Project Executive Summary

Matthew Schatz

The design of the original system is an attempt to gather in depth sensory data, reading position of the system (speed, location, forces applied, position), of an object in transit (such as a parcel). the original design also needed to consider that the system maybe moving at a high rate of speed, over long distances.

Initial design constraints were initially quite daunting. The system needed to be able to operate a variety of sensors, for 12 hours minimum, and retain detailed records of how all external forces effected the system. Our initial concern was with the microcontroller being able the operating current needed to operate the sensors, whilst still meaning a power usage low enough that the system stays powered for the 12 hours. A more powerful controller. Ultimately, we decided against a traditional microcontroller in leu of a more powerful, and power hungry, single board computer- the raspberry pi 4. This system allowed us great flexibility regarding the modularity, and expandability of the system. This decision allowed us to gather a plethora of extra sensor material regarding the system in transit. The integration of the sensor hardware was also another hurdle in the development process. We realized we needed to change to a scripting language, python, to operate our computer in a limited power state, running the sensory data code at power on. This was a key to lowering power usage of the system as whole to increase usability of the system over time. By limiting superfluous power usage, the two apps created for the project were able to operate perfectly for the desired minimum 12 hours.

Project Timeline

Tracking and Analysis of Moving Object

Jan 2021

Devolopment

Initial meeting with project partner to acertion the scope of the project- what is needed

March 2021

Design and impacts considered

Outline fof system is finalized by project partener, tracking system of an object: begind drafting possile designa and compenents- woth a specific regard for impacts on the world outside the system

April 2021

Project Partner Meeting to sign off on initial design.

final components for system have been selected based on needs of the systems,; run for at least 12 hours, and obtain data from sensors regarding position and change of position of the system

May 2021

Ordering of cirtical components for feasiblity of the system:GPS,IMU

Obtain order for all modules that need to be purchased for the system, these will be the modules that will not be hand built: GPS, IMU, Processor, and code implementing for system integration

June 2021

Proof of concept to project partner.

Testing of the concepts and design of system : approved by project partner to finalize materials for official build of system. finalize code needed for system to function as desired

July 2021

Project Parnter approval of inal system designs.

once final design are approved, parts and custom circuit board will be orderd

August 2021

Final Testing of System,

Final assembly of the system has been complete, in this phase tesing of final system design is critcal to ensre proper function and meeting project partner requiremnts

September 2021

Finalized project, system requiremnts probem, and proof of full design functuon is given to project partner .

Schatz: Project Timeline Capstone 2021

Key lessons learned as a group:

Technical:

- Scripting languages are ideal for automation of applications
- Simulation of circuit designs are a must to keep project on track with project timeline
- Having a clear understanding, within the team, of the requirements of the system yielded itself well to keeping the progressive of the project fluid
- The design process must be taken slowly, and methodically

Interpersonal:

- Open and honest communication is always best within teamwork setting, it provides a welcoming atmosphere and fosters an atmosphere of trust
- Open mindset to new ideas, and viewpoints, regarding engineering ideas is critical to the proper function of the group.
- Managing expectations is critical to working within a group. without an early outline of these expectations, there will inherently be interpersonal issues within the team.