

EE/CprE/SE 491 WEEKLY REPORT 3

Start Date – End Date: 9/4/2024 - 10/10/2024

Group number: 13

Project title: PTSD Detection Device

Client &/Advisor:

Advisor: Mohammed Selim

Mentors: Bae Systems - Alice Crutcher, Michael Goderre, Jennifer Plakyda, Ryan Littler

Client: America's VetDogs - Cheyenne Whitetree

Team Members/Role:

Justin Scherrman - Design Engineer - Communications and Sensors

Neil Prange - Software Engineer

Aidan Klimczak - Design Engineer - Microcontroller

Justin Jaeckel - Software Engineer

Ty Decker - Team stenographer

Katerina Zubic - Team organizer and sensor engineer

- **Weekly Summary**

This week, we started drilling deeper into a possible design solution. Looking into the type of microcontroller needed as well as what sensors will give us the data we need. We have decided to go with the previous' groups microcontroller. This is because it has all the necessary components and we already have it, saving time and money. Additionally, we have made the decision (is privy to change) to use a PPG sensor along with some kind of heart rate sensor (ECG). We are still researching these sensors to ensure they are what we need to retrieve the necessary biometrics. With the PPG specifically, the

previous senior design group left a few extra, so we are hoping to find a breakout board so we can identify what kind of data we are looking at.

Met with Dr. Selim, our client, America's VetDogs, our mentors, BAE systems, as well as our own team meeting. We got good feedback from these meetings and have a good idea of what the next week will look like for us. Overall, we are making progress.

- **Past week accomplishments**

We decided to use the previous senior design microcontroller and are considering using their PPG sensor. We want to test it before deciding to keep that sensor for our project, so we must find a breakout board.

Created a high-level systems-level diagram of a possible design solution. It included the two sensors, a microcontroller, some kind of communication (radio or Bluetooth is the current conversation), data storage and power.

Decided our goal is to complete a breadboard prototype by the end of the semester.

Neil Prange - Research

- Looked into different sensors and specifications for some of the parts in the previous senior design project.

Aidan Klimczak - Research

- Research the previous project's microcontroller for functionality and ways to further the research.

Justin Scherrman - Research

- Researched the possibilities of using either Bluetooth Low Energy or Radio Frequency for communication from each part of the device

Justin Jaeckel - Research

- Researched the microcontrollers and sensors used by past groups

Ty Decker - Research

- Researched blood pressure wearables and continued to document meetings. Started research on biometrics such as pulse oximetry and peripheral temperature.

Katerina Zubic - Research

- Dived into PPG sensors as well as what defines a PTSD attack.
 - PPG seems to be the best best for blood pressure, it measures blood volume via LED and a photodetector.
 - Heart rate variability is the main biometric in PTSD symptom studies that define when a PTSD episode has occurred.

- **Pending issues**

- Figuring out whether to utilize radio (RF) or Bluetooth communication.

- Getting control data from VetDogs along with a prototype dog vest.

○ **Individual contributions**

<u>NAME</u>	<u>Individual Contributions</u> <i>(Quick list of contributions. This should be short.)</i>	<u>Hours this week</u>	<u>HOURS cumulative</u>
Neil Prange	Researched different parts, including potential parts to buy (sensors, etc.)	6	24
Justin Scherrman	Researched BLE and RF communications between devices needed for final design.	6	24
Justin Jaeckel	Continued to examine hardware from last year and research programming relevant microcontrollers and sensors as well as different possible microcontrollers	6	24
Aidan Klimczak	Researched the microcontroller of the previous project, and found ways to continue going forward with research.	6	24
Katerina Zubic	More in depth research about the PPG sensor and its possible uses. Continued research on EDA (whether it is a viable option), and finally dope into what biometrics define a PTSD, HRV is the main attribute.	5	23
Ty Decker	Continued product research. Continued documenting meeting progress. Looked into biometrics needed for detecting PTSD, like pulse oximetry and peripheral temperature.	6	24

○ **Plans for the upcoming week**

- Complete lightning talk presentation

- Continue research on the project
- Correct the Gantt chart
- Correct work hours timesheet
- Research communication protocols (Bluetooth or radio)
- Find a PPG breakout board for purchase
- Figure out microcontroller for the dog vest

○ **Summary of biweekly advisor meeting**

Checked our progress from the previous two weeks and conveyed future progress.

Critiqued our Gantt chart for improvements.

Continued to figure out planning for this project.