

## Executive Summary

The purpose of this lab was to become familiar with the proper lab procedure for downloading data, in regards to the AEV, from the automatic control system. The team was able to use the collected EEPROM data obtained throughout the lab in the determination of physical parameters. The objective of this lab was to then use these physical parameters in calculating certain performance characteristics. This lab technique will be useful in determining and assessing factors of the AEV in its completion of delivering the R2D2 such as current and voltage being supplied to the electric motors. Such determinations will be a crucial aspect in designing an AEV that will complete its mission with less input power and energy consumption.

Seeing that power supply displayed throughout the Arduino code allowed for observations in trends that occur during the program activity. For instance, during the time interval between 2 to 9 seconds, the motors were running at about 20%. The supplied power averaged around this area 7 watts. When the motors were then run at 30%, the energy increased and averaged to around 9 watts. Assuming this pattern continues to 40% and 50%, the amount of supplied energy will increase by an interval of 2 watts on average per 10%. Supplied energy also spikes when the motors are reversed in direction and instantly programmed to a certain speed. There was also an unexplainable trend in the diagram. During the phase between 4-9 seconds the motor speed was held constant until the absolute position was reached. During this time, the supplied power fluctuated more often than in the phase between 2-4 when the AEV was running based on time rather than position. This suggests that the AEV constantly adapts to the sensors change in position. The data from the lab will allow the team to properly program the AEV's functions keeping in mind the energy distribution of the system.

Error can mostly be found in calculations for this lab. The interpretations of where phases in the program are is a subjunctive matter and differ based on the observer. This can be solved, however, by creating more distinct parameters for what is considered a phase in the arduino code. Also, only one code was used for data collection. This provides limited data for the overall AEV's performance, and assumptions and trends seen are not as validated. To solve this, simply test more codes to get a wider range of data, increasing the degrees of freedom for the data.

The team was able to collect the EEPROM Arduino data during the lab to determine the physical parameters, thus calculating the performance characteristics of the AEV. It was found that the higher percentage of power the motors were run at, the more energy on average was used. Trends were also observed when the Arduino code was programed at different percentages for the motors as well as when different functions for the motors to perform were performed. The team will be able to use this information to have the AEV retrieve the R2 unit while coming up with a solution for finding the right combination of speed and efficiency.