

### Traceability Matrix

ID	Requirement	Related Use Case	Fulfilled by	Test	Description
1	The HeartWave device displays multiple buttons(such as on/off,menu,back,etc). The device also displays the screen for the results of the graph	N/A	MainWindow.ui	Run project in QT to build,display, and test the device	Building in the QtCreator framework, the device was developed. Using push buttons in the UI to reproduce the buttons on the device, and downloading transparent png's to copy the exact look of the buttons of the device (such as the directional, back, and on/off buttons) of the actual HeartWave device. Private slots will allow the buttons to achieve functionality such as going back, accessing the menu, etc
2	The HeartWave device can be turned on and off, which enables/disables device simulation and function	Basic Use Case ( <i>Use Case #1</i> ), Shutdown Use Case ( <i>Use Case #5</i> )	MainWindow	Click the on/off button on the bottom of the device to turn on and turn off the device for simulation	Within the <i>MainWindow</i> class, it will contain two functions responsible for disabling and enabling the rest of the device functionality. Which hides or sets device buttons and screen visible.
3	The HeartWave device has a press selector on the interface which is used to initiate and end a session.	Basic Use Case ( <i>Use Case #1</i> )	MainWindow	Turn on the device and click the selector to start a session	The <i>MainWindow</i> class will have an interface with the directional buttons and selector(as seen in requirement 1). On startup of the device, the user can click the middle button to start a session. The <i>Session</i> class will be used to get and set the necessary values (ex. Coherence, Time, breath pacer)
4	The HeartWave device displays a symbol that indicates an active pulse of the user during a session	Basic Use Case ( <i>Use Case #1</i> )	MainWindow	On startup click the selector	A png of a heart will represent the active pulse which will show once a session is started by a user. Whenever a session is not occurring a png of a transparent heart will be shown which represents a non

					active pulse.
5	During session time, the screen of the device displays the HRV graph of the results given from the data recording during the session simulation with key metrics	Basic Use Case ( <i>Use Case #1</i> )	MainWindow, QCustomPlot	Turn on the device and start session by clicking on the selector and view the graph changing over time	Within the <i>MainWindow</i> class, it will use functions from the imported QCustomPlot class to plot the X axis and Y axis of the data. Specific functions in the class will deal with if the data from the simulation is either incoherent or coherent
6	The HeartWave device contains three lights which includes red, blue, and green lights which will flash depending on coherence level of the simulation (low, medium, and high)	Basic Use Case ( <i>Use Case #1</i> )	MainWindow	Turn on the device and start session by clicking on the selector and view which light illuminates during data collection	Within the <i>MainWindow</i> class, three QGraphicsView options will be placed on the screen. Depending on its coherence once the timer of the device reaches 64, the option will be setVisible(true) to represent the lights.
7	The HeartWave device displays both the length and coherence level during simulation.	Basic Use Case ( <i>Use Case #1</i> )	MainWindow	Turn on the device and start session by clicking the selector button to gather test results to collect coherence level and length of session	A timer is connected to the <i>MainWindow</i> class which is used to count the length of each session and is put on a label which displays the current session length. Random values are generated between the thresholds for low, medium, and high coherence which is then placed on a label to view
8	The HeartWave device displays a breath pacer which goes back and forth with a breath per 10 second interval	Basic Use Case ( <i>Use Case #1</i> )	MainWindow	Turn on the device and start session by clicking the selector button and view the breath pacer moving back and forth during data collection	An int variable is set on the breath pacer, a progress bar progresses up and down in respect to the numerical breath pacer variable. The value of the breath pacer progress bar is set using the setBreathPacer() function which is the <i>session</i> class
9	The device has four menu	N/A	MainWindow,	Turn on the device and	In the <i>MainWindow</i> class, once the menu

	options which users can select from. This includes tabs such as settings, history/log, and 'start a new sessions'		Menu	click the menu button after the device is turned on to access tabs.	pushButton is triggered, this will allow the slot connected to hide the graph values and instead display the tabs included in the list. Getters within the <i>Menu</i> Class will get the Menu tabs list and all its submenus etc. Using the up and down directional buttons on the interface, the users can select their preferred settings.
10	The breath pacer of the device will range 1-30 seconds with the default of the device being the standard of 10 seconds	User selects Settings from menu and Alters Breathe Pacer Settings ( <i>Use Case #2</i> )	MainWindow, Menu	Turn on the device and click the menu button after the device is turned on to access tabs. Use the directional buttons to get to the settings tab to view breath pacer settings	Within the <i>MainWindow</i> class, a <i>Menu</i> object for the settings tab is created. Which then leads to a <i>Menu</i> object that will be created for the Breath Pacer settings, containing a list of the various options users can choose from. The breath pacer <i>Menu</i> object is added into settings object as a child/submenu.
11	When a user session ends and logged, the device will displays a session summary of the data from the simulation including percentage of time in different coherence levels, average coherence, length of session, achievement score, and the HRV graph	User selects Log History from menu ( <i>Use Case #3</i> )	MainWindow, QCustomPlot	Turn on the device and start the session by clicking the selector button. Click the selector button to end the session to view data.	The <i>MainWindow</i> class contains two functions that deal with firstly updating the value of the battery and secondly depleting the battery. A timer is connected to a device which is also connected to the battery and as the timer counts, the battery goes down.
12	The HeartWave device displays battery level which depletes with time or the amount of session accrued during simulation.	Basic Use Case ( <i>Use Case #1</i> )	MainWindow	Run project in QT, and test the depletion of the battery level through starting sessions during simulation time and trying various other tasks	The <i>MainWindow</i> class contains two functions that deal with firstly updating the value of the battery and secondly depleting the battery. A timer is connected to a device which is also connected to the battery and as the timer counts, the battery goes down.

13	The device can wipe their collected history log	User clears Log History (Use Case #4)	MainWindow	Turn on the device and click the menu button to access the history/log from previous sessions. Clear data from this tab	Within the <i>MainWindow</i> class, a <i>historyMenu Menu</i> object is created which holds an array of the previous values collected through simulation. A <i>clearMenu Menu</i> object is then created which helps to clear the array values if the user chooses to. The <i>clearMenu</i> object is added to the parent <i>historyMenu</i> object