Team 5

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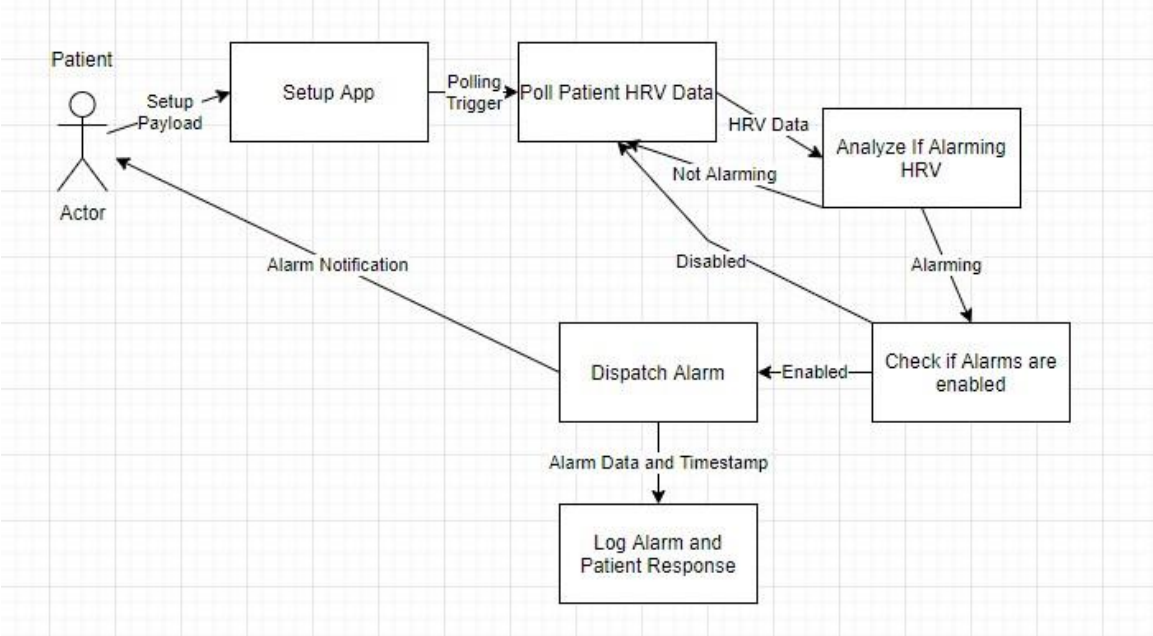
Project Description

Our project will consist of creating an app for analyzing in real-time biometric data to provide feedback to the user: TBI (Traumatic brain injury) patients. The biometric data will be based on the patient's heartrate variability. Heartrate variability, or HRV can tell how a person might be feeling at that certain moment. For example, HRV can show if a person may be stressed, anxious, some anger, or not feeling great. How we will measure HRV of a patient will be by using tools such as Apple Watches. Apple Watches would be the best option to use due to it being the only device on the commercial market that tracks a wearer's HRV. We will be using the API on the Apple Watch's OS to retrieve that data. If the data from the API does not work for what we need, we will need to have an alternative such as using Fitbit's data, or for this iteration, we may have to result to simply using mock data. How the app will be intended to work is to pay attention to changes in the HRV of the patient. When the data makes a sudden change, the app will inform the patient that their HRV has changed via an alert saying to relax. When the HRV moves towards zero (meaning an almost perfectly consistent heart rate), that means that the nervous system is over-acting, indicating some sort of stress at the moment. If the HRV moves higher (meaning lots of variability between heart beats), it means that the patient will be relaxed.

User Stories*

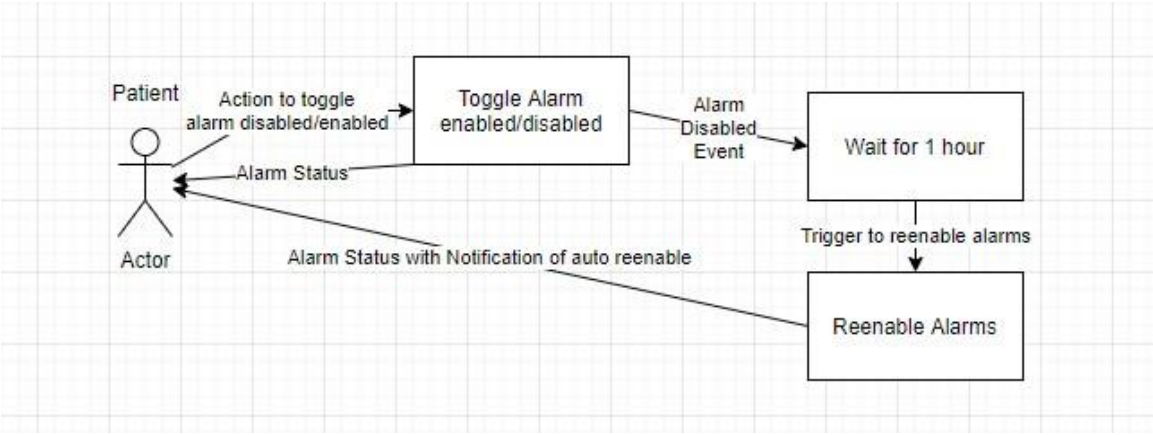
Priority 1 - A: As a patient I want an alert so that I know when I am feeling stressed or some other unusual nervous system over-acting.

> **A.1 (R2): Creation of Algorithm to Decide Whether to Give Alert.** There shall be an algorithm to detect if the patient's HRV has suddenly moved towards zero. This will then tell the program to send off an alert
>
> **A.2 (R3): Creation of Alert when the Algorithm Decides that an Alert is Necessary:** There shall be an alert for the patient while using the application when said patient's HRV has suddenly moved towards zero.
>
> **A.3 (R4): Logging of Records of Alerts that were Launched:** In the future there may be logging of timestamps and outcomes of these alerts for the doctor to create reports from.



Priority 2 - B: As a patient I want the program to have an option to deactivate so that it doesn't give me a false alarm due to HRV dropping towards zero from some kind of activity (e.g. exercising).

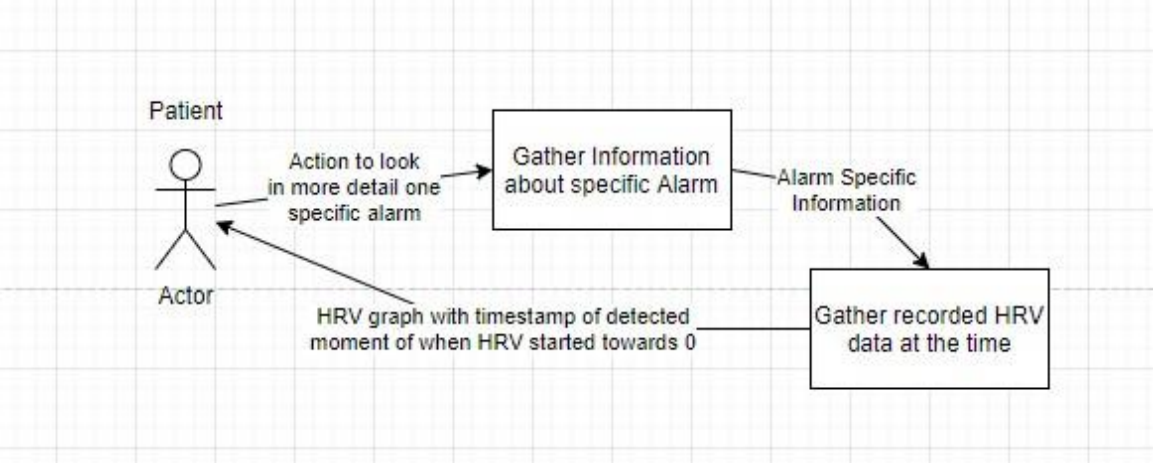
B.1 (R8): Creation of an option toggle to manually disallow and/or allow dispatches of alerts. There shall be a setting to turn off and on the alerts so that the patient may freely exercise.



Priority 3 - C: As a patient I want the program to log and analyze my HRV in real-time so that alerts promptly and accurately get dispatched.

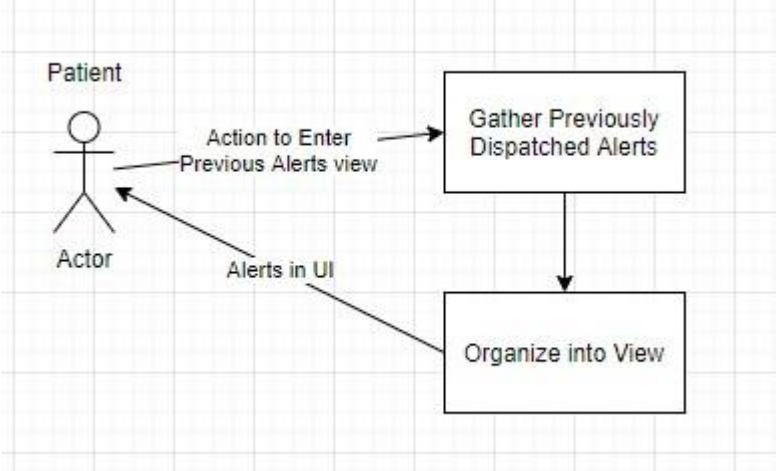
C.1 (R6): Testing of the Algorithm that Detects Dangerous HRV Shift with the goal to ensure reliability: There shall be an algorithm that accurately knows when the HRV suddenly moves towards zero. This must be thoroughly tested to ensure that the algorithm performs reliably, which means that it limits false negatives so that the alert may be dispatched during the crucial times.

C.2 (R7): Creation of a View to show Patient where the Algorithm Detected the shift in the Patient's HRV: Perhaps later there may be graph diagrams for the patient to show at what point their HRV was detected to be suddenly changed to help the patient know their stressors better.



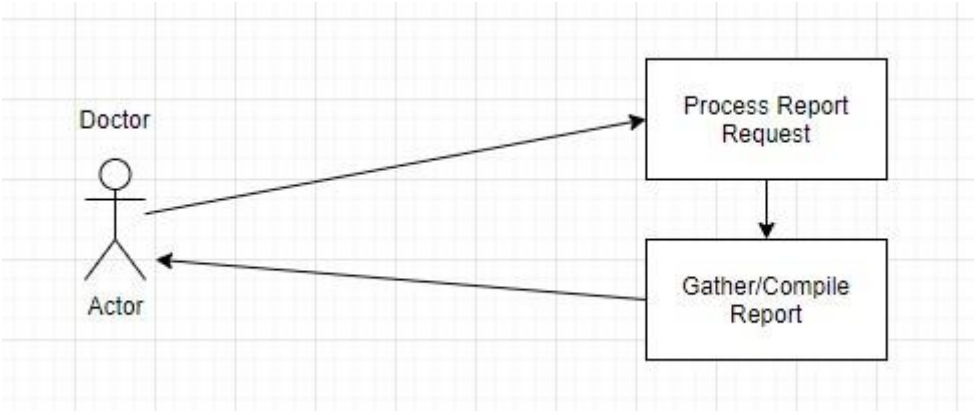
Priority 4 - D: As a patient I want to view previous alerts so that I can find patterns and/or triggers that lead to stress.

D.1 (R5): Logging of Records of Alerts and HRV statistics: The app shall log information about the patient's HRV over time as well as when alerts were given to the patient.



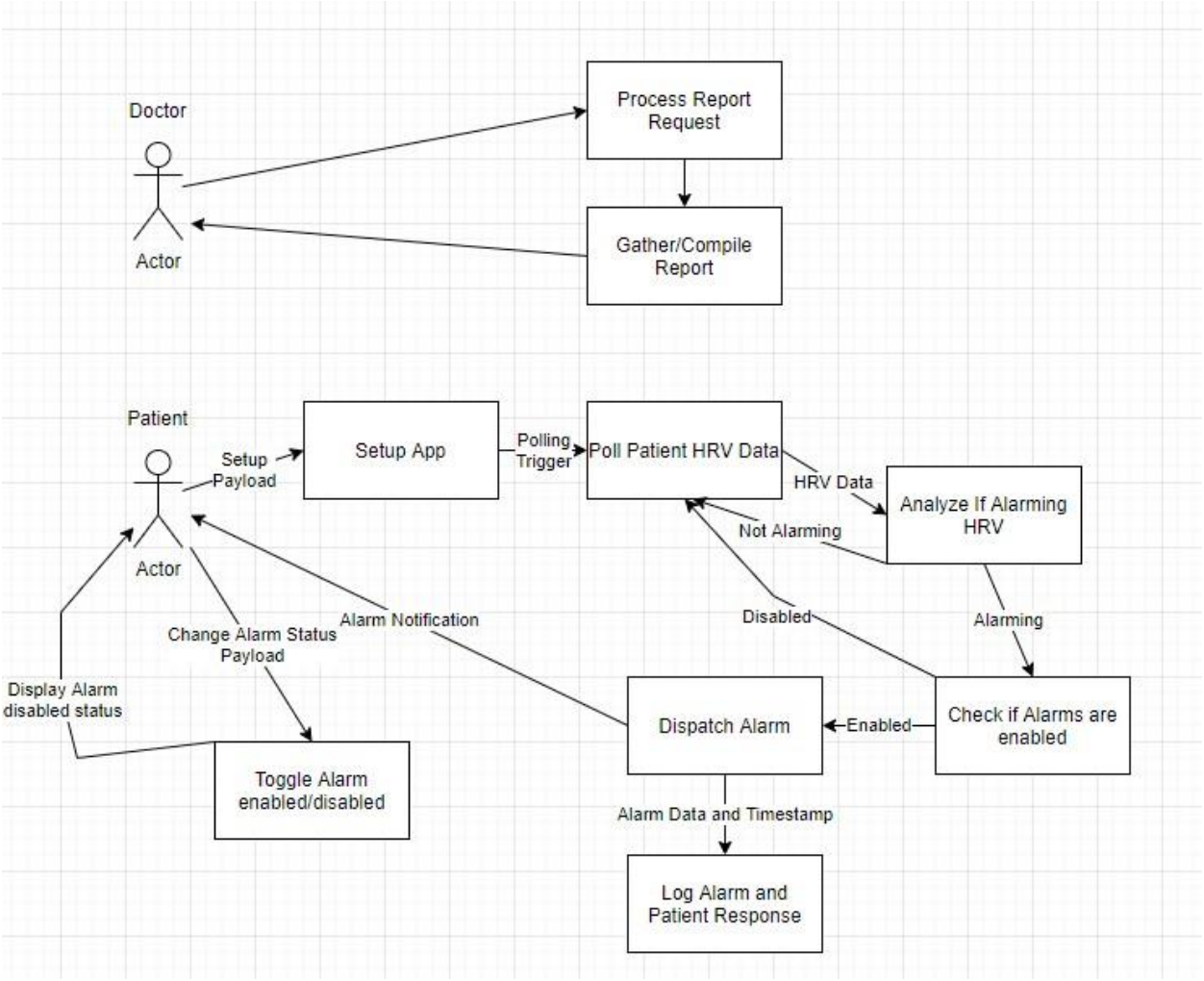
Priority 5 - E: As a doctor I want reports and timestamps of alerts when a patient has lost control so that I can cross reference with video feeds to find the root cause of the patient losing control.

E.1 (R9): Creation of a View for the Doctor to view the Patient's history of alerts. The app shall have a feature to report information to the doctor to show information about when alerts were reported on a patient. This report system should help the doctor pinpoint the root cause of the patient's loss of control via timestamps in the report, because to supplement this timestamp, the doctor will also have video footage (outside of this app) to reference.



**R1 is currently created as "learn swift programming language", which was created on accident in the Shelby Website*

Unified User Story Diagram:



Priority Listing:

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Priority 2 - B:

B.1 (R8): Creation of an option toggle to manually disallow and/or allow dispatches of alerts.

Priority 3 - C:

C.1 (R6): Testing of the Algorithm that Detects Dangerous HRV Shift with the goal to ensure reliability

C.2 (R7): Creation of a View to show Patient where the Algorithm Detected the shift in the Patient's HRV

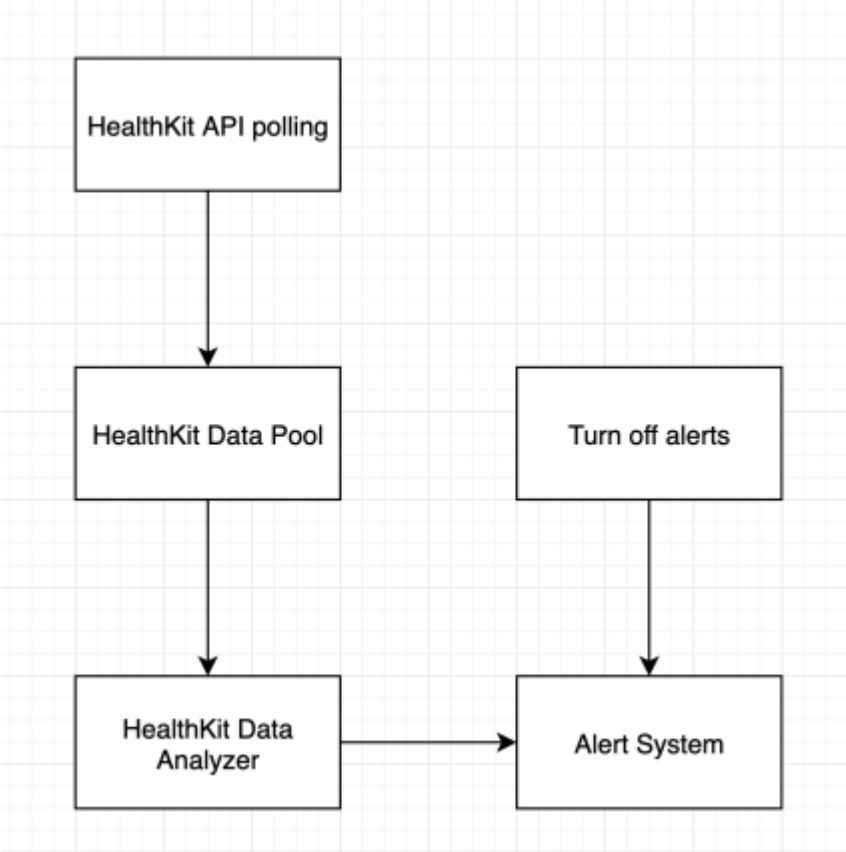
Priority 4 - D:

D.1 (R5): Logging of Records of Alerts and HRV statistics:

Priority 5 - E

E.1 (R9): Creation of a View for the Doctor to view the Patient's history of alerts

Architecture Diagram:



Glossary

TBI patient – traumatic brain injury patient

Biometric data – data about a biological organism(human) ex. Fingerprint, Hand, heartrate, blood type, facial images.

API – Application Programming Interface – set of routines definitions, protocols, library, and other tools to assists developers in writing code that connect with software.

Heart rate Variability (HRV) – The variation in the time between each heartbeat.