HyperRail Team 9 Executive Project Summary

Our team is working on the OPEnS Lab HyperRail, a motion control system developed for agricultural sensing of large areas. We are developing a 3 axis motion control system for this project, similar to a typical 3D printer movement system, but on a larger scale. The system was developed to Integrate with existing software and systems used by OPEnS Lab. This included using consumer components that are readily accessible to order online rather than specialized and custom components.

Our first step as a team was to identify the current issues with the system as designed, and which parts we found most interesting and were comfortable that they would be within our technical abilities. We decided that using an approach where we would help each other on the blocks in case we struggled or needed help would be the most effective way to use our time and solve issues if they arose. There were three phases to our project that coincided with our first and second block checkoffs and the system verification. Within each phase, each group member completed a singular block that was assigned to them until completion. A multitude of revisions and changes were made to our system as we had to find the right PCB to perform the functions we wanted as well as had to redesign our 3D printed components to better accommodate our system. Each week we would get together for a meeting, to discuss what parts of the project had been completed that week, and what would be done during the next week. We would also take this time to ask for help from each other, problem solve issues that may have come up during our time working, and recording the progress made.

Throughout the project there were several difficulties and lessons learned. One large lesson that the team learned was the need to clearly share information about individual portions of the project. This allows others to see and help point out problems that will crop up during the system integration process. A second lesson learned was how to handle working when the finished work is reliant on a 3rd party, as we were dependent upon the work of the OPEnS lab and their timeline. We learned that we needed to develop alternative methods to test our systems, and that it requires regular communication with the 3rd party to understand the system status, and what we can do about it.

Members:	First Block (Hrs)	Second Block (Hrs)	System Verification (Hrs)	Overall (Hrs)
Zach M.	10	20	20	50
Rene N.	14	18	15	47
Ryan C.	12	20	25	57
Ryan D.	8	15	21	44

HyperRail	h-		2	Winter 2021									
			1/11/2021					Ŀ				M	
					1/11/2021	1/18/2021	1/25/2021	2/1/2021	2/8/2021	2/15/2021	2/22/2021	3/1/2021	3/8/2021
PROJECTS	ASSIGNED TO	PROGRESS	START D	DAYS END	11 12 13 14 15 16 17	18 19 20 21 22 23 2	4 25 26 27 28 29 30 3	1 2 3 4 5 6	7 8 9 10 11 12 1	3 14 15 16 17 18 19 20	21 22 23 24 25 26 27	28 1 2 3 4 5 6	7 8 9 10 11 12 13 1
DESIGN					M T W T F S S	M T W T F S S	MTWTFSS	MTWTFS	S M T W T F S	S M T W T F S	SMTWTFS	SMTWT <mark>F</mark> S	S M T W T F S S
Block Diagram	ALL	100%	1/14/2021	2 1/15/2021									
Spec microcontroller	ALL	100%	1/12/2021	10 1/21/2021									
Spec motor drivers	ALL	100%	1/12/2021	10 1/21/2021									
Research compatible software	ALL	100%	1/14/21	10 1/21/2021									
Spec HyperRail present @ OPEnS	ALL	100%	1/19/2021	10 1/28/2021									
Initial PCB Design & Planning	ALL	100%	1/14/2021	16 1/29/2021									
BUILD / TEST													
Create Preliminary Board Enclosure	RC	100%	1/21/2021	4 1/24/2021									
Print Enclosure	RC	100%	1/24/2021	9 2/1/2021									
Test power regulation	Rene	100%	1/21/2021	9 1/29/2021									
Create end effector servo software	Zach	100%	1/21/2021	9 1/29/2021									
Upload and test Gcode interpreter	Ryan	100%	1/21/2021	9 1/29/2021									
Design PCB	Rene	100%	2/1/2021	19 2/19/2021									
Design Gripper Arm	Zach	100%	2/12/2021	9 2/19/2021									
Print and Assemble Gripper	Zach	100%	2/19/2021	3/7/2021									
	Rene	60%	2/20/2021	16 3/7/2021									
Order board	RC	100%	2/20/2021	4 2/23/2021									
Order Components	RC	100%	2/20/2021	9 2/28/2021									
Solder PCB And Components	RC	100%	2/28/2021	2 3/1/2021									
Integration	ALL	10%	3/1/2021	12 3/12/2021									
Transfer code over to GRBL	Ryan	100%	2/15/2021	15 3/1/2021									
System Verification	ALL	0%	3/1/2021	12 3/12/2021									
PRESENTATION													
Create Final Report	ALL	100%	3/2/2021	4 3/5/2021									
Create Video Report	ALL	100%	3/2/2021	4 3/5/2021									