NORTHROP GRUMMAN

Weapon System Support Software

Zachary Parham, Brandon Udall, Bradley Essegian, Dylan Motz

Mentor: Tayyaba Shaheen

NAU NORTHERN ARIZONA UNIVERSITY

Our Clients & Business

Aerospace & Defense Contractor

- Armament Systems
- $30 billion in revenue / year

Harlan Mitchell

- Sr. Systems Engineering Manager

Laurel Enstrom

- Principal Systems Engineer

B-2 Spirit Stealth Bomber
Source: Northrop Grumman

RQ-4 Global Hawk
Source: Northrop Grumman

NORTHROP GRUMMAN

The Problem

Advanced Weapon Systems

Faults with these weapon systems produce a lot of data

NG must dispatch engineers with a tool to collect data

NG will work to resolve the problem, traveling to and from as much as needed

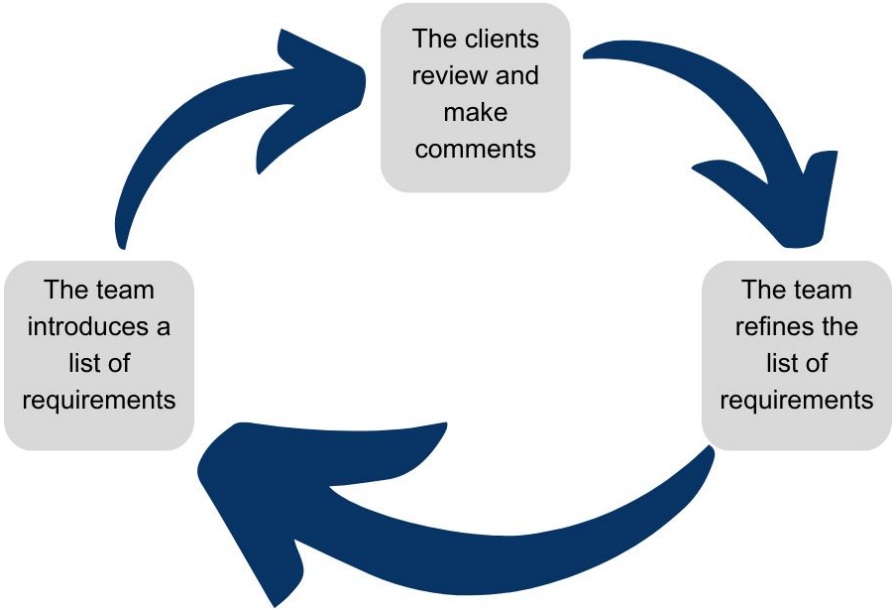
No end-user diagnostic tool

Complex, or insignificant data in existing tool

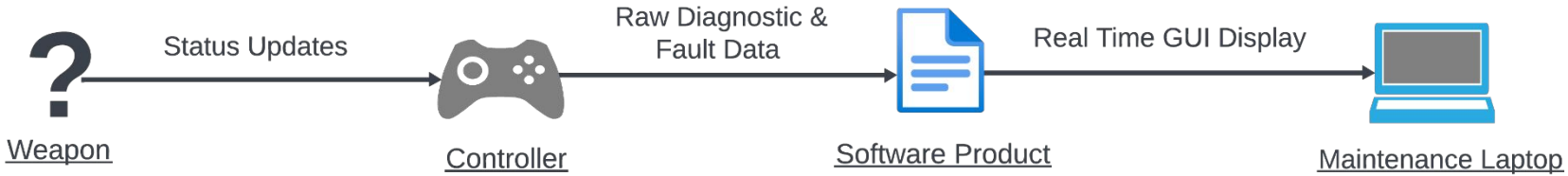
Expensive to dispatch engineers

Key Requirements

- **Key Requirements**
  - Must be a desktop application
  - Read data via RS 422 serial communication
  - Must be able to output to logfile
  - Must be able to filter weapon events and errors



Solution Overview



- Controller will send data to the software application via RS 422 serial communication
- The application will display the data into GUI and log file if selected by user
- The application will be installed by an installer that does not require administrator rights

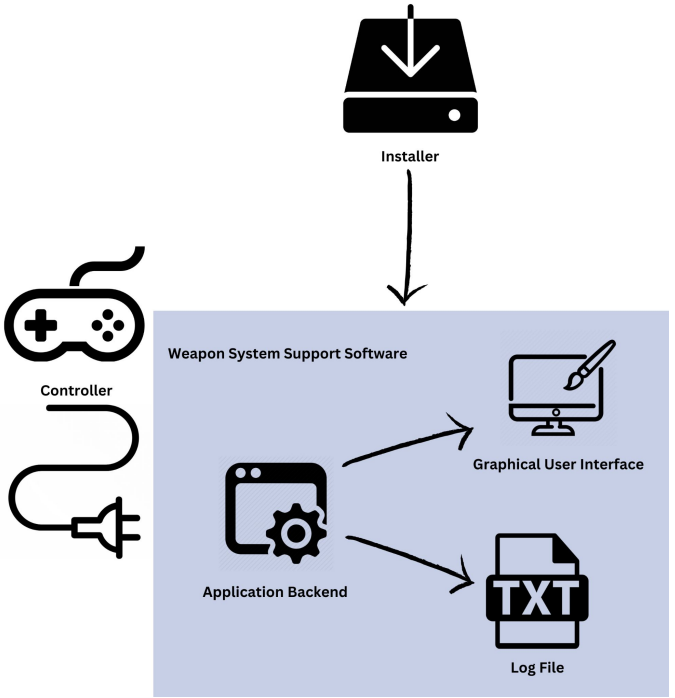
Implementation Overview

QT Framework

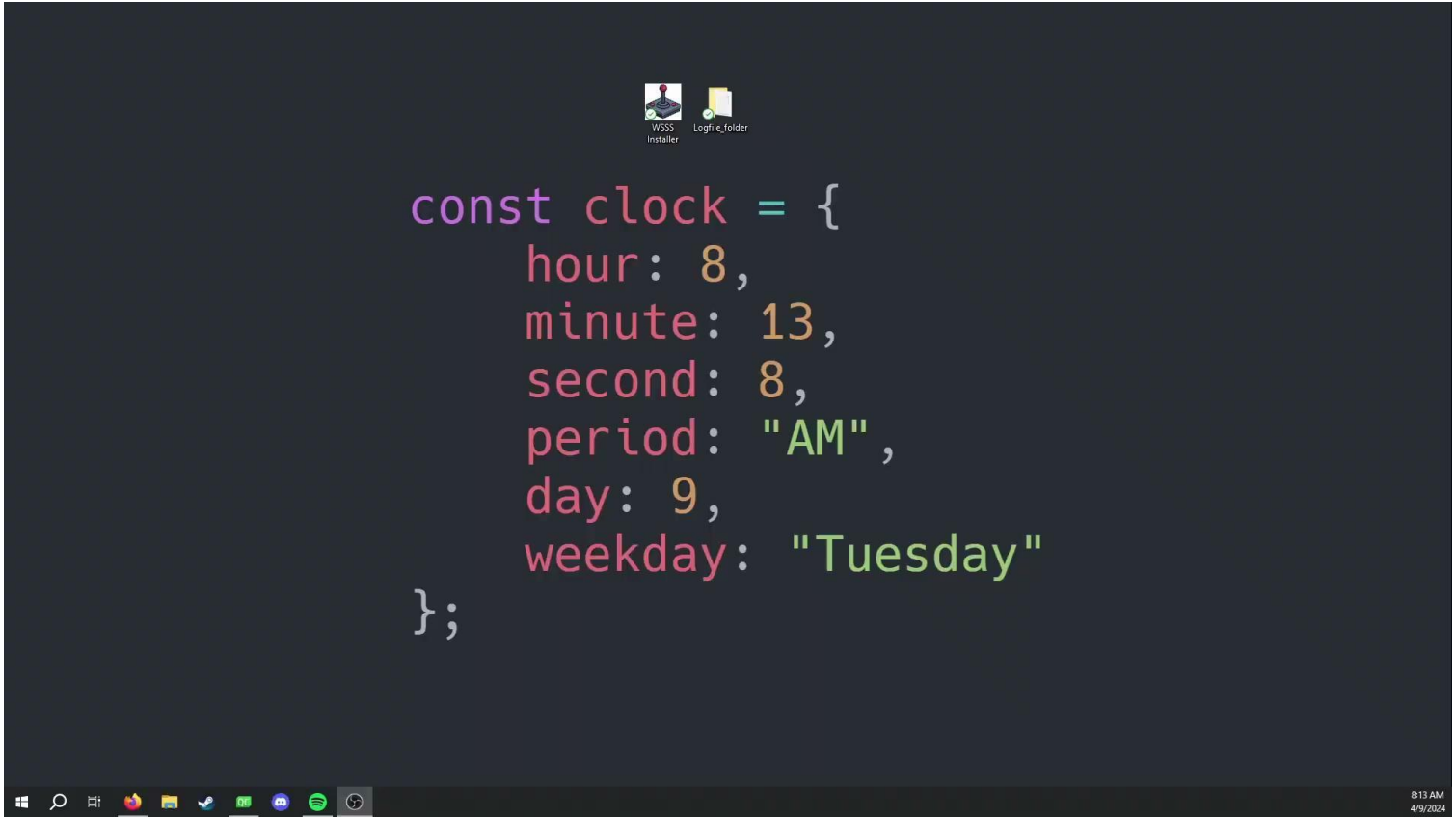
- QT Serial Bus
- QT Serial Port
- QT Graphical User Interface support

C++ Backend

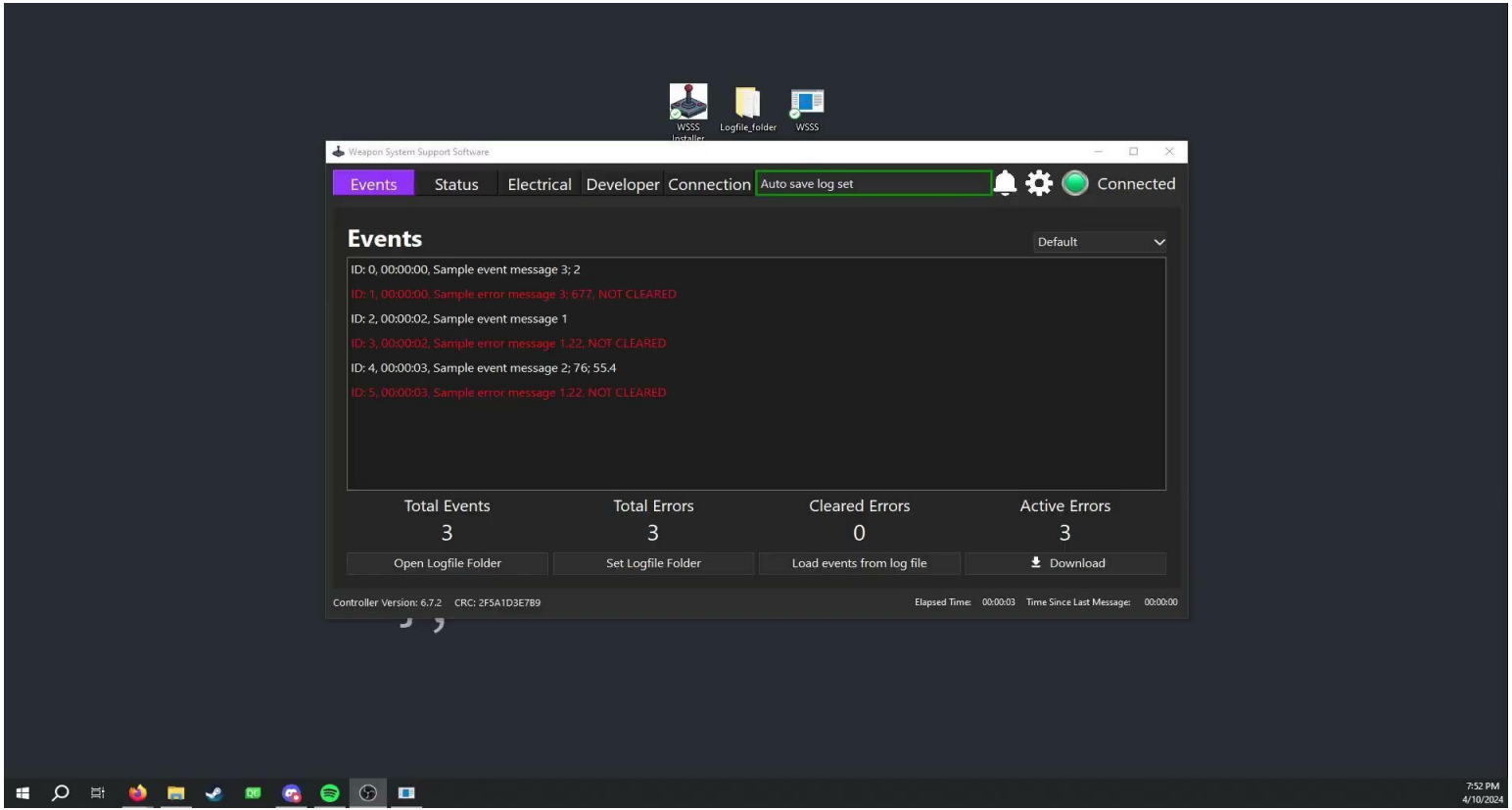
- OOP based classes
- Dynamic memory management



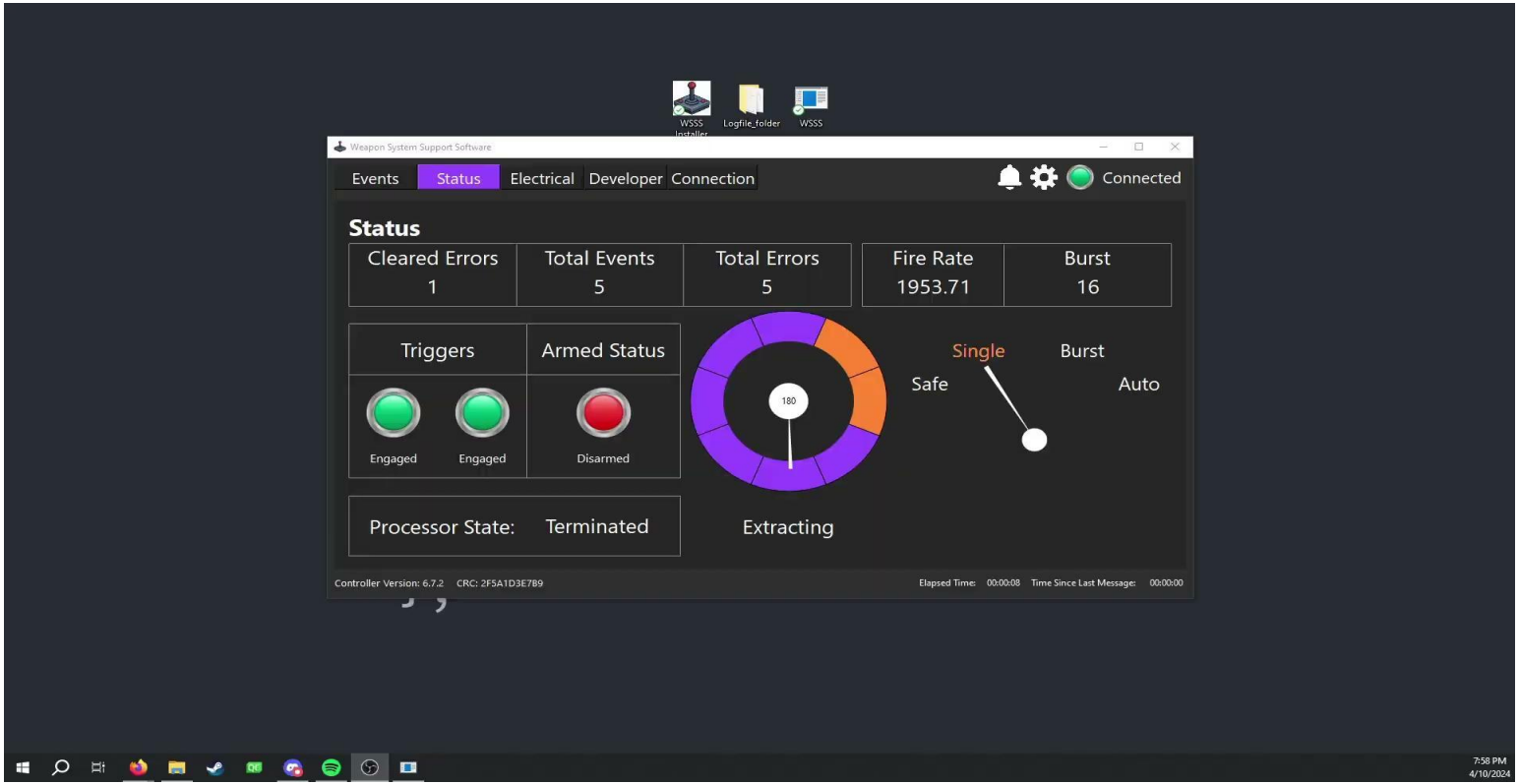
Prototype Review - Installer



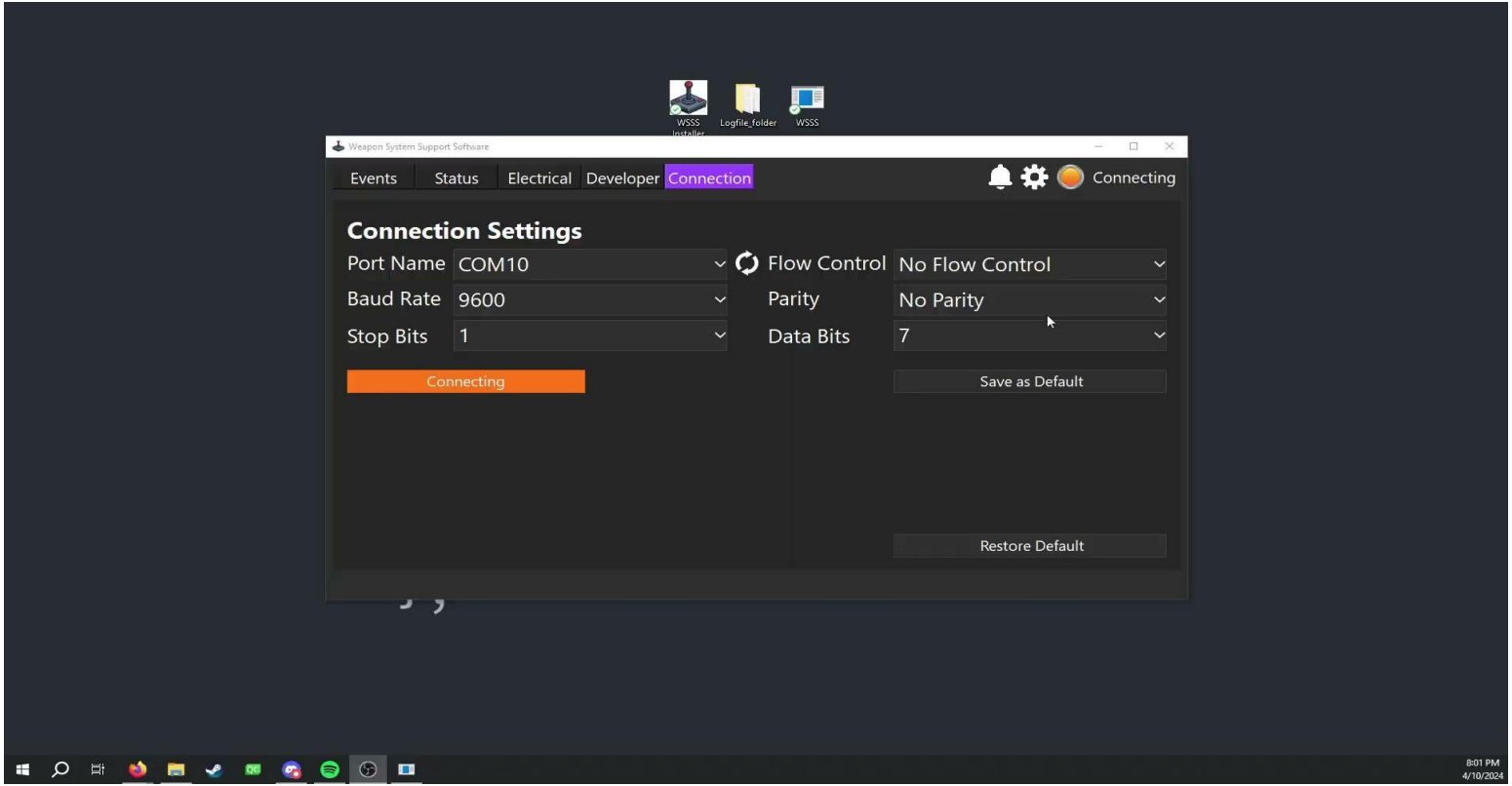
Prototype Review - Events Page



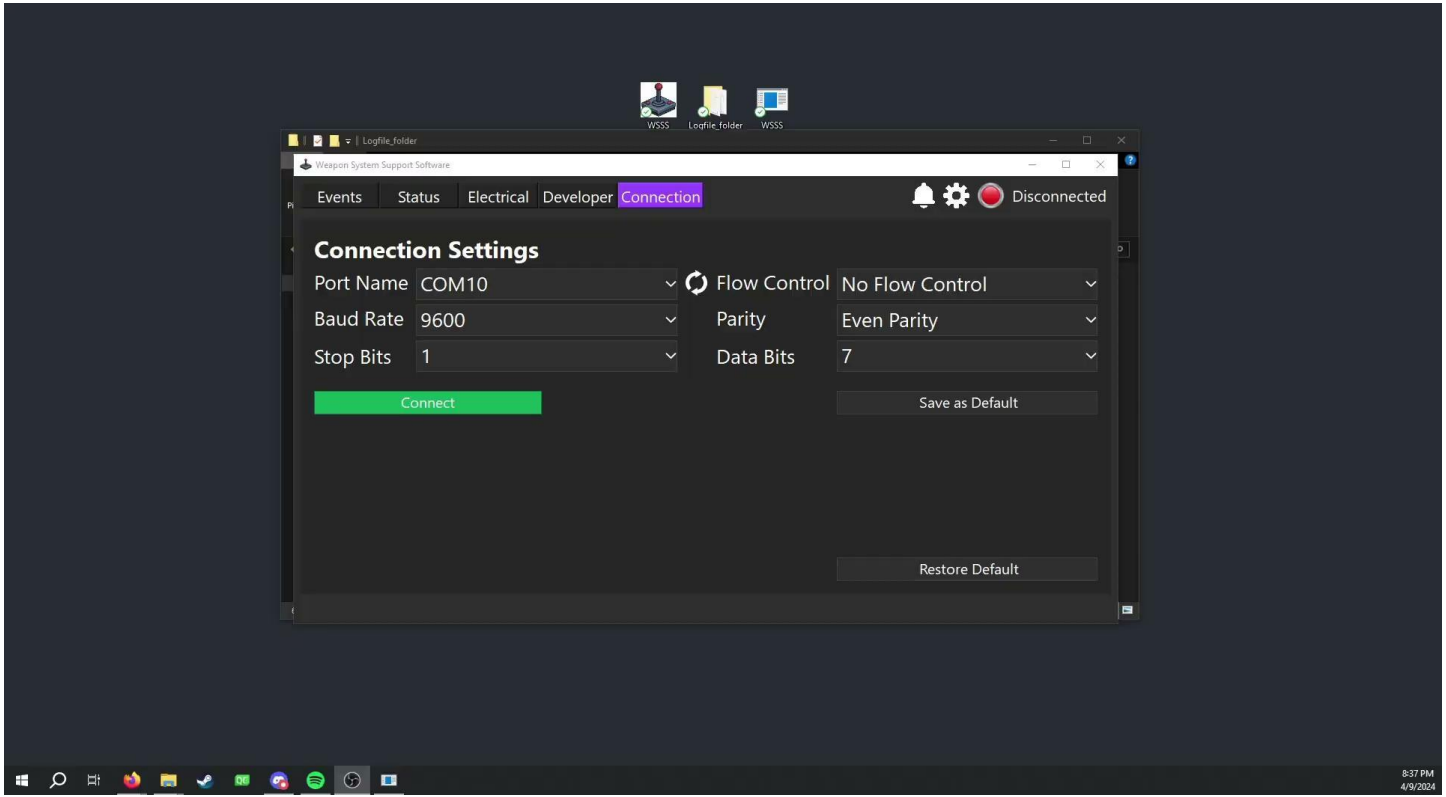
Prototype Review - Status Page



Prototype Review - Electrical Page



Prototype Review - Settings



Challenges and Resolutions

Risks

Misinformation

- Software Miscalculations
- Serial Protocol Encoding/Decoding Errors

Challenges

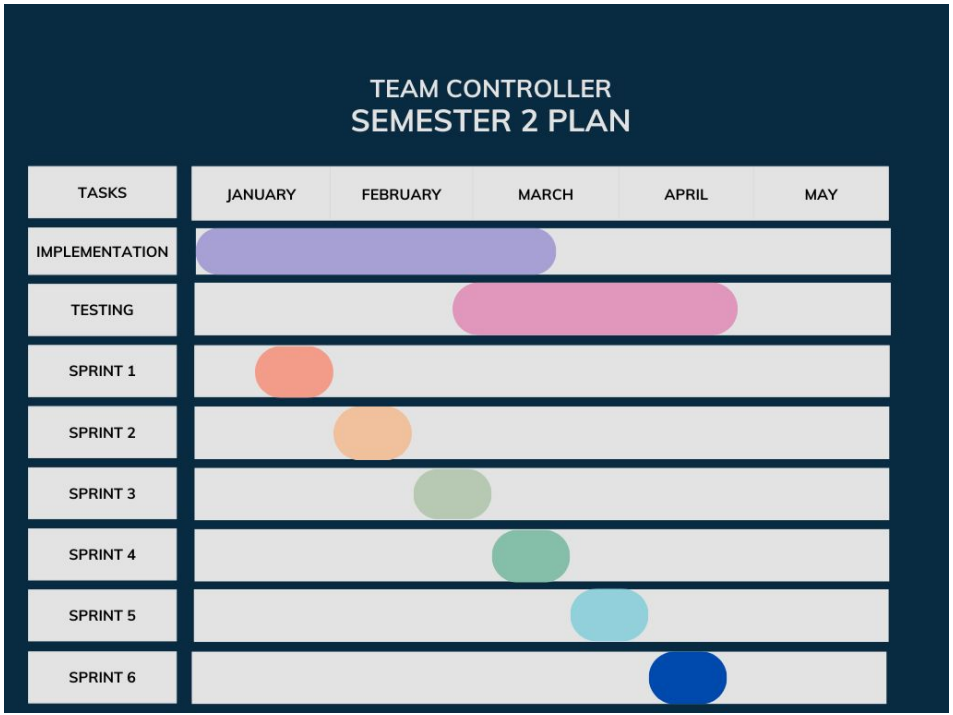
Completed

- Front end sub classes
- Simulated serial communication
- Installer
- Device to Device serial communication

In Progress

- Testing
  - Unit tests complete

Schedule



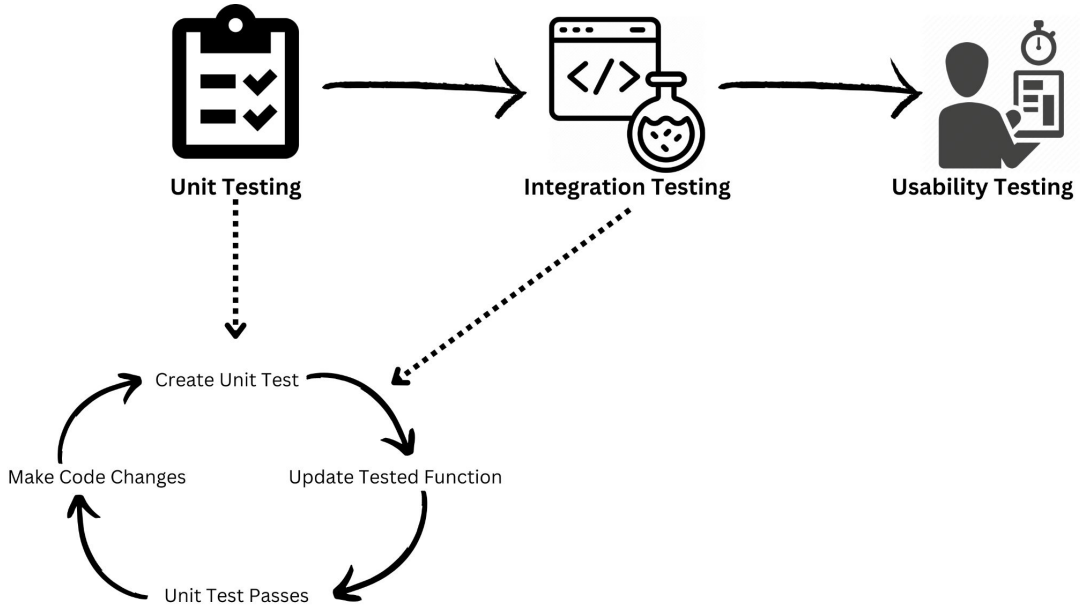
Sprint 5 is done

Current software progress:

- Back-end is finished
- Front-end refinement
- Finishing up testing

Testing Plan

- Linear testing path
  - Unit testing
  - Integration test
  - Usability testing
- Using QTest library
  - QCOMPARE()
  - QVERIFY()



Conclusion

Our clients are Northrop Grumman and the main issues are:

- Long travel times
- Complex data
- (Lack of) End user tool

Our goal is to provide our clients with an easy to use desktop application so a non-engineer can diagnose weapon data

We currently meet weekly to showcase what has been accomplished with our clients during our two week sprints