

## **Week 2**

### Situation

Last week the team spent time writing code and implementing different Arduino commands in order to get comfortable with the unique functions needed in order to program the AEV. Without an in-depth knowledge of these commands, it would be impossible to code the program needed to run the AEV along the monorail track. These commands control the motors of the vehicle, and by extension, the propellers. In order to learn about these functions, a list of scenarios were programmed and uploaded to the Arduino.

### Results & Analysis

An error was observed with one of the original motors which prevented it from working. After a new motor was obtained, the motors were observed to have a resistance that did not allow for a smooth acceleration. The motors made noise for a short while before any movement was observed. Lower percentages do not appear viable because the motor needs more power to overcome the inherent resistance.

By applying brake, the vehicle will not stop immediately because the AEV will still coast to decelerate. This would require braking far ahead of the desired stopping point, and will need testing to determine the proper distance. Other commands may have similar limitations, and the best way to overcome these would be to test the code and problem solve as each challenge comes along.

There were issues with the hardware, in both the Arduino and the motor. At first, the Arduino would not turn on when plugged into the computer. Once the device was replaced, the new Arduino had power and executed the code. This is when another roadblock was hit. Only one of the two motors had power. Upon switching the motors between the propellers, the other motor had no power. One of the motors was broken, and was replaced. Both propellers spun afterwards. Due to the errors encountered, the team was only able to complete the first scenario. Once all of the errors had been resolved, the code executed as it was supposed to.

There was assistance needed to replace the faulty materials. It was unclear how long each scenario might take, which resulted in the team being unable to program both scenarios. For next week's lab, to enhance team's efficiency, a suggested time for how long each part should take would help time management. This will give the team the ability to completely test the external sensors and test the wind tunnel in a timely manner.

### Takeaways

1.) Program - Commands can be used to brake, accelerate, decelerate, and keep the AEV at a constant speed. The commands can be applied to either a solo motor, or all of the motors.

- 2.) Program – The AEV does not stop immediately so adequate time will be required in order to stop the machine on time.
- 3.) General – It is important to check for faulty equipment.

### **Week 3**

#### Situation

The first part of the lab in week 3 is designed to aid in the understanding of how to move the AEV for set distances. The Arduino will record 8 marks per one revolution of the wheel, which translates to 3.9 inches traveled. Basic unit conversion can then be used to translate this amount of inches to feet. This part of the lab is critical for the group's success moving forward because now a certain speed can be kept for a set distance. Last week's commands were all based off of motor power and seconds, so there was no set method to determine how far that the AEV would travel.

The second focus of the lab in week 3 will be to understand how the different propellers affect the AEV's efficiency. The propellers will be tested under varying conditions to determine which one wastes the least amount of energy.

#### Weekly Goals

- 1.) Become familiar with the sensors and the hardware that is associated with them.
- 2.) Learn how to troubleshoot.
- 3.) Program the sensors so that they can be called with AEV controls.
- 4.) Become familiar with wind tunnel equipment and the propulsion system.
- 5.) Find out how the AEV connects with the wind tunnel.

#### Weekly Schedule

Table 1: Week 3 Schedule

| <b>Task</b>                           | <b>Teammates</b> | <b>Start Date</b> | <b>Due Date</b> | <b>Time Needed</b>    |
|---------------------------------------|------------------|-------------------|-----------------|-----------------------|
| <b>Testing Sensors in the Lab</b>     | All              | 1/25/17           | 2/1/17          | 1 Hour and 20 Minutes |
| <b>Testing Wind Tunnel in the Lab</b> | All              | 1/25/17           | 2/1/17          | 1 Hour and 20 Minutes |
| <b>Week 3 Progress Report</b>         | All              | 1/28/17           | 2/1/17          | 2 Hours               |

## Appendix A