# EE/CprE/SE 492 Status Report 3

**Start Date – End Date:** 02/27/2025 - 3/13/2025

**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 and Sensors

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**

From the last report, we finished the schematics for both our PCBs and began developing the footprints for our PCBs. We also came to the conclusion that simpler blood pressure monitoring techniques would not meet our accuracy requirement for detecting a PTSD attack, so research has shifted to finding or training a simple machine learning model to detect blood pressure increases.

- o **Past week's accomplishments**
    - FInished schematics for veteran and dog pcbs
    - Started learning developing our pcb footprints
    - Found accuracy of simple blood pressure detection schemes was not sufficient.
    - Looked into possible ML models for blood pressure detection.
    - Created a security matrix specific to our project.

**Neil Prange - Research/Implementation**
- Got blood pressure monitor cuff, using to verify accuracy of BP algorithm
- Researched ML based approaches for detecting BP - Simple algorithms don't appear to give sufficiently high accuracy
- Search for models that can run fast enough on ESP32 and fit into memory

**Aidan Klimczak - Research/Design**
- Finished the first iteration of the PCB schematic for the veteran
- Found all required components required for the PCB design
- Made sure all components work together in terms of voltage magnitudes

**Justin Scherrman - Research/Design**
- Research into possible design options for the device housing
- Research solid works import from KiCAD.
- Took over fthe inished schematic for the dog side for implementation to PCB

**Justin Jaeckel - Research / Development**
- Continued research into blood pressure detection using PPG sensor.
- Continued development into ptsd detection using heart rate.

**Ty Decker - Research / Security**
- Finished sorting NIST checklist items into separate matrices only relevant to our project.
- Begun separating checklist items into High/Medium/Low/Unsure items
- Begun cross referencing checklist items with NIST SP 800-53

**Katerina Zubic - Research & Testing**
- Finished the schematic dog side of the PCB.
- Met with Jacob, a PHD resource to help address questions and PCB design
- Began implementing the PCB footprint
- Began parts list for when we need to order PCB

- o **Pending issues**

    - Find ML model for blood pressure detection that meets our requirements (accuracy and size)
    - Making sure our PCB schematics will work correctly the first time.
    - Making sure lead times on purchased devices fits the planned schedule of the semester.

o **Individual contributions**

| NAME | Individual Contributions | Hours | HOURS cumulative |
|---|---|---|---|
| Neil Prange | Switching directions for blood pressure detection to look at simple machine learning models. Simple algorithms do not seem to give high enough accuracy for our use. Searched for publicly available models and datasets for blood pressure detection. | 5 | 21 |
| Justin Scherrman | Researched the 1 to 1 import of PCB from KiCAD to Solidworks for the design of the PCB housing. Took over pcb implementation for schematic created by Katerina. | 6 | 22 |
| Justin | Continued development into heart rate algorithm for ptsd detection. Prototype algorithm to detect resting heart rate completed and started working on detecting changes. | 6 | 22 |
| Aidan Klimczak | Finished the first iteration of the PCB schematic for the veteran. Found all required components required for the PCB design. Made sure all components worked together in terms of voltage magnitudes. | 10 | 30 |
| Katerina Zubic | Finished designing the schematic for the dog PCB. Began a parts list as well as the footprint PCB. | 10 | 31 |
| Ty Decker | Finished separating pertinent NIST SP 800-12 checklist items into a new list for our own use. Began categorizing items in to | 6 | 14 |

| | High/Medium/Low risk for prioritization. | | |
|---|---|---|---|

- o **Plans for the upcoming weeks**

  - Material research for housing the device for both dog and veteran.
  - Make a final decision on an algorithm/model for blood pressure detection.
  - Implement our decided detection scheme and port to ESP32.
  - Start initial examination of Bluetooth settings
  - Have security matrix categorized
  - Begin designing both our prototype PCB footprints
  - Clarify the functionality of our schematics