Executive Summary

The launch control system's purpose is to fill the need for a wireless, robust, and easy-to-use launch control system for the Oregon State University (OSU) High Altitude Rocketry Team (HART). In the past, HART has resorted to borrowing the launch control systems from other AIAA rocketry teams within OSU, and so they desired to have their own dedicated launch system. The system we created to fit their requests is wireless so that it can launch a rocket at very long distances, as High Powered Rocketry (HPR) safety regulations require. In addition, HART asked for the project to be easy-to-use. This is to aid in making launch set-up faster so that the time that HART is out on the range is reduced. An additional goal of the ECE team was to incorporate a live telemetry system to integrate more of the launch functionality into one system, as this removes the need for a laptop to gather live telemetry.

Project Timeline:

Block 1:

- Design: Weeks 2-10
- Build: Winter Break
- Validation: Weeks 11-13
- Verification: Weeks 14-16

Block 2:

- Design: Weeks 6 - Break
- Build: Weeks 11-15
- Validation: Weeks 16-18
- Verification: Weeks 19-Finals

System Integration:

- Build: Weeks 16-19
- Initial Verification: Weeks 20 - Finals
- FInal Verification: Weeks 21-24

Presentation:

- Poster: Weeks 21-22
- Project Showcase: Weeks 23-26
- Expo: Weeks 27-30

Frankencow:

- Build 1: Weeks 1-6
- Launch 1: Weeks 7-8
- Build 2: Weeks 9- Winter Break
- Launch 2: Weeks 11-12

Single Stage:

- Build: Weeks 11-20
- Launch: Spring Break

Full Scale

- Build: Weeks 21-30
- Launch: Summer Break

The project proceeded in four phases: plan, design, build, and integrate. In the first phase of design, research into components, functionality, and impact was conducted. During this phase we began reviewing documentation, defining requirements, and researching components to fit our needs. Over weekly meetings, we discussed and brainstormed about approaches we would be taking for wireless communication, telemetry modules, power modules, and more. We also invested time in defining the breakdown of work for the rest of the project. Assessing the project's impact to society through a variety of lenses was a large part of this phase. This was completed individually at first, and the team later compared the impacts assessed to form a more complete image of potential project impacts.

Phase two was when physical design began. During this time, meetings were often more than weekly as we worked hard to nail down the physical design we had defined during phase one. After getting a rough idea of the design settled we began on physical design, working out kinks and rough spots in the project. The team worked together around twice a week to ensure that the project was ready for deadlines that were given to us by our instructors. This was a very collaborative effort, with many of the meetings being in-person as compared to the near-exclusive use of online services for meeting that phase one was.

In phase three, integration was handled. After our design was nearing full capability, we began integration. This phase was a deeper extension of phase two, with many physical meetings to get our system working in time for verifications. We were getting rid of the final few bugs that were still in our system, including our wireless functionality, and ensuring that all our parts worked together. In addition there was also more documentation compared to phase two, with reflections on work and our design being a large part of the documentation. With the completion of phase three, our project was finally finished and ready to present.

Throughout this project many lessons were learned across the various phases of project development and documentation updates. The first and likely the most useful take away was to utilize your professors, they have a wealth of knowledge and experience and are the perfect people to discuss ideas with or to ensure your project is not going too far out of scope. This is what brought forward the realization to change the flight computer portion of the project to something else that worked better even if it took some time to understand how to utilize it properly. Second is to not be afraid to change up your project on the fly. The initial design is just that, initial and is not set in stone. Experiment and find out what works and doesn't which will require a change to make it work. For example, the original communication modules we purchased were cheap and simple but came with a slew of issues. The team wasted a large amount of time attempting to make them work when simply looking into a more expensive module fixed the problem outright. Adapt and overcome when issues appear rather than simply attempting the same fix repeatedly wasting valuable time. Finally communicate with your team and do so often. Our team did well with this, and we got better over time updating each member on individual progress and asking for help or input when needed or simply wanted. It can also ensure that components will work together with other member's blocks and discover interconnection issues sooner rather than later. Utilize your resources and use them often, your team and your professors are here to ensure you succeed.