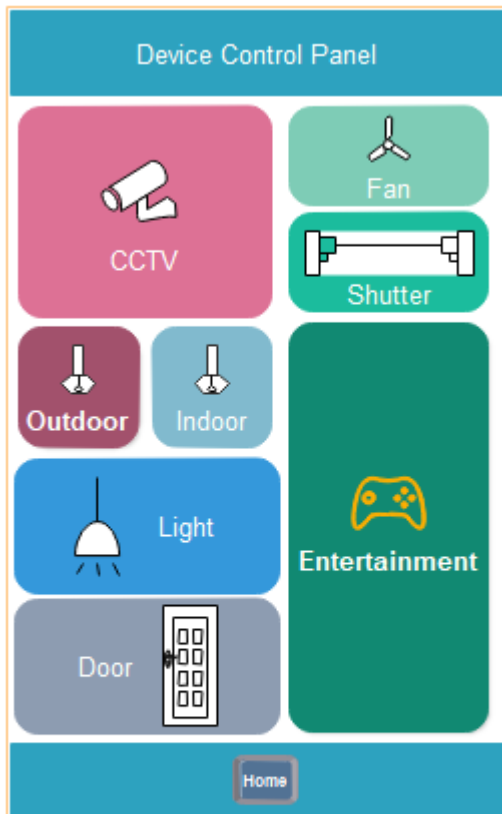
*Figure 36 door access camera control page screen*

### 3.2.2.8 Turn Door Camera Off

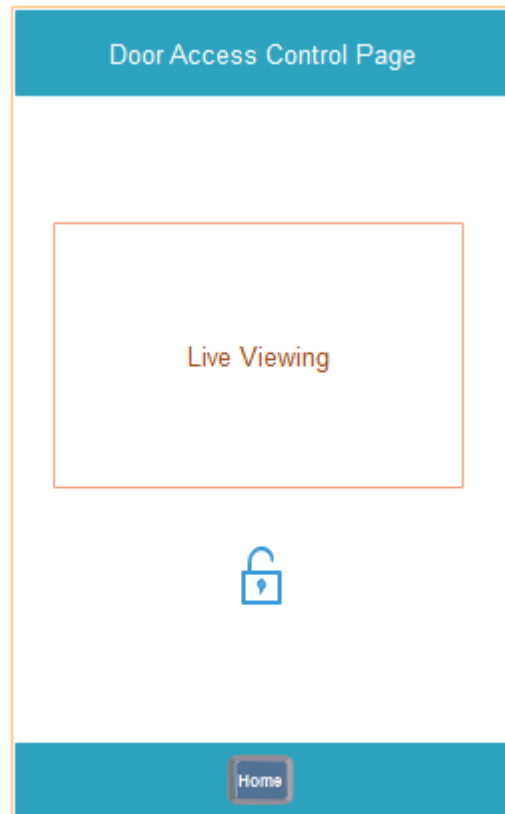
#### User Story

As a householder, I want to quit the Door Access Control Page screen, so that I can shut down the camera after I have already recognized who at the door is through my mobile app.

#### User Interface



1



2

Figure 37 door access camera operation

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Door Access Control Page should show on the screen through navigator:
  - Remote Control -> Door -> Door Access Control Page

#### Description

When the Door Access Control Page has been already shown on the screen, the householder can click the video-off button to turn off the camera on the door.

#### Post requisite

- i. After the householder quit the Door Access Control Page screen in the mobile app, then the door access camera in the real-world should be notified to turn off.
- ii. Once the Door Access Control Page screen disposed, then the screen should show up the Device Control Panel on mobile app.

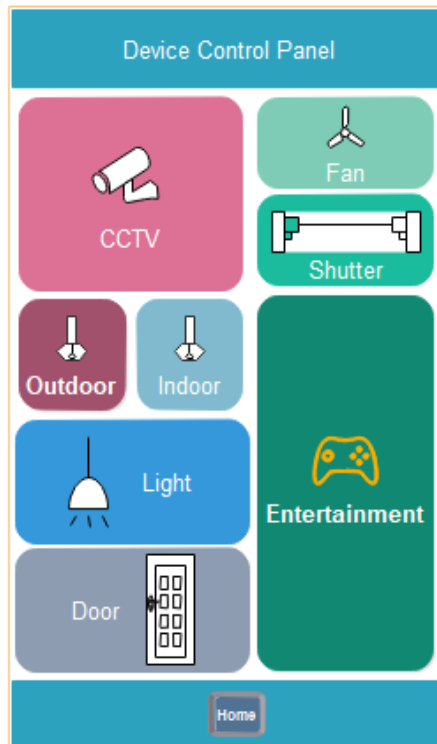


Figure 38 device control page

### 3.3 Sensor Control

#### 3.3.1 Temperature

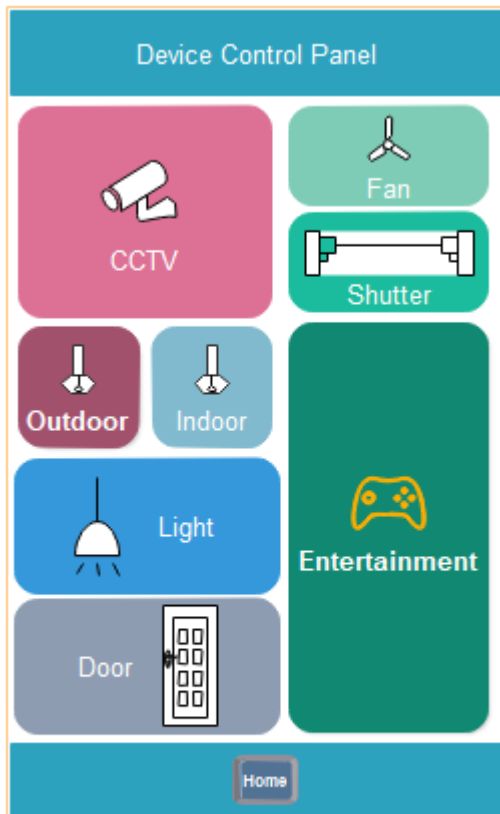
The temperature module that manages its status is to display the measurement in real-time that will notify the temperature sensor in the real-world to execute the corresponding action. In this module, the communication between the mobile app to the temperature sensor in the real-world through Wi-Fi.

##### 3.3.1.1 Display Temperature Indoor

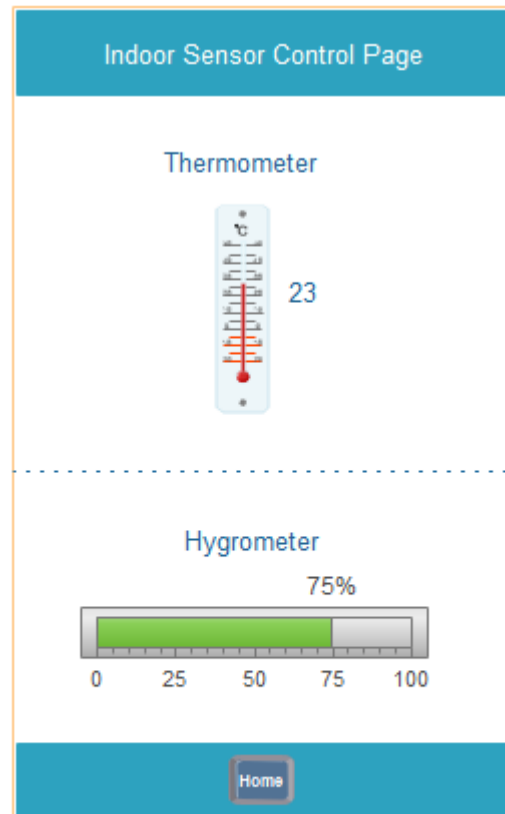
###### User Story

As a householder, I want to have a thermometer on the UI of the mobile app, so that I can see the temperature indoor in real-time through my mobile app.

###### User Interface



1



2

Figure 39 indoor sensor screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Indoor Sensor Control Page should show on the screen through navigator:
  - Remote Control -> Indoor -> Indoor Sensor Control Page

#### Description

When the Temperature Indoor Page has been already shown on the screen, then notify right now the temperature sensor to send the measurement within a default frequency that is received by mobile app and the Indoor Sensor Control page refresh the measurement of temperature by the same a default frequency. Finally, the householder can view the temperature indoor in real-time on that screen.

#### Post requisite

- i. Once the Indoor Sensor Control Page is shown up on the screen, then the thermometer on this screen will display the temperature measurement right now.

- ii. Meanwhile, to refresh this measurement on a default frequency that measurement is displayed which looks like in real-time.

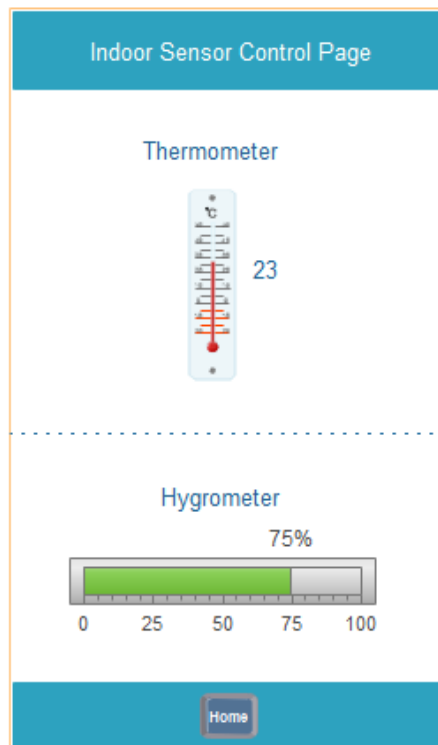


Figure 40 indoor sensor control page screen

### 3.3.1.2 Display Temperature Outdoor

#### User Story

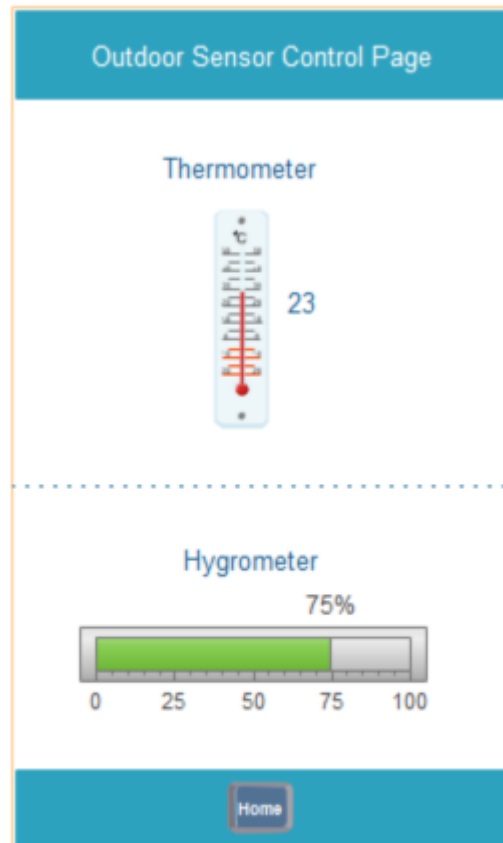
As a householder, I want to have a thermometer outdoor on the UI of the mobile app, so that I can see the temperature outdoor in real-time through my mobile app.

#### User Interface





1



2

Figure 41 outdoor sensor operation page screen

#### Prerequisite

- iv. The mobile phone should connect directly to Wi-Fi or Internet.
- v. The mobile app should be running that is shown on the screen.
- vi. The Outdoor Sensor Control Page should show on the screen through navigator:
  - Remote Control -> Outdoor -> Outdoor Sensor Control Page

#### Description

When the Temperature outdoor Page has been already shown on the screen, then notify right now the temperature sensor to send the measurement within a default frequency that is received by mobile app and the Outdoor Sensor Control page refresh the measurement of temperature by the same a default frequency. Finally, the householder can view the temperature outdoor in real-time on that screen.

#### Post requisite

- iii. Once the Outdoor Sensor Control Page is shown up on the screen, then the thermometer on this screen will display the temperature measurement right now.

- iv. Meanwhile, to refresh this measurement on a default frequency that measurement is displayed which looks like in real-time.

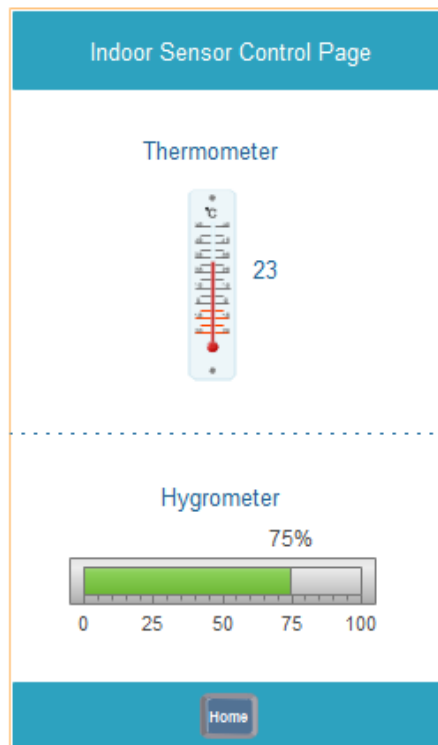


Figure 42 indoor sensor control page screen

### 3.3.2 Humidity

The humidity module that manages its status is to display the measurement in real-time that will notify the humidity sensor in the real-world to execute the corresponding action. In this module, the communication between the mobile app to the humidity sensor in the real-world through Wi-Fi.

#### 3.3.2.1 Display Humidity Indoor

##### User Story

As a householder, I want to have a hygrometer indoor on the UI of the mobile app, so that I can see the humidity indoor in real-time through my mobile app.

##### User Interface

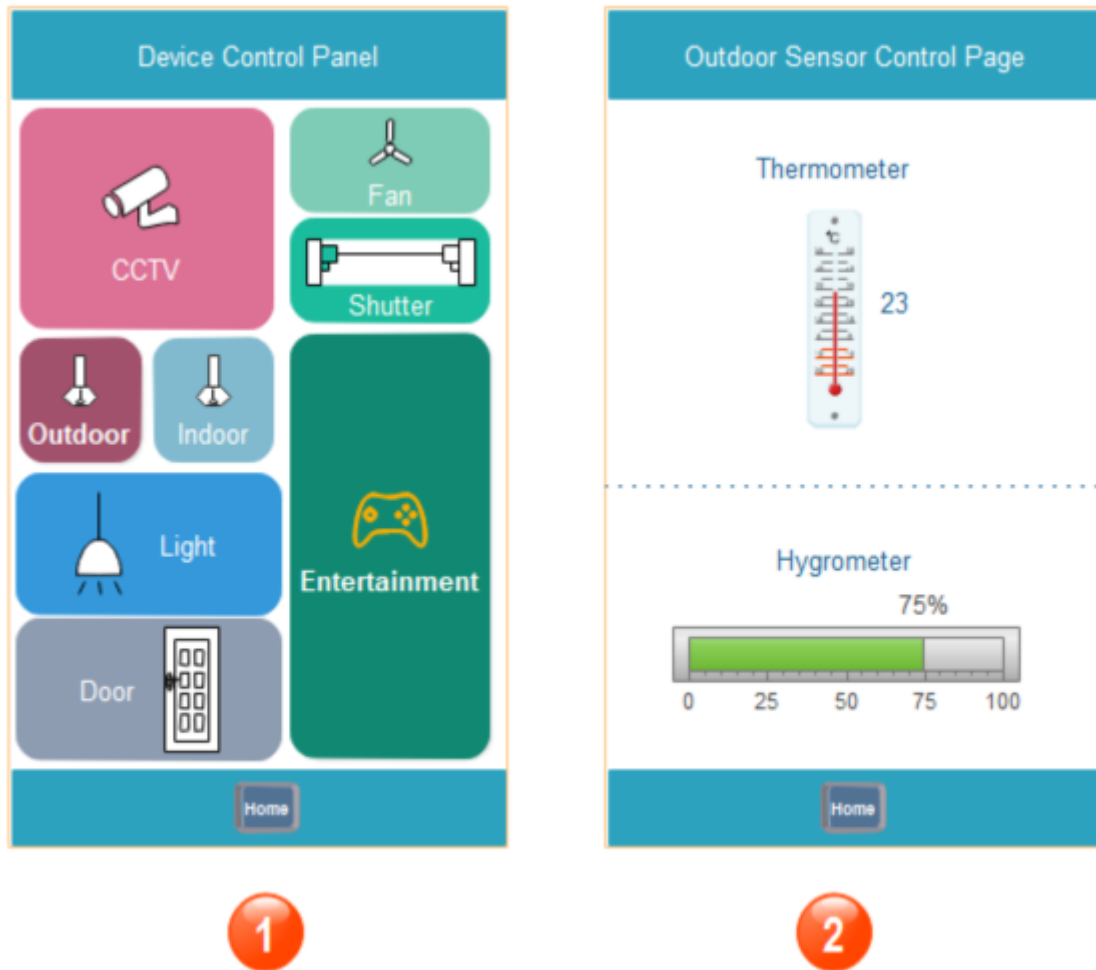


Figure 43 outdoor sensor operation screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Indoor Sensor Control Page should show on the screen through navigator:
  - Remote Control -> Indoor -> Indoor Sensor Control Page

#### Description

When the Humidity indoor Page has been already shown on the screen, then notify right now the humidity sensor to send the measurement within a default frequency that is received by mobile app and the Indoor Sensor Control page refresh the measurement of humidity by the same a default frequency. Finally, the householder can view the humidity indoor in real-time on that screen.

#### Post requisite

- i. Once the Indoor Sensor Control Page is shown up on the screen, then the hygrometer on this screen will display the humidity measurement right now.
- ii. Meanwhile, to refresh this measurement on a default frequency that measurement is displayed which looks like in real-time.

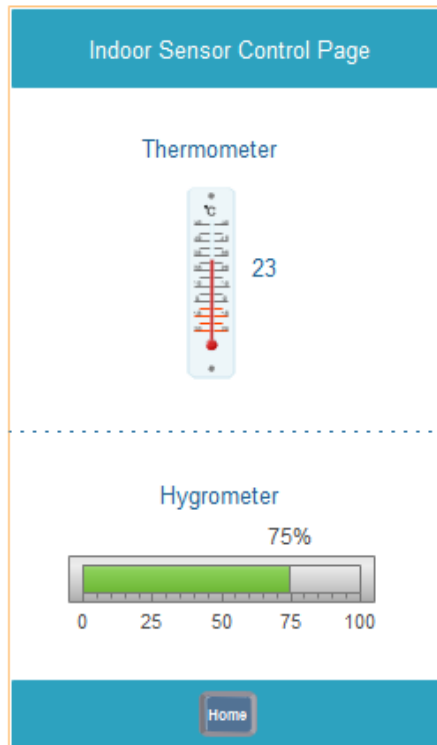


Figure 44 indoor sensor control page screen

### 3.3.2.2 Display Humidity Outdoor

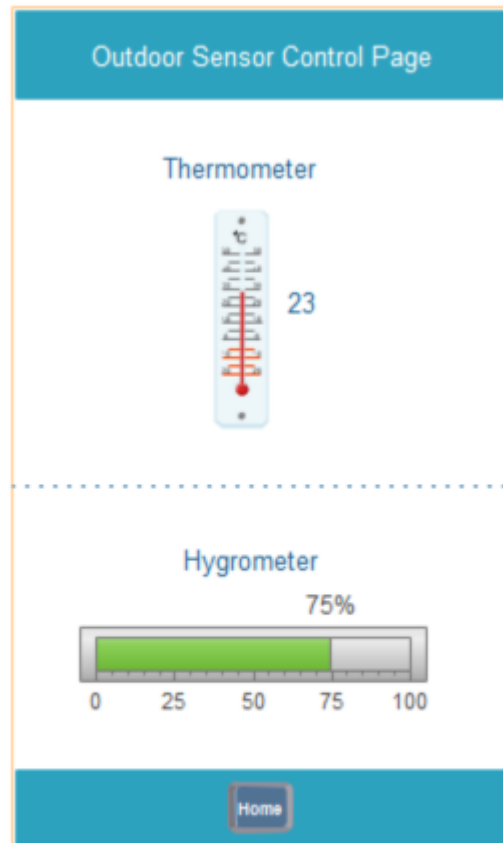
#### User Story

As a householder, I want to have a hygrometer outdoor on the UI of the mobile app, so that I can see the humidity outdoor in real-time through my mobile app.

#### User Interface



1



2

Figure 45 outdoor sensor control page screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi or Internet.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Outdoor Sensor Control Page should show on the screen through navigator:
  - Remote Control -> Outdoor -> Outdoor Sensor Control Page

#### Description

When the Humidity outdoor Page has been already shown on the screen, then notify right now the humidity sensor to send the measurement within a default frequency that is received by mobile app and the Indoor Sensor Control page refresh the measurement of humidity by the same a default frequency. Finally, the householder can view the humidity outdoor in real-time on that screen.

#### Post requisite

- v. Once the Outdoor Sensor Control Page is shown up on the screen, then the hygrometer on this screen will display the humidity measurement right now.

- vi. Meanwhile, to refresh this measurement on a default frequency that measurement is displayed which looks like in real-time.

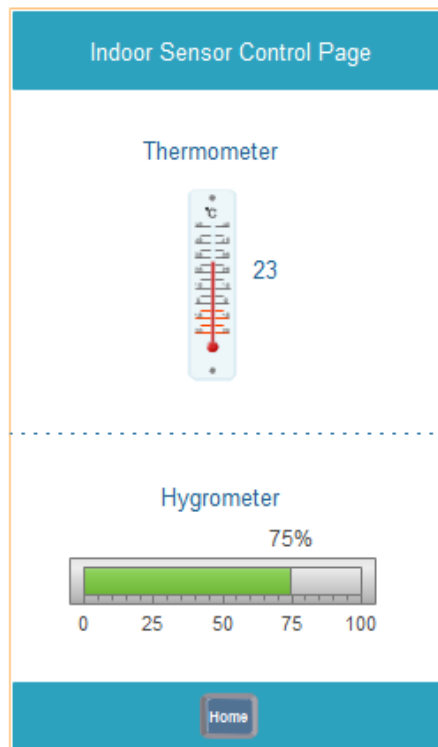


Figure 46 indoor sensor control page screen

## 3.4 Entertainment

### 3.4.1 Game Centre

#### 3.4.1.1 Bomb man

##### 3.4.1.1.1 Launch Game

###### User Story

As a player, I want to have a start button on the UI of the mobile app, so that I can launch this game through mobile app.

###### User Interface

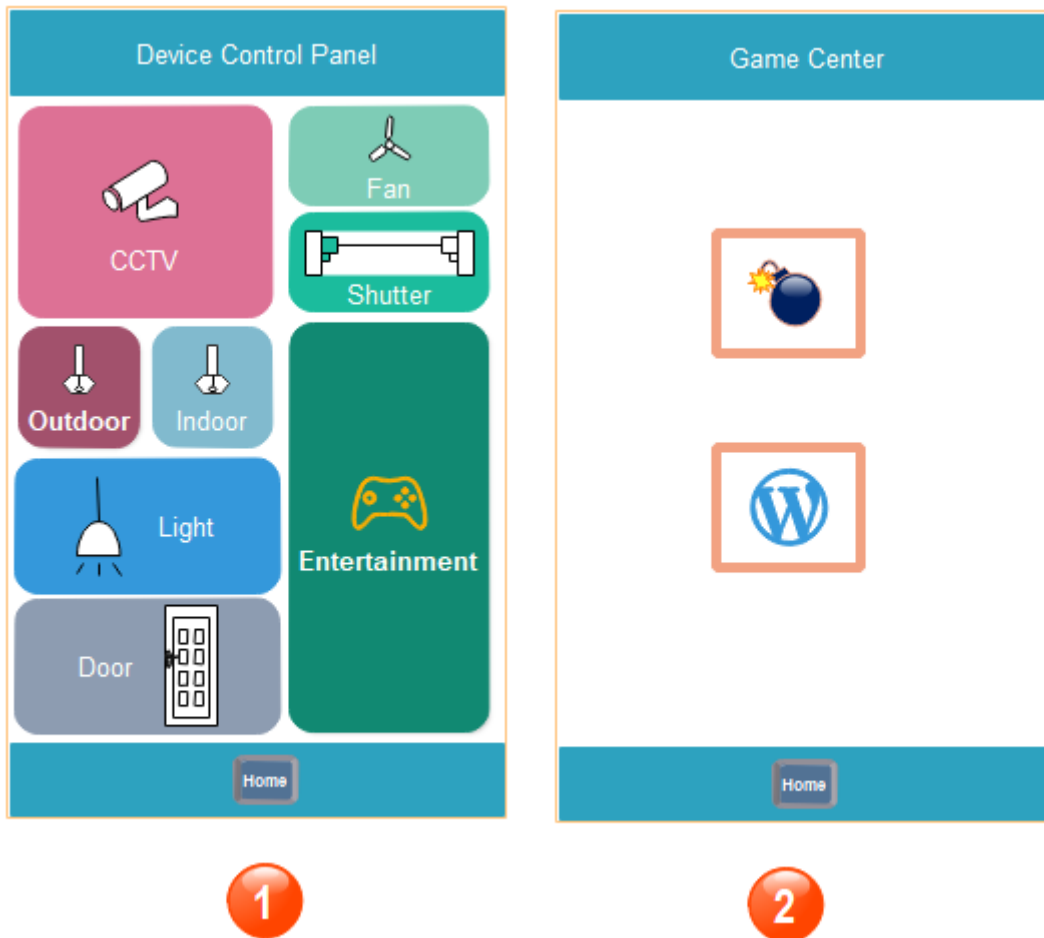



Figure 47 game centre screen

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Game Centre screen should be shown on the screen through navigator:
  - Remote Control -> Entertainment -> Game Centre
- iv. The TV or monitor should be connected to the home automation system.

#### Description

When the Game Centre screen has already been shown up on the mobile phone, then the player can click the image button  on the screen to launch the bomb man game.

#### Post requisite

- i. Once the player clicked the image button, then the game screen should be displayed on the TV or monitor right now. As shown in figure 3.4-1.
- ii. Meanwhile, the bomb man game control panel should be shown up on the mobile phone screen. As shown in figure 3.4-2.

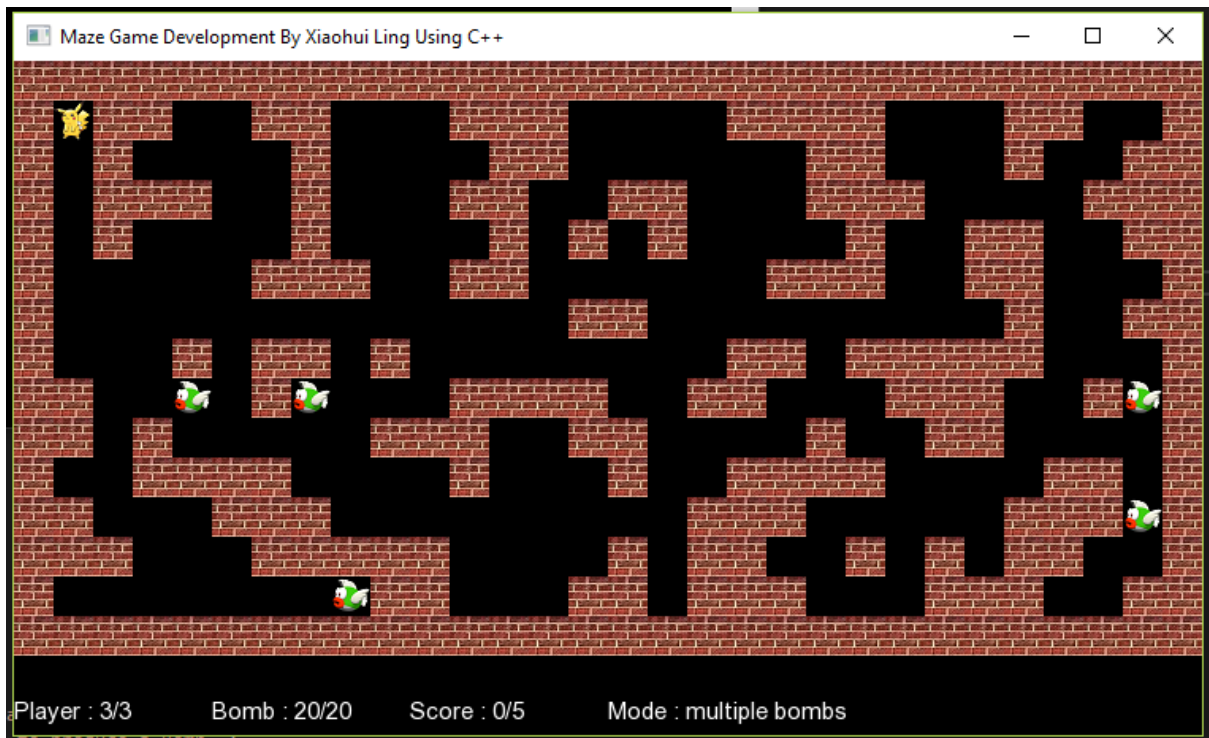


Figure 48 bomb man game



Figure 49 bomb man control panel 1

### 3.4.1.1.2 Bomb Man Moving

#### User Story

As a player, I want to have a direction keys (up, down, left, right) on the UI of the mobile app, so that I can move the bomb man to walk in different directions.



## User Interface



Figure 50 bomb man control panel 2

### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Bomb Man Game Control Panel screen should be shown on the screen through navigator:
  - Remote Control -> Entertainment -> Game Centre -> Bomb Man Control Panel
- iv. The TV or monitor should be connected to the home automation system.
- v. The direction keys should be all available on the screen.

### Description

When the Bomb Man Game Control Panel screen has already been shown up on the mobile phone, then the player can tap the different direction keys on the screen to move the bomb man to walk in the corresponding direction.

### Post requisite

- i. Once the player taps the right-direction key on the screen of the mobile app, then the bomb man walks in real-time on right-direction in the map of this game.



Figure 51 bomb man control panel 3



Figure 52 bomb man game left

- ii. Once the player taps the left-direction key on the screen of the mobile app, then the bomb man walks in real-time on left-direction in the map of this game.

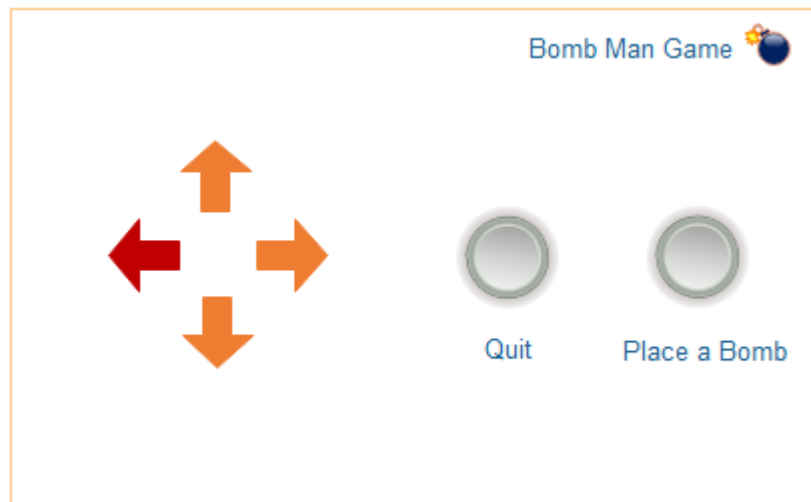


Figure 53 bomb man right arrow



Figure 54 bomb man game right arrow

- iii. Once the player taps the up-direction key on the screen of the mobile app, then the bomb man walks in real-time on up-direction in the map of this game.



Figure 55 bomb man game up

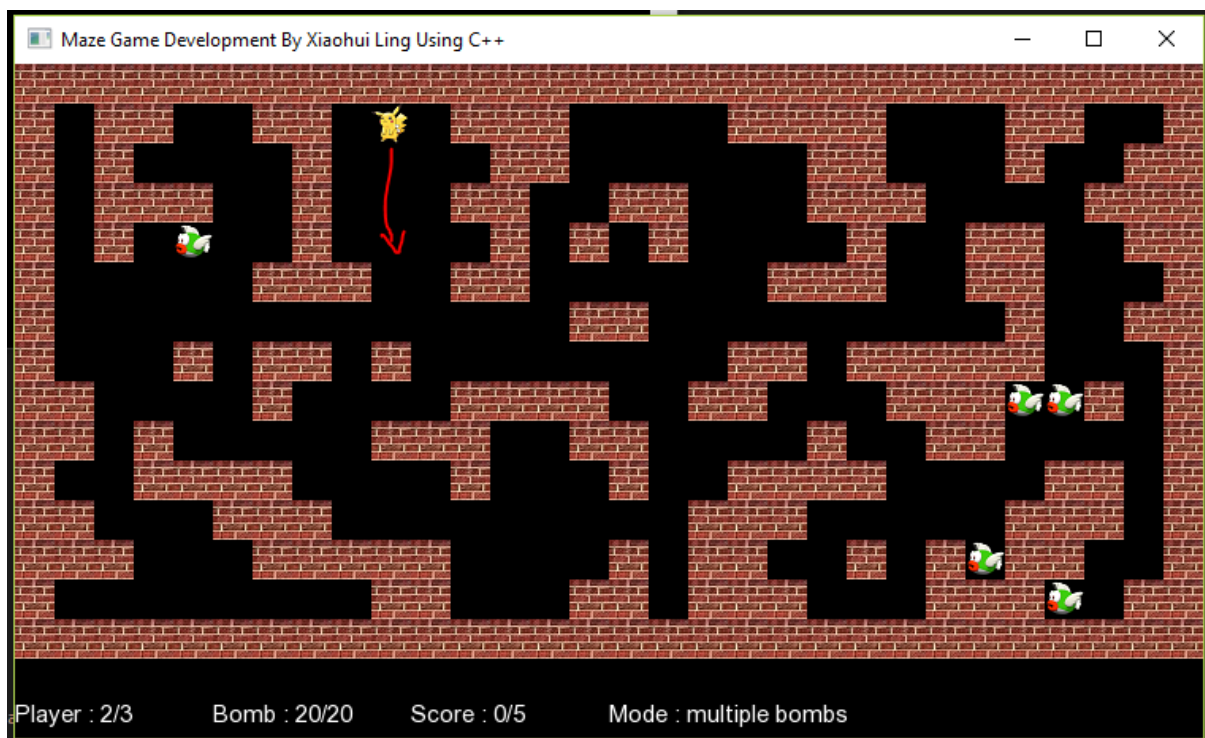


Figure 56 bomb man game up

- iv. Once the player taps the down-direction key on the screen of the mobile app, then the bomb man walks in real-time on down-direction in the map of this game.



Figure 57bomb man game down



### 3.4.1.1.3 Place a Bomb

#### User Story

As a player, I want to have a place bomb button on the UI of the mobile app, so that I can destroy the enemies by placing a bomb on the map of this game by clicking the button.

#### User Interface



Figure 58 bomb man game control panel

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Bomb Man Game Control Panel screen should be shown on the screen through navigator:
  - Remote Control -> Entertainment -> Game Centre -> Bomb Man Control Panel
- iv. The TV or monitor should be connected to the home automation system.
- v. The Place a Bomb button should be available on the screen.

#### Description

When the Bomb Man Game Control Panel screen has already been shown up on the mobile phone, then the player can tap the Place a Bomb button on the screen to place a bomb on the map on where the bomb man's current position is.

#### Post requisite

- i. Once the player taps the Place a Bomb button on the screen of the mobile app, then the bomb man's position on the map where should be placed a bomb on in real-time.
- ii. Once the bomb was placed on the map of this game shows up on the TV or monitor, the bomb should explore after 4 seconds.





Figure 59 bomb man game control panel



#### 3.4.1.1.4 Quit Game

##### User Story

As a player, I want to have a quit button on the UI of the mobile app, so that I can exit the game.

##### User Interface



Figure 60 bomb man game control panel

#### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Bomb Man Game Control Panel screen should be shown on the screen through navigator:
  - Remote Control -> Entertainment -> Game centre-> Bomb Man Control Panel
- iv. The TV or monitor should be connected to the home automation system.
- v. The Place a Bomb button should be available on the screen.

#### Description

When the Bomb Man Game Control Panel screen has already been shown up on the mobile phone, then the player can tap the Quit button on the screen to quit the game.

#### Post requisite

- i. Once the player taps the Quit button on the screen of the mobile app, then the screen on the mobile phone will show up on Game Centre screen.





*Figure 61 game centre option*

### 3.4.1.2 Word game

#### 3.4.1.2.1 Launch Game

##### User Story

As a player, I want to have a start button for word game on the UI of the mobile app, so that I can launch a word game through my mobile app.

## User Interface

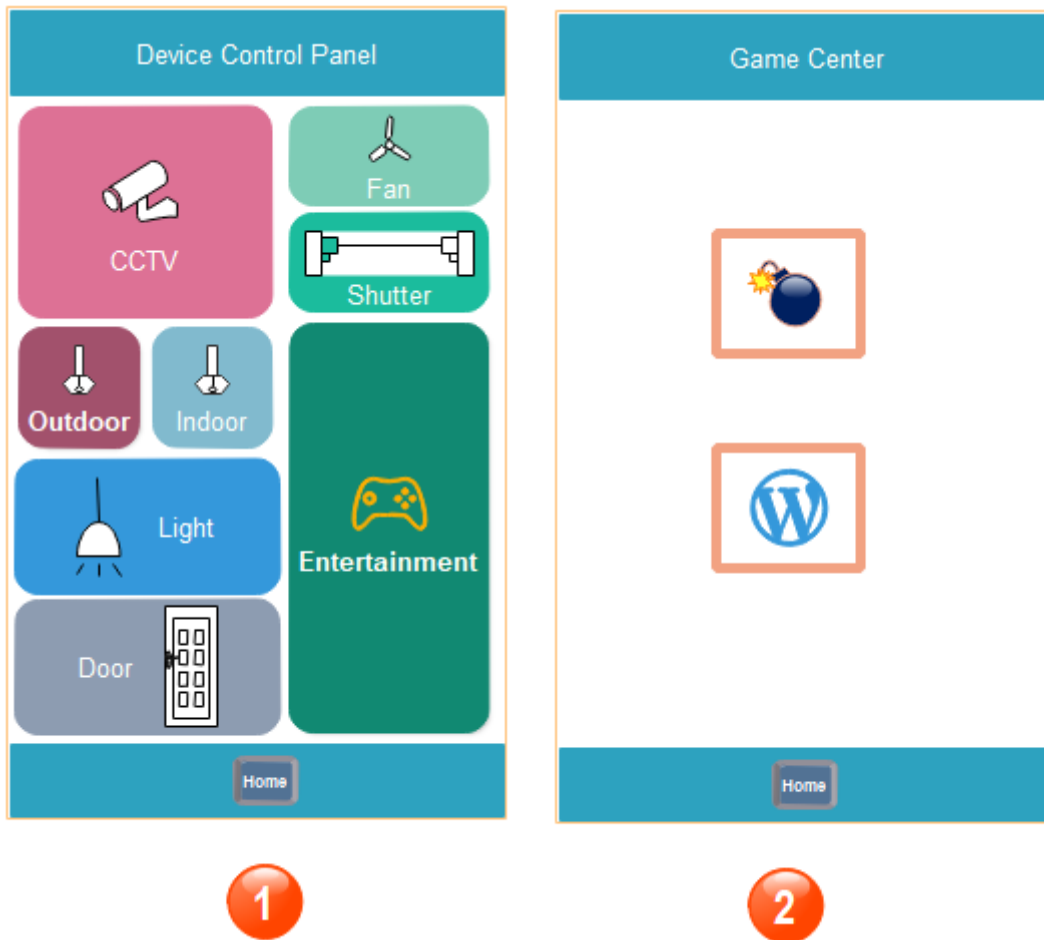



Figure 62 game centre screen

### Prerequisite

- i. The mobile phone should connect directly to Wi-Fi.
- ii. The mobile app should be running that is shown on the screen.
- iii. The Game Centre screen should be shown on the screen through navigator:
  - Remote Control -> Entertainment -> Game Centre
- iv. The TV or monitor should be connected to the home automation system.

### Description

When the Game Centre screen has already been shown up on the mobile phone, then the player can click the image button  on the screen to launch the word game.

### Post requisite

- i. Once the player clicked the image button, then the game screen should be displayed on the TV or monitor right now. As shown in figure 3.4-1.
- ii. Meanwhile, the word game control panel should be shown up on the mobile phone screen. As shown in figure 3.4-2.

#### 4. Non-Functional Requirement

The project is research on the home automation field that is a prototype system. In this initial stage, it will not be considered too much on the non-functional requirement.