

Use Case 1: Normal operations during a treatment session

Primary Actor: User(The person who is undergoing the neurofeedback treatment.)

Preconditions: The device is powered on, the device is charged or plugged in and all required 21 EEG electrodes are properly attached to the user's scalp.

Postconditions: The treatment session is completed successfully, session data is saved for future reference and the session status is updated on the PC.

Main Success Scenario:

1. User initiates the session:
 - The User presses the 'Start' button on the Neureset device to begin a new session.
2. Device checks for electrode connections:
 - The EEG Headset checks for secure connections at all electrode points.
 - If any electrode is not properly connected, the system alerts the User to adjust the headset until all connections are secure.
3. Session starts upon secure connection:
 - Once all electrode connections are confirmed, the NeuresetDevice instantiates a new Session.
 - The Model updates the session status, indicating that the session has begun.
4. Treatment application:
 - The NeuresetDevice applies the neurofeedback treatment according to the specified protocol.
 - Treatment involves sending frequency modulations to the brain via the EEG Headset.
5. Data recording and session end:
 - Throughout the treatment, the session data is continuously recorded.
 - Upon completion of the treatment, the NeuresetDevice finalizes and saves the session data.
 - The Model updates the session status to 'Completed' and saves the treatment data to the PC for record-keeping.

Use Case 2: View Neurofeedback Session History

Primary Actor: User

Preconditions: The device is powered on, the device is charged or plugged in and there is at least one session that has been logged.

Postconditions: The session logs are displayed on the interface and the user can clearly see it.

Main Success Scenario:

1. User requests therapy history:
 - The User navigates to the therapy history section on the Neureset device.
2. Neureset device displays session logs:
 - The Model triggers the Neureset device to render the session logs page, showing a summary of past sessions.
3. PC Interface retrieves therapy history:

- The Neureset device sends a request to the PC to fetch the detailed therapy history.
- 4. PC displays therapy history data:
 - The PC Interface processes the request, retrieves the session history data, and displays it to the User.
 - The User can now view detailed session logs, including dates, times, session lengths, and any notes or flags regarding each session.

Use Case 3: Battery low response

Primary Actor: User

Preconditions: The device is powered on and the battery reaches a low pe

Postconditions: The user is informed of the low battery and the device is either charged or it shuts down.

1. Neureset Device detects low battery:
 - While in use, the Neureset Device monitors its battery level.
 - Upon detecting that the battery level has dropped to a critically low state, it proceeds to the next step.
2. User-interface shows battery warning:
 - The Neureset Device triggers the User-interface to display a low battery warning, alerting the User of the need to charge the device.
3. User decides to charge the device:
 - The User sees the warning and decides to charge the device.
 - If the User begins charging the device, the Neureset Device enters a charging state and continues operation.
 - If the User does not charge the device, it moves to the next step.
4. Automatic shutdown if not charged:
 - If the device is not put to charge, the Neureset Device will save all current session information for later recovery.
 - After saving the session, the Neureset Device automatically shuts down to preserve the remaining battery and prevent data loss.

Use Case 4: Handling connection loss

Primary Actor: User

Preconditions: The User is actively undergoing a treatment session using the Neureset device and EEG Headset.

Postconditions: The user is informed of the connection loss and it is either reconnected or the device has shut down and erased the session.

1. Connection Loss Detected:
 - The EEG Headset detects a loss of connection with the User's scalp.
 - The NeuresetDevice receives a signal indicating the connection loss and initiates the appropriate response.
2. Session Paused:

- The NeuresetDevice pauses the ongoing session to allow the User to reestablish connection.
- 3. User Interface Alerts User:
 - The User-Interface alerts the User through a flashing light or on-screen notification about the loss of connection.
- 4. Reconnection Attempt:
 - The User adjusts the EEG Headset in an attempt to restore the connection.
 - If the connection is reestablished within 5 minutes, the session resumes from where it was paused.
 - If the connection is not restored within 5 minutes, the device takes action as described in the exception flow.

Use Case 5: Starting a Neurofeedback Session

Primary Actor: User(The person who is undergoing the neurofeedback treatment.)

Preconditions: The device is powered on, the device is charged or plugged in and all required 21 EEG electrodes are properly attached to the user's scalp.

Postconditions: The neurofeedback session begins and the system starts collecting EEG data for baseline calculation.

Main Success Scenario:

1. The user selects "New Session" from the main menu:
 - The device checks the connection of all electrodes.
 - The system initializes the EEG data collection for baseline determination.
2. Device confirms electrode connection.
 - If all electrodes are properly connected, a blue light turns on, signaling readiness.
 - If any electrode is not properly connected, a red light flashes and the device beeps to alert the user.
3. Device calculates baseline EEG frequencies:
 - The device collects EEG data for one minute to establish a baseline for neurofeedback.
 - A progress bar shows the time left until the session officially starts.
4. Session begins:
 - The device starts the neurofeedback process based on the LENS protocol, applying a frequency offset every 1/16th of a second for one second per electrode.
 - The green light flashes to indicate that treatment is being delivered.
5. Continuous monitoring and adjustment:
 - The device continuously monitors the EEG and adjusts the treatment in real time.
 - If an electrode loses contact, the session is paused, and the user is alerted to adjust the electrode.
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Extensions:

1. Electrode Disconnection:

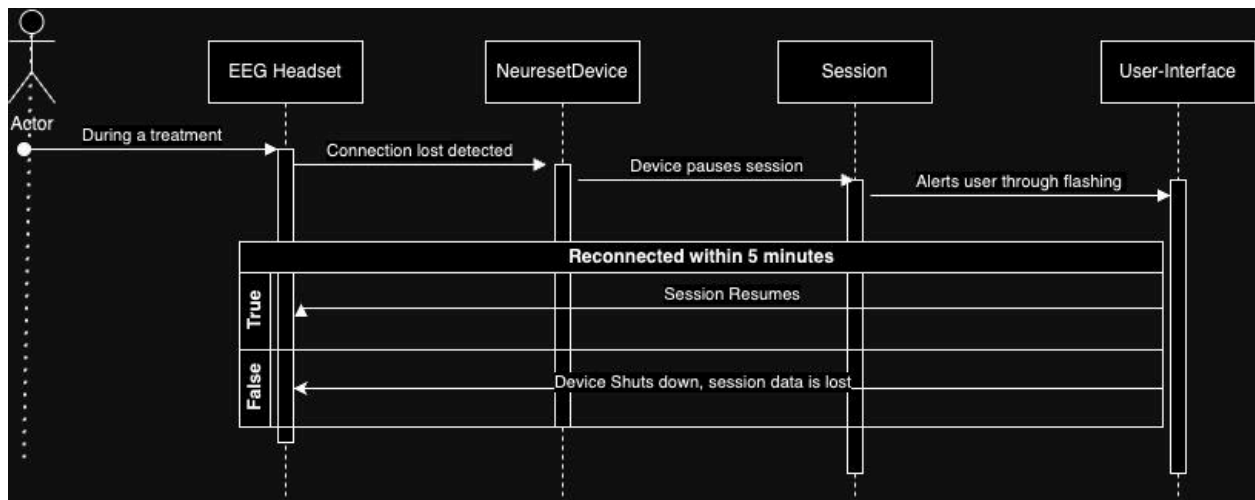
- If the connection is not reestablished within 5 minutes, the device automatically turns off to save data and battery, and the session is terminated.

2. Low Battery Warning:

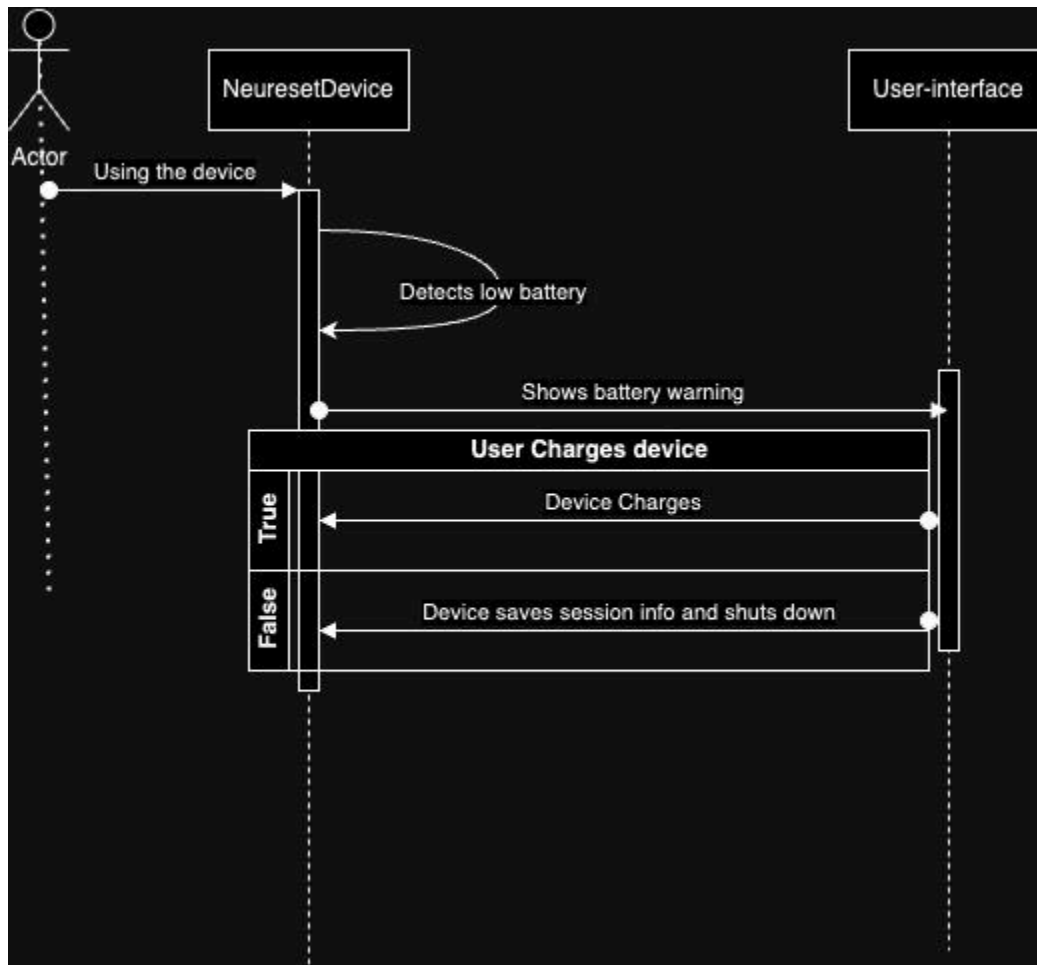
- If the battery level is critical before or during the baseline calculation, the device warns the user and advises saving data and charging the device.
- If ignored, the device will save the session state and shut down to prevent data loss.

Sequence Diagrams:

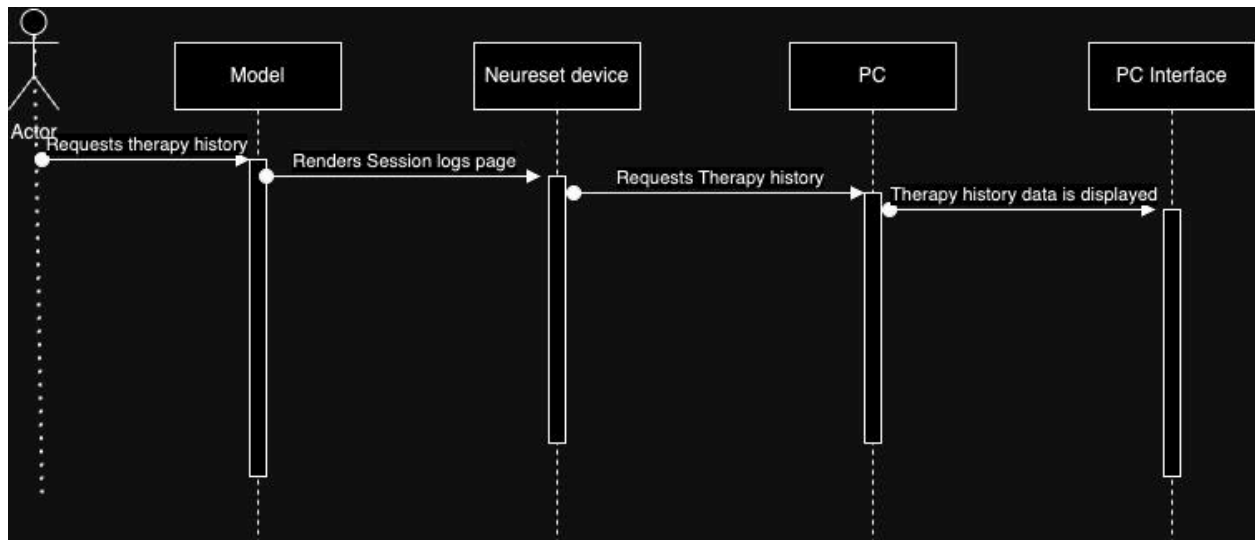
Connection lost:



Low Battery Detected:



Therapy history viewing:



Normal treatment of operations:

