

## HeartWave Traceability Matrix

ID	Requirement	Related Use Case	Fulfilled By	Test	Description
1	Application interface contains the buttons, display and admin panel.	N/A	MainWindow.ui	Run the simulator in QT to see the UI.	Intractable UI is created using the QT framework. It is used to create the simulated HeartWave device and an admin panel.
2	The application battery loses power during a session.	N/A	MainWindow	Begin a session with the power on and let the power drain until it reaches 0, you can reach this outcome sooner by setting the battery level to a lower value in the admin panel.	The <i>Profile</i> class keeps a record of the device's battery level. While a session is in progress the battery level will continuously decrease throughout; this data is stored in <i>Profile</i> and updated in <i>MainWindow</i> .
3	The display and light updates its information during the session.	UC-07	MainWindow, Session	Begin a session and observe the changing elements such as coherence level, time, achievement score, breath pacer and heart rate graph.	While a session is in progress, <i>MainWindow</i> will send a stream of data to the <i>Session</i> object, which will process various parts, to store and send back to <i>MainWindow</i> . <i>MainWindow</i> takes all of this data and displays it on its display and changes the light.
4	When a session is completed it creates a record of itself.	UC-07	Session, SessionRecord	Begin and end a session then check history for the record of the session.	When a session completes, it creates a <i>SessionRecord</i> object by copying and processing its data, to obtain

					the required information.
5	When a session is completed it goes to a view of its session record.	UC-07	MainWindow, Session, SessionRecord	After beginning a session press the select button again to enter the record view.	When a session completes, it creates a <i>SessionRecord</i> , <i>MainWindow</i> then clears the display and passes the new object into the function responsible for viewing records.
6	Session pauses when not reading heart rate.	UC-07	MainWindow	Begin a session and, in the admin tab, change the hr contact value from true to false.	The <i>MainWindow</i> class keeps track of if the device's heart rate monitor is receiving data (can be changed in the admin panel). The session timer pauses if it is not in contact.
7	Device supports breath pacing in the range of [1, 30] seconds.	N/A	MainWindow, profile	From the main menu navigate to settings then breath pace. You can now use the left and right buttons to change the value in its respective direction.	The <i>Profile</i> class keeps a record of the user's breath pace setting. Breath pace can be updated in Settings and in the Admin panel (updates during a session do not affect the breath pacer in the session); this data is stored in <i>Profile</i> and updated with <i>MainWindow</i> .
8	Simulates reading of heart rate from device.	UC-07	MainWindow, Session	By beginning a session, the system will start reading in hr values every second.	The <i>Session</i> class will continuously read heart rate values from the <i>MainWindow</i> class while the session is active (not paused/off).
9	The user can view a history of	UC-05	MainWindow,	Start and end a bunch of	The user can see a list of

	sessions.		SessionRecord.cpp, DBManager	sessions then go to history to view the records of the sessions	previous sessions and can select a session to see its information
10	The user can clear the history of sessions.	UC-06	MainWindow DBManager	Go to history and click "Clear" then 'yes' and every session record should clear	The user clears all the sessions from the database.
11	The device can be turned on and off, and properly disables the device's functionality when off.	UC-01, UC-02	MainWindow	While the screen is off, buttons on the machine will not light up and will not change the state of the system.	<i>MainWindow</i> keeps track of the device's status, and enables/disables elements depending on whether the device is on or off.
12	Saved record saves all required information.	N/A	DBManager	Go to history and the previous sessions, their dates and summaries are available.	A record is created containing the information from the record session and is stored in the database
13	Graph of heart rate over time is created for both the session and the session record displays.	N/A	MainWindow, Session, SessionRecord	Starting a session or viewing a record will display a graph of the heart rate values of that specific session over time.	<p><i>MainWindow</i> has a object <i>QCustomPlot</i> that is able to create a chart from two <i>QVector&lt;double&gt;*</i> objects, which can adjust size to fit the provided information.</p> <p><i>Session</i> feeds in its heart rate information to these vectors in real time as it receives it, causing the x-axis' range to expand over time.</p> <p><i>SessionRecord</i> simply provides the function with its heart rate information at once.</p>

14	Records are stored in persistent storage.	N/A	SessionRecord, DBManager	After starting a session, ending, and closing the simulation, the user can reopen the simulation and look at previous records in the view menu.	<i>DBManager</i> receives a <i>SessionRecord</i> object which it turns into a query to place it into the database for storage.
15	Battery level and breath pace are stored in persistent storage.	UC-03	Profile, DBManager	After starting a session, changing the breath pace , or changing the values found in the admin section, closing the simulation, and reopening the device will display the same number for the respective values.	The <i>Profile</i> class keeps a record of the device's battery level and the breath pace setting. When the application is closed this data is stored in the database, to be retrieved when the application is reopened.
16	Device turns off (becoming non-functional) when the battery level reaches 0.		MainWindow	Manually reduce the battery level and when the battery hits 0, the device turns off.	When the battery reaches 0 the function handling battery %, turns off the device; but stops it from turning on unless the battery % is greater than 0.