

EE/CprE/SE 492 Status Report 5

Start Date – End Date: 03/13/2025 - 04/03/2025

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, Sensors, and PCB

Neil Prange - Software Engineer

Aidan Klimczak - Design Engineer - Microcontroller

Justin Jaeckel - Software Engineer - Embedded systems

Ty Decker - Security - Stenographer

Katerina Zubic - Team organizer and PCB engineer

○ **Bi-Weekly Summary**

- Completed research on blood pressure detection strategies and began implementing our algorithm.
- Finished prototype PCB designs for both the dog and veteran.
- Ordered all parts for the PCB

○ **Past week's accomplishments**

- Finished first drafts of PCB design to be reviewed.
- Created a parts list from the PCB schematic
- Ordered parts from the part list, including components for breadboard design.

Neil Prange - Research/Implementation

- Found PPG and blood pressure dataset for neural network training.
- Landed on neural network architecture (1D CNN) as method for detecting blood pressure
- Began implementing training script using Tensorflow

Aidan Klimczak - Research/Design

- Finished the first design iteration of Veteran PCB
- Began preparing final deliverables

Justin Scherrman - Research/Design

- Research solid works import from KiCAD.
- Created initial PCB design in KiCAD
- Reviewed the first design of the PCB
- Completed a second iteration of the PCB design, updating possible issues with the layout and USB-C connector clearance

Justin Jaeckel - Research / Development

- Completed prototype algorithm for detecting abnormal heart rate
- Began testing algorithm
- Started improvements on the original heart rate detection method

Ty Decker - Research / Security

- Categorized items in security matrix
- Researched recommended security controls for high risk items with NIST SP 800-53.

Katerina Zubic - Research & Testing

- Ordered parts for breadboard design and PCB layout.
- Finalized schematic for dog PCB design.
- Provided assistance in developing dog PCB footprint.
- Began developing the final design document and poster.

○ **Pending issues**

- Ensuring lead times on purchased devices fit the planned schedule of the semester.
- Potentially look into larger BP/PPG datasets for more accurate blood pressure testing

- **Individual contributions**

<u>NAME</u>	<u>Individual Contributions</u>	<u>Hours</u>	<u>HOURS cumulative</u>
Neil Prange	Started working on implementation of an algorithm to detect blood pressure using PPG. Imported dataset into Tensorflow lite and concluded research on different detection approaches.	6	27
Justin Scherrman	Completed two iterations of the design the dog side PCB after having iteration one reviewed by Ph.D. student Jacob. Iteration 2 has a cleaner PCB design and can be decreased in size.	20	41
Justin Jaeckel	Finished a prototype algorithm into abnormal heart rate detection. Testing has begun and improvements to the initial heart rate detection method are being worked on.	10	32
Aidan Klimczak	Finished the first design iteration of Veteran PCB. Began preparing final deliverables	10	30
Katerina Zubic	Began the Design document and poster. I completed the schematic design for the dog side of PCB and provided assistance with the PCB footprint. Ordered parts for breadboard and PCB design.	20	41
Ty Decker	Categorized items in security matrix. Cross referenced relevant security items with NIST SP 800-53	6	20

- **Plans for the upcoming weeks**

- Finish PCB design and review
- Import dog side pcb into Solidworks to create a plastic housing
- If parts from Digikey are received, we will assemble a breadboard prototype of our PCB design.
- Order the PCB prototypes for the dog and the veteran.
- Complete Blood pressure detection algorithm implementation with reasonable accuracy
- Begin porting blood pressure detection functionality to the ESP32