Oregon State University

Supply Activity Logger Project Charter
ECE Subteam

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Rev. 1

1 Executive Project Summary 2

1.1 Purpose: 2

1.2 Audience: 2

1.3 Background Information: 2

1.4 Development Process/Management: 2

1.5 Results: 2

2 Team communication protocols and standards 3

3 Scope and Engineering Requirements Summary 5

3.1 General Requirements 5

3.2 Engineering Requirements 5

3.2.1 Humidity Logging 5

3.2.2 Orientation Logging 5

3.2.3 Pressure Logging 5

3.2.4 Shock Response 5

3.2.5 Temperature Logging 5

3.2.6 Power Configuration/Consumption 5

3.2.7 Form Factor 5

3.2.8 Data Handoff 5

4 Project Timeline 7

4.1 Project Gantt Chart 7

5 Risk Assessment 8

5.1 Top Risks Summary 10

5.1.1 Parts Delay 10

5.1.2 Sensor Failure 10

5.1.3 Misaligned Inter-group expectations 10

6 Revision Log 11

1 Executive Project Summary

1.1 Purpose:

To produce the hardware and software components to monitor the conditions a shipment is subjected to, in order to give suppliers insight to prevent future product damage.

1.2 Audience:

The primary stakeholders and audience for this product would be employees of HP. This finished product should provide an easy and efficient way to monitor the shipping conditions of packages shipped to and from HP. This will aid in positive customer relations, quality control, and minimizing product losses/damages.

1.3 Background Information:

HP and other companies have experienced numerous occurrences of unexplained product damage during shipment. Inspection of the damaged merchandise often does not explain what happened. There is an interest to solve this problem in order to find ways to prevent needless damage. In order to solve this conundrum, there needs to be a way to record what conditions a supply is subjected to during transit. This can be accomplished with a device that can record raw orientation, vibration, impact, temperature, humidity, and location data. This raw data will need to be stored, processed, and displayed in a user friendly environment.

1.4 Development Process/Management:

The project will be carried out by the development team in tandem with the Project Partner. The development team will be split into subgroups: one hardware (ECE) team and one for software (CS) team. The subgroups will work closely together for the duration of the project. The design process will take place over the course of Fall term. Once the designs are fleshed out, implementation and further testing will be continued during Winter term. During the beginning of Spring term, the project will undergo final validation required before the product is finalized. Over the entire course of development, communication between the development team and the Project Partner will occur in regular intervals. The project partner will assist the development team in any technical, manufacturing, and/or testing cases in addition to providing overall guidance on the project.

1.5 Results:

The final results of this project will give insight to HP as to why their packages are getting damaged throughout the supply chain. If significant evidence is found from our project that packages are damaged at certain points, then HP can use this information to reduce the number of damaged packages. If HP is able to reduce the number of damaged packages then there will be a positive reaction from consumers.

2 Team communication protocols and standards

Topic	Protocol	Standard
Meeting	Absences	Team meeting attendance is required. If a team member announces that they will be absent from a team meeting, within a reasonable time frame and for a good reason, the absence will be excused.
Meetings	In-person meetings	We shall follow OHA and OSU guidelines when meeting in person.
Communication	Discord Communication	Discord will be used for all team communication unless a team member(s) cannot be reached. In this case, we shall communicate via mobile phone. Our team will respond to each other within a reasonable time frame (a couple hours during the day). The Jacob Clause: During Holidays, this expected time of response is extended to 36 hours
Communication	General Communication Etiquette	Phone communication should be limited to 9am-10pm, outside of an emergency. Every member should be treated with respect regardless of circumstances.
Communication	Interteam Sub-Group Communications	When determining email communications with project partner and/or instructors, it should be agreed upon by at least ⅔ majority of the combined teams. General communication between the sub-groups will be open for discussion between the two.
Documentation	Coding	Coding should have sufficient comments such that an outside observer can tell what the code does. When appropriate, variables and functions should be descriptively named, or when not possible, the variables should be referenced in extended documentation.
Documentation	Weekly Meeting Notes	Meeting notes should be taken by a volunteer or a rotation determined alphabetically by first name. Meeting notes will be posted either as a message in the ‘meeting-notes’ Discord chat or as a document link in that same chat. The document should be uploaded to the google drive. Meeting notes should include a summary of points discussed and a full attendance.

Topic	Protocol	Standard
Documentation	Team Google Drive	All documents should be uploaded to the team google drive within a reasonable timeframe. When possible, documentation (Google Docs, Google Sheets, etc) should be hosted natively on Google Docs to allow collaboration.
Task management	Asana	We will manage our task delegation by utilizing Asana. We will delegate tasks as well as due dates through our team meetings and update our task management board.
Version Control	Github	We will use Github for our software development and version control. Commit messages should be meaningful and concise. Team members will then review each commit to review our code.

3 Scope and Engineering Requirements Summary

3.1 General Requirements

HP and other companies rely on shipping companies to transport their goods around the world. While it is common for shipping companies to provide services such as package tracking, there is a lack of services that can report on the integrity of the package itself which can lead to unexplained damages of said goods on arrival. The motivation for this project is to create a device that can periodically capture and store various metrics such as temperature, humidity, pressure, shock, and orientation events during a package's trip across seas. This will provide insight into the shipping environment for these companies and help explain the cause of damaged goods.

3.2 Engineering Requirements

3.2.1 Configurability

The system will have configurable time intervals between data logging events.

3.2.2 Data Handoff

The system will transfer its logged information to another device.

3.2.3 Data Logging

The system will measure and log orientation within 1% accuracy, atmospheric pressure, and temperature within 3% accuracy, and humidity within 10% accuracy.

3.2.4 Form Factor

The system will be no larger than: 9" x 5" x 2"

3.2.5 GPS Capability

The system will make multiple attempts to obtain its geographical location data for logging events, but stop retrying if a signal cannot be acquired.

3.2.6 Pilot Data Sets

Complete full system verification by week 20 and test system functionality by mailing the system to several locations within the United States.

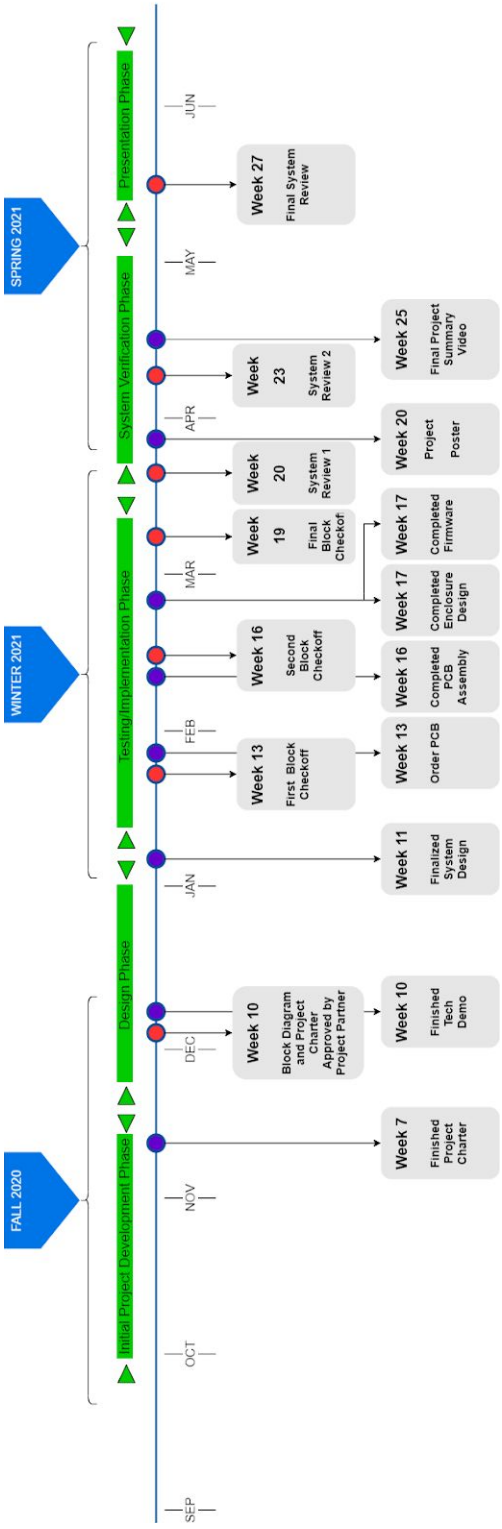
3.2.7 Power Consumption

The system will be functional for at least 3 weeks of operation, while completing a logging event once per hour.

3.2.8 Shock Response

The system will detect shock events and log measurements.

4 Project Timeline



4.1 Project Gantt Chart

5 Risk Assessment

Risk Description	**- Risk ID - Risk % - Severity**	**Risk Category**	**Performance Indicator**	**Responsible Party**	**Action Plan**
Board Failure	- HW1 - 10% - High	External/ Internal, Technical , Parts	The Board ceases to function, has reproducible failures, has visible damage	Trevor: handle consistently and carefully, note and communicate changes in behavior, note state upon receipt	Avoid: board will need to be reexamined and possibly redesigned if cause was not observable (physical damage, misuse)
Sensor Failure	- HW2 - 40% - Low	External/ Internal, Technical , Parts	A sensor ceases to function, has reproducible failures or inconsistencies, or has significant visible damage	Ash: handle consistently and carefully, note and communicate changes in behavior, note state upon receipt.	Retain: Keep an eye on sensor outputs and handle with care, but existing documentation and experience suggests that this is bound to happen, and impact is low
Sensor Spec Failure	- HW3 - 30% - Low	Internal, Technical , Docume-ntation	A sensor does perform to it's expected spec/ the spec was misunderstood by team members	Jacob: read and research part specs thoroughly before purchasing, ensure that the spec is well understood	Reduce: Ensuring that parts are vetted before purchase will reduce the likelihood of this occurring, and the impact severity if it does occur
Parts Delay	- TL1 - 50% - Medium	External, Timeline	A part arrives later than expected oris initially out of stock	Trevor: order parts well in advance	Retain: move timeline if required
Budgeting	- CT1 - 35% - Low	Internal, Cost	Parts required to meet spec are too expensive, or unexpected failures cause unforeseen costs	Trevor: budget out costs in advance to catch budgetary roadblocks early	Transfer: notify project partner and course instructor, request situational budget increase depending on source of cost

Risk Description	**- Risk ID - Risk % - Severity**	**Risk Category**	**Performance Indicator**	**Responsible Party**	**Action Plan**
Misaligned Inter-group expectations	- CM1 - 25% - Medium	Commun-ication	Ongoing communication difficulty between teams, misunderstandings between halves of the project	Ash: ensure that teams are meeting periodically and verifying interfaces	Reduce: Periodic meetings and verification that we understand each others completion state and finished product goals
Data readability Failure	- SW1 - 20% - Medium	Internal, Software	Logged data is unreadable by or inconvenient for CS team to process	Trevor: ensure communication and cooperation with CS team on data storage, data logging	Transfer: Work with CS team to reach a middle ground/ help understand data Reduce: collab with CS team
Software Compatibility Failure	- SW2 - 15% - Medium	Internal, Software	CS team's programming and data vis is incompatible with hardware setup/data logging and transfer	Jacob: Ensure communication between teams on current platforms, verify and track compatibility in specs	Reduce: consistent communication with CS team, regular meetings to discuss format of data, hardware medium specifics, and data visualization
Code bugs and updates	- SW3 - 90% - Low	Internal, Software, Program-ming	Code does not work as it did before, fails	Ash: verify and track firmware updates, communicate with CS team	Retain: this is expected and is part of the development process
Reproducing Results Failure	- PD1 - 15% - High	Interal, Docume-ntation	Documentation for a project component is missing/out of date and needed to reproduce that project component	Trevor: Document each and every step of project components	Reduce: Examine related documentation to recreate the missing or out of date documentation

5.1 Top Risks Summary

5.1.1 Parts Delay

Parts essential to completing project benchmarks or system assembly could encounter shipping difficulties, resulting in possibly delays to the project timeline. Trevor will order parts well in advance to reduce the chance of this impacting the project timeline.

5.1.2 Sensor Failure

Sensors essential to testing or full system functionality could break, give in to wear and tear, or have faulty construction, requiring them to be replaced. This will increase cost and push back the project timeline. Ash will ensure that sensors are handled carefully and operated well within spec to reduce the chance of this happening. Additionally, Trevor will order multiple copies where costs permits, so that the time to order a new sensor would be bypassed in the event of such a failure.

5.1.3 Misaligned Inter-group expectations

Two teams working on separate parts of the final system, the ECE team and the CS team, could have miscommunications, or have a misunderstanding of the other teams intentions with regard to interfaces or timeline goals. This could result in incompatible blocks for the final system, incompatible interfaces, or timeline mismatches. To combat this, Ash will ensure that both teams are periodically meeting to verify expectations, refresh interfaces, and clarify upcoming timeline events.

6 Revision Log

Revision Number	Date	Changes
Rev. 1	11/11/2020	Initial Document Submission
Rev. 2	3/7/2021	Updated Engineering Requirements after they have settled into what will be very close to their final form. Updated Language in the introductory paragraphs to better represent the clarified project