

AED Simulator List of things to do

- Create Git Repo - Done
- Determine Use Cases - Done
- Create UML Class Diagram
- Create Sequence Diagrams For Regular Operation
- Create Sequence Diagrams For Irregular/Safety related Operation
- Create State Diagrams
- Create State Diagrams for Controllers (He wanted them for the assignments so I am guessing he will want it here but idk maybe not needed)
- Create Explanations on Key design decisions (Ex If using status's list out and explain what each status is and what it means do this for each object that has a status)
- Create Test Video showing off what happens for all the Sequence Diagrams for both regular and irregular operations in the completed simulator.
- Create Traceability Matrix
- Create AED Simulator

AED Simulator Basic functions:

Users can analyze heart rhythms of patients

Users can provide electric shocks to the patients which change heart rhythms of patients (Though AEDs can not change heart rhythms of patients once they flatline.)

Users can receive guidance from AED.

AED Simulator Required functions:

Power On: When you turn on an AED, it initiates a self-test to ensure that the device is functioning properly and ready for use. It will often provide a visual and audible indication that it is operational.

Electrode Placement: The AED typically comes with adhesive electrode pads that have sensors. The first step is to place these electrode pads on the patient's bare chest. The pads are typically labeled "Adult Pads" and "Child Pads" to ensure proper placement for different age groups. (For implementation it means we will probably be best off to just use bool to simulate "Adult Pads" or "Child Pads" instead of making a whole object as while creating an object.)

Heart Rhythm Analysis: The AED analyzes the patient's heart rhythm through the electrodes. It monitors the electrical activity of the heart to determine whether a shockable rhythm is present. The primary shockable rhythms are ventricular fibrillation and ventricular tachycardia.

Voice and Visual Prompts: The AED provides clear voice and visual prompts to guide the user through the process. These prompts may include: * "Stand clear" to ensure no one is touching the patient. * "Analyzing" as the AED evaluates the heart rhythm. * "Shock advised" if a shockable rhythm is detected.

Shock Delivery: If a shockable rhythm is identified, the AED will prompt the user to deliver a shock. The shock is administered by pressing a button on the AED. It's essential to ensure that no one is in contact with the patient when the shock is delivered.

CPR and Post-Shock Care: After delivering a shock, the AED often instructs the user to perform cardiopulmonary resuscitation (CPR) for a specified duration. The AED may continue to monitor the patient's heart rhythm and provide feedback on the quality and rate of chest compressions during CPR.

Continued Evaluation: The AED may continue to monitor the patient's heart rhythm and provide further shocks or CPR instructions as needed. It's important to note that AEDs are designed for ease of use, even by individuals with minimal medical training. The voice and visual prompts provided by the AED guide the user through the process, making it possible for bystanders to respond effectively to a sudden cardiac arrest situation. The use of an AED, along with timely CPR, significantly improves the chances of survival for individuals experiencing cardiac arrest.

Requirements (draft):

The modeled unit of the AED Plus must contain the core functions of an AED outlined above and a user interface to administer them. They can be organized into the following modules:

1. User Interface Design:
 - Design the software for a graphical user interface (GUI) that resembles the AED Plus's display.
 - Develop visual elements to display essential information, including:
 - Real-time CPR feedback.
 - Cardiac arrhythmia diagnosis results.
 - Device status indicators (e.g., battery, electrode placement).
 - Simulated user interaction controls (e.g., buttons for electrode placement).
 - Include a display panel to show the simulated ECG (electrocardiogram) waveform and device status.
2. Cardiac Arrhythmia Detection:
 - Develop a module to simulate the AED's capability to diagnose cardiac arrhythmias, specifically ventricular fibrillation and ventricular tachycardia.
 - Simulate the analysis process where the AED Plus detects the heart rhythm.
 - If a shockable rhythm is detected, display a message on the screen and provide textual instructions on how to prepare and deliver a shock.
 - If a non-shockable rhythm is detected, provide appropriate textual guidance for CPR (Cardiopulmonary Resuscitation).
3. Real-Time CPR Feedback:
 - Create a system that emulates the real-time CPR feedback feature of the AED Plus.
 - Simulate the measurement and assessment of chest compressions, delivering visual and textual feedback to guide the user.
4. Visual Prompts:
 - Specify scenarios of a simulated cardiac emergency with visual prompts and their timing to guide the user through a rescue situation.
5. User Interaction:
 - Implement an interactive system that allows users to perform actions mimicking real-world AED operation.
 - Provide input mechanisms for electrode placement, shock delivery, and CPR initiation.
6. Simulated Scenarios:
 - Develop scenarios with varying patient conditions, user responses, and outcomes to test your software.

