Use Cases:

USE CASE 1: Normal Use

Primary Actor: User

Stakeholders and Interests: User, Victim

Precondition: Victim is unresponsive and requires treatment

Success Guarantee: AED and CPR were used to try and resuscitate the patient

Main Success Scenario:

1. User powers on device (Use case 2)
2. User places electrodes (Use case 3)
3. Heart rhythm analysis (Use case 4)
4. Voice and Visual Prompts (Use case 5)
5. Shock Delivery (Use case 6)
6. CPR and Post-Shock Care (Use case 7)
7. Continued Evaluation (Use case 8)

Extensions:

1. Check the extensions for each individual use case

USE CASE 2: POWER ON

Primary Actor: User

Stakeholders and Interests: User, Victim

Precondition: Victim is unresponsive and requires treatment

Success Guarantee: Device has been powered on and is ready for use

Main Success Scenario:

1. User presses the power button
2. Device initiates self-test to ensure it is working properly

3. Self-test is okay, and device gives a visual and audible cue that it is working.

Extensions:

2a. Self-test is not okay, device is not operational

2a1. Perform CPR

USE CASE 3: ELECTRODE PLACEMENT

Primary Actor: User

Stakeholders and Interests: User, Victim

Precondition: Device has been powered on and is ready for use

Success Guarantee: Electrodes have been properly applied and device is ready to begin analysis

Main Success Scenario:

1. Remove clothing covering the victim's chest

2. Place electrodes on chest and remove protective backing for adhesive

Extensions:

1a. Victim has excessive chest hair

1a1. Cut or trim chest hair before applying electrodes

2a. Electrodes placed incorrectly

2a1. Device will prompt user to check that the pads are making good contact with the victim’s skin

USE CASE 4: Heart Rhythm Analysis

Primary Actor: User

Stakeholders and Interests: User, Victim

Precondition: The device is on, and the electrodes have been correctly and securely placed.

Success Guarantee: Analyzes the patient's heart rhythm correctly and gives advised action

Main Success Scenario:

1. The AED analyzes the patient's heart rhythm through the electrodes
2. It monitors the electrical activity of the heart to determine if there is a shockable rhythm (ventricular fibrillation or ventricular tachycardia) or not.
3. It provides the results of the analysis

Extensions:

USE CASE 5: Voice and Visual Prompts

Primary Actor: User

Stakeholders and Interests: User, Victim

Precondition: The device is on, and the electrodes have been correctly and securely placed.

Success Guarantee: Clearly and concisely displays the prompts based on the situation

Main Success Scenario:

1. Provides clear voice and visual prompts to guide the users through the entire process.

Extensions:

1. If anyone is touching the patient
    a. The prompts include “Stand Clear!”
2. When the AED is analyzing the patient’s heart rhythm
    a. The prompts include “Analyzing!”
3. If shock is advised
    a. The prompts include “Shock Advised!”

USE CASE 6: Shock Delivery

Primary Actor: User

Stakeholders and Interests: User, Victim

Precondition: Having done the Heart Rhythm Analysis and a shockable rhythm is identified

Success Guarantee: The shock is successfully delivered timely and without issues

Main Success Scenario:

1. Once the AED advises you to deliver a shock, the shock button is pressed.
2. Shock is delivered and no one can be in contact with the patient.

Extensions:

USE CASE 7: CPR and Post-Shock Care

Primary Actor: User

Stakeholders and Interests: User, Victim

Precondition: The shock is provided

Success Guarantee: Provided the user with valuable information such as duration of CPR needed and provides feedback on the quality of the CPR and its effectiveness.

Main Success Scenario:

1. The AED will instruct the user to perform CPR for a duration of time.
2. The AED continues to monitor the patient's heart rhythm
3. Gives feedback on the quality and rate of chest compression during the CPR

Extensions:

USE CASE 8: Continued Evaluation

Primary Actor: User

Stakeholders and Interests: User, Victim

Precondition: Post-shock Care has been completed

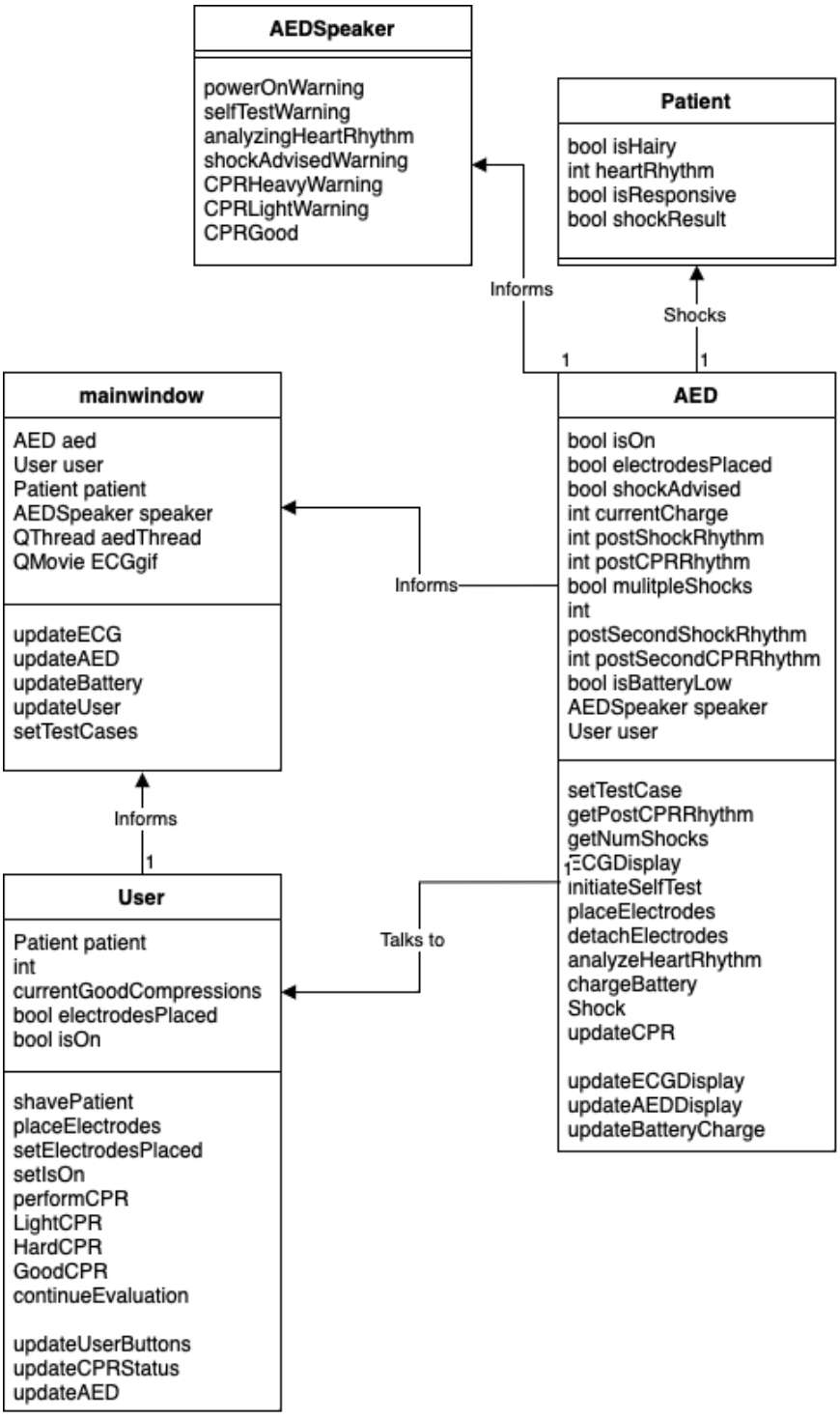
Success Guarantee:

Main Success Scenario:

1. Further monitoring of patient's state is continued
2. More feedback is given on the condition of the patient and user's CPR
3. Further instructions are provided when needed

Extensions:

UML Class Diagram:

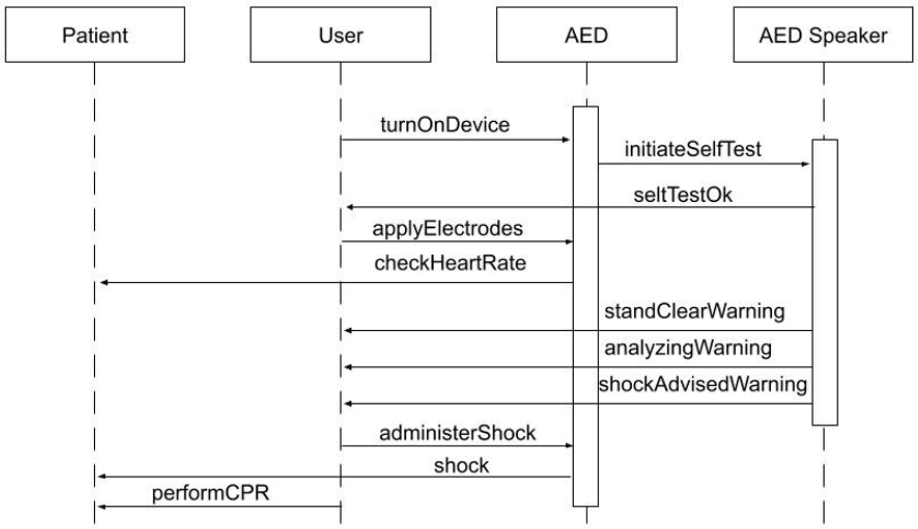


Sequence Diagrams:

1. **Normal Use**

   User turns on AED

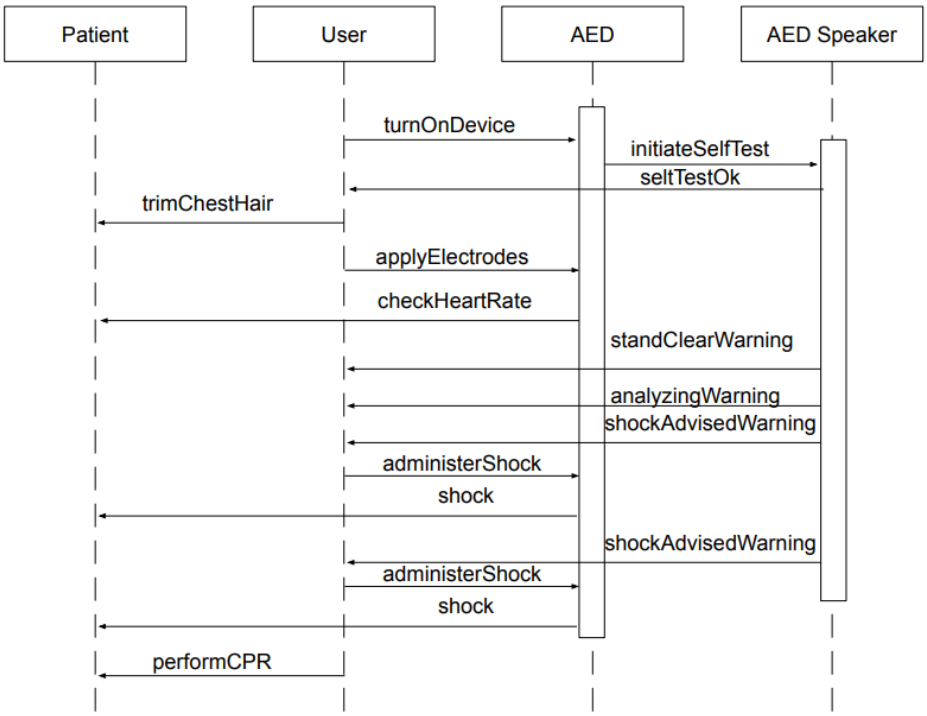
AED preforms self-test then informs user that the self-test is ok
User applies Electrodes
AED analyzes Heart Rate
Patient has Shockable rhythm
AED Speaker sends Stand Clear warning
AED Speaker sends Analyzing voice message
AED sends Shock Advised
User Administers Shock
AED Shocks
User Performs CPR



2. **Two shocks with Chest Hair**

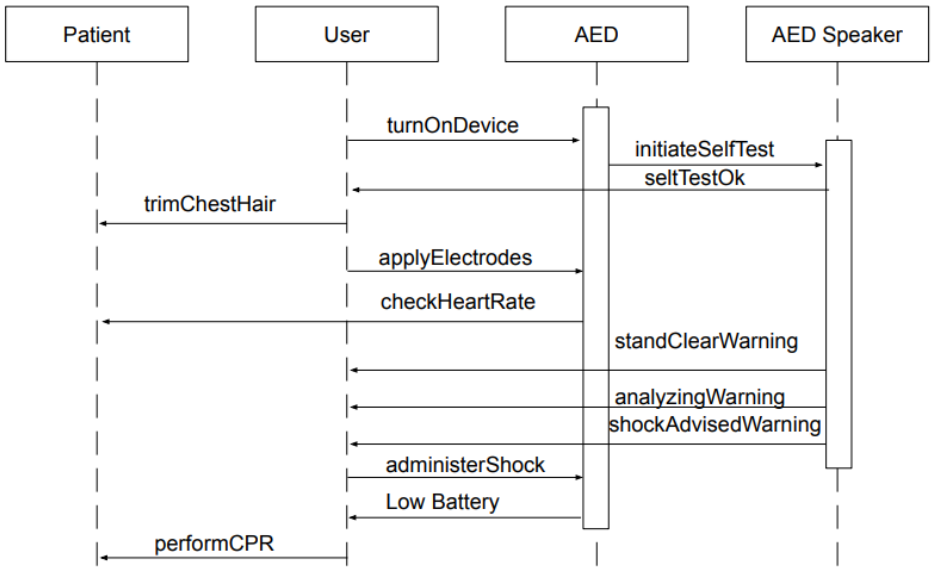
User turns on AED
AED preforms self-test then informs user that the self-test is ok
User Shaves Chest
User applies Electrodes
AED analyzes Heart Rate
Patient has Shockable rhythm
AED Speaker sends Stand Clear warning
AED Speaker sends Analyzing voice message
AED sends Shock Advised
User Administers Shock
AED Shocks
AED sends Shock Advised
User Administers Shock
AED Shocks

User Performs CPR



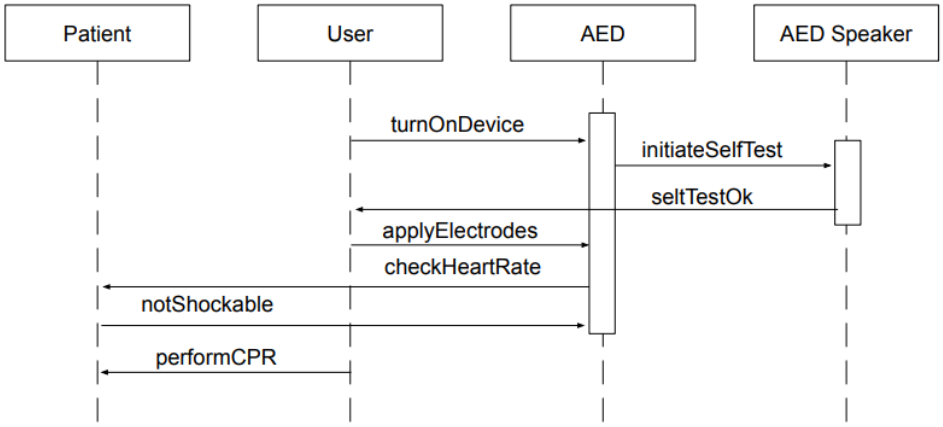
3. **User Trims chest hair, but has low battery**

User turns on AED
AED preforms self-test then informs user that the self-test is ok
User Shaves Chest
User applies Electrodes
AED analyzes Heart Rate
Patient has shockable rhythm
advise shock
Try to shock but not enough battery
Administer CPR

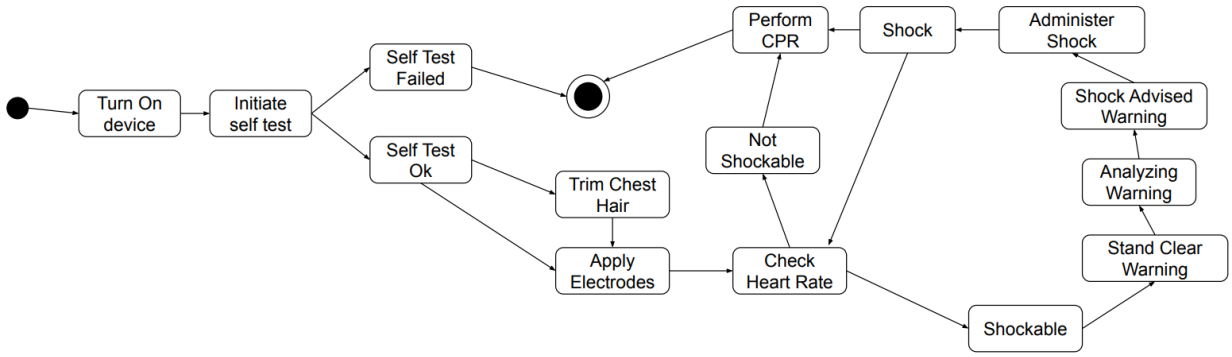


4. **Non shockable Rhythm**

   User turns on AED
   AED preforms self-test then informs user that the self-test is ok
   User Shaves Chest
   User applies Electrodes
   AED analyzes Heart Rate
   Patient has non shockable rhythm
   perform CPR



State Diagrams:


Turn On device
Initiate self test
Self Test Failed
Self Test Ok
Trim Chest Hair
Apply Electrodes
Check Heart Rate
Not Shockable
Perform CPR
Shock
Administer Shock
Shock Advised Warning
Analyzing Warning
Stand Clear Warning
Shockable