

SE 500 Documentation

Project Name: Digital Home

By: Alizeh Jafri & Maisa Alghamdi

Table of Contents

Introduction:	3
Requirement Specification:.....	3
Functional requirements:	3
Non-Functional requirements.....	3
Required resources:	4
Scrum Framework:	4
DB ER diagram.....	6
Database tables:.....	7
Software design	9
Conceptual Design:	9
Class diagram	10
Sequence diagram.....	11
System Architecture:.....	12
System Interface:	13

Introduction:

This document discusses the details of the Digital Home System. The Digital Home (DH) is Graphical User Interface (GUI) oriented system which is developed using C# programming language in Visual Studio and Microsoft SQL Server Management Studio for the database. The purpose of the DH System is to enhance the functionality of the Home and make it easier for the people to live. The digital home system would manage the records of the members living in the house and allow them to use the DH system and easily manage their daily routine by providing for a lifestyle that would bring together security, environmental ease and energy management (lights, AC, temperature), and entertainment (music, TV) etc. Overall, the Digital Home system has secured registration form, login form, kitchen form, master bedroom, bedroom, bathroom, living room, garage and outdoor. Moreover, this document will be covering DB ER diagram, DB tables, system Architecture, Software design class diagram, conceptual design, sequence diagram, etc.

Requirement Specification:

This part contains the requirements for the for Digital Home system which is shown as follows:

Functional requirements:

They are observable capabilities that should be present for the users to complete their goals or perform the task which are specified by the use case.

Super user:

- Super user can Register into the DH system by entering his/her correct Username and password which must be at least 8 characters which should contain at least 1 capital letter and 1 special character.
- Super user can login to the DH system by entering his or her correct Username and created password. If any of the credentials are not correct, the login won't be successful.
- Can see password while typing using the show check box.
- Super user can access everything in the DH System

Children:

- Children have limited access.
- They can't use hot water.
- Can't use Stove
- Can't manage outdoor
- Can't use oven

Non-Functional requirements

Characteristics that are not the features of the system. The non-functional requirements for DH System are stated as follows:

- Security- passwords must be stored as hashes in the database.
- Ease of usability – DH system should be straight forward to use
- System speed should be decent
- Storage- DH system must store at least 100 records.

Required resources:

Hardware

- I) A good Internet connection
- II) Laptop (preferably windows 10).

Software

- I) Visual Studio 2017
- II) C# Language
- III) Microsoft SQL Server Management Studio

Scrum Framework:

We have been using Scrumwise to add backlog items, used to have stand up meetings every 2-3 weeks and total sprints to work for us were 3.

Maisa Product Backlog items:

Sprint 3:

- Design UI

Sprint 4:

- Login & registration (password encryption)
- TV
- Outdoor
- Livingroom
- Lights
- Garage
- Fire alarm
- AC
- Door

Sprint 5:

- Conceptual Design
- DB Tables/ER Diagram
- Door Automation closes.
- Super user/Children creation
- Finalize Garage
- finalize outdoor
- finalize Big window
- Finalize living room
- Database integration

Alizeh Sprint items:

Sprint 3

- Finalizing UI
- Finalizing Language
- Creating and finalizing database

Sprint 4

- Music
- Microwave
- Window
- Shower
- Faucet
- Login with more features
- Stove
- Coffee Maker
- Oven
- Login Security
- Bedroom
- Bathroom

Sprint 5

- DH Project integration
- Creating/finalizing documentation
- Fix errors in Login/Registration
- Finalize entire DH
- Arrange Database
- Master Bedroom
- Fire Alarm update
- Software Interface design
- Finalize Kitchen
- Finalize Bathroom
- Finalize Bedrooms
- Finalizing entire GUI

DB ER diagram

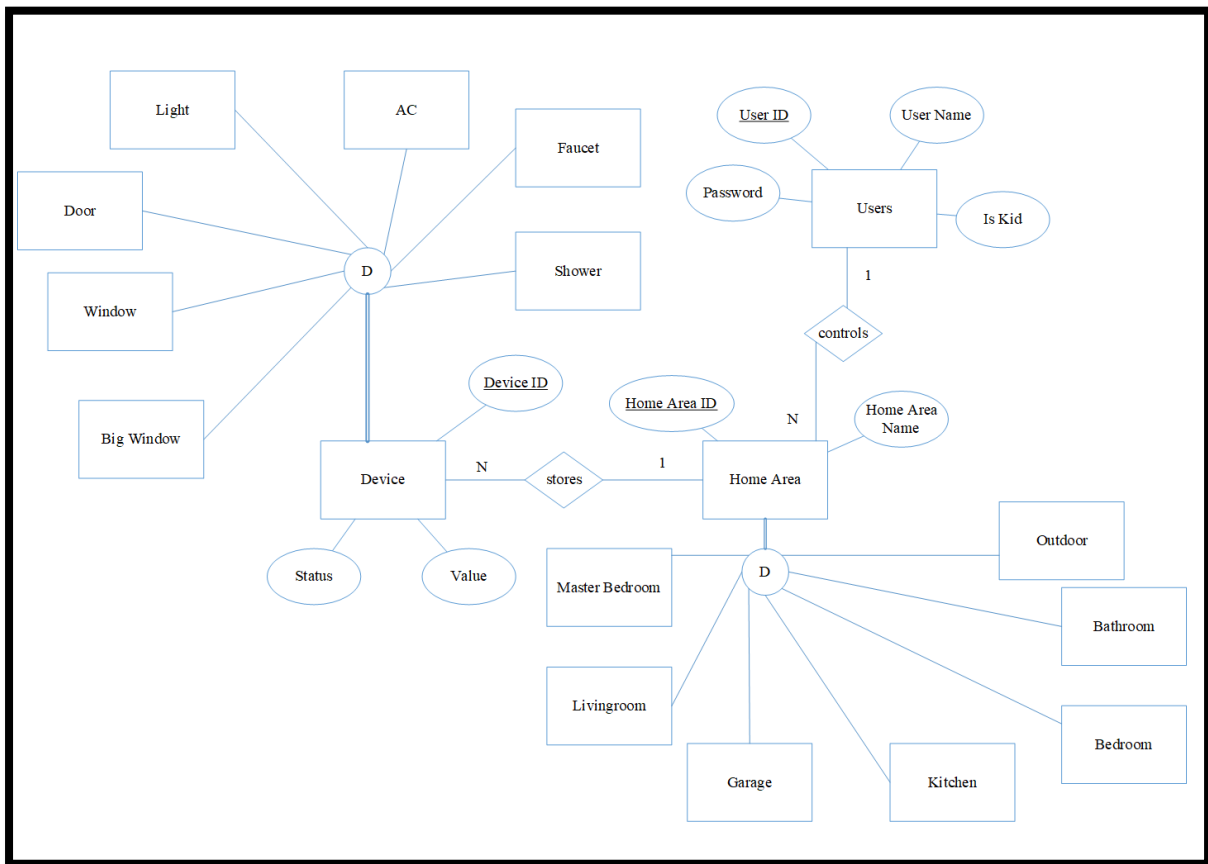


Figure 1 ERD Design

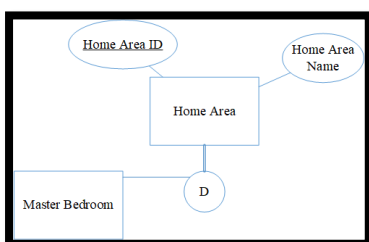
There are two users in the system that are normal users and kids. The kid users have limit of permissions such as open the front door.

The Users control many areas in the home (Home Area entity). The Home Area is Master Bedroom, Living room, Garage, Kitchen, Bedroom, Bathroom, Outdoor.

Each area in the home stores in devices. Each device has status (on or off) with the specific value such as temperature.

The device is AC, shower, faucet, Light, Door, Window, Big Window.

The following symbol describes the parent/child relationship where Master Bedroom is the specific area in the home. D means distinct so each area is master bedroom or living room ... One area cannot be both master bedroom and living room.



The double line means that the area must be one of its child. The Home Area ID occurs in the Home Area entity must be in one of its child entity (in a Master Bedroom, Living room, Garage, Kitchen, Bedroom, Bathroom or Outdoor).

Database tables:

The database has two tables, Users table and Device table. The user table has four columns and it saves the password as hash as shown beliw:

	UserId	UserName	Password	UserType
►	1	tom	202CB962AC59...	0
	2	aa	C493A0B7D577...	0
	3	baby	202CB962AC59...	1
	4	james	202CB962AC59...	1
	5	Jane	E521E34511C0A...	0
	6	Alizeh	6431C5C30E85...	0
	7	Peter	12A08D6C9558...	0
	8	Alizehh	D2C4AB409A8D...	0
	9	Alex	D9A61DED2829...	1
	10	Bill	70751EC965BB6...	0
	11	Maisaa	D79B705560EC3...	0
	12	Stanley	C051761114741...	0

Second: Device table has four columns and 41 devices which are sorted according to their Device IDs. So, each time user performs the action, the Status and Value gets updated as shown below:

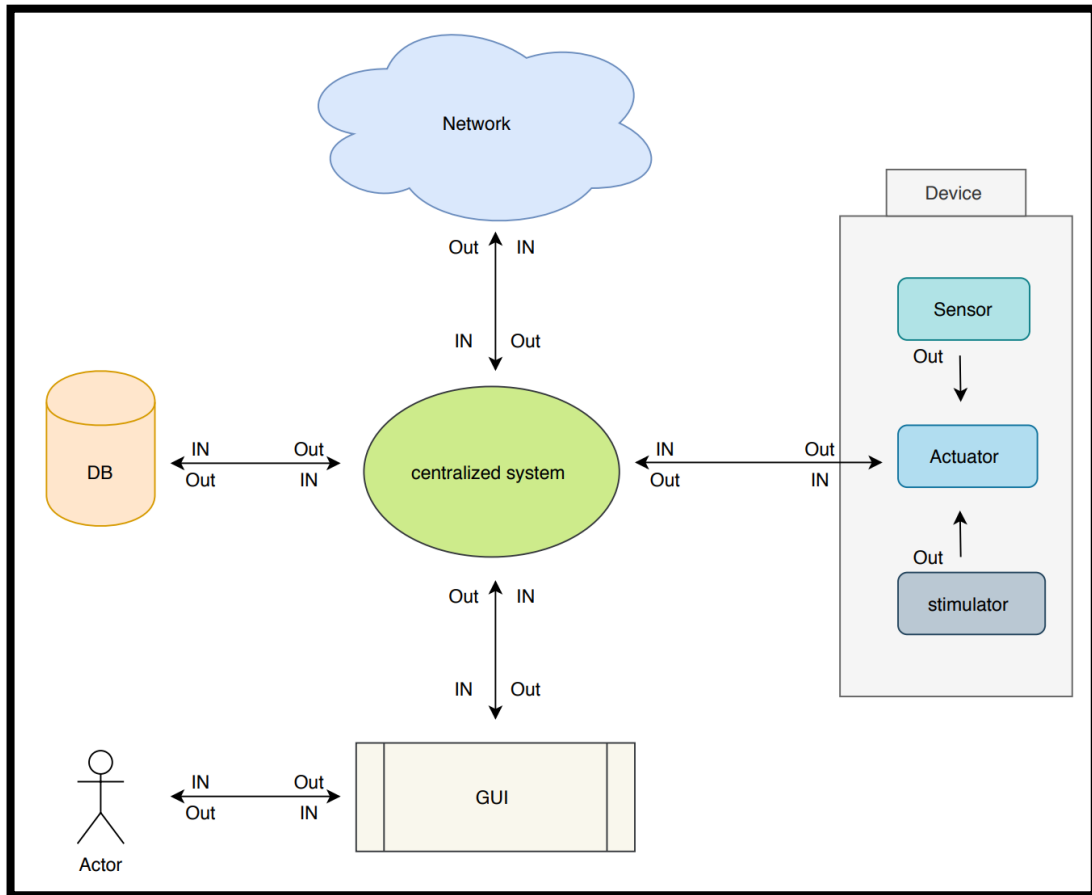
	DeviceID	DeviceName	Status	Value
▶	10001	livingroom light	0	8
	10002	garage light	1	12
	10003	outdoor light	1	0
	10004	livingroom door	0	0
	10005	garage door	1	0
	10006	outdoor door	0	0
	10007	livingroom AC	1	0
	10008	garage AC	0	12
	10009	outddor AC	0	0
	10010	livingroom Music	0	song1
	10011	garage Music	0	0
	10012	outdoor Music	0	0
	10013	living room firealarm	1	0
	10014	garage firealarm	0	0
	10015	outdoor firealarm	0	0
	10016	livingroom camera	0	0
	10017	garage camera	0	0
	10018	outdoor camera	1	0
	10019	livingroom TV	0	100
	10020	bathroom AC	1	1
	10021	bathroom door	0	0
	10022	bathroom light	1	0
	10023	bathroom window	1	2
	10024	bathroom shower	1	1
	10025	bathroom faucet	1	1
	10026	kitchen coffee	0	LATTE
	10027	kitchen stove	0	10
	10028	kitchen light	1	5
	10029	kitchen AC	0	1

	10030	kitchen oven	1	10
	10031	bedroom AC	0	10
	10032	bedroom light	1	10
	10033	bedroom door	1	1
	10034	bedroom window	0	1
	10035	masterbedroom AC	1	1
	10036	masterbedroom light	1	10
	10037	masterbedroom door	1	5
	10038	masterbedroom wind...	1	2
	10039	masterbedroom bigwi...	1	1
	10040	masterbedroom faucet	1	3
	10041	masterbedroom shower	1	4
*	NULL	NULL	NULL	NULL

Software design

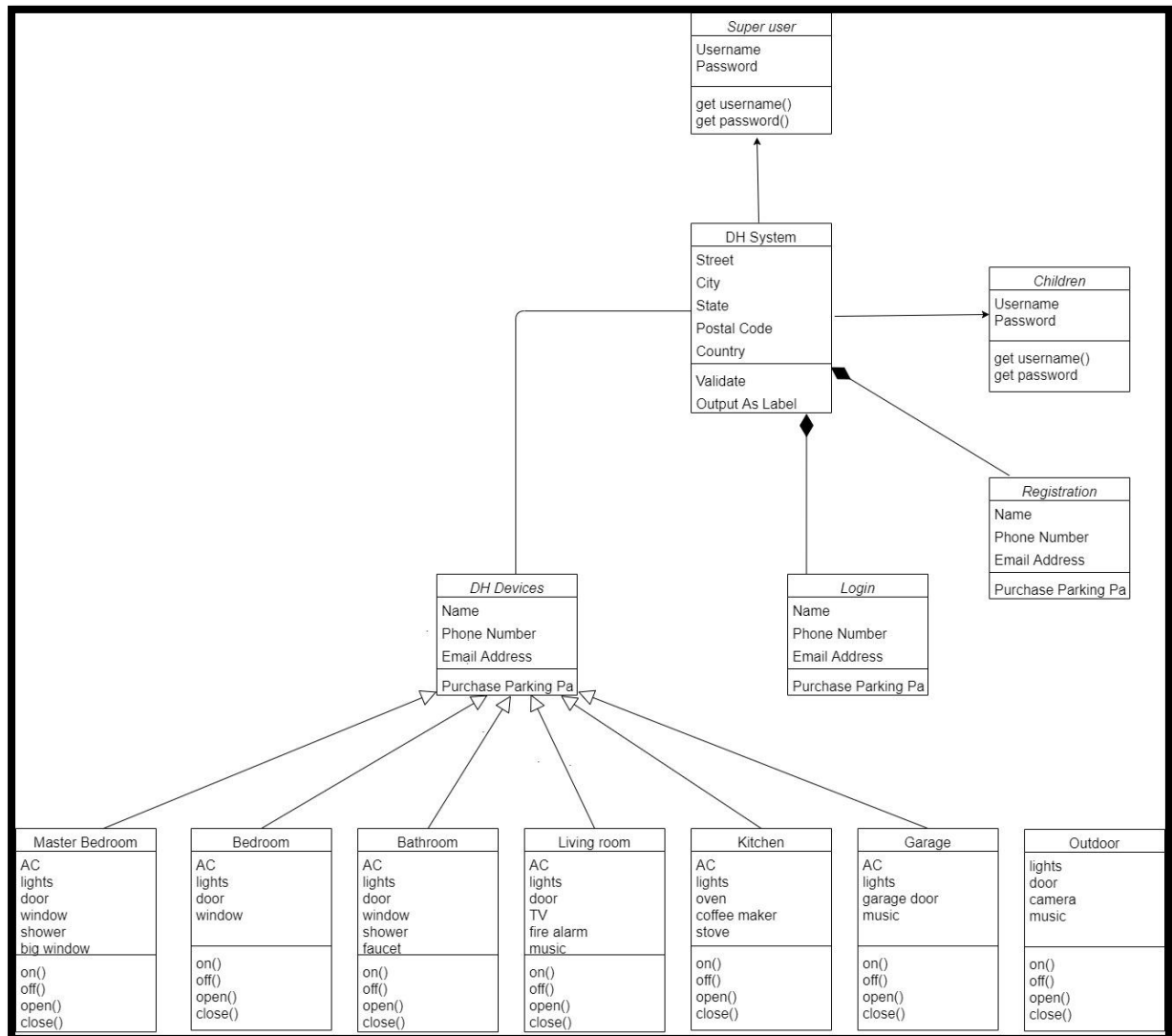
Conceptual Design:

The conceptual design of our DH project s shown as follows:



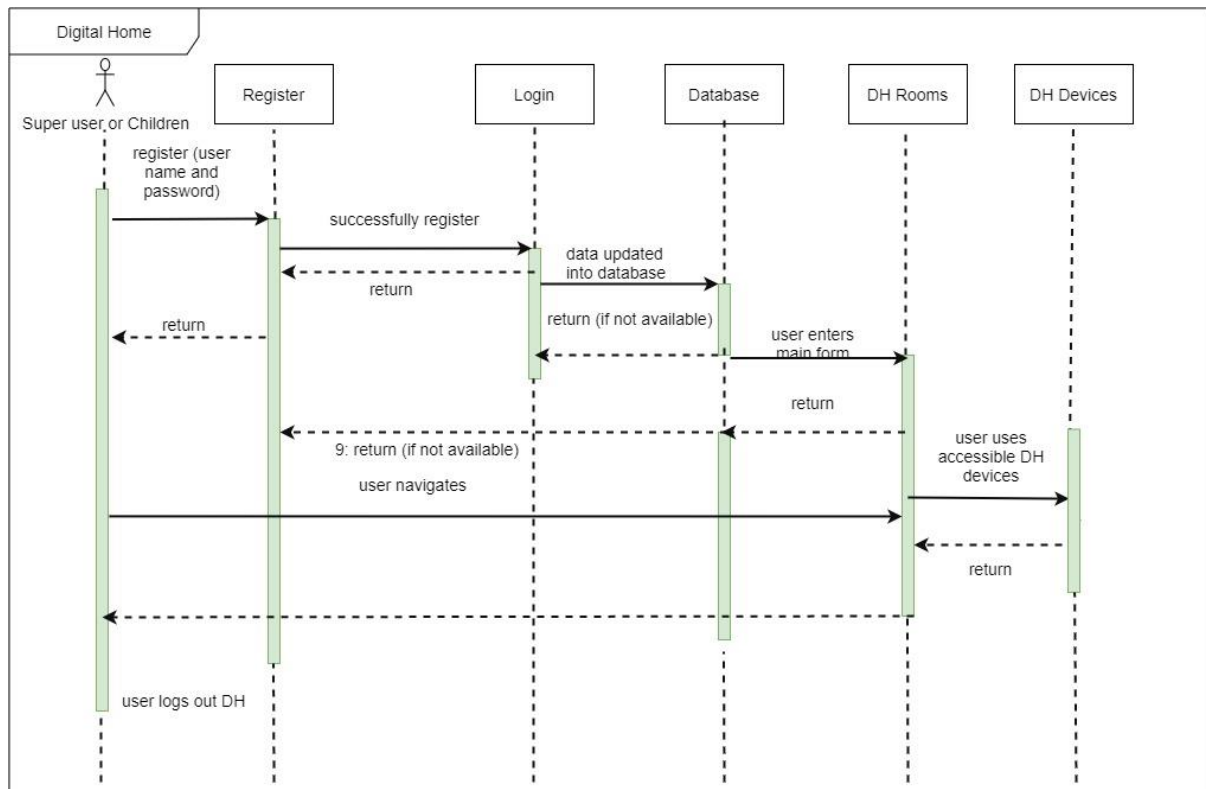
Class diagram

The class diagram of DH project is shown as follows:

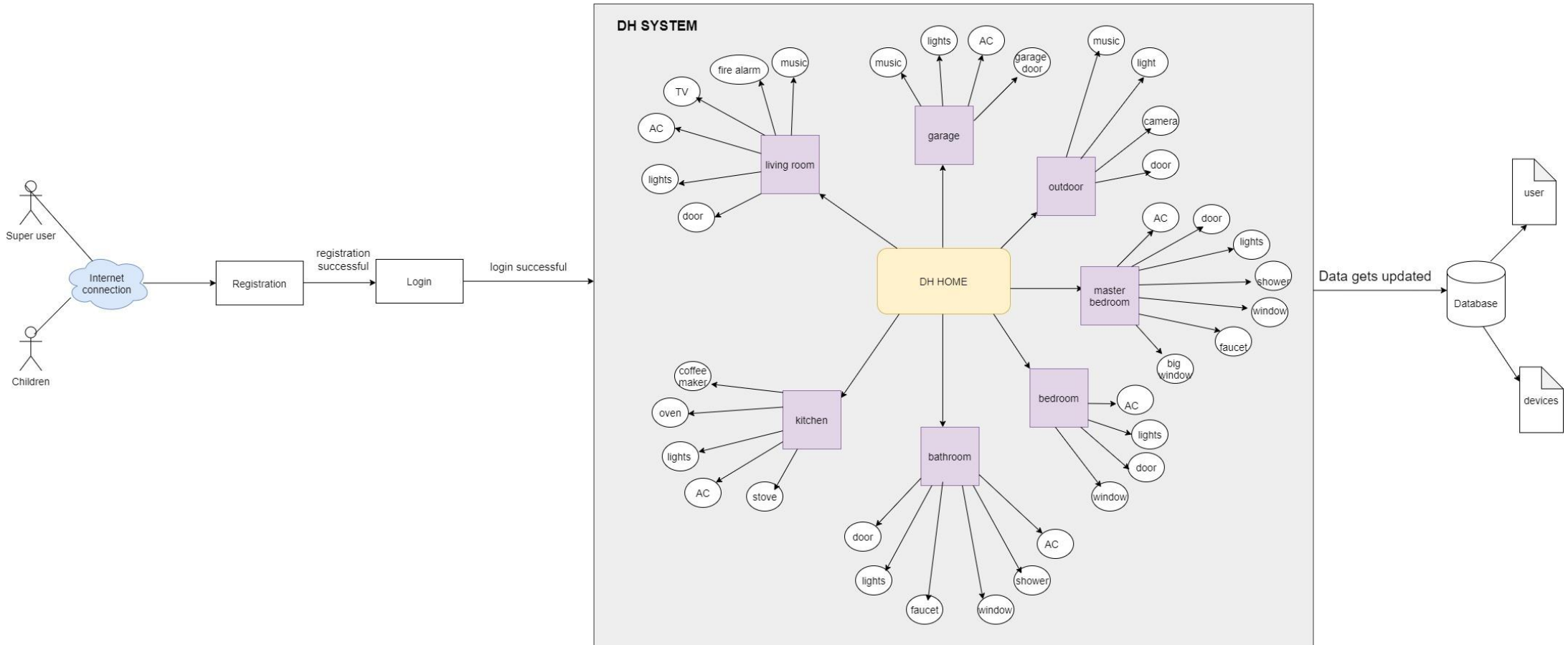


Sequence diagram

The sequence diagram of DH project shows the interaction and what messages are being exchanged between the objects:



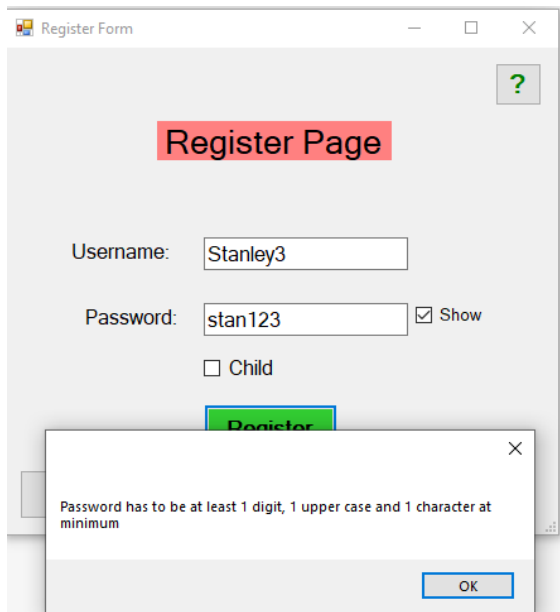
System Architecture:



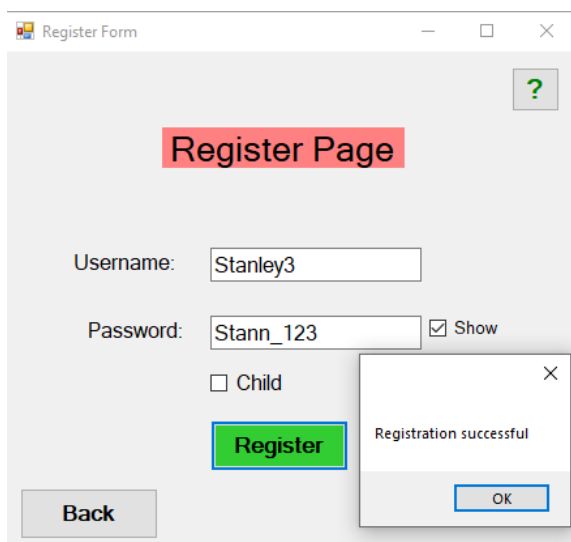
System Interface:

The screen shot below shows the 'Registration' page of the 'Digital Home System'. The login page consists of 2 fields Username and password, show check box for password and registration for Super user and Children respectively. The username/password can't be left empty field. It also has a 'help' feature on top right with the necessary guidelines.

Furthermore, Password for both users should have at least one upper-case letter, one digit and at least one character while registering to the DH System. Otherwise, the user won't be able to successfully register:



When the password requirements are met:



Help page on registration form:

The screenshot shows a window titled "HelpForm" with a red "HELP!" label at the top. Below it, a heading reads "Stuck using Digital Home System? Below are some guidelines that might be helpful to you:". The text provides instructions for two user types: "Super user: register/login normally without checking the checkbox" and "Children: check the checkbox to register/login for children". It also offers troubleshooting for login issues, advice on using the "Back" button, and instructions on using the "logout" button. At the bottom, it lists temperature settings for "Shower and Faucet": "COLD 5", "MEDIUM is 3", and "HOT is 1". A "Back" button is located at the bottom left.

HELP!

Stuck using Digital Home System? Below are some guidelines that might be helpful to you:

There are two types of users:
Super user: register/login normally without checking the checkbox
Children: check the checkbox to register/login for children

Are you facing problems in logging into your account?
Please enter the correct username and password. Failing to enter the correct credentials will not allow you to login successfully.

On the current page, you don't want to proceed?
Click on the 'Back' button.

You have finished working in your account?
Click on the logout button.

Shower and Faucet has COLD, MEDIUM and HOT buttons.
COLD 5
MEDIUM is 3
HOT is 1

Back

The screen shot below shows the 'Login' page for Super user:

The screenshot shows a window titled "Digital Home" with a red "Login Form" label at the top. It features a "Username:" field with the text "Stanley3" and a "Password:" field with masked characters "*****". To the right of the password field is a "Show" checkbox. Below these fields is a green "Login" button. At the bottom left is a "Back" button.

Login Form

Username: Stanley3

Password: ***** ☐ Show

Login

Back

When registering for a child, the child check box must be ticked as shown below

The screenshot shows a window titled "Register Form" with a red "Register Page" label at the top. It features a "Username:" field with the text "Robert3" and a "Password:" field with the text "Daytona_3". To the right of the password field is a "Show" checkbox, which is checked. Below the password field is a "Child" checkbox, which is also checked. At the bottom center is a green "Register" button. At the bottom left is a "Back" button. A green question mark icon is visible in the top right corner.

Register Page

Username: Robert3

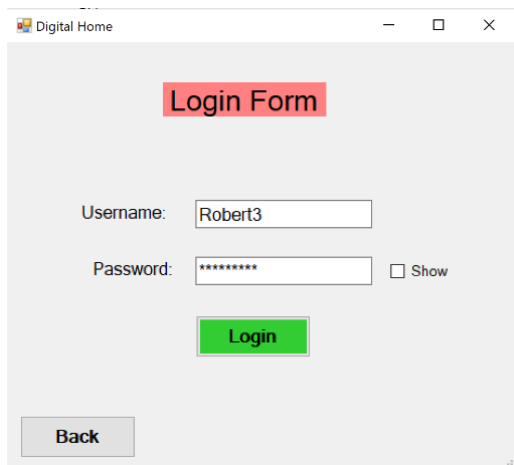
Password: Daytona_3 ☒ Show

☒ Child

Register

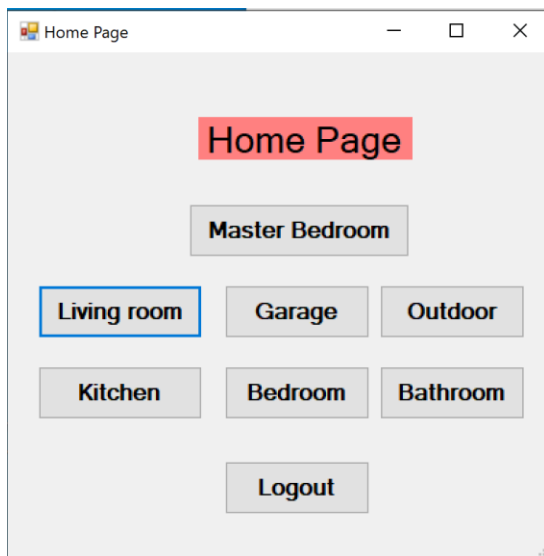
Back

Login form- Logging in successfully will open the Home page:



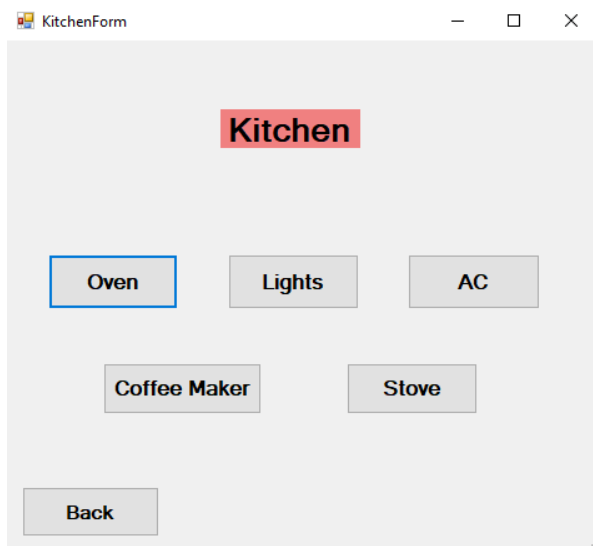
A screenshot of a web application window titled "Digital Home". The window contains a "Login Form" section. It has two input fields: "Username:" with the text "Robert3" and "Password:" with masked characters "*****". To the right of the password field is a checkbox labeled "Show". Below the password field is a green "Login" button. At the bottom left of the form is a grey "Back" button.

The screen shot below shows the 'Home page' for Digital Home System and has the buttons to all the rooms as shown below.



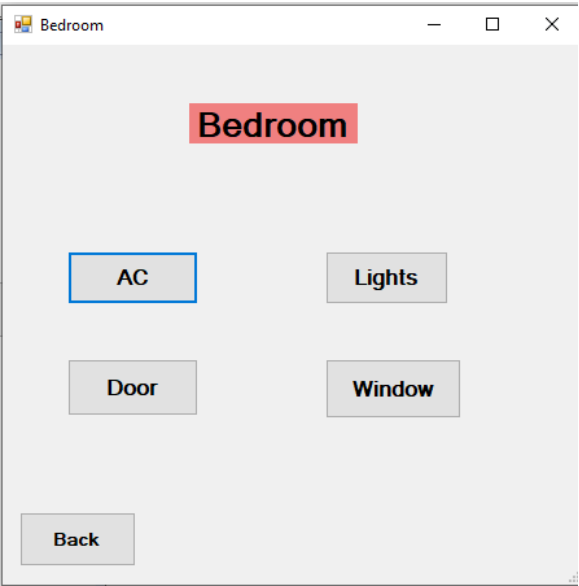
A screenshot of a web application window titled "Home Page". The window displays a grid of buttons for different rooms: "Master Bedroom", "Living room", "Garage", "Outdoor", "Kitchen", "Bedroom", and "Bathroom". The "Living room" button is highlighted with a blue border. At the bottom center is a "Logout" button.

Kitchen has six features as shown below:

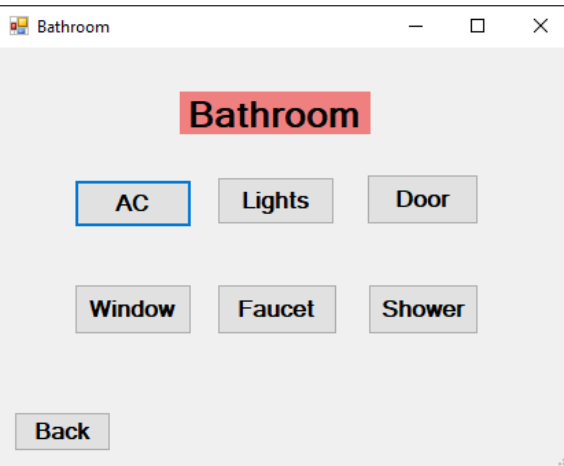


A screenshot of a web application window titled "KitchenForm". The window displays a grid of buttons for kitchen features: "Oven", "Lights", "AC", "Coffee Maker", and "Stove". The "Oven" button is highlighted with a blue border. At the bottom left is a "Back" button.

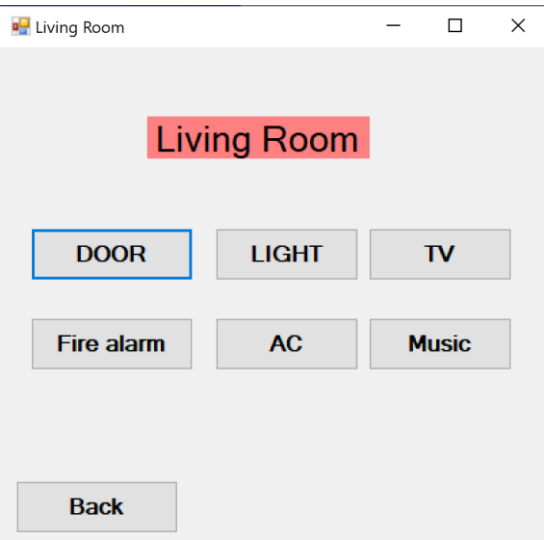
Bedroom has four features as shown below:



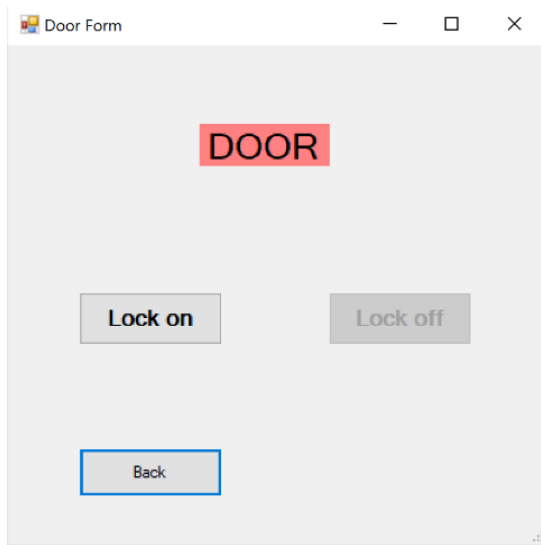
Bathroom has six features as shown below:



Living room has six features as shown below:

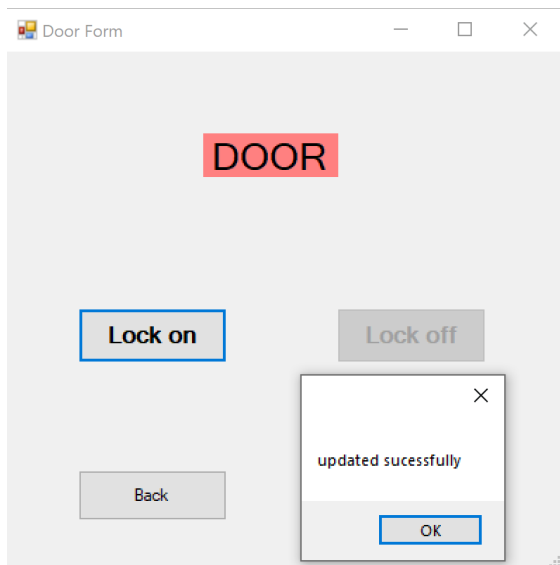


Door form has 2 buttons as shown:



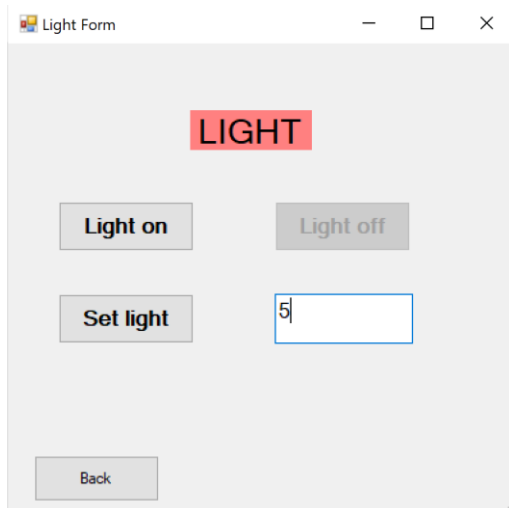
The screenshot shows a window titled "Door Form" with a standard Windows title bar (minimize, maximize, close buttons). The main content area has a light gray background. At the top center, the word "DOOR" is displayed in a red rectangular box. Below this, there are two buttons: "Lock on" on the left and "Lock off" on the right. Both buttons are gray with black text. At the bottom left, there is a "Back" button with a blue border. The bottom right corner of the window contains a small icon.

Confirmation window will appear when either button is clicked, gets updated in database



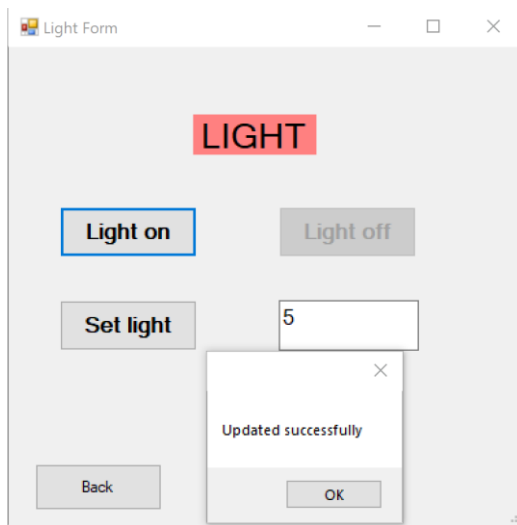
This screenshot shows the "Door Form" window with a confirmation dialog box overlaid on top. The dialog box is titled "updated sucessfully" (note the typo) and has a close button (X) in the top right corner. At the bottom of the dialog is an "OK" button. The background "Door Form" window is slightly dimmed, showing the "Lock on" and "Lock off" buttons and the "Back" button.

When light button is clicked, set light sets the brightness:

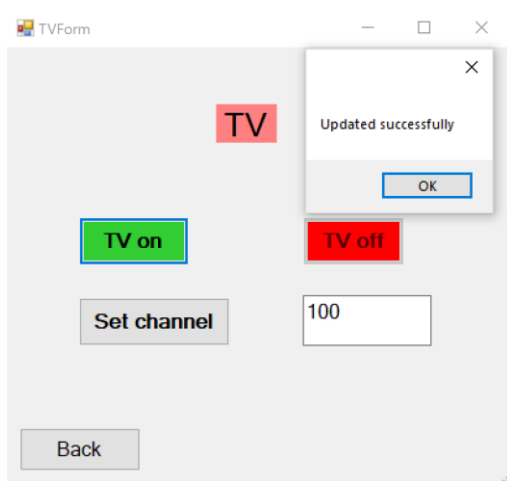


The screenshot shows a window titled "Light Form" with a standard Windows title bar. The main content area has a light gray background. At the top center, the word "LIGHT" is displayed in a red rectangular box. Below this, there are three buttons: "Light on" on the left, "Light off" on the right, and "Set light" below "Light on". All buttons are gray with black text. To the right of the "Set light" button is a text input field containing the number "5". At the bottom left, there is a "Back" button. The bottom right corner of the window contains a small icon.

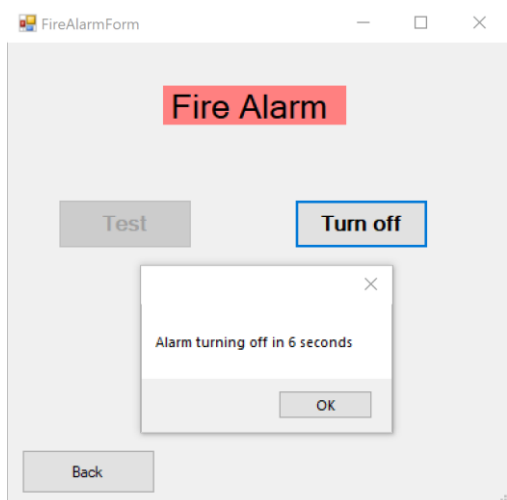
Confirmation window (pop-up) will appear to confirm that the data is updated in the database:



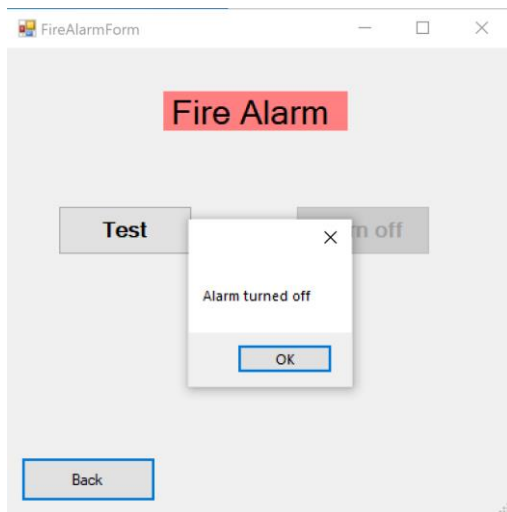
User can set the channel and click on TV on or TV off on the TV Form:



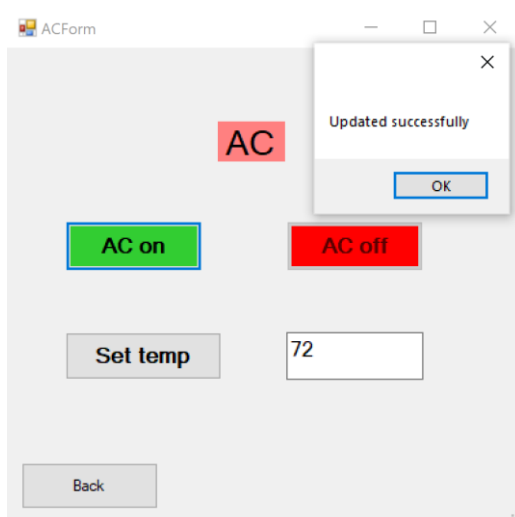
For the fire alarm, when the test button is clicked, sound will be heard to check if the fire alarm is working fine. Next, a window will pop-up when the user would click on 'Turn off' button as shown below:



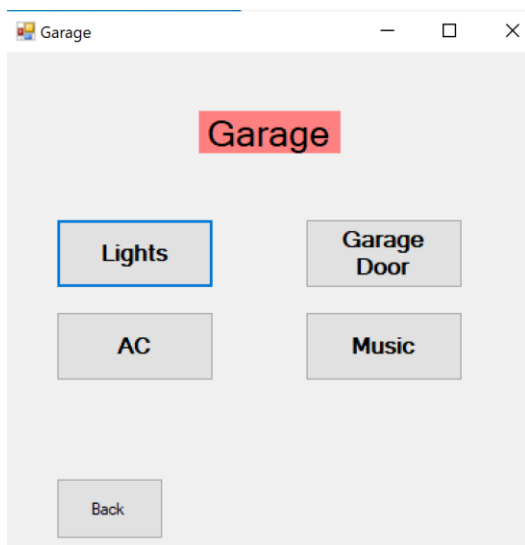
Then, the alarm will be off :



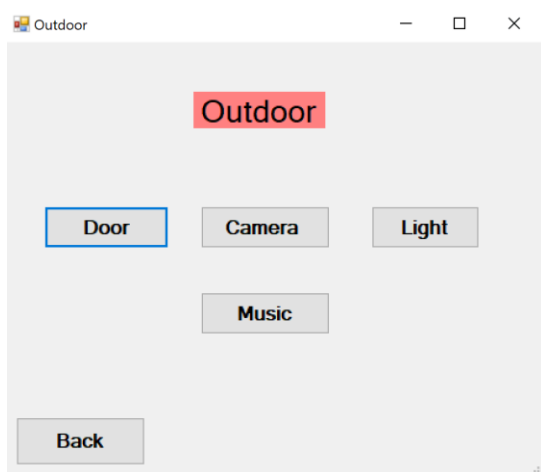
When clicking AC



Garage form has four features as shown below:

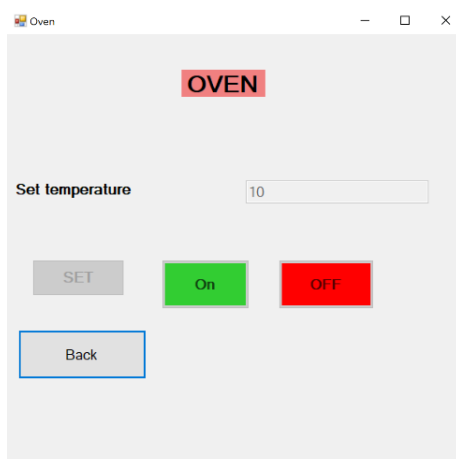
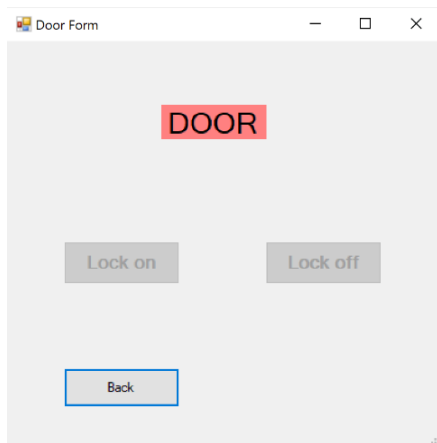


Outdoor has four features as shown below:

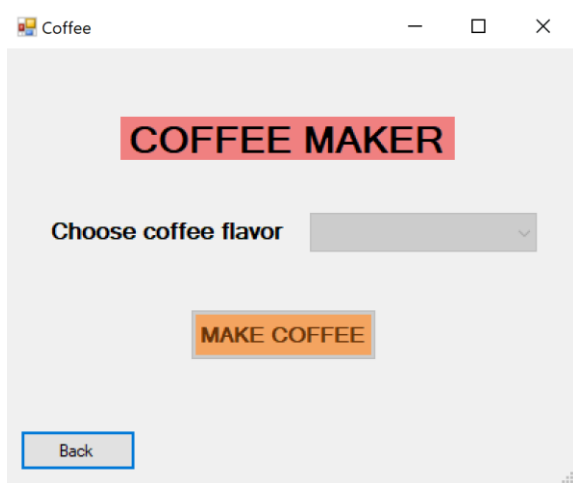


Child user will be restricted from using the below devices for safety purposes:

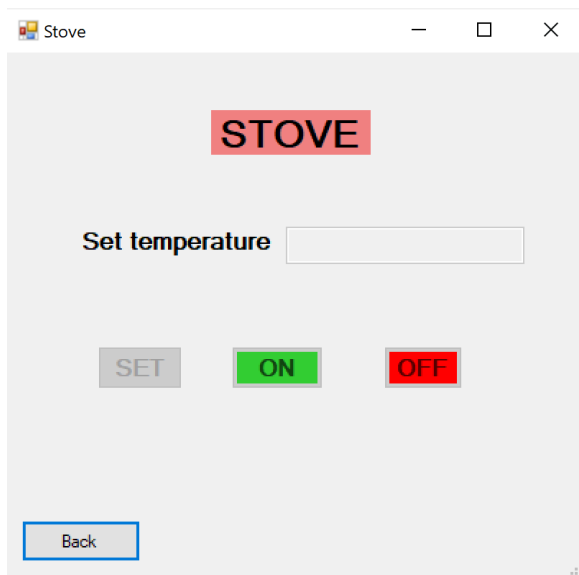
Outdoor door:



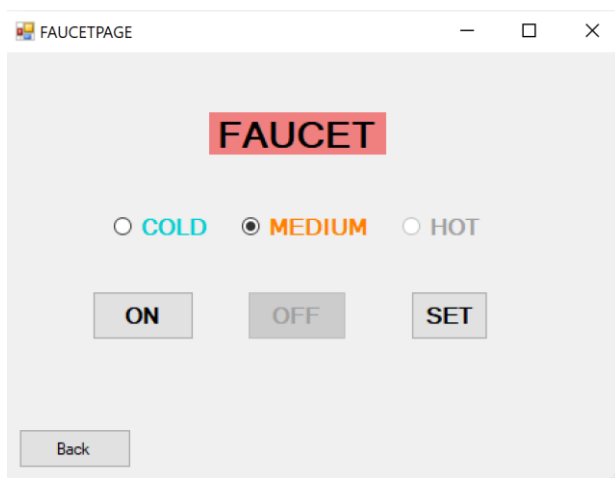
Since the coffee is Hot:



Stove:



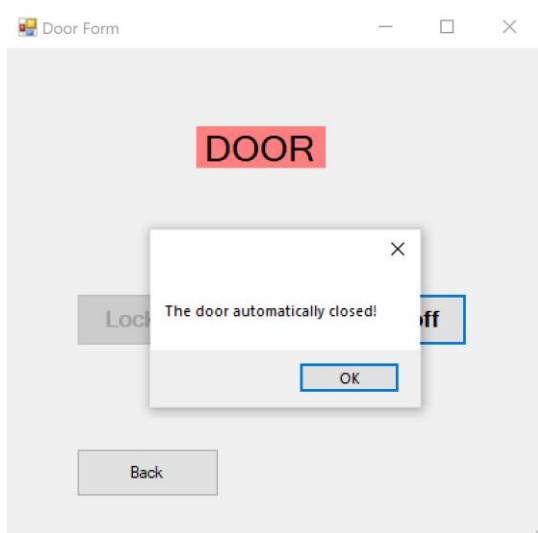
Child user cannot use HOT water while using faucet:



Child user cannot use HOT water while using shower:



The following form is the screen shot of the outdoor door for security. When the outdoor door is open, it will be closed automatically in 6 seconds as shown below:



Lastly, when can click on logout button on the 'Home page' and a pop-up window will appear as shown below:

