Carleton University

COMP 3004 A

Object-Oriented Software Engineering

Final Project

Documentation for MCT Simulator with Qt C++

Due Sunday April 18th at 11:59 pm as a single pdf file submitted on cuLearn with source files and pdf of Use Cases, Object design model, Test Case and Traceability matrices in a single zip file

Submitted to Professor Vojislav Radonjic

TA assigned John Jegede

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USE CASE MODEL

USER TURNS ON DEVICE Concrete Use Case 1

Actors: Patient

Precondition: Device turned off

Description:

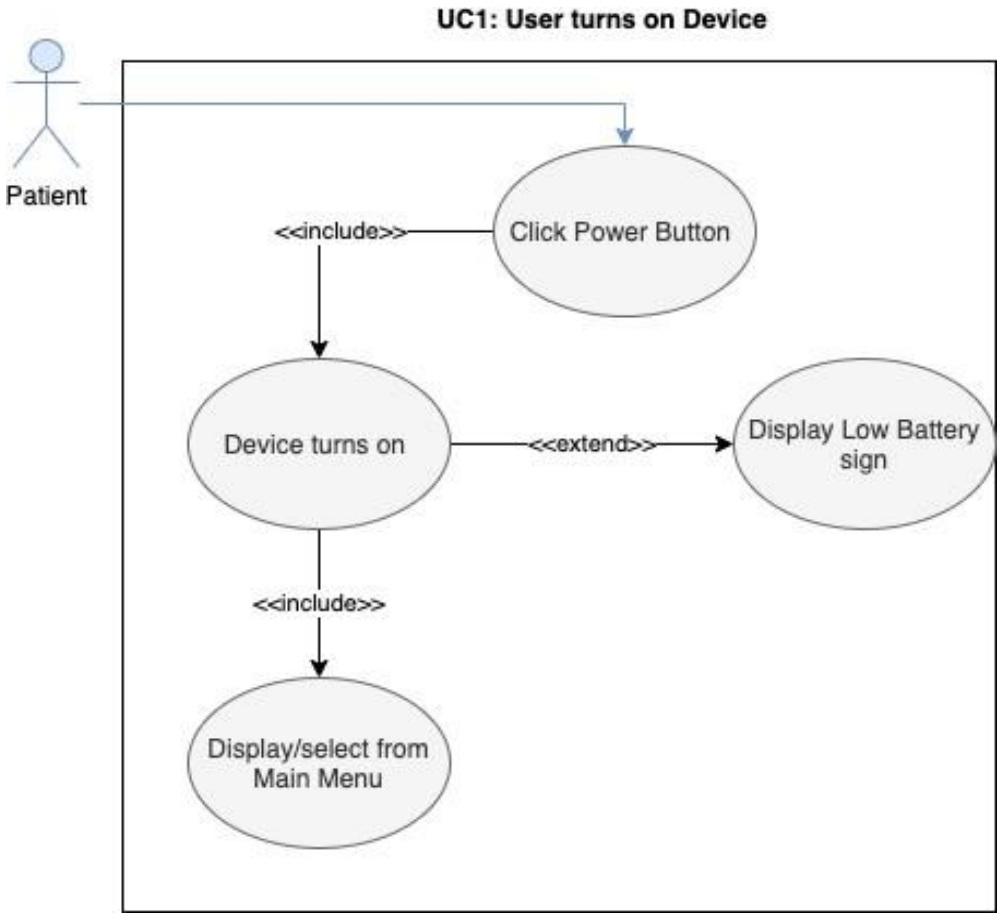
1. User clicks power button
2. Device turns on
3. Home page displayed on screen

Postcondition:

1. Device is turned on

Alternatives:

1. Low power sign is displayed
2. Device does not turn on due to no battery in device



USER TURNS OFF DEVICE Concrete Use Case 2

Actors: Patient

Precondition: Device is turned on

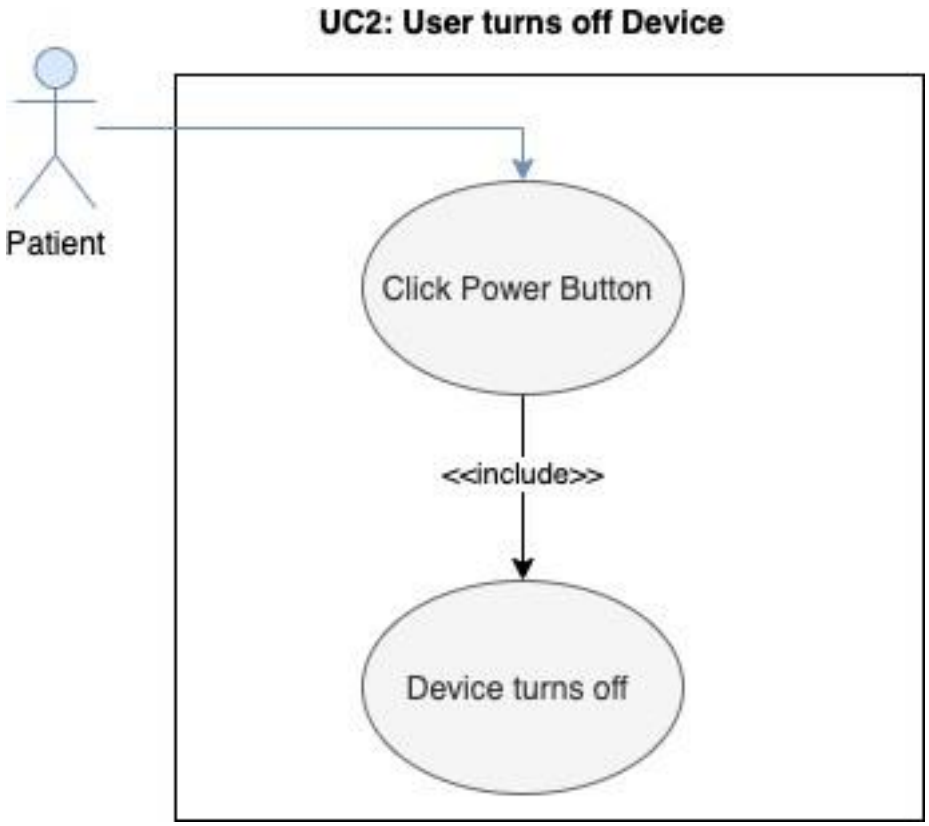
Description:

1. User clicks power button
2. Device turns off

Postcondition:

1. Device is off

Alternatives: N/A



USER CARRIES OUT A SPECIFIC PROGRAM TREATMENT Concrete Use Case 3

Actors: Patient

Precondition: Device is turned on and main menu is displayed

Description:

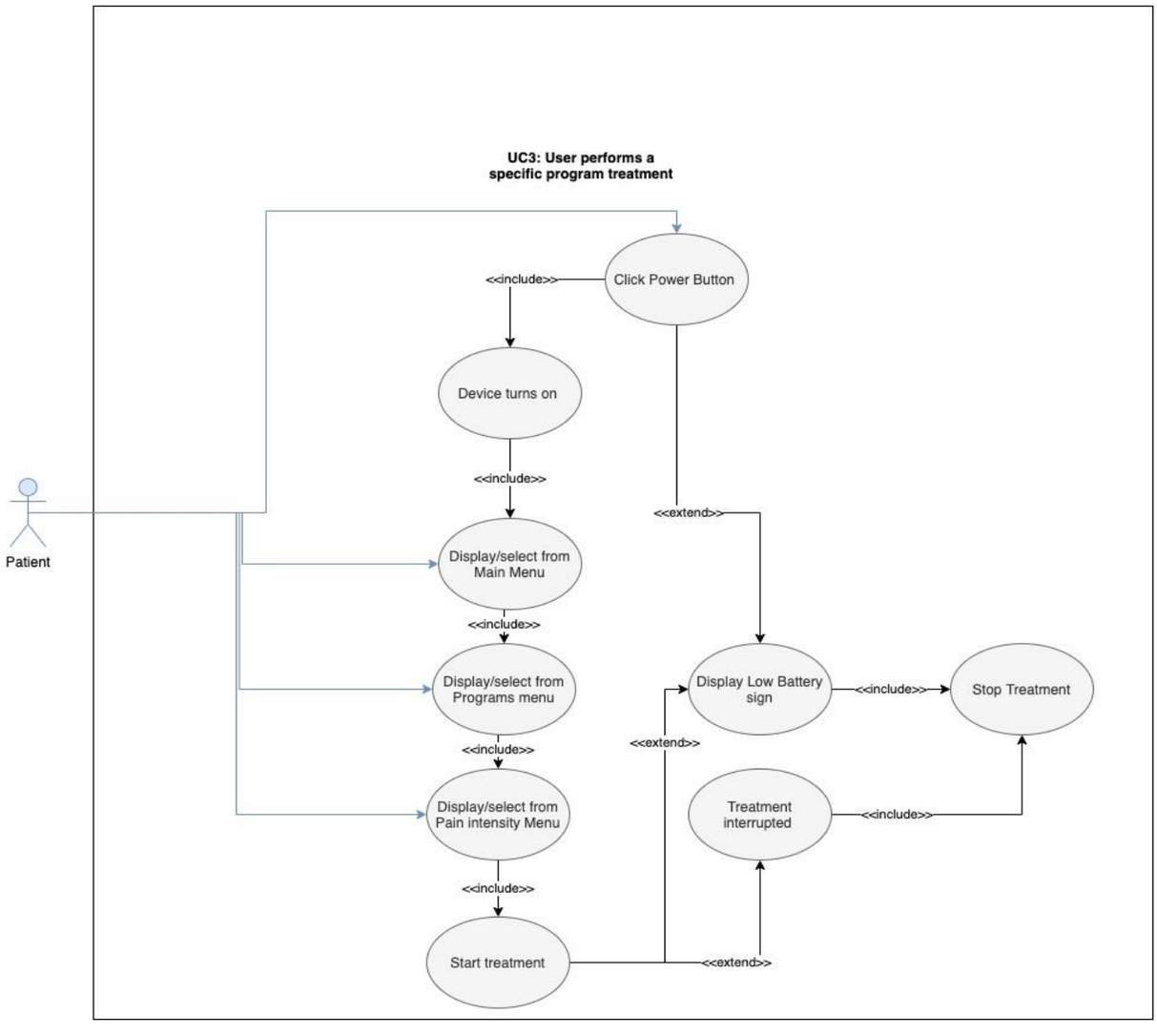
1. User selects “programs” from main menu and clicks “ok” button to trigger their selection
2. User selects one of the program options from the “programs” menu using the up/down arrows and clicks “ok” button to trigger their selection
3. User selects their required power level using right/left buttons
4. User selects ok to confirm their settings/treatment and start the treatment
5. User waits for timer to countdown to zero

Postcondition:

1. Users treatment is complete

Alternatives:

1. Low battery results in stopping the treatment
2. User Interrupts treatment by removing device from skin before treatment is complete. System then waits for user to put device back on skin or cancels the treatment
3. User interrupts treatment by switching screens while treatment is active. System waits for user to return to screen or resets treatment.



USER CARRIES OUT A SPECIFIC FREQUENCY TREATEMENT Concrete Use Case 4

Actors: Patient

Precondition: device is turned on

Description:

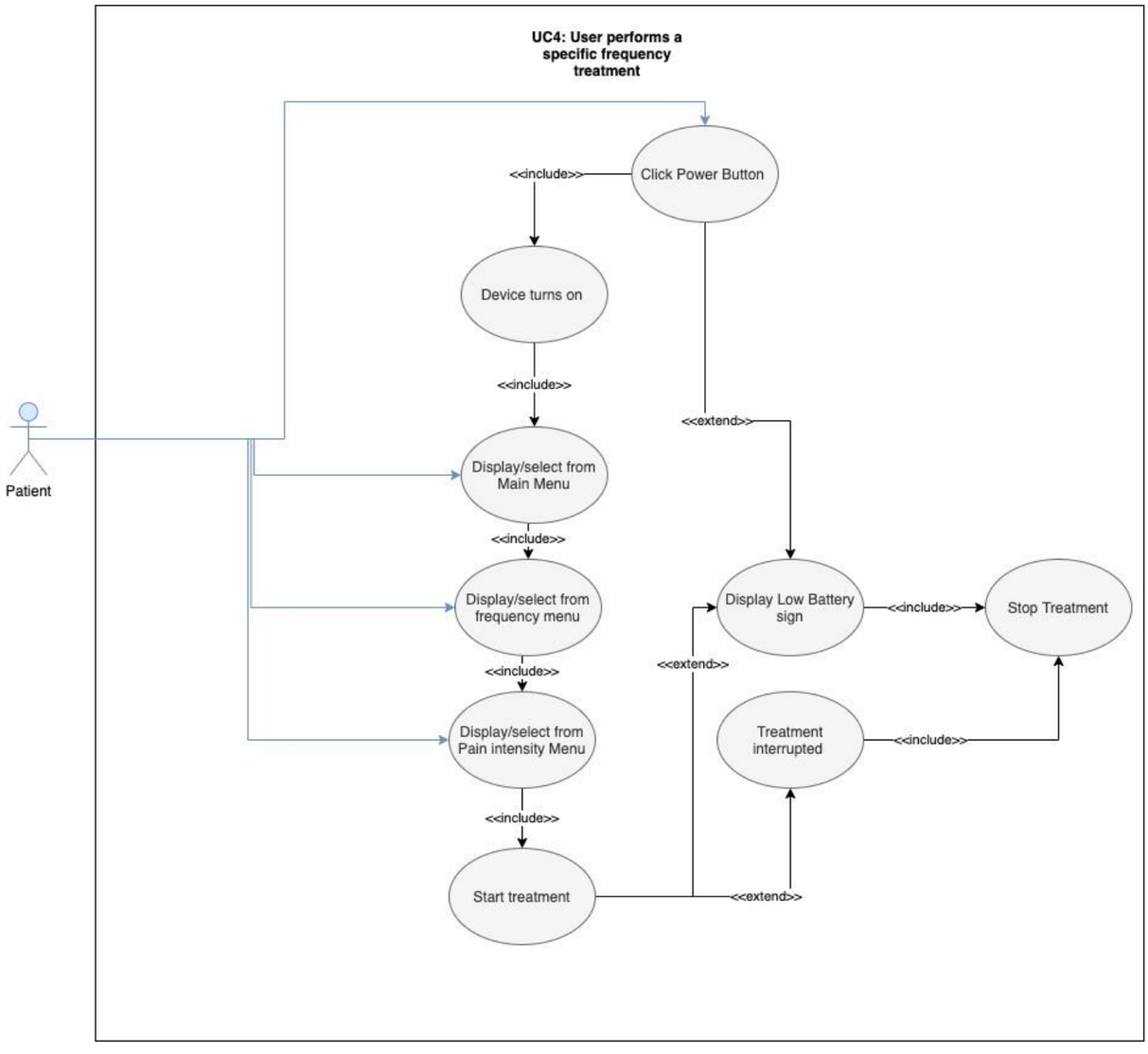
1. User selects “frequencies” from main menu and clicks “ok” button to trigger their selection
2. User selects one of the frequency options from the “frequencies” menu using the up/down arrows and clicks “ok” button to trigger their selection
3. User selects power level using the arrow and clicks “ok” button to trigger their selection
4. User stops treatment once they are ready to do so

Postcondition:

1. User Treatment is complete

Alternatives:

1. Low battery results in stopping the treatment
2. User removes device from skin before treatment is complete. System then waits for user to put device back on skin or cancels the treatment
3. Treatment times out at 59 minutes and stops
4. User interrupts treatment by clicking back button and switching screens while treatment is active. System waits for user to return to screen or resets treatment.



USER VIEW TREATMENT HISTORY Concrete Use Case 5

Actors: Patient

Precondition:

1. device is turned on
2. at least one treatment has been completed by the user

Description:

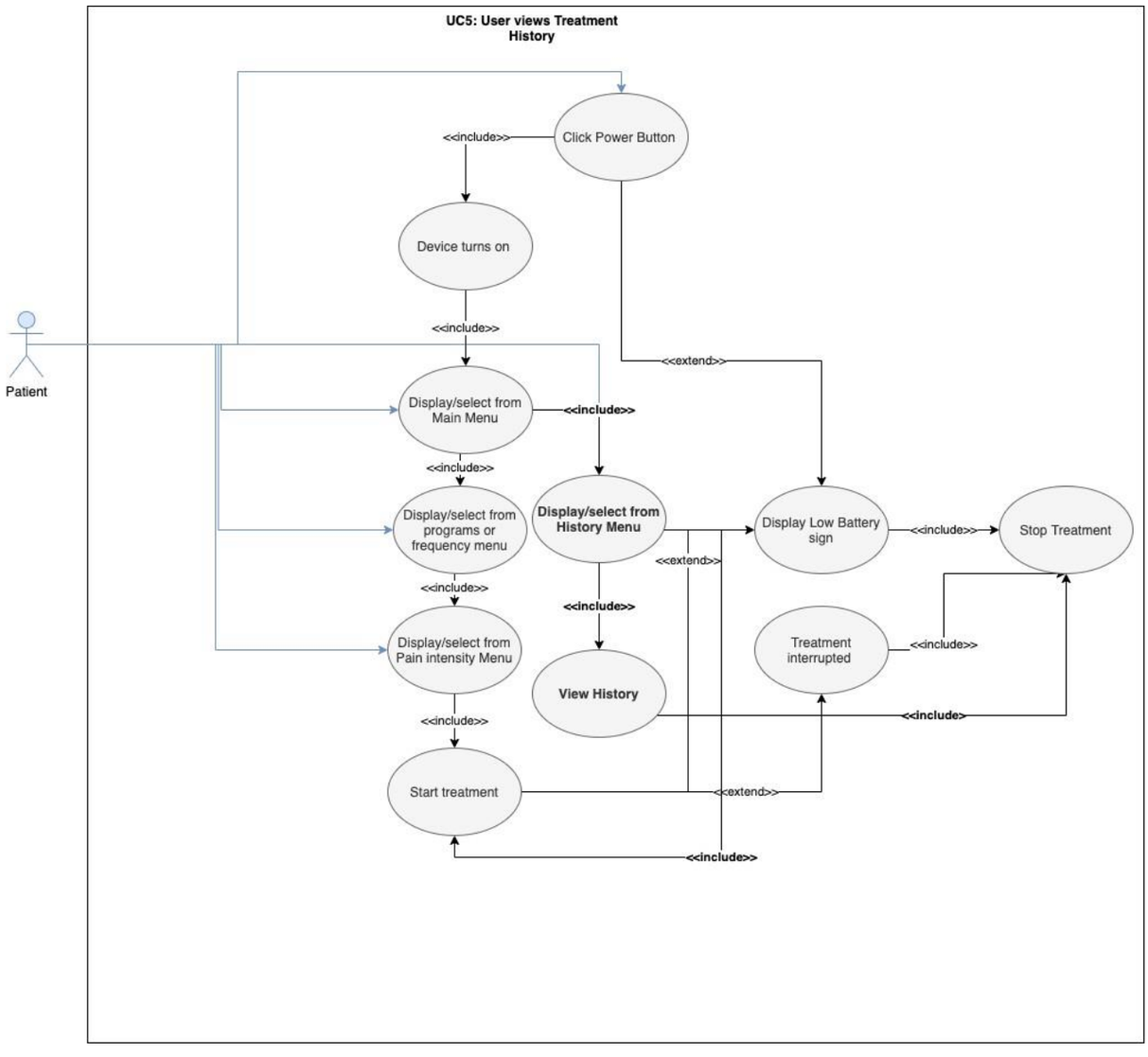
1. User selects “History” from main menu using the up/down arrow buttons and clicks “ok” button to trigger their selection
2. User selects “View” using the up/down arrow buttons and clicks “ok” button to trigger their selection

Postcondition:

1. User’s previous treatments data appear in list

Alternatives:

1. User does not have any treatments completed; Post condition will have an empty page instead of treatment list



USER ERASES TREATMENT HISTORY Concrete Use Case 6

Actors: Patient

Precondition:

1. device is turned on
2. at least one treatment has been completed by the user

Description:

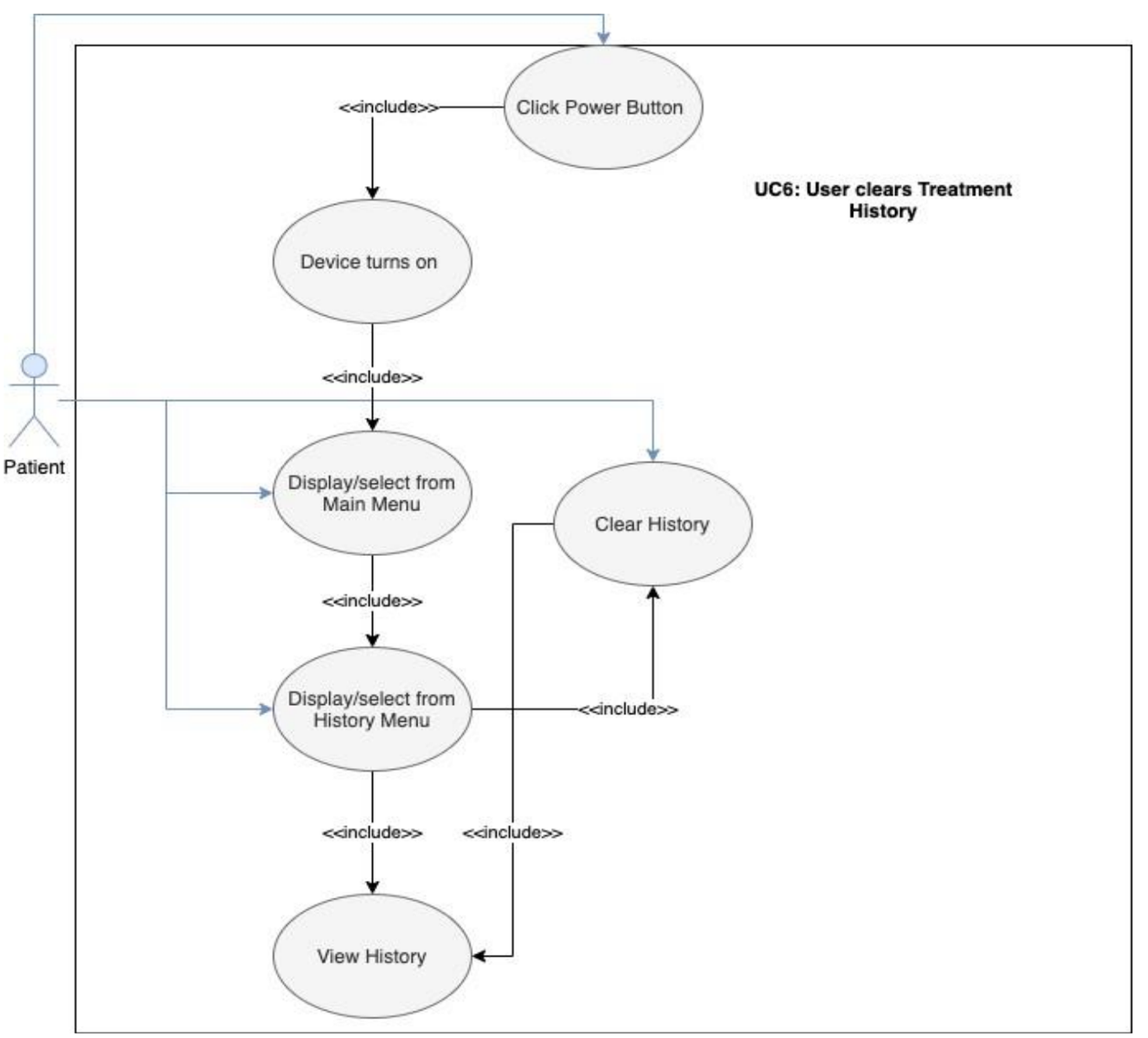
1. User selects “History” from main menu using the up/down arrow buttons and clicks “ok” button to trigger their selection
2. User selects “clear” using the up/down arrow buttons and clicks “ok” button to trigger their selection

Postcondition:

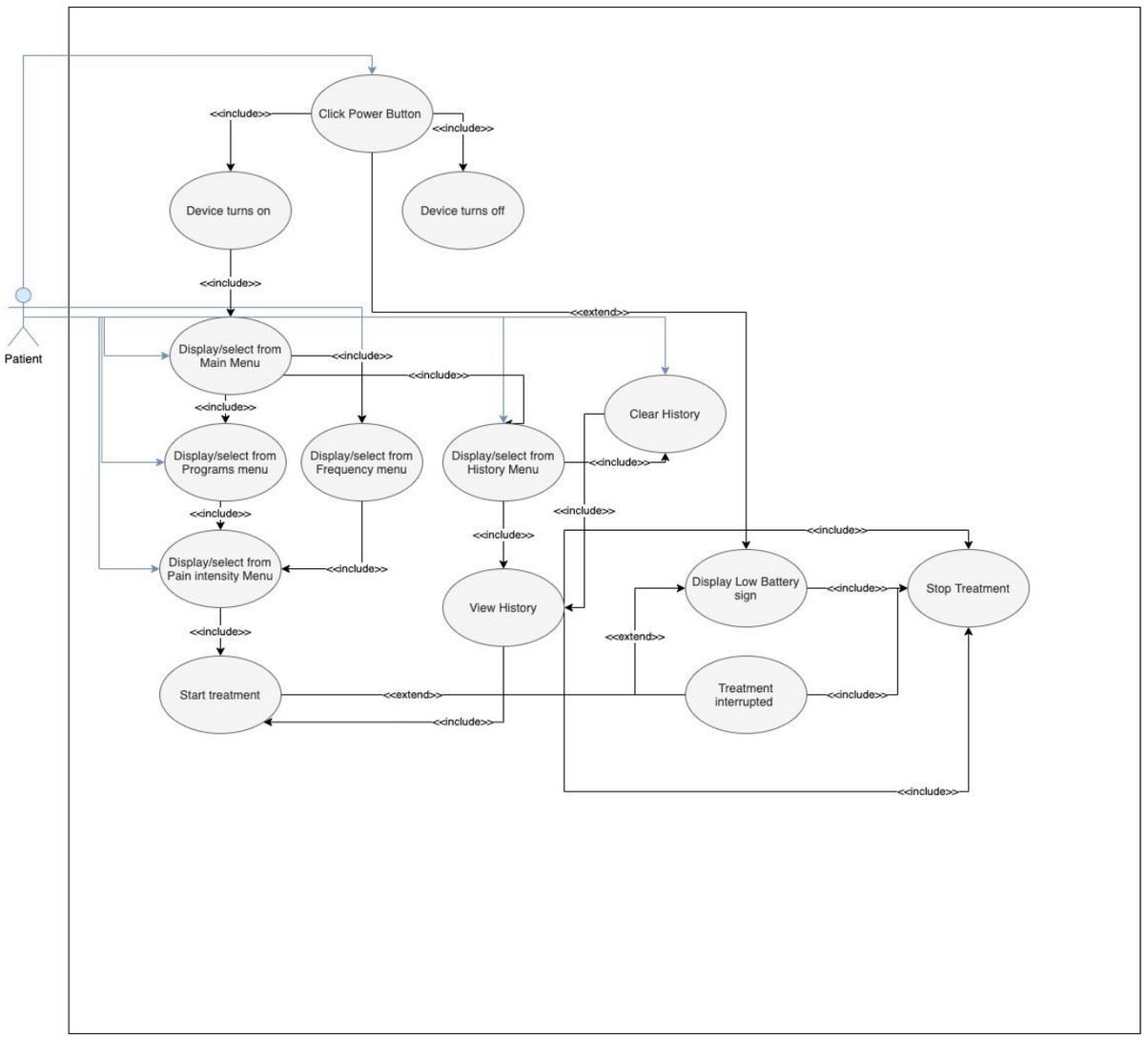
1. User’s treatment history is erased
2. “view history” is empty

Alternatives:

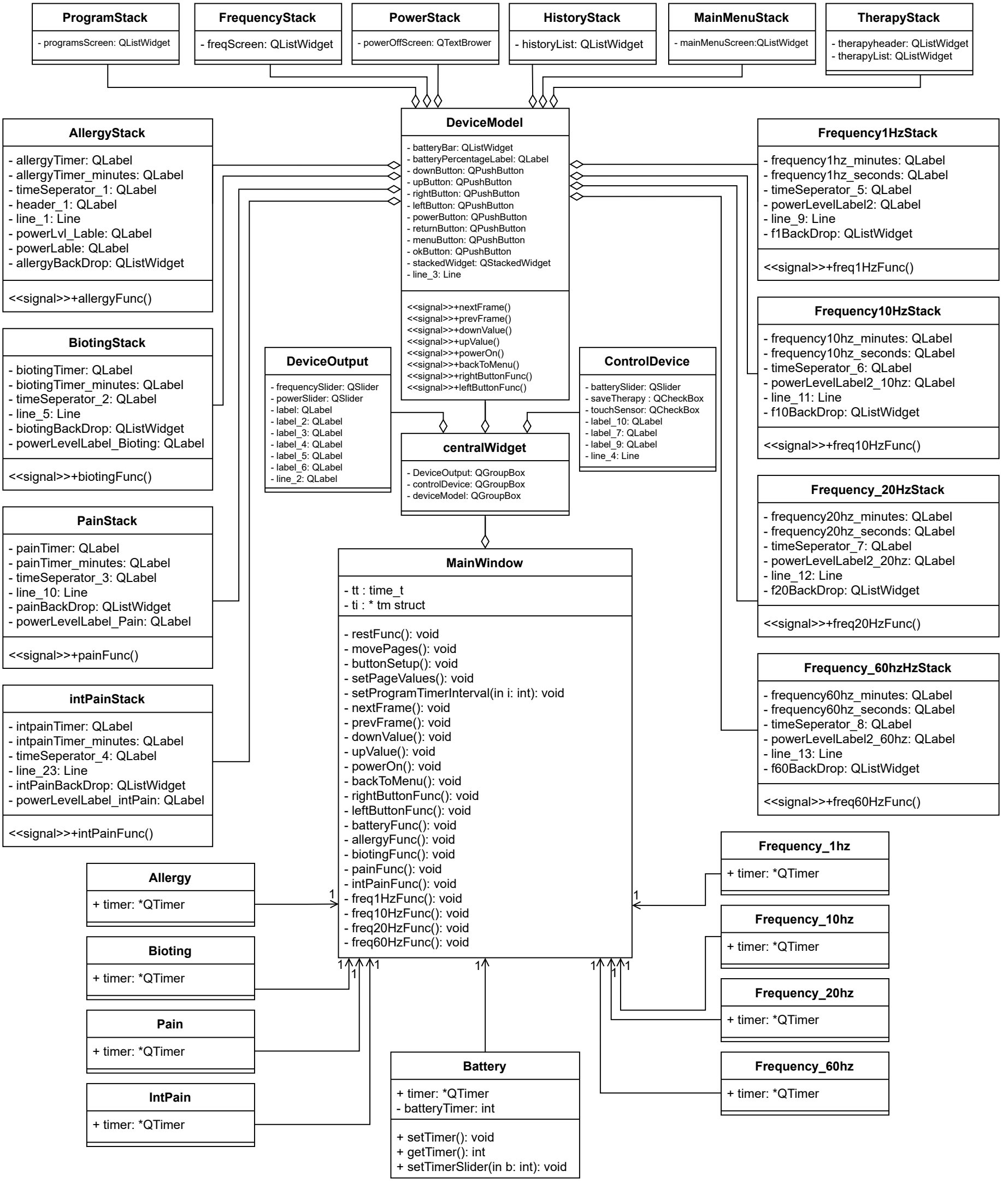
1. User does not have any treatments completed and thus the “clear” selection does nothing



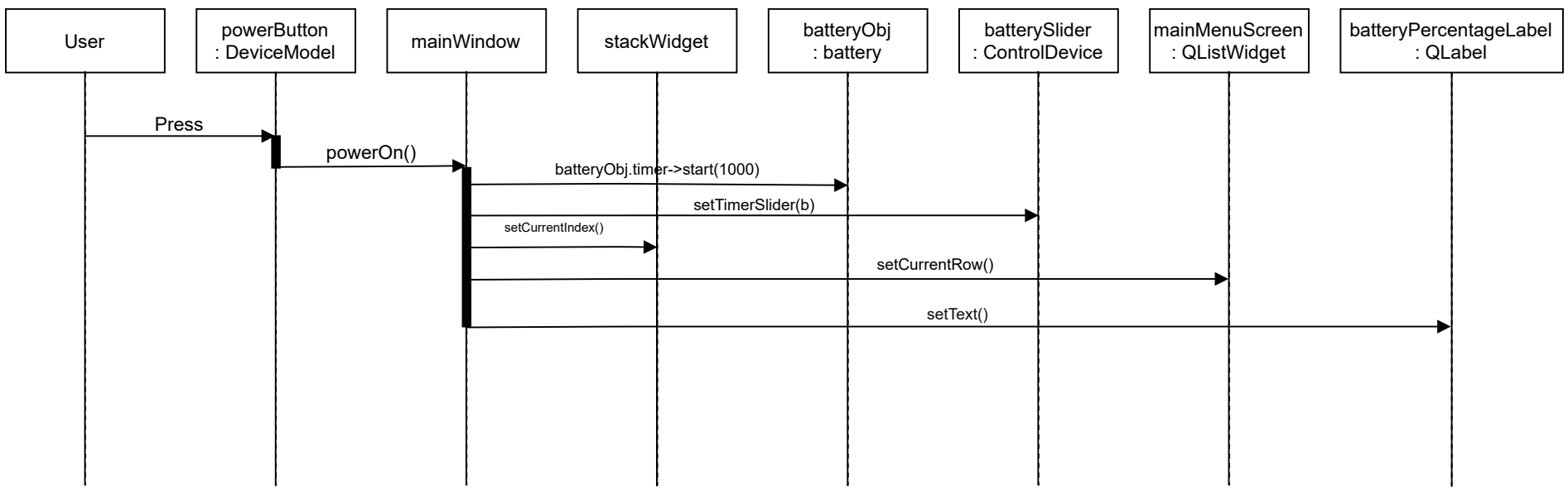
Complete Use Case Diagram



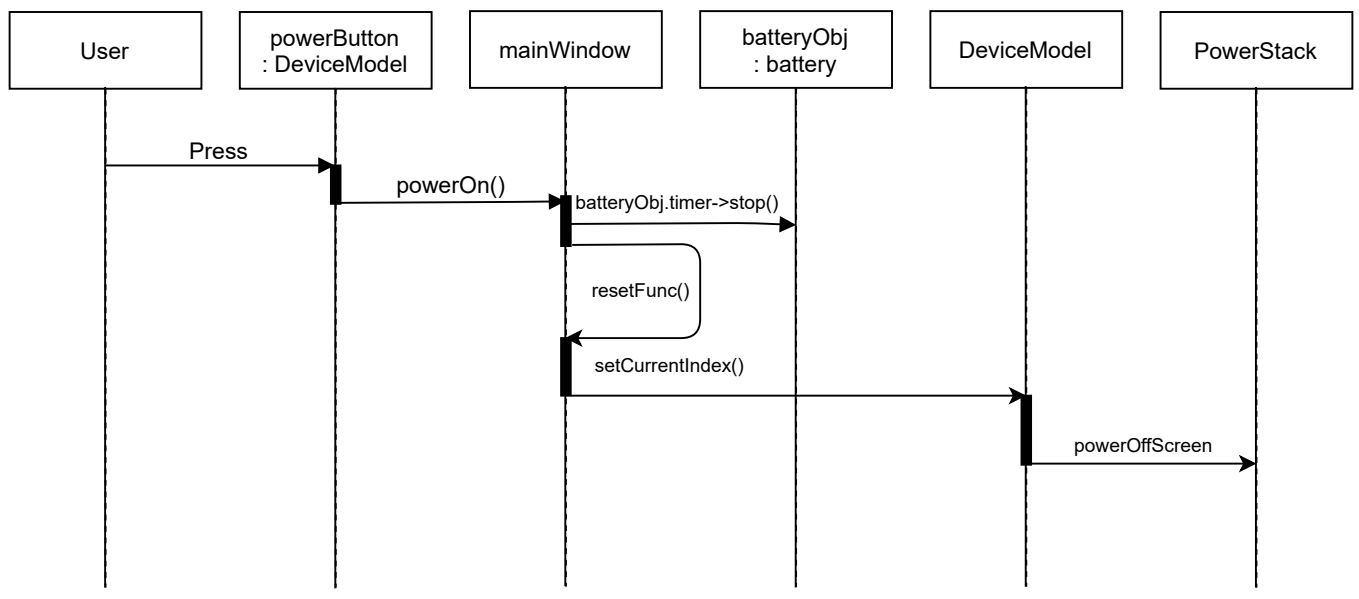
UML Class Diagram for MCT Simulator



SEQUENCE DIAGRAM for UC1: User Turning on Device

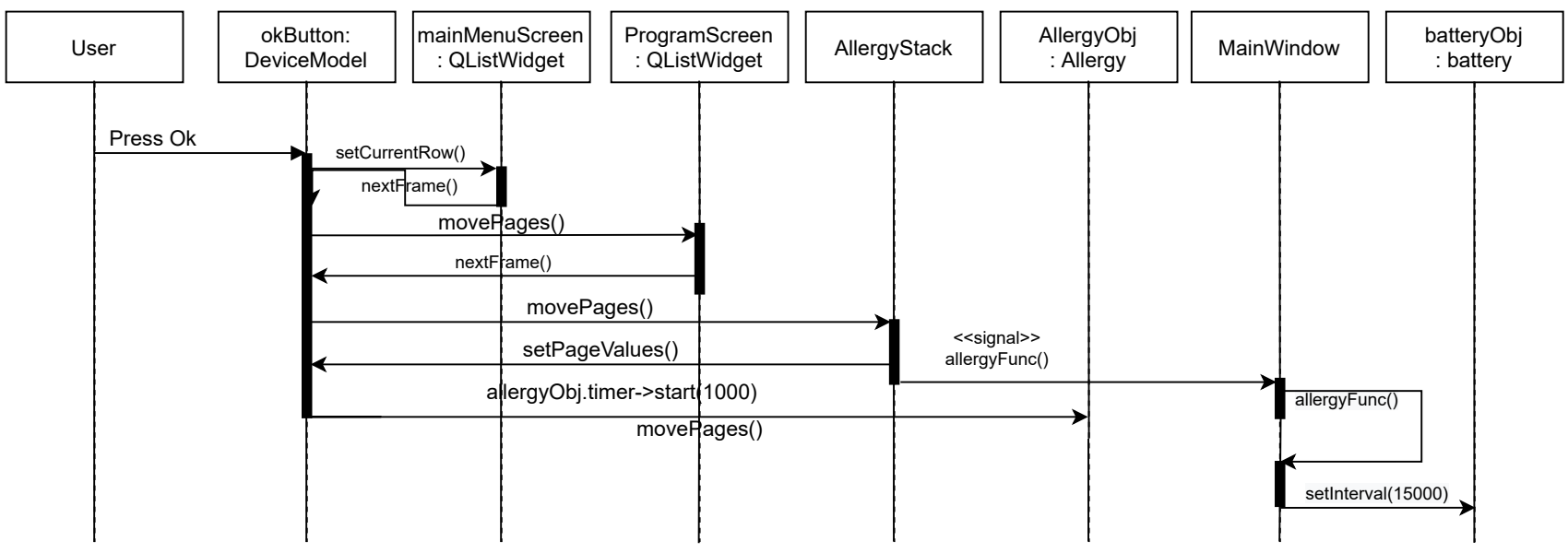


SEQUENCE DIAGRAM for UC2: User Turning off Device



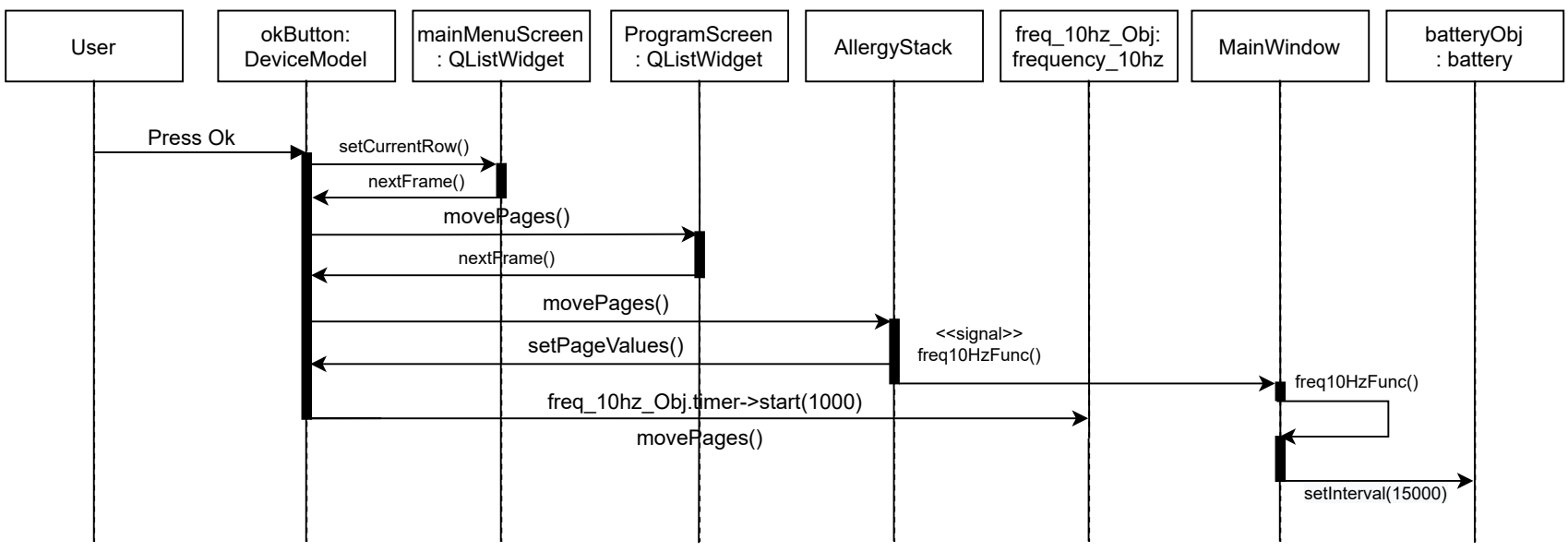
SEQUENCE DIAGRAM for UC3: User Choosing a specific treatment

For this diagram we are doing a Allergy Therapy

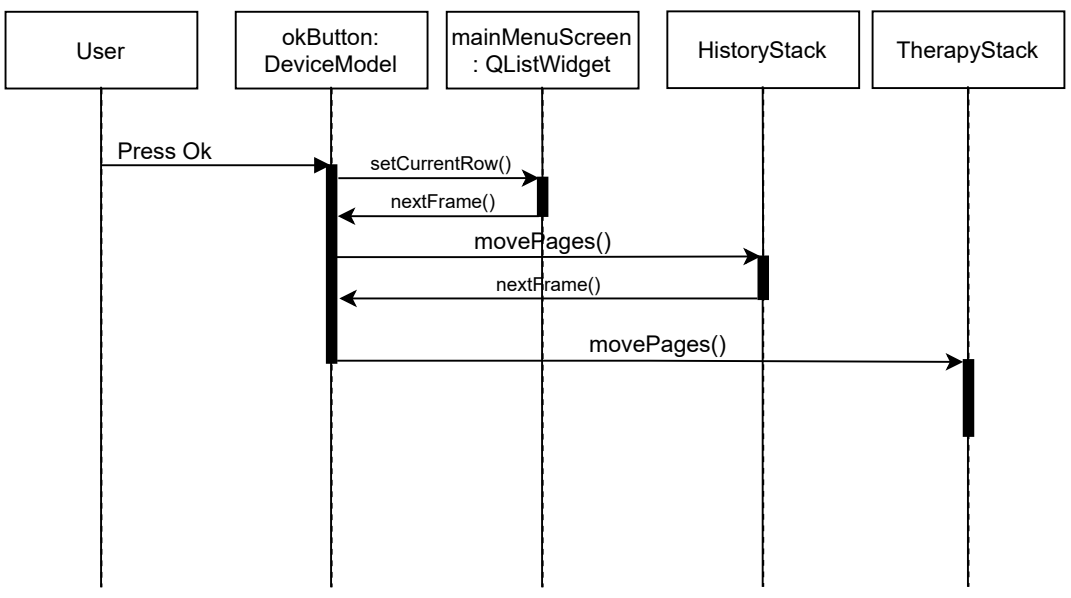


SEQUENCE DIAGRAM for UC4: User carries out a specific frequency treatment

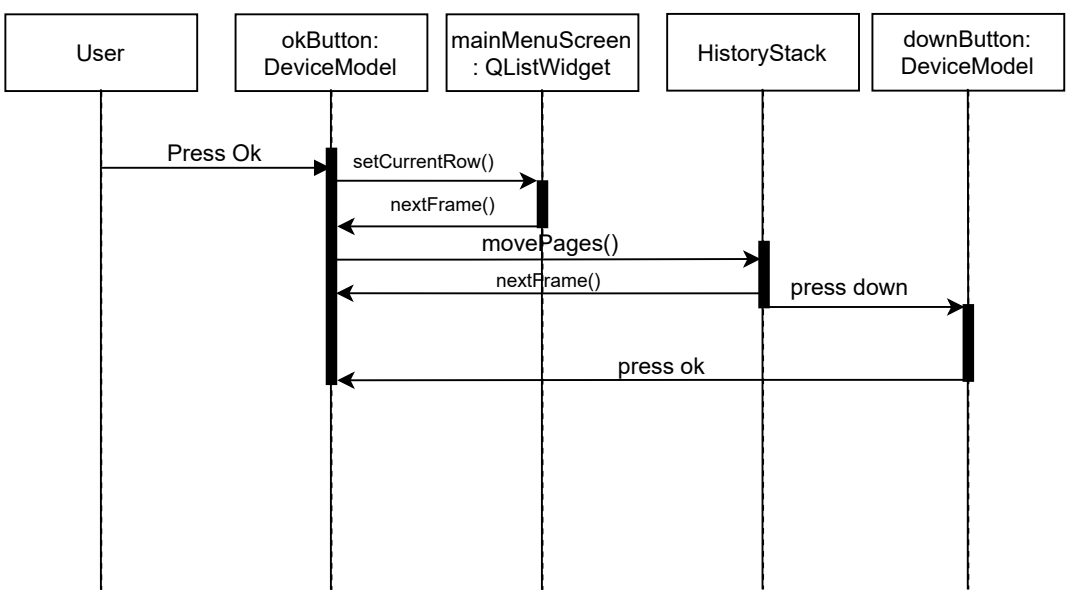
For this diagram we are doing a 1,0-9.9 Hz frequency Therapy



SEQUENCE DIAGRAM for UC5: User views the treatment history



SEQUENCE DIAGRAM for UC6: User erases the treatment history



TEST CASES

Test Case 1: Running Allergy Program option at 50 power and save therapy to History.

- Run the Denas-Simulator, this will pop up the GUI model.
- Make sure the batterySlider is not set at 0 as the simulator will not turn on with 0% battery.
- Press the Powerbutton on the GUI, this will take the user to the mainMenu screen of the simulator
- Press the Programs option on the mainMenu screen using the okButton, this shows the user the list of programs available for use
- Press the Allergy option from the list of programs using the okButton, the user will be taken to the Allergy Therapy screen.
- Set the power level to 50 using the right Button, make sure the touchSensor and saveTherapy checkboxes are checked.
- Press the okButton, this will start the timer of 10 seconds and the frequency will be set to 77Hz
- Wait for the Timer to end, when the timer ends the user will be prompted back to the Programs Screen
- Since the saveTherapy option was checked, we will now navigate from the Programs Screen to the View History Screen to check for saved Therapies
- Press the menuButton to go to the mainMenu screen and navigate to the History option using the downButton
- Press ok to go to the History Menu screen and click the okButton on the view option.
- Here we should be able to see the information about Allergy therapy conducted with its exact date and time.

Test Case 2: Running Frequency10Hz Program option at 100 power for 30 seconds

- Run the Denas-Simulator, this will pop up the GUI model
- Make sure the batterySlider is not set at 0 as the simulator will not turn on with 0% battery
- Press the Powerbutton on the GUI, this will take the user to the mainMenu screen of the simulator
- Press the Frequency option on the mainMenu screen by navigating to the frequency option using the downButton and the okButton.
- The user will now see the list of frequency therapies available for use.
- Press the 10Hz option from the list of frequencies using the okButton, the user will be taken to the 10Hz Therapy screen.
- Set the power level to 100 using the right Button, make sure the touch Sensor checkbox is checked
- Press the okButton, this will start the timer that will increment every second and the frequency will be set to 10Hz
- Once 30 seconds have passed press the returnButton or the menuButton to exit the 10Hz frequency therapy
- If the saveTherapy option was checked, we can now navigate to the View History Screen to check for saved Therapies

- From the mainMenu screen, navigate to the History option using the downButton
- Press ok to go to the History Menu screen and click the okButton on the view option.
- Here we should be able to see the information about 10Hz therapy conducted with its exact date and time.

Test Case 3: Running Frequency20Hz Program option and uncheck the touch Sensor checkbox (remove electrode from skin)

- Run the Denas-Simulator, this will pop up the GUI model
- Make sure the batterySlider is not set at 0 as the simulator will not turn on with 0% battery
- Press the Powerbutton on the GUI, this will take the user to the mainMenu screen of the simulator
- Press the Frequency option on the mainMenu screen by navigating to the Frequency option using the downButton and the okButton.
- The user will now see the list of frequency therapies available for use.
- Press the 20Hz option from the list of frequencies using the okButton, the user will be taken to the 20Hz Therapy screen.
- Set the power level to what you need using the right Button, make sure the touch Sensor checkbox is checked initially
- Press the okButton, this will start the timer that will increment every second and the frequency will be set to 20Hz
- As the timer is running, uncheck the touch Sensor checkbox, this will instantly stop the incrementing timer and an alert will pop up.
- The pop up will state "Please place Electrode on skin and Press OK to continue!". At this moment, the timer will remain stopped until the touch Sensor checkbox is checked and the okButton has been pressed.
- The user will now check the touch Sensor checkbox and press the okButton. The timer will now start from where it left off.

Test Case 4: Running Frequency60Hz Program option for 60 minutes

- Run the Denas-Simulator, this will pop up the GUI model
- Make sure the batterySlider is not set at 0 as the simulator will not turn on with 0% battery
- Press the Powerbutton on the GUI, this will take the user to the mainMenu screen of the simulator
- Press the Frequency option on the mainMenu screen by navigating to the Frequency option using the downButton and the okButton.
- The user will now see the list of frequency therapies available for use.
- Press the 60Hz option from the list of frequencies using the okButton, the user will be taken to the 60Hz Therapy screen.
- Set the power level to what you need using the right Button, make sure the touch Sensor checkbox is checked
- Press the okButton, this will start the timer that will increment every second and the frequency will be set to 60Hz

- Wait till the timer gets to 60 minutes. After 60 minutes the user should be taken back to the frequencyscreen.

Test Case 5: Checking the Clear History Option

- Run the Denas-Simulator, this will pop up the GUI model
- Make sure the batterySlider is not set at 0 as the simulator will not turn on with 0% battery
- Press the Powerbutton on the GUI, this will take the user to the mainMenu screen of the simulator
- Now the user will run a couple different therapies such as Bioting, Allgery, Pain, 60Hz Frequency.
- For every therapy, the user makes sure that the saveTherapy button is checked. This will save every therapy to the therapy screen
- Next the user will navigate to the History Screen from the mainMenu Screen.
- First, we will check if the Therapies have been saved by clicking the view option. Once the view option is clicked the user will be shown all the saved therapies conducted
- Next, we will click the returnButton to go back to the history screen and using the downButton we will get to the clear option.
- Once the user clicks the okButton while on the clear option. The user will get an alert stating, "History deleted!".
- Now the user can go back to the therapy screen and there will be no saved therapies there

Test Case 6: Checking if the simulator turns off when the battery level reaches 0%

- Run the Denas-Simulator, this will pop up the GUI model
- Make sure the batterySlider is not set at 0 as the simulator will not turn on with 0% battery
- We can set the batterySlider to 5% for this test case
- Press the Powerbutton on the GUI, this will take the user to the mainMenu screen of the simulator
- Wait till the power level becomes 0% and check if the user is prompted back to the power off page.
- If the battery level is 0 and the user tries to click the powerButton, nothing will happen

UC - 01	User turns on Device	Connected Test Cases
Description	When the user wants to use the device, they will turn it on	Test Case 1
Actors	Patient	Test Case 2
Triggering Event	User presses the power button	Test Case 3
Pre-Condition	Device is turned off	Test Case 4
Main Sequence	1. User clicks power button	Test Case 5
	2. Device turns on	Test Case 6
	3. Home page displayed on screen	
Post-Condition	The user can now navigate the menu to select the therapy they want	
Resulting Event	Device is turned on	
Alternative Scenarios	1. Low power sign is displayed	
	2. Device does not turn on due to no battery in device	
Comments	User can start the device to use it	

UC - 02	User turns off Device	Connected Test Cases
Description	When the user is done using the device, they will turn it off	Test Case 1
Actors	Patient	Test Case 2
Triggering Event	User presses the power button	Test Case 3
Pre-Condition	Device is turned on	Test Case 4
Main Sequence	1. User clicks power button	Test Case 5
	2. Device turns off	
Post-Condition	User can now keep the device to the designated place for the next use.	
Resulting Event	Device is turned off	
Alternative Scenarios	N/A	
Comments	The device is turned off and ready to be used by someone else	

UC - 03	User carries out a specific treatment	Connected Test Cases
Description	When the user wants to carry out a specific treatment, they can select a function	Test Case 1
Actors	Patient	Test Case 2
Triggering Event	User wants to get treated for a specific treatment	Test Case 3
Pre-Condition	Device is turned on and main menu is displayed	Test Case 4
Main Sequence	1. User selects “programs” from main menu	Test Case 5
	2. User selects one of the program options from the “programs” menu	
	3. User selects their required power level using arrow buttons	
	4. User selects ok to confirm their settings/treatment	
	5. User waits for timer to countdown to zero	
Post-Condition	User can now select a treatment and perform the actions	
Resulting Event	Users’ treatment is complete	
Alternative Scenarios	1. Low battery results in stopping the treatment	
	2. User removes device from skin before treatment is complete. System then waits for user to put device back on skin or cancels the treatment	
	3. User interrupts treatment by switching screens while treatment is active. System waits for user to return to screen or resets treatment.	
Comments	User can select what treatment they want to get using the navigation	

UC – 04	User performs treatment with selected frequency	Connected Test Cases
Description	Users does a treatment with a frequency that is needed for them	Test Case 2
Actors	Patient	Test Case 3
Triggering Event	User goes in program to select a treatment at a specific frequency	Test Case 4
Pre-Condition	Device is turned on	Test Case 5
Main Sequence	1. User selects “frequencies” using arrow buttons and the “ok” button	
	2. User selects a particular frequency from the “frequencies” menu	
	3. User selects power level using the arrow and “ok” buttons	
	4. User waits for timer to countdown to zero	
Post-Condition	User can now select the treatment with a specific frequency and treat themselves	
Resulting Event	Users’ treatment is complete	
Alternative Scenarios	1. User clicks menu button if they are not already on the menu	
	2. Low battery results in stopping the treatment	
	3. User removes device from skin before treatment is complete. System then waits for user to put device back on skin or cancels the treatment	
Comments	The user can select frequency unless its predefined using the left and right button	

UC – 05	User views Treatment History	Connected Test Cases
Description	User can check the history of tests performed	Test Case 1
Actors	Patient	Test Case 5
Triggering Event	User selects history in the menu	
Pre-Condition	1. Device is turned on	
	2. At least one treatment has been completed by the user	
Main Sequence	1. User selects “History” from main menu the up/down arrow buttons and clicks "ok" button to trigger their selection	
	2. User selects “View” using the up/down arrow buttons and clicks “ok” button to trigger their selection	
Post-Condition	1. User’s previous treatments data appear in list	
Resulting Event	User can see the history of treatments done	
Alternative Scenarios	User does not have any treatments completed; Post condition will have an empty page instead of treatment list	
Comments	The user can navigate through the history using up and down arrow keys	

UC – 06	User Erases Treatment History	Connected Test Cases
Description	User wants to remove the history	Test Case 5
Actors	Patient	
Triggering Event	User wants to keep track of series of event for a specific day	
Pre-Condition	1. Device is turned on	
	2. At least one treatment has been completed by the user	
Main Sequence	1. User selects “History” from main menu using the up/down arrow buttons and clicks “ok” button to trigger their selection	
	2. User selects “clear” using the up/down arrow buttons and clicks “ok” button to trigger their selection	
Post-Condition	1. User’s treatment history is erased	
	2. “view history” is empty	
Resulting Event	The history is deleted, and it is a blank history page	
Alternative Scenarios	User does not have any treatments completed and thus the “clear” selection does. nothing	
Comments	The history can be used to track a daily activity or a specific period	