Executive Summary

The purpose of this lab was to utilize techniques for design decision making in creating an initial sample AEV in order to program and test a command that will be later performed on the classroom track. An essential aspect of the lab included the performance of a concept screening and scoring--where different designs would be assesed in their ability to complete the transportation procedure of the R2 unit. The lab contained three main components in which brainstorming techniques were utilized in creating a testable design. After testing, the final component included decision matrices in which the requirements of the AEV were weighed against selection criteria.The objective of this lab was for the team to ultimately compare the reference sample AEV against the initial design brainstormed during the first lab. This made it possible to visualize what components of the initial design might be better or worse than the reference AEV at transporting the R2 unit to the desired area.

Originally, the AEV did not work exactly as intended. The propellers had flown off of the motors, and adjustments needed to be made. Once fixed, the AEV had done just what it was programmed to do. However, there was a slight delay for the movement of the AEV after the code was activated, which may be a normal occurrence with the Arduino. As the AEV was on the track, it leaned to the side. This was due to the AEV having an odd center of gravity, as the weight was not distributed evenly throughout the design. The new design, however seemed to have a better sense of balance than the sample did and was able to move at a faster speed. It was not as easily built as the sample, but was stable and hard to break. The design was also heavier than the sample.

When comparing the AEV design to the sample AEV, a baseline must be set where the sample was tested first. Then the design was analyzed based off its performance compared to the sample. The team's design performed above the the sample, scoring a 1 on the concept screening and 6.2 on the concept scoring. This improvement in performance is likely from a completely from scratch design while the sample had a more generic design where efficiency was not a factor in its creation. While adding greater speed and less weight allows for less strain on the motors, it also added a creativity factor that the sample did not. The obvious betterment of the design compared to the sample encouraged the team to continue development on this particular design.

The fault, and major error of the lab, is that fact that all data recorded is subjective and can vary based on the observer. To solve this, technology such as scales or motor monitors can be used to obtain quantitative data to support claims. Also, more programs should be used to test the AEV's instead of just 1 in order to view the AEV's in different scenarios

The end results of the concept scoring and screening made it easy to see that the development of the design instead of developing the sample would be better moving forward. It outperformed the sample and also has the most potential out of the other designs from lab 1. Deciding easily and quickly on design and mechanics issues like this in the future will make it easier to build an AEV that provides safe and speedy passage for the R2 unit.

Appendix

```
celerate(4,0,25,3);        // Accelerate all motors from start to 25% in 3 seconds.

motorSpeed(4,25);          //Run all motors at a constant speed (25% power) for 1 second.
goFor(1);

motorSpeed(4,20);          //Run all motors at 20% power for 2 seconds.
goFor(2);

reverse(4);                //Reverse all motors.


motorSpeed(4,25);          //Run all motors at a constant speed (25% power) for 2 second.
goFor(2);

brake(4);                  //Brake all motors.

                           //Save the program as CSS1
```