Section 1: Use Cases

UC1: Using the OasisPro device for a therapy session

Primary Actor: User

Precondition: User has access to the Oasis Pro device. The session which the user desires is already created.

Success Guarantee: User finishes their chosen therapy session.

Main Success Scenario:

1. User Plugs the stimulus cable into the output jack, and attaches the black clip to their left ear and the red clip to their right ear. Optionally, the user may also apply a small amount of liquid to their earlobes for a better connection.

2. Press and hold the power button until the power LED turns on

3. A ***power level check (UC2)*** occurs and battery levels are displayed.

4. Inactivity Timer (2 minutes) begins.

5. Initial/default session length / group icon lights up. Repeatedly press the power button until the desired group icon is lit. There are groups for session lengths of 20 minute, 45 minute, 3 hours, custom length, and then an additional group for history. When a group icon is lit, the numbers on the light bar corresponding to available sessions in that group are lit. The currently selected session number is highlighted, and the corresponding frequency icon and mode icon light up.

6. Press INT up or down buttons to until the desired session number is lit

7. Press the checkmark button to confirm the session selection. After the button is pressed, the number light of the selected session will blink several times. The inactivity timer is deactivated. The device waits 5 seconds.

8. At the beginning of the session, the strength / quality of the connections to the skin is tested and the results are displayed on the light bar (***UC3: Connection Test***)

9. A session length timer is set to the length of the therapy session and begins counting down.

10. If there is a saved intensity for the chosen session, a SoftOn animation displays and the intensity is adjusted to the saved value. If there is no save intensity, the display/ bar graph goes blank.

11. The Progress bar displays the intensity. (eg, if the intensity is at level 4 then sections 1-4 will be lit)

11. The session length timer runs out. The device powers off automatically.

Extensions:

4a. The inactivity timer expires

4a1. The device powers off.

9a. After the simulation starts, pressing the INT up arrow button will increase the intensity of the stimulation, and pressing the INT down arrow button will decrease the intensity of the stimulation.

9b. At sometime during the session, the user presses and holds the select button (the checkmark) for 1 second.

9b1. The current intensity at the time will be remembered for this session number.

9b2. The graph will display a “short” animation. *This is probably the SoftOn animation*

UC2: Turn on the Oasis Pro Device

Primary Actor:

- Device User

Precondition:

- The device user has an Oasis Pro

Main Success Scenario:

1. The device user presses the power button
2. The Oasis Pro device turns on

Post Condition:

- The Oasis Pro device has been turned on and it is waiting on the main menu page where you select a session

Extensions:

2a. The Oasis Pro device does not turn on

2a1. In the event that the Oasis Pro does not turn on, then the device user is required to charge the device's battery. If the battery is fully charged and the device still does not turn on, then the device user should replace the battery. If the device does not turn on despite the battery being fully charged and replacing the battery then the customer service of Mind Alive Inc.

UC3: Turn off the Oasis Pro Device

Primary Actor:

- Device User

Precondition:

- The device user has an Oasis Pro

Main Success Scenario:

1. Press and hold the power button until the power LED turns on
2. A ***power level check (UC2)*** occurs and battery levels are displayed.
3. Inactivity Timer (2 minutes) begins.

Post Condition:

- The Oasis Pro device has been turned off and is no longer consuming battery power.

UC4: Starting a Session

Primary Actor:

- Device user

Precondition:

- Oasis Pro device is powered on and no session has been selected

Success Guarantee:

- User selects one of four standard sessions groups

Main Success Scenario:

1. A list of standard session groups is displayed on screen, starting from 20 mins, 45 mins, 3 hours, or any user designated time frame.
2. All four groups will offer eight sessions each which are indicated by a lit number between the “intensity” and “select” control buttons.
3. The power button will be pressed to switch between each one of the four groups and will also change the lit group icon.
4. The User will then use the “Intensity control button” (INT up/down) to highlight one of eight sessions.
5. Both frequency and mode icons will light up to indicate the appropriate frequency range and CES pulse type being used.
6. The User will then select the “start session” button (✓) to begin which will result in the session number to flash and begin with a five second delay.

Post Condition:

- User has selected a session and now awaits the connection test.

Extensions

4a. If no sessions are available then no numbers will be lit.

UC5: Connection Test

Primary Actor:

- Device user

Precondition:

- The user has just now selected a session.

Success Guarantee:

- The connection is either of excellent or okay quality.

Main Success Scenario:

1. The mode icon corresponding to the current session begins blinking.
2. The strength of the connection between the device and the skin is measured. While the strength of the connection is uncertain, the light bar (graph) scrolls up and down. This may take as long as 20 seconds.
3. The strength of the connection is displayed through the light bar (graph). The connection will be represented as red (bad, sections 7-8), yellow (okay, sections 4-6), or green (excellent, sections 1-3).
4. If the connection is bad, the device waits for the connection to change. The use case continues from step 2 again.

UC6: Adjusting Intensity

Primary Actor:

- Device User

Precondition:

- User has selected a session

Success Guarantee:

- Correct level of intensity is achieved

Main Success Scenario:

1. The level of intensity is increased by pressing “Intensity control button” (INT up), it is decreased by pressing (INT down).
2. A graph is lit from 1-8 to display the level of intensity.
3. The topmost lit number will begin to blink while adjusting the level of intensity.

Post Condition:

- After completing adjustment of intensity, the user will be given the option to record their treatment.

UC7: Recording a Session

Primary Actor:

- Device user

Precondition:

- All previous steps are completed

Success Guarantee:

- Therapy plan is recorded and stored in history

Main Success Scenario:

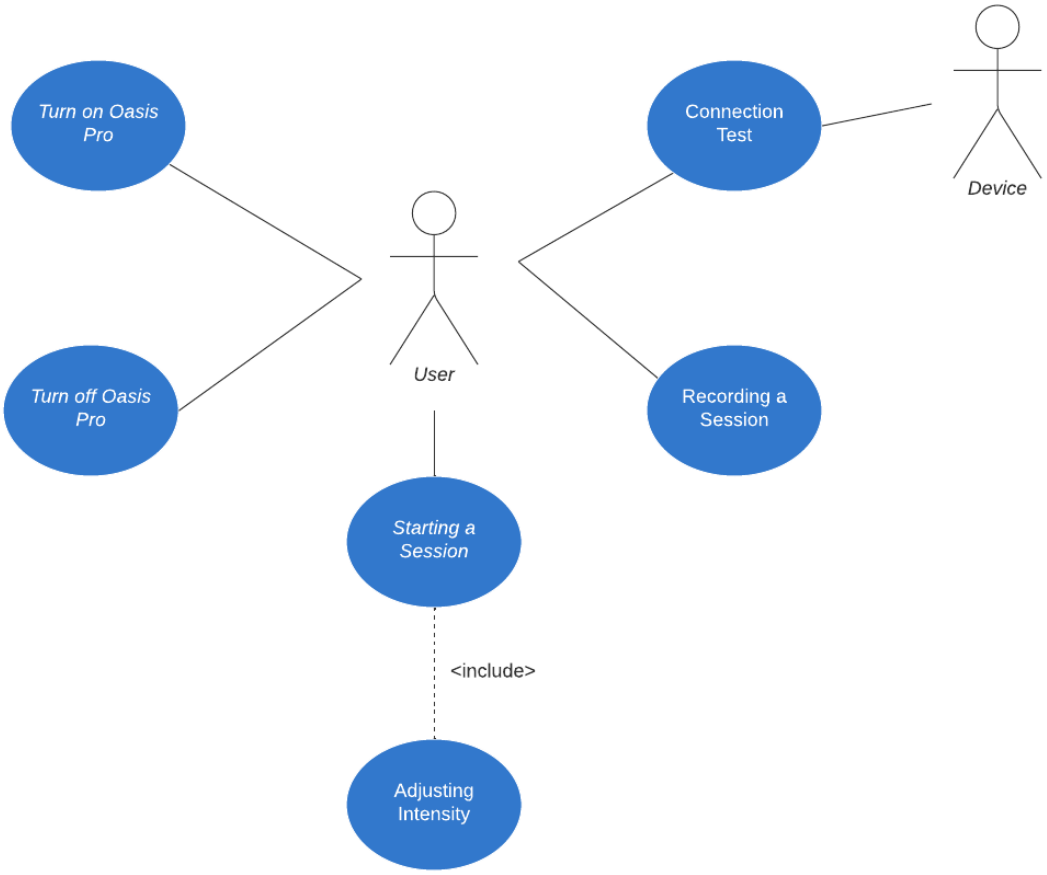
1. An option to record treatment is presented at the end of each session.
2. If the button is selected then Oasis Pro will store all recent data related to Session type, Duration, and intensity level.

Extensions

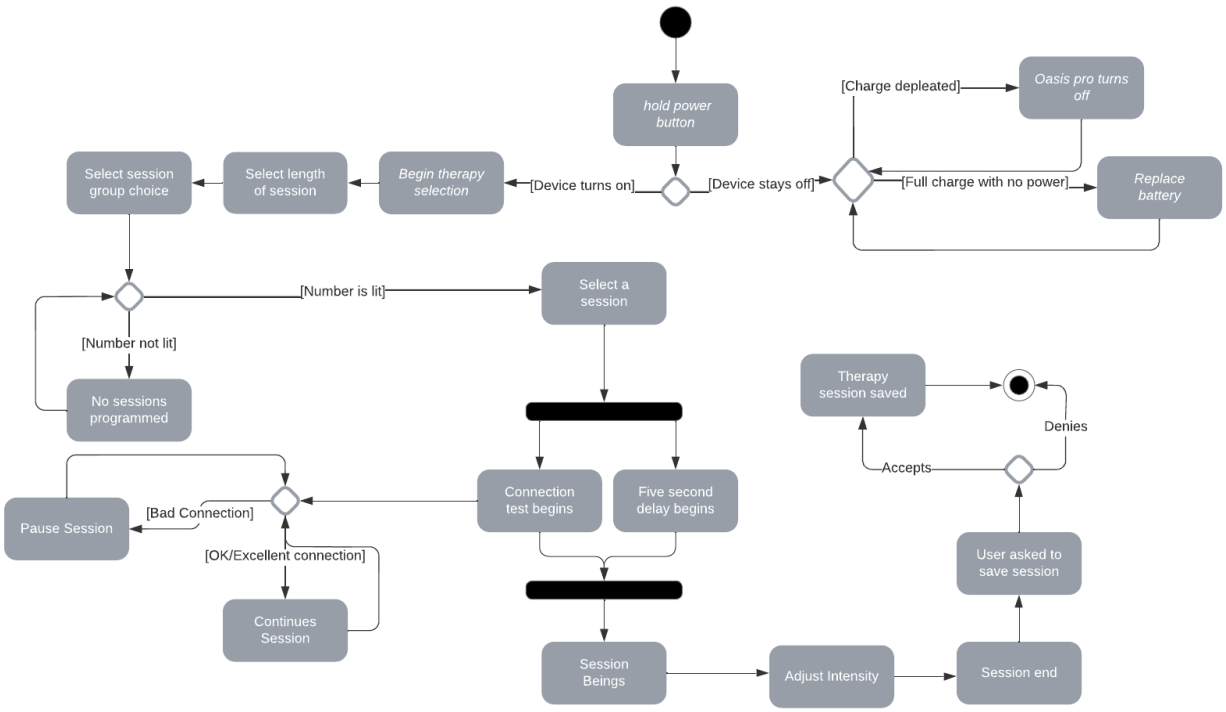
2a. If the button is not selected then the device will power off or be taken back to selecting a session.

2b. If the level of intensity is changed throughout the session then only the last level will be recorded and placed in the history.

Use Case Diagram:

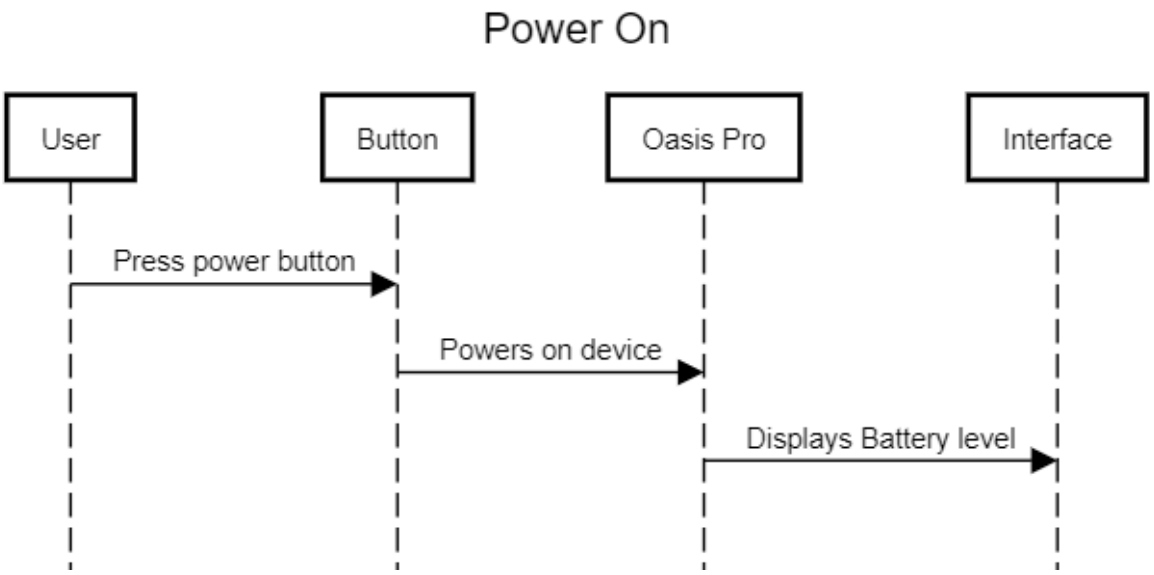


Activity Diagram:

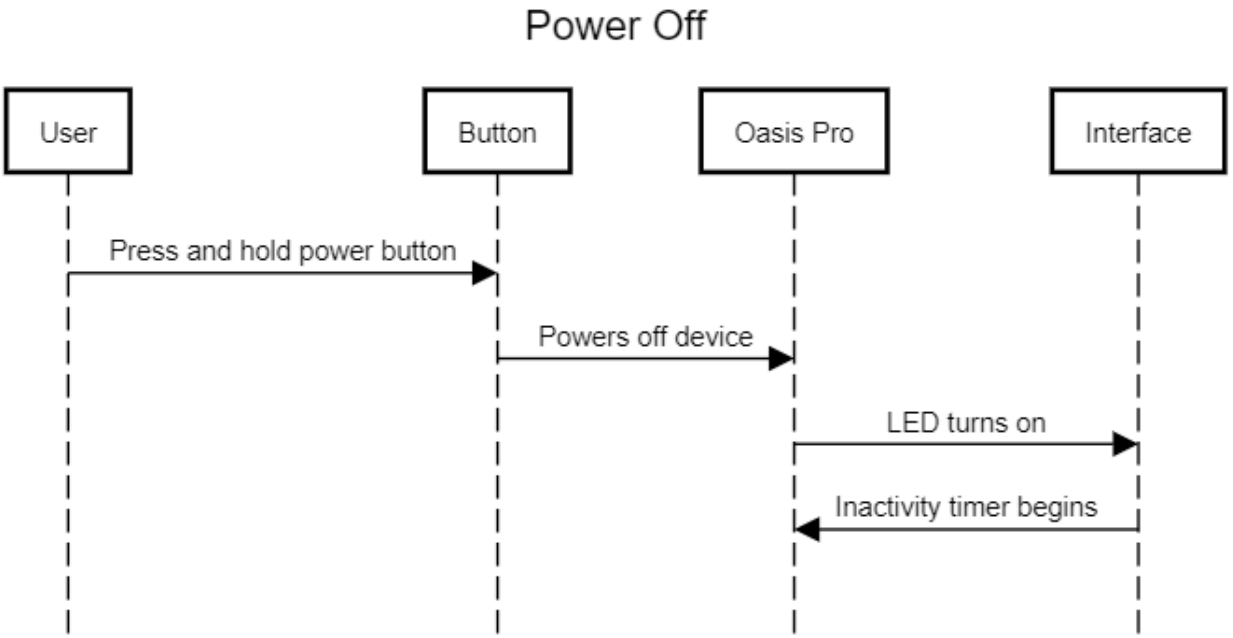


Sequence Diagrams:

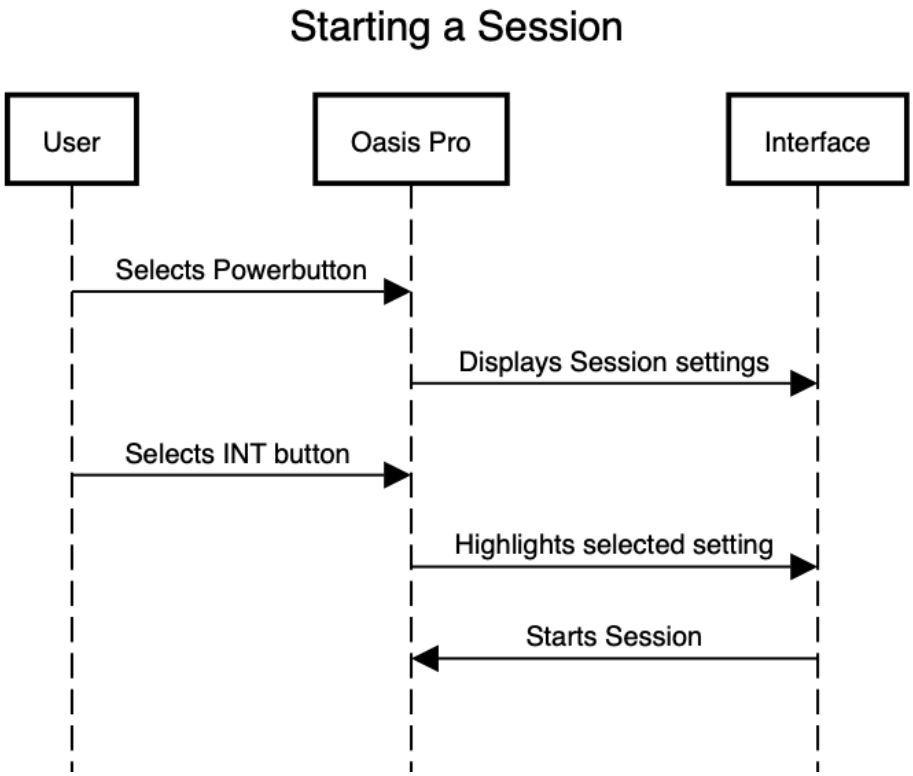
UC2: Turn on Device



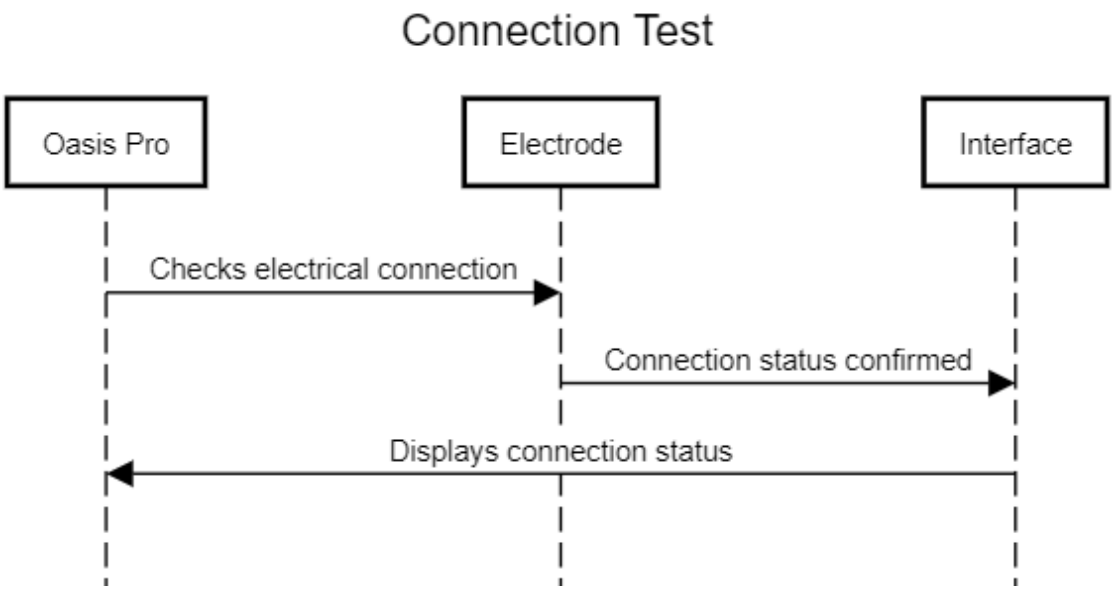
UC3: Turn Off Device



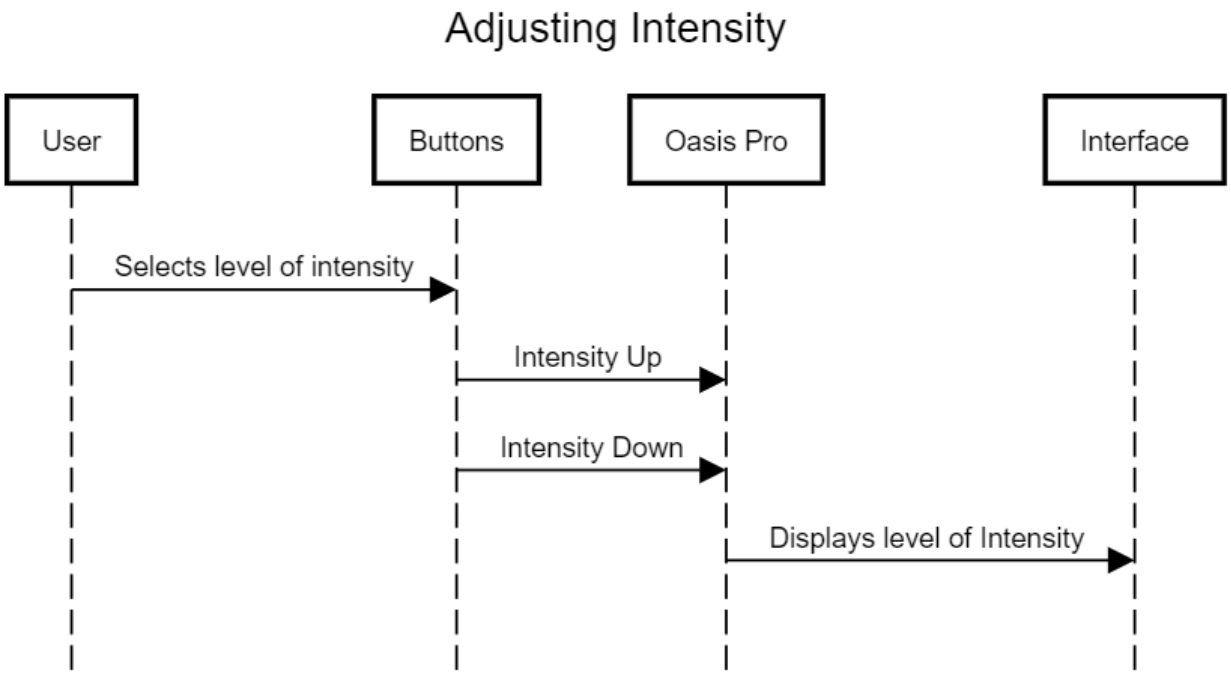
UC4: Starting session



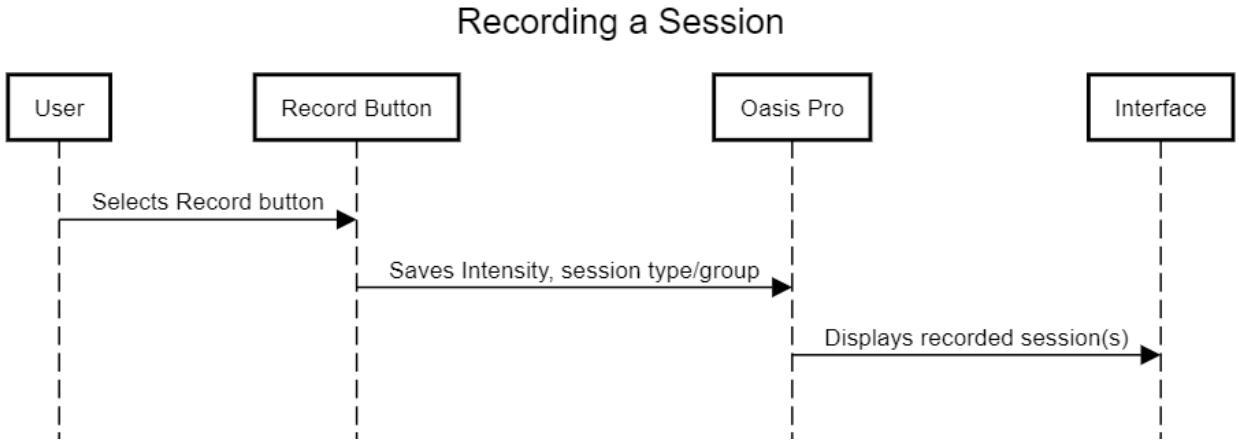
UC5: Connection Test



UC6: Adjusting Intensity



UC7: Recording a session



Traceability Matrices

ID	Requirement	Related Use Case	Fulfilled by	Test	Description
1	Turn on Oasis Pro	UC:2	MainWindow, MainWindow.ui	Run the simulation and select power button	Using the QT framework ,the device user presses the power button and the Oasis Pro device turns on assuming there is sufficient charge. The battery is displayed using QtProgressbar.

2	Turn off Oasis Pro	UC:3	MainWindow, MainWindow.ui	Run the simulation and select power button	Press and hold the power button until the power LED turns on, a power level check occurs and battery levels are displayed. If no activity is detected then an Inactivity Timer begins. Both Inactivity timer and battery levels are using Qt timer for 2 Minutes. Buttons are simulated using “push buttons”. If no session is in progress the power button can be pressed to turn off the device.

3	Starting a Session	UC:4	Session, Device	After beginning the simulation, the user can select a number of sessions by clicking QcomboBox which will show a list of available sessions.	A list of session groups is displayed on screen. The list is shown using QcomboBox. All four groups will offer eight sessions each which are indicated by a lit number between the “intensity” and “select” control buttons. The power button will be pressed to switch between each one of the four groups. The user will then use the “Intensity control button” to highlight one of eight sessions. Both frequency and mode icons will light up to indicate the appropriate frequency range and CES pulse type being used. User will then select the “start session” button to begin which will result in the session number to flash and begin with a five second delay. User

					designated length is determined using Qspinbox.

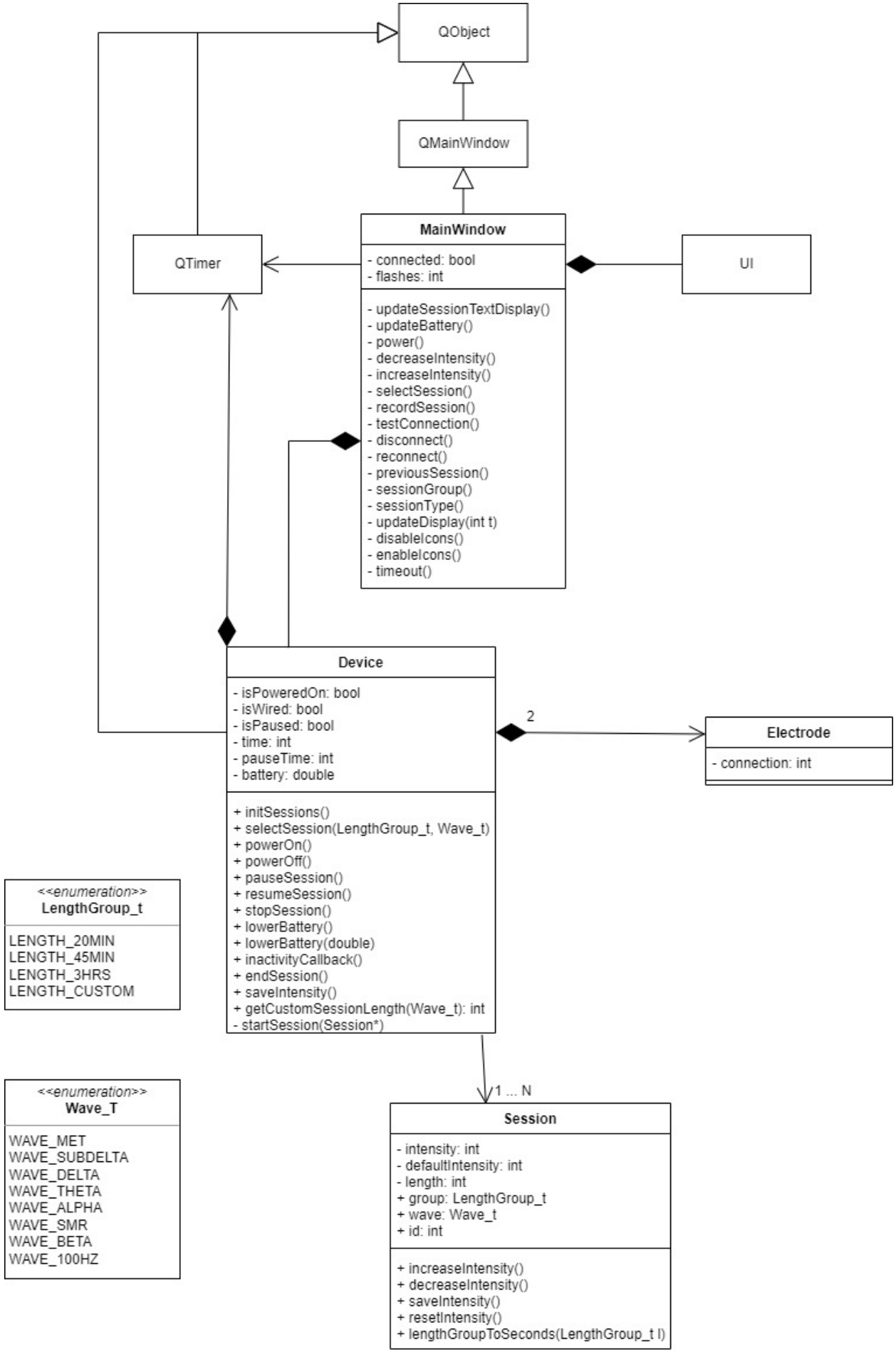
4	Connection Test	UC:5	Electrode, MainWindow	After starting a session, the device will automatically start a connection test to determine if it can proceed with the desired session.	The mode icon corresponding to the current session begins blinking. The strength of the connection between the device and the skin is measured. While the strength of the connection is uncertain, the light bar scrolls up and down. The strength of the connection is displayed through the light bar. The connection will be represented as blinking red (bad, sections 7-8), yellow (okay, sections 4-6), or green (excellent, sections 1-3). If the connection is bad, the device waits for the connection to change. Connection is displayed using QComboBox. A dropdown list shows whether connection is excellent, ok, or bad.

5	Adjusting Intensity	UC:6	MainWindow, Session	Select the “INT up/INT down” button to increase or decrease the the intensity to your desired level	The level of intensity is increased by pressing “INT up”, it is decreased by pressing “INT down". A bar is lit from 1-8 to display the level of intensity. This is simulated using QPushButton and QProgressBar
6	Recording a Session	UC:7	Session, MainWindow.ui	Select the “record” button after selecting all desired settings	An option to record treatment is presented at the end of each session. If the button is selected then Oasis Pro will store all recent data related to Session type, Duration, and intensity level. This is simulated using QPushButton. When held it will store all data relevant to that session.

7	Disconnecting the ear clips should pause the session	UC4	MainWindow.ui, Device, Electrode	During a session, pressing the “disconnect” button	During a session if a user disconnects the ear clips the session is paused and a connection error is displayed. This disconnection is simulated with a QPushButton.
8	Reconnecting ear clips should resume a paused session	UC4	MainWindow.ui, Device, Electrode	Pressing the “reconnect” button when a session is paused	If a session has been paused by a disconnection of the ear clips, reconnecting them will resume the session. A connection strength is displayed as well. This reconnection is simulated with a QPushButton.
9	View Recorded sessions	N/A	MainWindow.ui	Pressing the “Previous Sessions” button	The history of all record previous sessions will be displayed on the device screen. The screen is simulated with a QTextBrowser, and the button by a QPushButton.

10	Stopping a session early	N/A	MainWindow.ui, Device	Pressing the power button during an ongoing session.	If there is a session ongoing, pressing the power button will end the session early, and start the inactivity timer.
11	Battery drains dependent on intensity and time	N/A	Device	Turning on the device and starting a session.	If on the device will decrease in battery level. If a session is started based on the intensity level the battery will drain faster or slower.
12	Session ends when battery is low	N/A	MainWindow.ui, Device	Have a session on when the power is low.	If the device detects that the battery is low the current session will end prematurely, a low power warning is displayed, and the inactivity timer begins.
13	If battery is low a waring is displayed	N/A	MainWindow.ui, Device	Start the device with low power.	If the device is started with low power the bar graph will flash the red low power warning in the graph. This is simulated with the QGraphicsView.

UML Class diagram


QObject
QMainWindow
MainWindow
- connected: bool
- flashes: int
- updateSessionTextDisplay()
- updateBattery()
- power()
- decreaseIntensity()
- increaseIntensity()
- selectSession()
- recordSession()
- testConnection()
- disconnect()
- reconnect()
- previousSession()
- sessionGroup()
- sessionType()
- updateDisplay(int t)
- disableIcons()
- enableIcons()
- timeout()
QTimer
UI
Device
- isPoweredOn: bool
- isWired: bool
- isPaused: bool
- time: int
- pauseTime: int
- battery: double
+ initSessions()
+ selectSession(LengthGroup_t, Wave_t)
+ powerOn()
+ powerOff()
+ pausesession()
+ resumeSession()
+ stopSession()
+ lowerBattery()
+ lowerBattery(double)
+ inactivityCallback()
+ endSession()
+ saveIntensity()
+ getCustomSessionLength(Wave_t): int
- startSession(Session*)
2
Electrode
- connection: int
<<enumeration>>
LengthGroup_t
LENGTH_20MIN
LENGTH_45MIN
LENGTH_3HRS
LENGTH_CUSTOM
<<enumeration>>
Wave_T
WAVE_MET
WAVE_SUBDELTA
WAVE_DELTA
WAVE_THETA
WAVE_ALPHA
WAVE_SMR
WAVE_BETA
WAVE_100HZ
1 ... N
Session
- intensity: int
- defaultIntensity: int
- length: int
+ group: LengthGroup_t
+ wave: Wave_t
+ id: int
+ increaseIntensity()
+ decreaseIntensity()
+ saveIntensity()
+ resetIntensity()
+ lengthGroupToSeconds(LengthGroup_t l)