Week 9

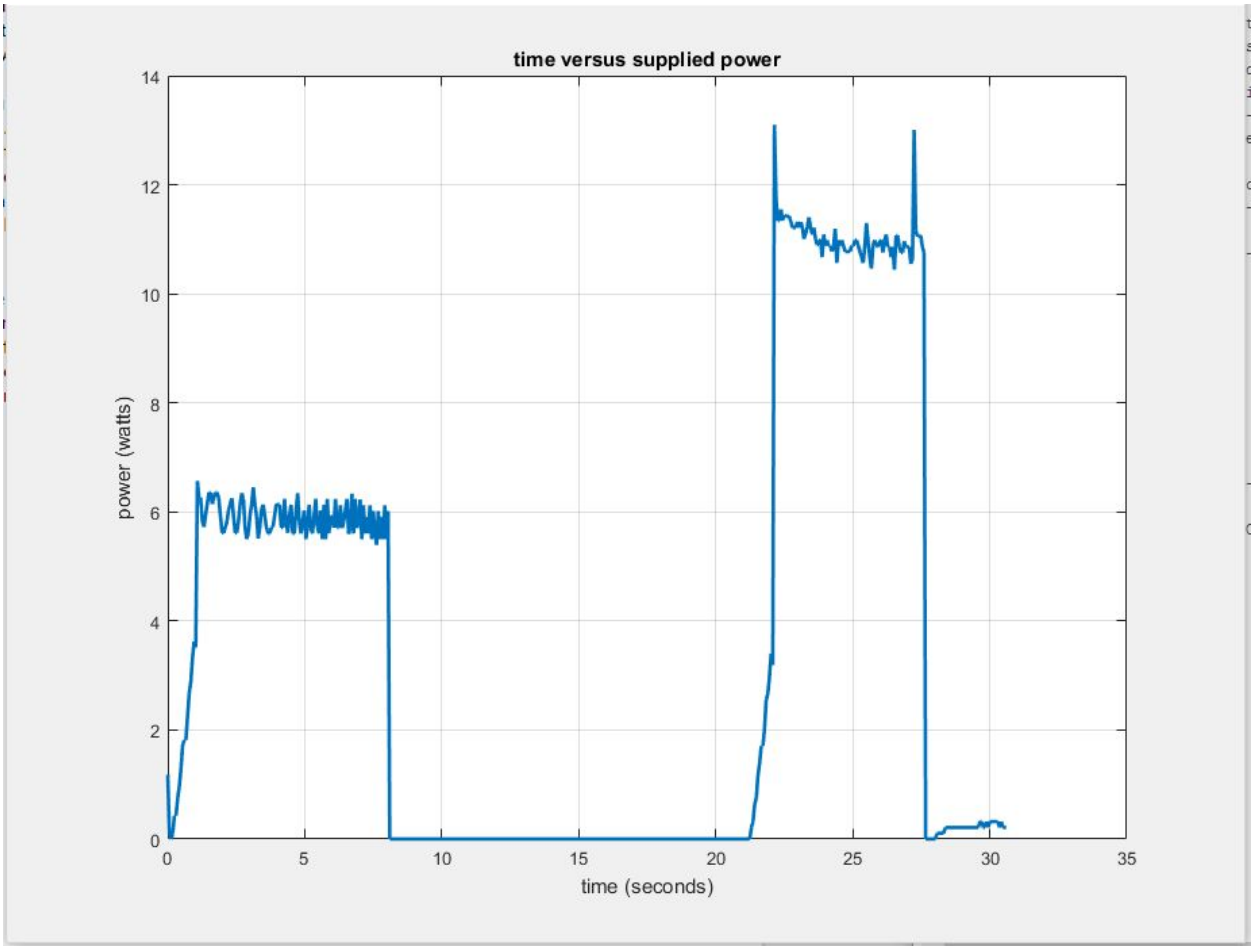
Backwards Situation

In week nine, the main focus for the team was to complete the coding and design on the AEV. Each day was spent innovating the design and testing the vehicle on the track multiple times each session. Some of the main areas of the AEV the team focused on was slightly changing the code to be more efficient, inserting a metal piece to attach to the R2D2, and making the entire vehicle more balanced with weight. The team's first 3d-design was also completed and tested out during the week. This 3-D piece is a simple base that is lighter than the original base used and has a pocket for the battery. Outside of class, the preliminary design review was completed for the AEV and required a lot of analysis and reflection over the course of all the work the group has currently done on the AEV. The PDR consisted of many aspects of the project such as the experimental methodology, results, and analysis to show the progress that has been made.

Results & Analysis

This week consisted entirely of testing and changing the design of the AEV. After many test runs and small changes, the group was able to have the AEV travel to the halfway point, stop at the sensor for ten seconds to wait for the gate to open, and then travel to the other end of the track where the R2D2 unit was. The reasons the AEV could not fully complete the mission was because the design did not have a metal piece that could attach to the magnet on the R2D2 unit and carry it back to the original starting point. The results showed that, when accelerating to two different speeds within the same amount of time, the higher speed will use significantly higher energy in the acceleration portion as the energy was experienced an initial spike much higher than the following average energy used per unit time. The first design was able to stop in front of the gate and then continue to the end of the track. The second design was not able to have the same success, in large part due to inconsistencies in the performance on the track despite minimal or no changes to the code. For example, the AEV was programmed to have the motors on for 4 seconds, in which the AEV ran into the gate, but a couple runs later, after testing smaller durations of time, the code was tested at 4 seconds again. However, the AEV did not reach even the first sensor (in the second test of duration 4 seconds). The group wasn’t sure if this was caused by the battery or not, but the group decided to try to change the code to have the motors run up to a certain position rather than for a certain time. Thus, the code would have to be adjusted to replace the “goFor” functions with “goToAbsolutePosition” and “goToRelativePosition” functions. The data showed that the marks traveled 140 marks before the power was shut off, and then traveled another 100 marks before stopping in front of the gate. Because the AEV crashed at the end, the total marks traveled in the forward part of track could not be properly determined, but the code was emulated such that after stopping at the gate, the AEV traveled for another 140 marks before shutting the motors off. The results of the power used relative to time is included below labeled as Figure 1.

Figure 1



Takeaways

For next week the team needs to make sure that all aspects of the mission can be completed with the design and code that is being used. This week the AEV was unable to fully complete the mission so the takeaway for the week is to fix any issues that prevented this and have the AEV complete the mission next week. This will require some analysis from the AEV eeprom data and also from our observations of the physical vehicle as it moved on the track.

Time management is a very important part of this project and in any engineering project in order to complete the project on time. With that being said, some changes need to be made to the way that the group conducts its time management. As a group it is being discovered that some class time is being wasted just figuring out what all needs to be done each day. For this reason there is going to be some changes as to how class time will be used. The group is going to be working on coming to class each day with a plan in mind for what needs to be completed that day in class and which group member(s) will be completing each task.

Week 10

Forwards Looking Situation

Labs 10A, 10B, and 10C will be used to complete Performance Test 3. The third performance test will focus on testing the vehicle design the group decided would be used for the final run along with the chosen code to find the most efficient way to complete the mission and ensure the AEV will be successful. This will be done by making slight adjustments to the code to determine what is the most efficient way for the vehicle to complete the requirements. It will consist of many trials and comparison of the EEPROM data collected after each run. The purpose of Performance Test 3 is to find which code used the least amount of energy. The mission demands an energy efficient vehicle, so this test will help the AEV meet this requirement.

Weekly Goals

- Determine what our final design will be
- Make progress on solidworks for the parts needed in our final design
- Determine the power difference that will be needed to carry the card back with the AEV
- Determine the time needed for the AEV to come to a stop and allow the gate to open properly on both the way to the cart and the way back carrying the cart

Weekly Schedule

Task	**Teammate(s)**	**Start Date**	**Due Date**	**Time Needed**
Lab 10 Progress Report	All	3/23/17	3/30/17	3 Hours
Lab 10A	All	3/30/17	3/30/17	55 Mins
Lab 10B	All	4/4/17	4/4/17	55 Mins
Lab 10C	All	4/5/17	4/5/17	1 Hour 20 Mins
Update Portfolio	Adam	3/23/17	3/30/17	30 Mins

Appendix

Team Meeting Notes

Date: 27-Mar-17
Time: 5:00pm
Members Present: Aaron Mckinley, Adam Boes, Christian Considine and Spencer Lohmeier

Topics Discussed: Tasks to be completed for the week

Objective:

- Establish a plan for tasks that need to be completed this week
- Make sure all members understand what needs to be completed
- Form a general understanding about where the project needs to be at the end of the week

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To do/Action Items:

- Progress Report (SL, AB, AM, CC)
- Backwards Looking Situation (AB)
- Forwards Looking Situation (CC)
- Results & Analysis (AM)
- Weekly Meeting Notes (SL)

Status Summary:

The results from the prototype test runs came back with an unexpected outcome for the group. The prototype that was expected to have a better efficiency, was not the design that ended up being the most efficient. For this reason the group is discussing its options for what changes need to be made to the current design. The goal is to update the design in a way that keeps the same concept, but improves the efficiency. Some changes that may be made are repositioning the arduino and/ battery, or changing the position of the motors. All these are just some of the ideas that are being discussed at this point.

Reflection:

- Better use of class time needs and will be a main goal
- Continue to think of ways to make the current design more efficient
- Remain a group that gets along well and produce results

Task	Teammate(s)	Start Date	Due Date	Time Needed
Lab 9A	All	3/22/17	3/22/17	1 Hour 20 Mins
Lab 9B	All	3/23/17	3/23/17	55 Mins
Lab 9C	All	3/28/17	3/28/17	55 Mins
Update Portfolio	Adam	3/23/17	3/30/17	30 Mins
Complete PDR Report	All	3/19/17	3/23/17	3 Hours

Codes

Code 1 (first design)

```
reverse(2);
celerate(4,0,25,.5);
goFor(7);
brake(4);
goFor(13);
celerate(4,0,40,.5);
goFor(5.5);
brake(4);
```

Code 2 (second design)

```
celerate(4,0,25,.5);
goFor(7);
brake(4);
goFor(13);
celerate(4,0,25,.5);
goFor(5.5);
brake(4);
```