

Executive Summary

The purpose of this project is to implement ways to reuse recycled materials for innovative technology. This project focuses on the repurposing of recycled wheelchairs. The ultimate goal of this project is to finish designing and implementing features on an inexpensive autonomous delivery robot by repurposing electric wheelchairs that would otherwise be thrown away. The robot will travel from a predetermined point to another point while carrying a package and be able to traverse around obstacles in its way. There will be a web app that will allow users to enter in the sender and receiver information and choose a delivery location. The web app also allows the user to follow the robot on a map and see through the robot's onboard camera. This project will serve the community of OSU by providing fast and easy to use package delivery around campus. The project also serves to help reduce carbon emissions as it focuses on the reuse of materials.

A brief overview of our project is to have our repurposed wheelchair be a full autonomous vehicle that is able to receive commands through a web app on a user's internet enabled device. It then uses these commands to transport packages of up to 50 kg of weight from a location on campus to a different, specified location. The main focuses and concerns include curb detection, ledge detection, avoiding collision with moving and non moving objects, and web app development.

The team working on this project consists of three undergraduate Computer Science students, three undergrad Electrical Computer Engineering students, and one Electrical Computer Engineer graduate student. One of the primary contributors will be Hanna Anderson. Hanna is the project stakeholder and is also using this project to obtain their Master's degree.

Our Experience

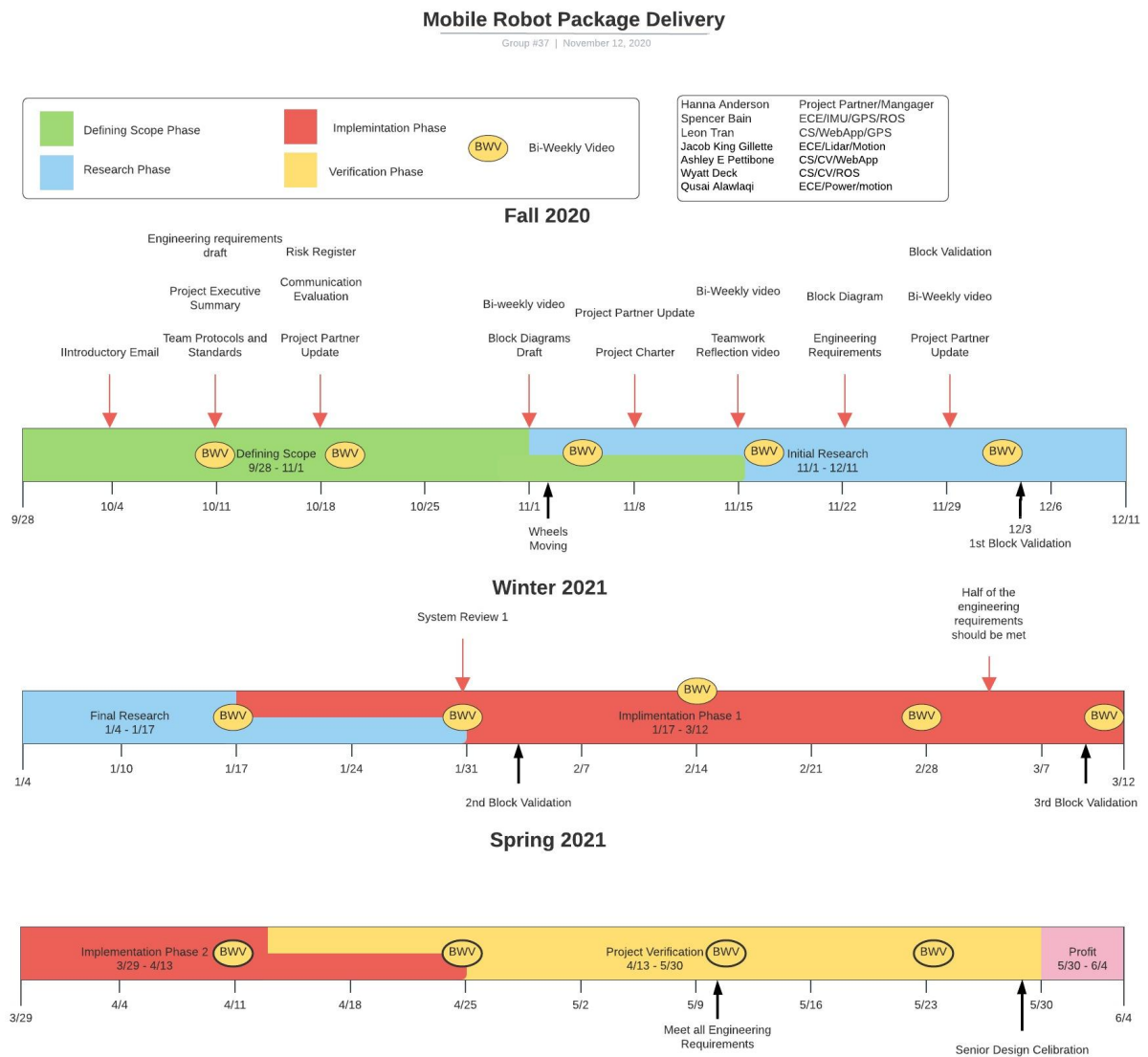
As a team we first divided up pieces of the project to each person, so they had specific tasks to focus on. One person was responsible for the website and its main functionalities, another was responsible for dealing with the image processing from the camera, and the third person mainly focused on making a valid path for the robot to take. We had weekly meetings to update the team of each person's progress and potential issues or roadblocks.

Fall term was used to research and plan the development of the codebase for the robot. Each member researched their specialized areas and presented multiple methods of completion to the project partner. The team also created block diagrams for future integration.

Winter term began with the team completing their individual blocks in preparation for integration. The latter part of winter term was spent integrating the different pieces of our project together and testing our system.

Spring term started out with our team integrating the last pieces of our project and trying to fix any last minute issues we were having. We quickly had to change roles into testing all the pieces of our system to ensure they were working properly. As we came across issues we tried to find quick fixes, some were successful and some were not.

Project Timeline



What We Learned

The most valuable lessons we have learned are to integrate sooner and be in good communication with other group members to be knowledgeable of the specifics of what they have done, be clear about what the client is asking for and be prepared when this changes, and to get help quickly after a road block is encountered. Integrating later meant that despite our blocks being well designed, they were largely stand alone and weren't made with connecting them in mind. When we found that the edge detection block was difficult and unnecessary to the success of the project, we left it alone to focus in other areas. However, the client still wanted this feature to be complete, and it never was. Lastly, we encountered many obstacles that caused significant delays when asking others could have solved the problem much quicker, wasting valuable time.