Week 4

Situation: Backwards Looking:

This past week in lab, the team performed Lab 5. The purpose of this lab was to evaluate the team's various AEV models using screening and scoring tests. A screening matrix is an effective way to look at a bunch of different concepts, and quickly see which ideas are the best, which need work,and which the group shouldn't continue with. Once the team screened their four ideas, the best model was tested, and scored against the reference design using a scoring matrix. The scoring matrix allows for weighing the different screening categories, and giving each design a score based off of the weighted categories and a score for that category. This is an easy way for the team to see which design will be able to complete the desired tasks the best, based off what is important and what is less so. The ability to make screening and scoring matrixes is very important because it allows for effective analysis of the AEV, and is something that will be used throughout the entire project, as modifications are made to the AEV.

Results / Analysis

The team selected seven different categories to screen and score the AEV on: balance, center of gravity, power efficiency, cost, weight, aerodynamics, and consistency. For full descriptions of the seven categories, look in Appendix Part A. After screening the four designs, it was found that design N and A should be continued. Since designs H and R were identical to the reference design, they both received net scores of 0, and it was determined they should be reworked. Design N improved in both cost and weight, due to the removal of the wings, and replacement of the body. However, design A improved upon the balance and aerodynamics of the vehicle via the reorientation of the wings. This led to a net score higher than design N, and so design A was tested and scored compared to the reference. Both design were tested using the code found in appendix Part C. After testing and scoring, design A received a score of 3.45 while the reference received a score of 3.05. It was found that design A was much more balanced, and handled the curve on the track much smoother than the reference. It was decided to develop design A for further use.

The scenario code provided in last week's lab was not very helpful. The AEV didn't even move a full foot on the track. Along with the provided code, Team H tested the code we had from previous labs using different power levels for the motors and different stoppage times to test efficiency against the original settings. The balance was compromised during this run, but the AEV stayed on the track and completed the run.

Bret and Nate's AEV design did well, but nothing spectacular. It was the basically similar to the model provided in the lab manual. It was consistent in all testing and balance and efficiency was a positive. Cons include needing an extension for the magnet on the front of the AEV. Josh's design is likely to be used. The motors are in the center of the AEV providing equal push and pull on the way to the R2-D2 unit. The motors are also located further away from the body providing better balance to the AEV. Jesse's model has yet to be tested, but it is expected to be

almost as good as Josh's design. Balance and efficiency are expected to be a pro, however with rectangular wings, aerodynamics will be compromised.

Takeaways:

1. Josh's design seemed to work best and we will move forward using it
2. The scoring matrix was very helpful in selecting a AEV model
3. Motor power will be moved around and tested to measure efficiency

Week 7

Situation

Looking ahead to Lab 6, this week is considered the halfway checkpoint for the AVE project. Team H has established an online profile, up-to-date with relevant documentation such as Progress Reports 2-6, and links for the PDR, Bonus Video, and the Final Project Report. Upon having this website checked by the instructional team, the team will also have their CDR Oral Presentation worksheet checked. The worksheet consists of a storyboard draft for the Oral Presentation with detailed portions of what each team member plans on discussing during the allotted time to present. Team H will spend the remainder of the lab period re-grouping their thoughts, and directing their energy towards the outline of the first performance test in weeks to come. The team will also continue to score test various success criteria amongst the individual designs.If all goes to plan, Team H should be able to navigate to a successful end to the AEV project.

Weekly Goals

AVE- continue score testing various success criteria
AVE- consider possible parts to 3D print for the AEV and begins construction of individual parts on Solidworks programming
-AEV- begin writing the code for the 1st performance test and test for efficiency and operational consistency
-General-continue to strive to be the most efficient team and earn a trip to the project showcase

Weekly Schedule

Task	Members	Start	Due Date	Approx. Time
Lab 6	All	2/22	2/22	45 min
Week 6 Progress Report	All	2/16	2/22	4 hours
Team meeting	All	2/16	2/16	1 hour 30 min
Review Scoring Data	All	2/18	2/18	45 min

Appendix

Part A

Matrices

Scoring Matrix					
		Reference		Josh	
Success Criteria	Weight	Rating	Weighted Score	Rating	Weighted Score
Balance	20%	2	0.40	3	0.60
Center of Gravity	5%	3	0.15	4	0.20
Power Efficiency	15%	3	0.45	3	0.45
Cost	10%	3	0.30	3	0.30
Weight	10%	3	0.30	3	0.30
Aerodynamics	15%	3	0.45	4	0.60
Consistency	25%	4	1.00	4	1.00
Total Score			3.05		3.45
Continue?			No		Develop

Figure 1

Screening Scoresheet					
Success Criteria	Reference	Jesse	Josh	Nate	Bret
Balance	0	0	+	0	0
Center of Gravity	0	0	+	0	0
Power Efficiency	0	0	0	0	0
Cost	0	+	0	0	0
Weight	0	+	0	0	0
Aerodynamics	0	0	+	0	0
Consistency	0	0	0	0	0
Sum +	0	2	3	0	0
Sum -	0	0	0	0	0
Sum 0	7	5	4	7	7
Net Score	0	2	3	0	0
Continue	Revise	Yes	Yes	Revise	Revise

Figure 2

Part B

Arduino Code

Inside Track

```
motorspeed(4,25);                    //Set all motors to 25% power
goFor(2);                            //Runs last command (all motors 25% power) for 2
sec

motorspeed(4,20);                    //Set all motors to 20% power
```

```
goToAbsolutePosition(332);          // Continue previous command (all motors at 20%)
until the vehicle reaches 332 marks (13.5 ft) relative to the absolute starting position
reverse(4);                         //Reverse polarity of all motors
motorspeed(4,30);                   //Run all motors at 30%
goFor(1);                           //Run last command (all motors 30% power) for 1
sec
brake(4);                           //Stop all motors
```

Part C

Team Meeting Notes

Date: 2/16/2017

Time: 5:30pm-7:00pm

Members Present: Josh Anson, Nate Heister, Jesse Noble, & Bret Ricklic

Objective:

The main focus of today's meeting was to divide up the work for progress report week 6. Afterwards we discussed the PDR worksheet and the scoring matrices from the previous day in lab.

To Do/Action Items:

- "Backwards Looking Summary" (Situation, Results, Analysis)- Josh
- "Forwards Looking Summary" (Situation, Weekly Goals)- Bret
- "Appendices" (Team Meeting Notes, Arduino Code, Matrices, Weekly Schedule)-Jesse
- "Formatting and Submission, Report Questions, and Take-Aways" -Nate

Decisions:

- Team H decided to use Josh's design since the matrices' results supported his design more than the other design.
- Due to scheduling conflicts at Thompson Library, Team H decided to meet at Smith Steeb in the case that Thompson Library is unavailable.
- Team H decided to start recording more work on the AEV for the extra credit video.

Reflections:

- Team H feels that the lab went very well last week, and they feel that with some more time the design and code will be ready on time.