To: Dr Janiszewska

From: Ian Claggett, Ed Doerring, Stuart Fanko (Group Jasper)

Subject: ENGR 1182.01

Date: March 18, 2021

Introduction: The purpose of this lab was to test and retest the AEV on the track to create and record data, allowing to improve on the efficiency of the power supplied. Along with minimizing how much power is used. These plots allowed for the refining and improvement of the code and power efficiency of the AEV. By having a visual of how much power is used over a distance, it is easy to see where unnecessary power is being used.
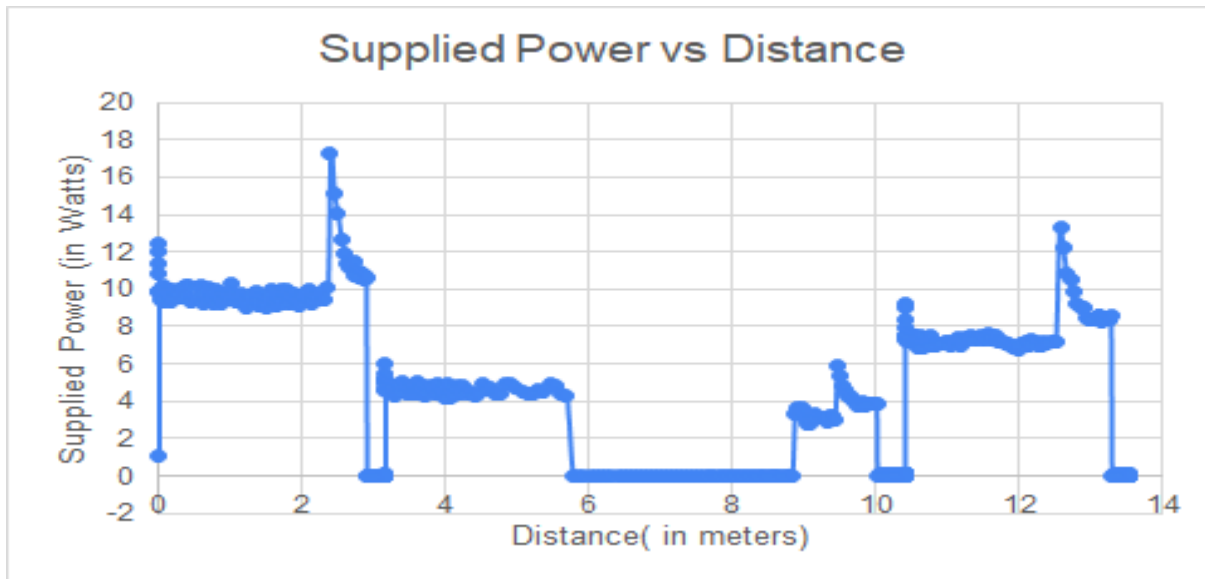
Half Track Run:

Figure 3: Plot of the supplied power to the AEV vs the total distance it traveled.
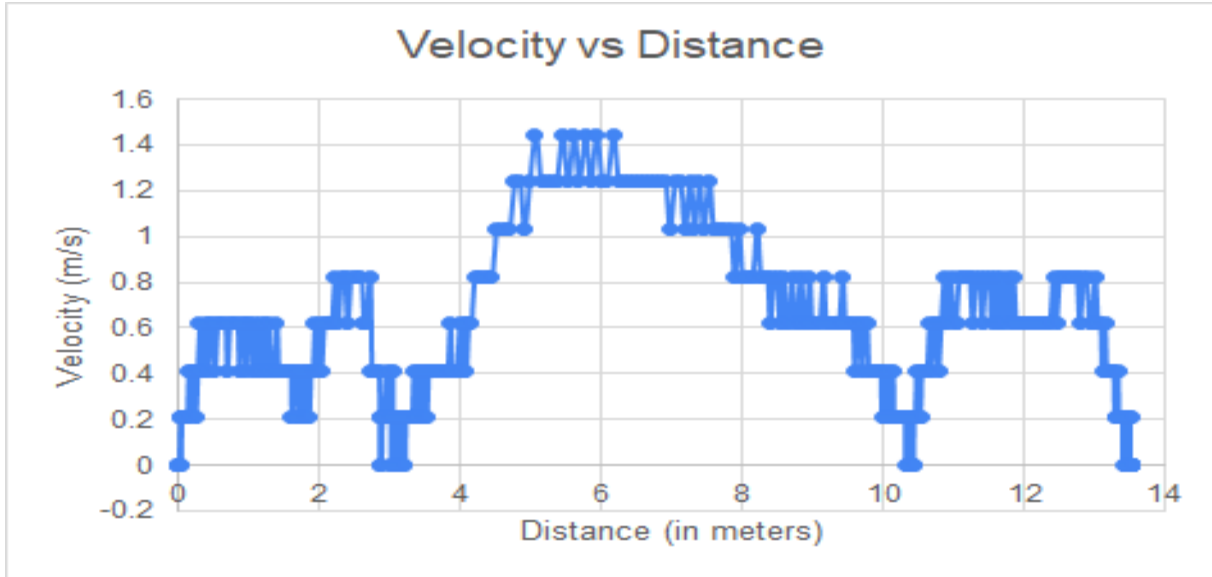
Figure 4: The velocity the AEV traveled vs the total distance it traversed on the track.
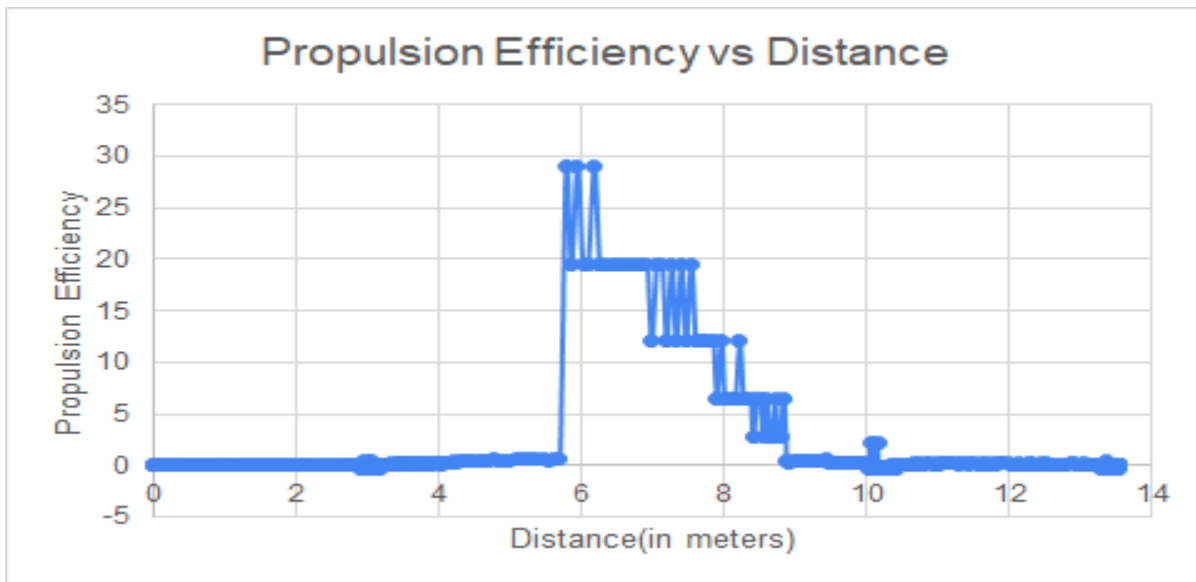

Figure 5: The propulsion efficiency of the AEV vs the total distance it traveled.
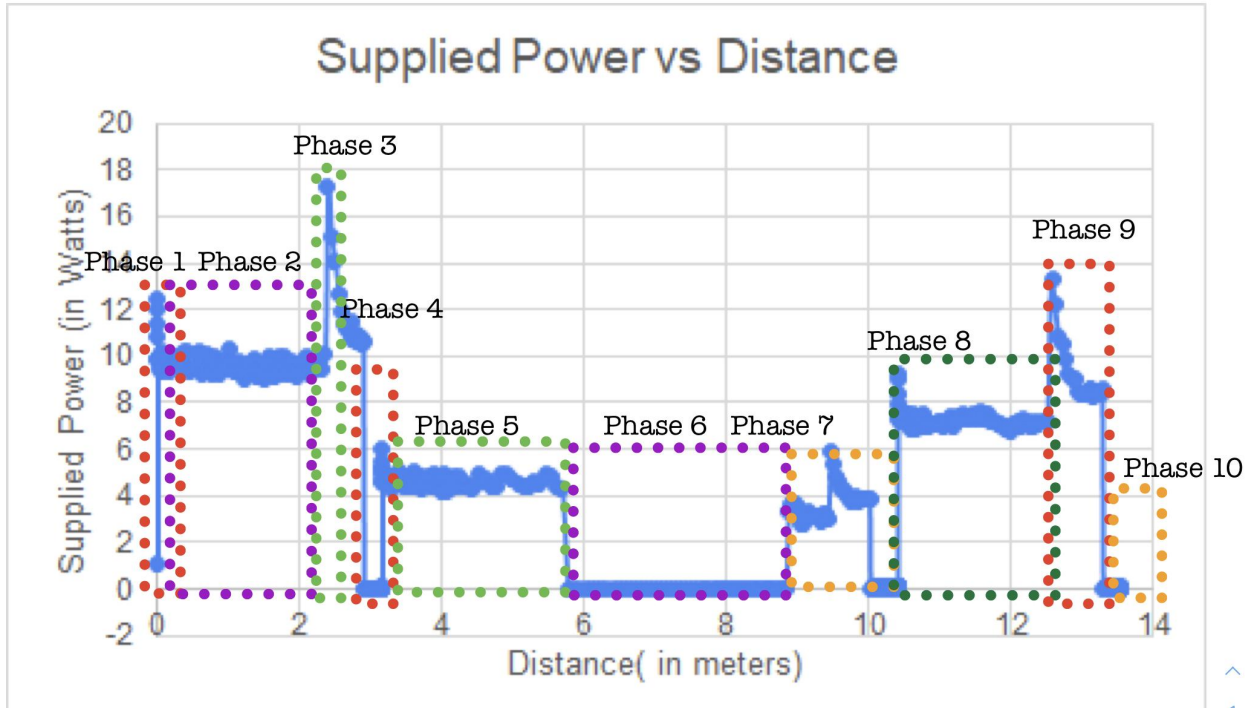
Figure 6: The breakdown of phases on the graph of the supplied power vs distance of the AEV.

Phases:	Arduino Commands:	Energy Used:
Phase 1	reverse(4); motorSpeed(1,32); motorSpeed(2,32);	1.094331999 joules
Phase 2	goToAbsolutePosition(-187);	920.5736485 joules
Phase 3	motorSpeed(1,38); motorSpeed(2,38); goFor(1.2);	234.0542747 joules
Phase 4	brake(4); goFor(2);	0 joules
Phase 5	motorSpeed(1,20); motorSpeed(2,20); goToAbsolutePosition(0);	377.9765279 joules
Phase 6	brake(4); goToAbsolutePosition(250);	0 joules

Phase 7	motorSpeed(1,15);
	motorSpeed(2,15);
	goToAbsolutePosition(300);
	brake(4);
	reverse(4);
	motorSpeed(1,17);
	motorSpeed(2,17);
	goFor(1.2);
	brake(4);
		131.7761761 joules

Phase 8	motorSpeed(1,27);
	motorSpeed(2,27);
	goToRelativePosition(170);
		482.2230164 joules

Phase 9	brake(4);
	reverse(4);
	motorSpeed(1,30);
	motorSpeed(2,30);
	goFor(1.2);
		187.3552307 joules

Phase 10	brake(4);	0 joules
Total Energy Used:		2339.711108 joules

Figure 7: Chart of phases programmed into the AEV with the total energy exhausted performing the code.

Arduino Code:

```
reverse(4);
motorSpeed(1,32);
motorSpeed(2,32);
goToAbsolutePosition(-187);
brake(4);
reverse(4);
motorSpeed(1,38);
motorSpeed(2,38);
goFor(1.2);
brake(4);
goFor(2);
motorSpeed(1,20);
```

```
motorSpeed(2,20);
goToAbsolutePosition(0);
brake(4);
goToAbsolutePosition(250);
motorSpeed(1,15);
motorSpeed(2,15);
goToAbsolutePosition(300);
brake(4);
reverse(4);
motorSpeed(1,17);
motorSpeed(2,17);
goFor(1.2);
brake(4);
goFor(4);
reverse(4);
motorSpeed(1,27);
motorSpeed(2,27);
goToRelativePosition(170);
brake(4);
reverse(4);
motorSpeed(1,30);
motorSpeed(2,30);
goFor(1.2);
brake(4);
```

Matlab Reduction Code:

```
FileName=input('enter name of the file you would like to open: ','s');
File=fopen(FileName,r);
Te=File(:,1);
Ce=File(:,2);
Ve=File(:,3);
MarksC=File(:,4);
MarksP=FIle(:,5);
Vr=2.46;
Time=Te./1000;
Current=(Ce./1024)*Vr*(1/0.185);
Voltage=(15*Ve)/1024;
```

```
Distance=0.0124*MarksC;
RelaDistance=0.0124*MarksP;
fprintf('Time     Current    Voltage    Distance    Relative Distance    /n');
fprintf('%5.2f    %5.2f    %5.2f    %5.2f    %5.2f/n',Time,Current,Voltage,Distance,RelaDistance);
```

Conclusion:

This portion of the testing did not go as smoothly as the others had some problems with the code were encountered during the half track run but these were worked out and were eventually run successfully. It took more testing and trial and error to work out the problems in the code. The final code was very different from the code used in the other labs, so very little of it was used. What was used though was the information learned during the code writing processes from the other labs. Familiarity with the code led to quicker problem solving faster testing. The EEPROM data downloaded from the AEV after these tests were completed also allowed for better optimization of the AEV and the running of its propellers.

Lab 7: System Analysis 3 Grading Rubric Progress Report		
Report		40
Attachments	Matlab code	10
	Arduino Code	5
Individual		10
Writing Total		
	Spelling/Grammar	
	Language Usage	15
Total		80

Instructor signature   _____

Work division for this summary
Student Name: Description of work

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