Winter 2024 COMP 3004 Group Project
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Due: 24/04/12

Part 1: Direct Neurofeedback EEG Device Use Case

Primary Actor: Therapist

Scope: The Patient

Level: User level

Stakeholders and Interests: - wants to treat their condition.

Therapist – wants functional EEG device to help treat patient.

Facility - wants trained therapists to treat patients properly.

Developer – wants the equipment to function.

Precondition: Patient has condition that needs treatment, Facility has trained therapist and EEG Device.

Minimal Guarantees: Therapist will hit the power button.

Success Guarantees: The Patient will have their condition treated.

Trigger: Power button

Main Success Scenario:

1. Therapist hits power button, EEG Device turns on.
2. Therapist selects menu button.
3. Therapist selects new session.
4. Therapist connects Sensors to Patient scalp.
5. Therapist selects play button.
6. EEG Device gives connection signal.
7. EEG Device analyzes all 21 sites, treatment signal lights up, progress is displayed as percentage.
8. EEG Device gives treatment to each site where it is needed, treatment signal lights up, logging each treatment.
9. EEG Device analyzes all 21 sites, treatment signal lights up, progress is displayed as percentage.
10. Therapist hits power button, EEG Device turns off.

Extensions:

1a. EEG Device has no power and doesn't turn on.

2a. Therapist plugs into pc, and views data from past sessions.

2-9a. EEG Device dies and powers off.

3a. Therapist selects sessions log, display time stamps of past sessions.
3b. Therapist selects date and time, updates date and time.
6a. EEG Device does not give connection single, if remains for 5 minutes EEG Device powers off.

7-9a. EEG Device loses connection single.

7-9a1. if remains for 5 minutes rase session data and EEG Device powers off.

7-9a2. Reconnect and resume.

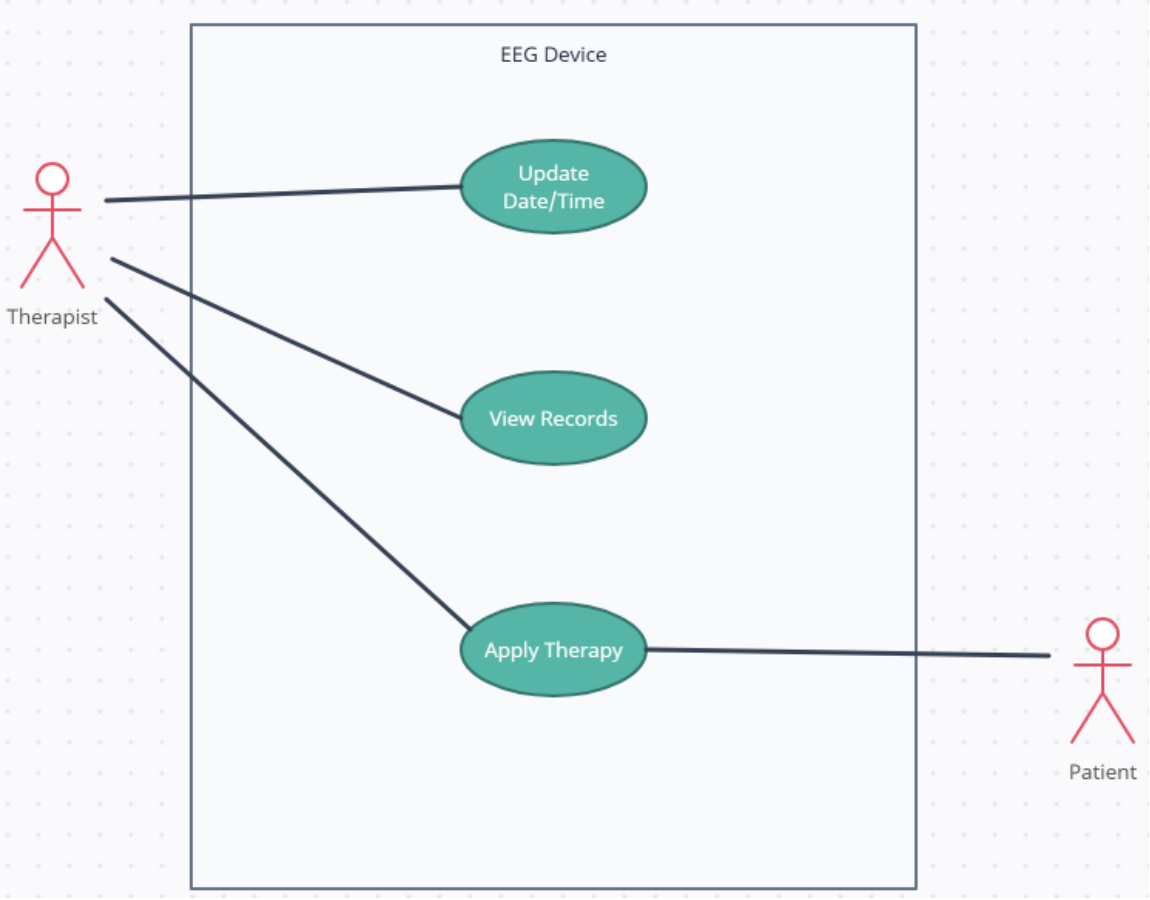
7-9b. Therapist selects pause button.

7-9b1. sessions timer pauses if inactive for remains for 5 minutes erase session data and EEG Device powers off.

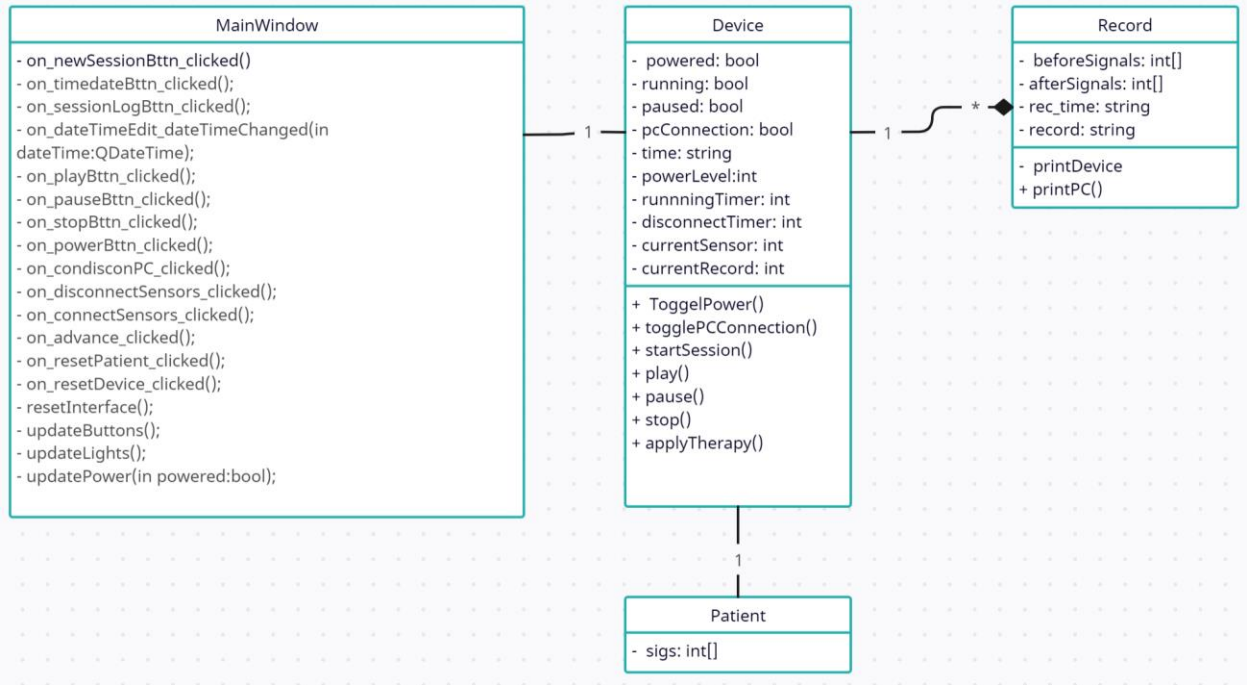
7-9b2. Therapist selects play button timer and session resume.

7-9c. Therapist selects stop button, erase session data.

Diagram:



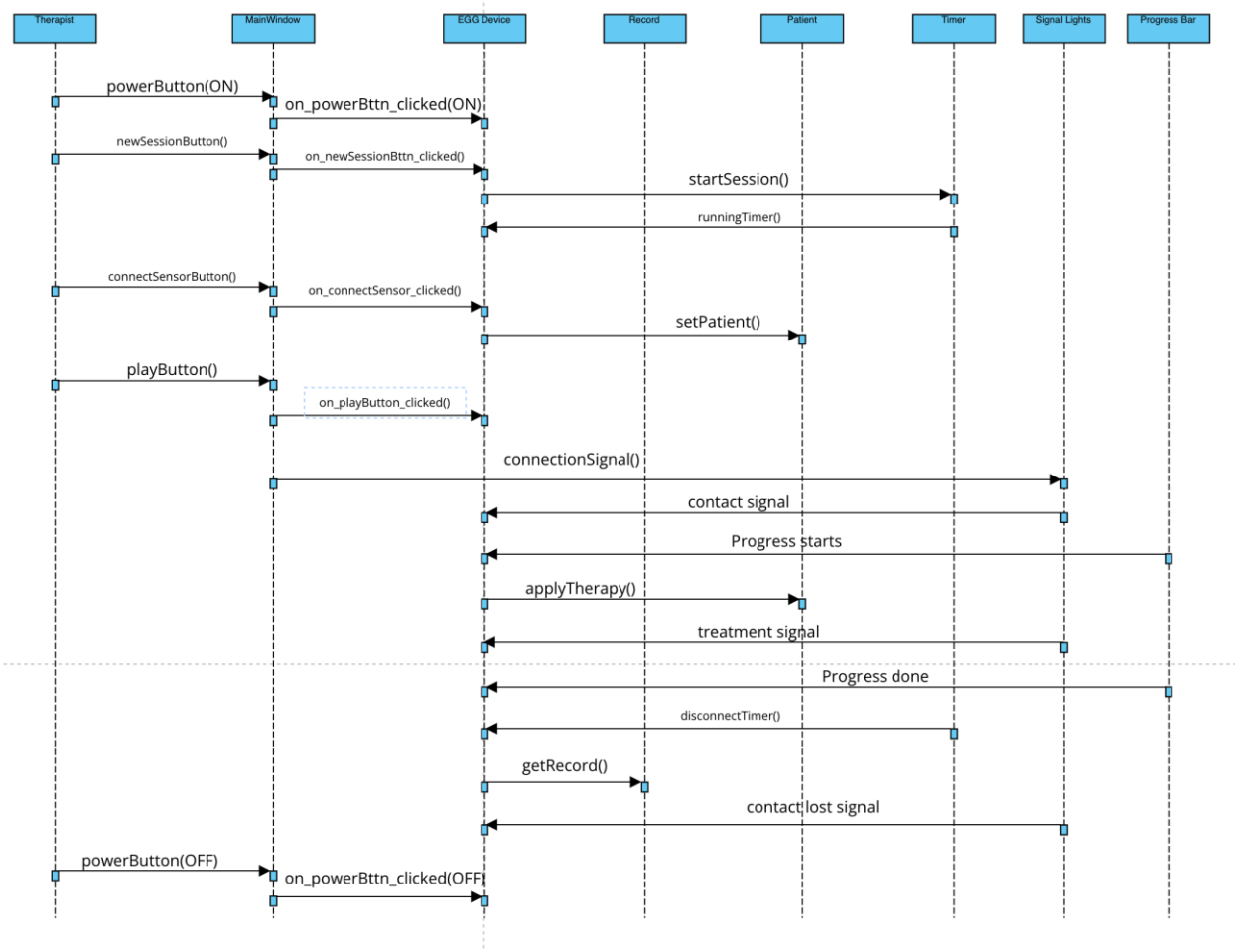
Part 2: UML Class diagrams



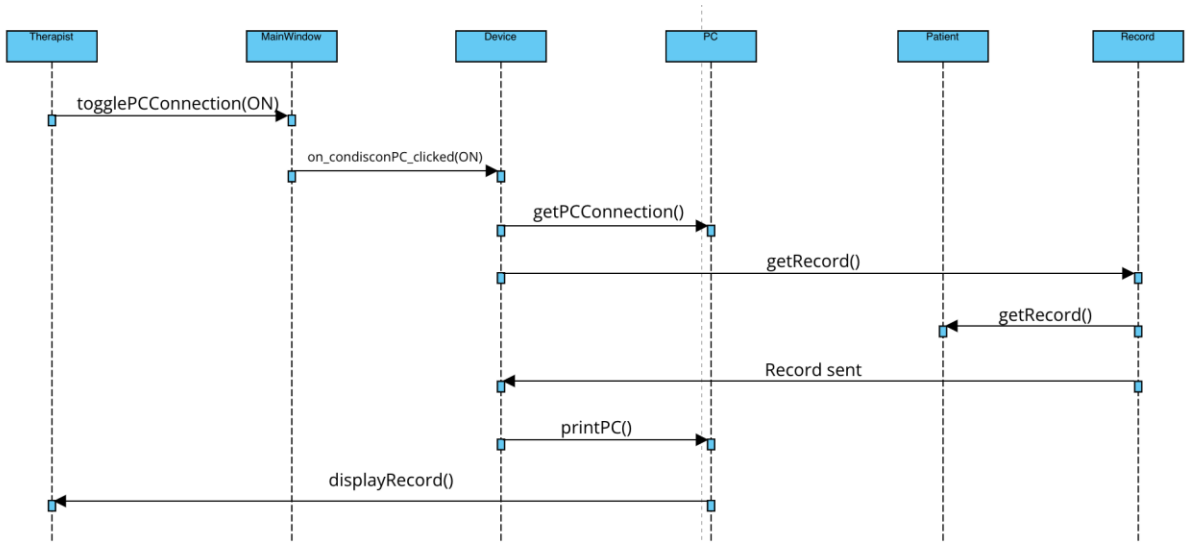
Part 3: UML sequence diagrams

Note: diagrams can also be view in their own files

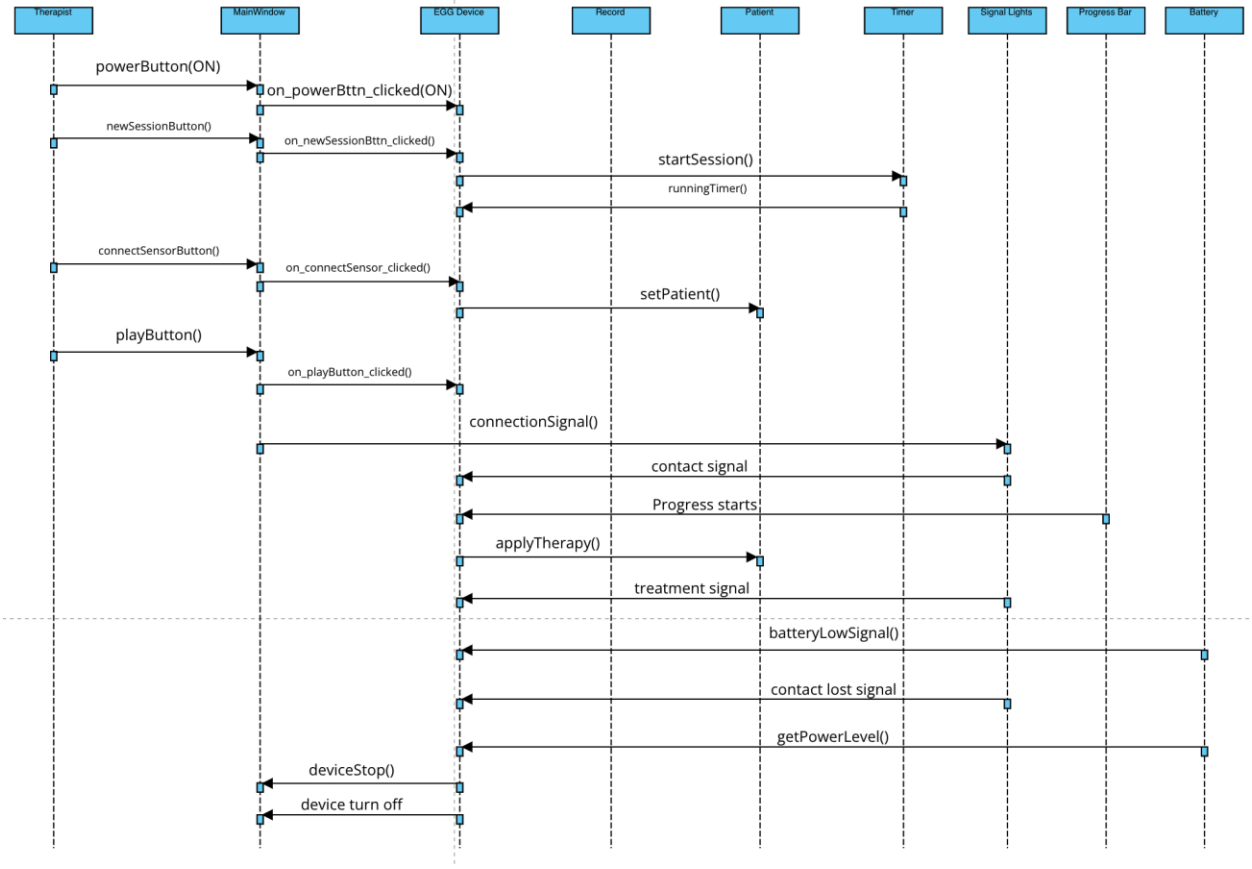
1. Normal operation of treatment with Neureset device



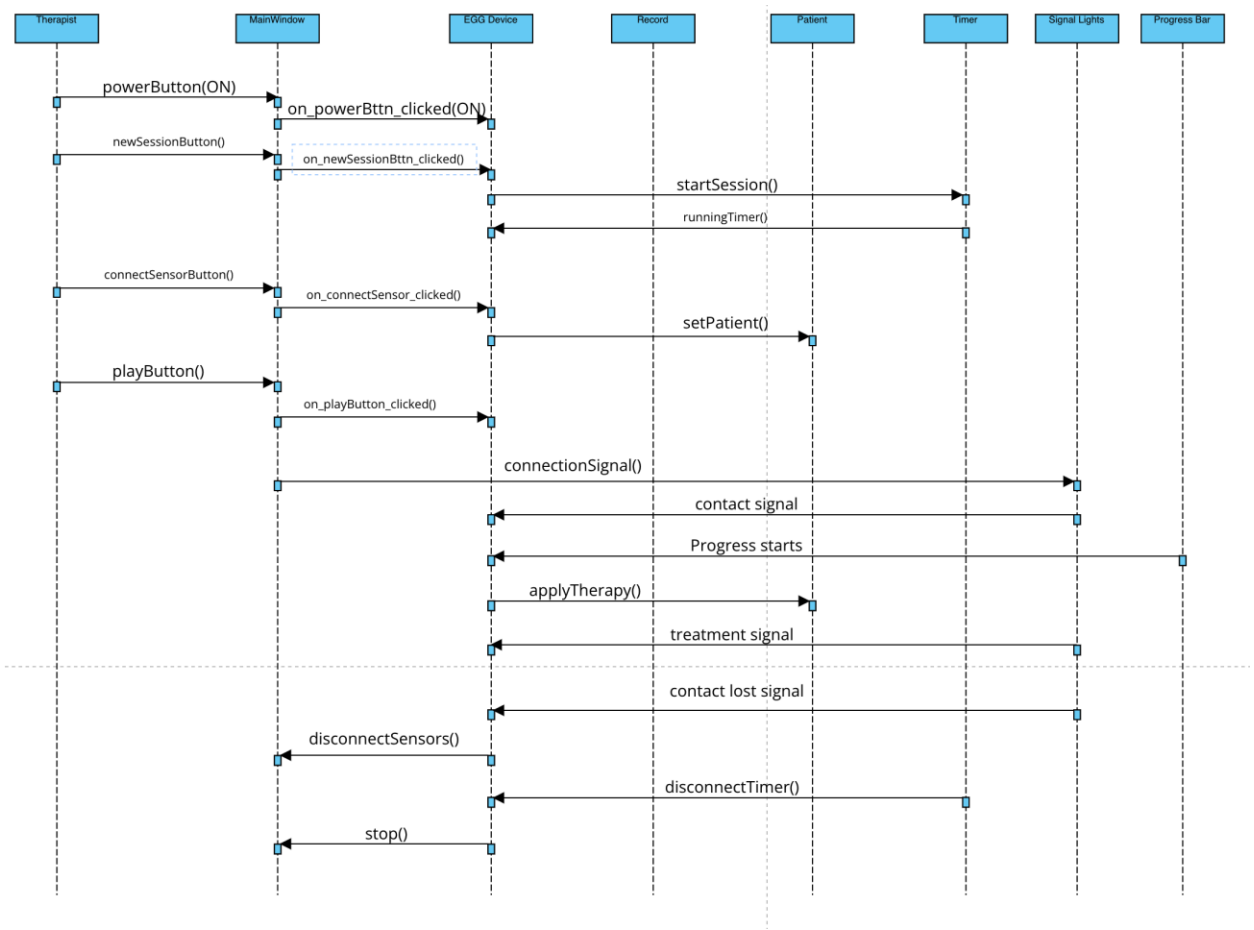
2. Therapy history viewing with PC



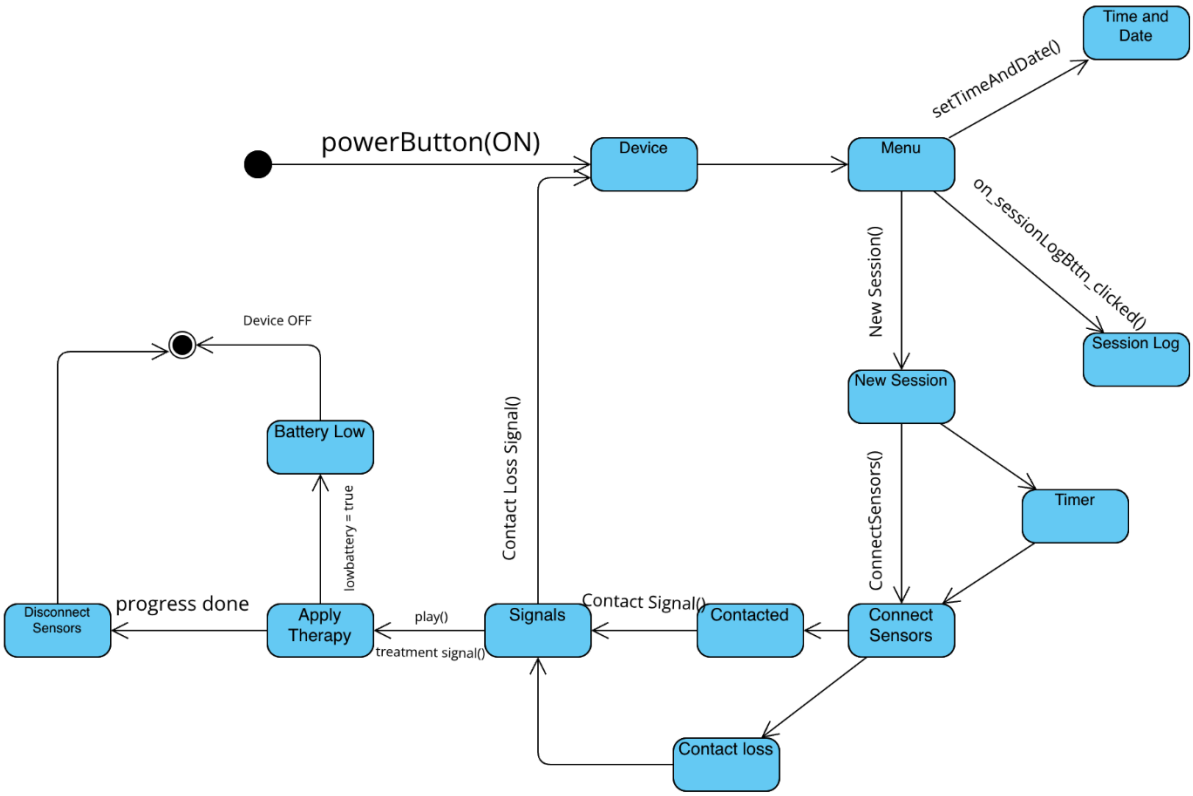
3. Battery low response of the device



4. Connection loss between electrodes and the device


Therapist
MainWindow
EGG Device
Record
Patient
Timer
Signal Lights
Progress Bar
powerButton(ON)
on_powerBttn_clicked(ON)
newSessionButton()
on_newSessionBttn_clicked()
startSession()
runningTimer()
connectSensorButton()
on_connectSensor_clicked()
setPatient()
playButton()
on_playButton_clicked()
connectionSignal()
contact signal
Progress starts
applyTherapy()
treatment signal
contact lost signal
disconnectSensors()
disconnectTimer()
stop()

Part 4: UML state machine diagram



Part 5: Traceability Matrix

Included in the file *"UML_Requirement_Traceability_Matrix___team50.pdf"*

Part 6: Design explanation

In our original design of our classes, we only had three; the MainWindow acting as the therapist, Device, and Patient. The records to keep track of past therapy sessions were

going to be stored as variables in the Device class. We recognized doing this would make our Device class further crammed, so we created the brand-new record class making our project more organized. Our second change from the original design was the removal of the “connected” variable in the Device class. Originally, “connected” was used to show when a patient was connected to the EEG device, we removed this and instead tracked the devices connection through the already existing patient pointer. When the patient pointer is null the device is disconnected, and when it points to a patient it connected.

An early design decision we made was to work with a singular patient who brainwave levels are randomized rather than work with an array or list of Patient objects. Then when the reset patient button on the GUI is selected the original patient is discarded and a new one is made with different levels, this allows us the simplicity of handling a single object while also have distinct records in our devices history as one session is all that is needed to correct a patient’s brainwaves. Another decision was not to have the device and PC text output to the terminal. Screens as part of the GUI make the application more user friendly and removing the difficulty of viewing data in one window and interacting with that data in a second. The most notable design decision of ours was the addition of the a simulation advancement section in the GUI. This section is What's used by the user to control the time and speed at which the device runs. The user enters the number of frames they wish to progress, and device jumps forward X frames. This decision was made to allow us to follow the times given in the Project Specifications without making the user wait for extended periods of time like in the case of a pause or patient disconnect.