Week 6

Situation

This lab was focused on the AEV design and planning. By using concept screening and scoring matrixes, the team was able to announce and prioritize criteria that will be used in building the AEV. The concept screening matrix takes criteria and the team assigns either a positive value or a negative value to the proposed aspect compared to the reference AEV. Then, an integer total is taken for each design. Any design with a total positive review is favorable, a negative value is unfavorable, and a total of zero should be revised. With the concept scoring matrix; each aspect is weighted and assigned a numerical rating. The total is taken once again and any design total over the reference is favorable.

Results & Analysis

The Reference AEV originally did not balance very well, however, after a few tweaks it had a nearly perfect center of mass. This lead it to run on the track smoothly and lead the designers to try to match its balance. The AEV does not start immediately after the code is activated, but other than that the code causes the AEV to run on the track flawlessly, stopping and returning when it is supposed to.

As seen in figure 1 and in figure 2, the Liz-dog model has a shell around it making it rather heavy compared to the Reference AEV. That is only one of the cons for the Liz-dog, it also does not have adequate durability because there are several parts. These parts also lead it to not be very cost effective, and not much better than the original design. The weight of it leads the group to believe that it could carry the trailer with ease, however, it is still not significant enough to be better than the other models. Finally, the blimp shape makes it very aesthetically pleasing, but that not very relevant when choosing a design to move an R2D2.

The "Toughy" design is based on reducing weight as much as possible, thus increasing energy efficiency. It does this by using the minimal parts required to make it move. Built purely with the arm, a shell, and the hardware, this AEV design is light compared to the reference design. By using less parts than the reference, the cost also drops significantly. Due to the Toughy AEV design being based off a sunfish, the aesthetic is radical and cool. However, due to the lack of constructional parts; the durability of the AEV is not favorable. It is also estimated that the capability to stay on the monorail and the ability to drag the trailer is roughly the same as the reference. These components can be seen in figure 1. For a detailed view, figure 2 shows weighted values for each aspect of the AEV design.

The "Barack-o-Flock-o-Flame" design is also based on reducing weight but relies heavily on custom parts. The machine is centered on one main piece, which would reduce cost and weight, but the concept was extremely ugly and having one piece that was so large and thin drastically reduced the durability of the vehicle. As seen in tables 1 and 2, the weight and cost are improved upon from the reference, but the durability and aesthetic are much worse. The model's abilities in terms of completing the mission seemed to be similar to the reference.

There were many similarities and differences between the sample AEV and the loser cruiser design. The loser cruiser was fairly similar to the sample AEV in terms of design, but some changes were made in order to try and maximize efficiency. The main pro that comes with the loser cruisers design is that it is a flat T shape. As seen in figure 1, this allowed the AEV to be more durable than the sample due to the fact that the weight was more evenly distributed. The main downfall to the loser cruiser design is that it was very like the sample AEV so it did not outperform or underperform the sample in any of the other

weighted categories that were used for evaluation. The loser cruiser also had a very similar cost and weight to the sample AEV due to it using similar parts. The main purpose of this design was to have the AEV be durable and have the weight evenly distributed throughout when all of its components were attached.

Takeaways

1.) Organization is especially crucial in a long-term project.
2.) A concept scoring matrix gives a more in-depth view of each AEV design and is preferable to a scoring matrix.
3.) Filing a concept screening and scoring matrix sooner may make the design process more efficient.
4.) The AEV design will focus mostly on being as light as possible, with durability and cost being the second most important.

Week 7

Situation

This lab serves as a halfway checkpoint in the design process. A Lab Proficiency Quiz (LPQ) will begin the lab in order to test each teammate's individual knowledge of the AEV project. The team's Project Portfolio should be up to date for this lab, which will be check by the instructional team. The remainder of time should be spent organizing for the rest of the design project.

Weekly Goals

1.) Be prepared for the LPQ.
2.) Have the PDR presentation worksheet filled out.
3.) Know what must be accomplished to continue with the AEV design process.
4.) Project Portfolio up to date.

Weekly Schedule

Task	**Teammates**	**Start Date**	**Due Date**	**Time Needed**
Week 6Progress Report	All	2/20/2017	2/22/2017	2 Hours
PDR Presentation Worksheet	All	2/21/2017	2/22/2017	45 minutes

Appendix A

Date: 2/21/17

Time: 1:45-2:50

Members Present: Lizzie Rumford, Josh Penko, Collin Barack, Madison Hudak

Topics Discussed: Lab 6 Progress Report

Objective:

The focus of today was to complete the Lab 6 Progress Report due on the 2/22/2017.

To Do:

1.) Lab 6 Progress Report.

Decisions:

1.) The team decided to focus on the "Toughy" model and make slight alterations, including laser cutting custom parts.

2.) Weight, cost, and durability are the most important factors when comparing different models.

3.) The final AEV will be named the sunfish.

Reflections:

1.) Doing part of the progress report before meeting is advisable.

Appendix B

```
motorSpeed(4,25);                       //motor runs at 25% power for 2 seconds
goFor(2);

motorSpeed(4,20);                       // motor runs at 20% speed until position = 394 units
goToAbsolutePosition(394);

reverse(4);                             // reverse motors and run at 30% power for 1.5 seconds
motorSpeed(4,30);
goFor(1.5);

brake(4);                               // brakes all motors
```

Appendix C

Figure 1: Concept Screening Matrix

	Reference A	Liz-dog	Toughy	Barack-o-flock-flame	LoserCruiser
Stays on the track	0	0	0	0	0
Weight	o	-	+	+	0
Ability to carry trailer	o	+	0	0	0
Cost	o	0	+	+	0
Aesthetic	0	+	+	-	0
Durability	0	0	-	-	++
Total +	0	2	3	2	2
total 0	6	3	2	2	5
total -	0	1	1	2	0
Net	0	1+	2+	0	2+
Continue?	no	revise	revise	no	no

Figure 2: Concept Scoring Matrix

	Weight %	Reference A	Score	Liz-dog	Score	Toughy	Score	Barack-o-flock-flame	Score	LoserCruiser	Score
Stays on the track	10	3	30	3	30	3	30	3	30	3	30
Weight	30	2	60	2	60	5	150	4	120	2	60
Ability to carry trailer	15	3	45	4	60	2	30	3	45	3	45
Cost	20	2	40	2	40	4	80	4	80	2	40
Aesthetic	5	1	5	4	20	5	25	1	5	2	10
Durability	20	3	60	2	40	2	40	2	40	4	80
Total +	100		240		250		355		320		265