Report of Progress

Situation

Recently, a grant proposal was made to try to improve on the existing designs that were made for the AEV project. The group had a meeting outside of class in order to accomplish this. The part was created in Solidworks and put in on a PowerPoint slide.

Results and Analysis

The program coded to the AEV successfully ran, however, the design of the vehicle was poor. As a result, no motion occured on the track which is demonstrated by zeroes all the way down the "Marks (wheel count)" column of Table 1 found in the Appendix. Also, in Table 2, the distance, position, and speed columns were at constant zeroes. This lack of motion was due in part to the weight of the AEV and the shifted balance as the vehicle was on the track.

Takeaways

The current design of the AEV is bulky and inefficient. In order to increase efficiency, the design should be slimmer and more aerodynamic.

Future Work

Situation

In the next meeting the team will complete exercises three and four in order to brainstorm ideas on the AEV and initiate the construction. Each team member designed their own AEV and will share ideas on how to build the most efficient vehicle using the best components. In the upcoming lab, Group A will present their grant proposal to the class for the specially designed AEV component. The entire class will vote on the top designs which will be 3-D printed and used in the final AEV.

Upcoming Goals

Finalize an AEV design that increases the efficiency of the vehicle. Specifically, this design will include a triangular tip to increase aerodynamics and holes along the perimeter to decrease the weight.

Upcoming Schedule

What will be completed next will be preparation for the Committee Meeting 1, as well as the activities of Labs 5 and 6.

Appendices

Codes Created in Lab:

Lab Activity 1 Code:

```
celerate(1,0,15,2.5);
motorSpeed(1,15);
goFor(1);
brake(1);
celerate(2,0,27,4);
motorSpeed(2,27);
goFor(2.7);
celerate(2,27,15,1);
brake(2);
reverse(2);
celerate(4,0,31,2);
motorSpeed(4,35);
goFor(1);
brake(2);
motorSpeed(1,35);
goFor(3);
brake(4);
goFor(1);
reverse(1);
celerate(1,0,19,2);
motorSpeed(2,35);
motorSpeed(1,19);
goFor(2);
motorSpeed(1,19);
motorSpeed(2,19);
goFor(2);
celerate(1,19,0,3);
celerate(2,19,0,3);
brake(4);
```

Lab Activity 2 Code:

```
motorSpeed(4,25);
goFor(2);
motorSpeed(4,20);
goToAbsolutePosition(295);
reverse(4);
motorSpeed(4,30);
```

```
goFor(1.5);
brake(4);
```

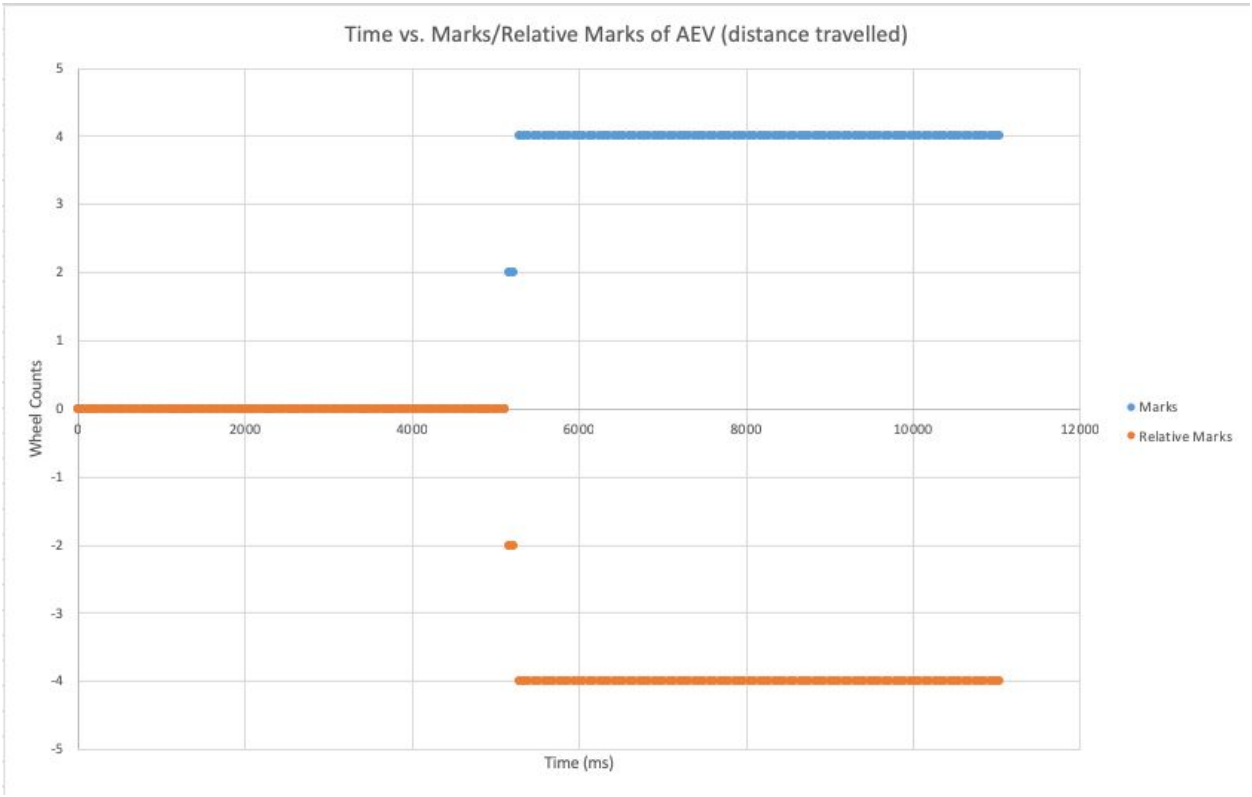
Lab Activity 3 Code:

```
celerate(4,0,25,3);
motorSpeed(4,25);
goFor(1);
motorSpeed(4,20);
goFor(2);
reverse(4);
motorSpeed(4,25);
goFor(2);
brake(4);
```

Tables and Figures:
These tables show data that was gathered during a test run of an AEV using the data extraction program on MATlab and excel.

Table 1: EEProm Readouts

	A	B	C	D	E
6	EEProm Readouts				
7					
8	Time (ms)	Current (counts)	Voltage (counts)	Marks (wheel counts)	Relative Marks (wheel counts)
9	0	12	544	0	0
10	60	0	544	0	0
11	120	0	544	0	0
12	180	0	544	0	0
13	240	0	544	0	0
14	300	1	543	0	0
15	360	0	543	0	0
16	420	3	543	0	0
17	480	3	543	0	0
18	540	4	543	0	0
19	600	4	543	0	0
20	660	7	542	0	0
21	720	7	542	0	0
22	780	9	541	0	0
23	840	9	542	0	0
24	900	12	540	0	0
25	960	12	540	0	0
26	1020	16	540	0	0
27	1081	16	540	0	0
28	1141	19	539	0	0
29	1201	20	539	0	0
30	1261	24	538	0	0
31	1321	23	539	0	0
32	1381	29	538	0	0
33	1441	29	538	0	0
34	1501	31	537	0	0
35	1561	31	537	0	0
36	1621	33	536	0	0
37	1681	32	536	0	0
38	1741	35	537	0	0
39	1801	32	537	0	0
40	1861	32	537	0	0
41	1921	32	537	0	0
42	1981	30	537	0	0
43	2041	28	537	0	0
44	2101	32	536	0	0
45	2161	31	536	0	0
46	2221	33	536	0	0
47	2281	33	535	0	0
48	2341	37	534	0	0


Time vs. Marks/Relative Marks of AEV (distance travelled)
Wheel Counts
Time (ms)
Marks
Relative Marks

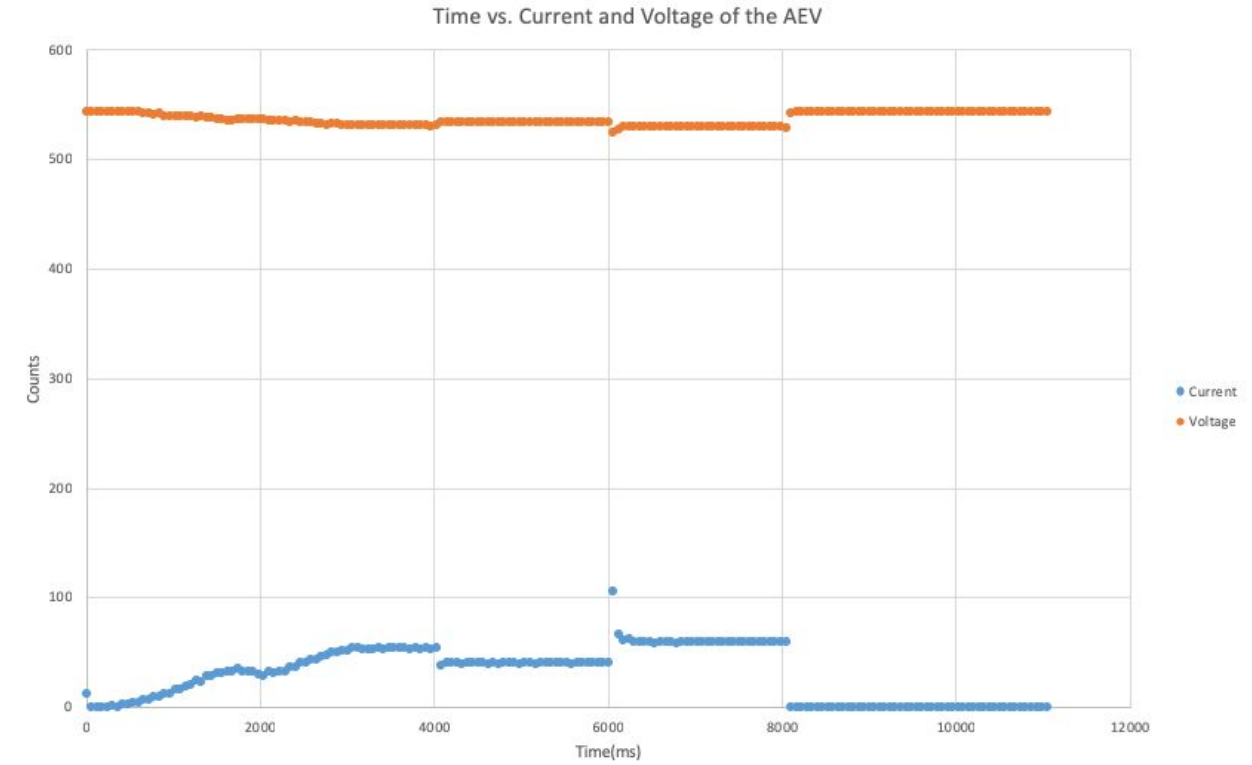

Time vs. Current and Voltage of the AEV
Counts
Time(ms)
Current
Voltage

Table 2: Conversions to Physical Parameter

Conversions to Physical Parameter								
Time (s)	Current (A)	Voltage (V)	Distance (m)	Position (m)	Speed (m/s)	Input Power (W)	Incremental Energy (J)	Total Energy (J)
0	0.155827703	7.96875	0	0	0	1.241752006	0	0
0.06	0	7.96875	0	0	0	0	0.03725256	0.03725256
0.12	0	7.96875	0	0	0	0	0	0.03725256
0.18	0	7.96875	0	0	0	0	0	0.03725256
0.24	0	7.96875	0	0	0	0	0	0.03725256
0.3	0.012985642	7.954101563	0	0	0	0.103289114	0.003098673	0.040351234
0.36	0	7.954101563	0	0	0	0	0.003098673	0.043449907
0.42	0.038956926	7.954101563	0	0	0	0.309867343	0.00929602	0.052745927
0.48	0.038956926	7.954101563	0	0	0	0.309867343	0.018592041	0.071337968
0.54	0.051942568	7.954101563	0	0	0	0.413156458	0.021690714	0.093028682
0.6	0.051942568	7.954101563	0	0	0	0.413156458	0.024789387	0.117818069
0.66	0.090899493	7.939453125	0	0	0	0.721692266	0.034045462	0.151863531
0.72	0.090899493	7.939453125	0	0	0	0.721692266	0.043301536	0.195165067
0.78	0.116870777	7.924804688	0	0	0	0.926178082	0.04943611	0.244601178
0.84	0.116870777	7.939453125	0	0	0	0.927890056	0.055622044	0.300223222
0.9	0.155827703	7.91015625	0	0	0	1.232621476	0.064815346	0.365038568
0.96	0.155827703	7.91015625	0	0	0	1.232621476	0.073957289	0.438995856
1.02	0.20777027	7.91015625	0	0	0	1.643495302	0.086283503	0.52527936
1.081	0.20777027	7.91015625	0	0	0	1.643495302	0.100253213	0.625532573
1.141	0.246727196	7.895507813	0	0	0	1.948036503	0.107745954	0.733278527
1.201	0.259712838	7.895507813	0	0	0	2.05056474	0.119958037	0.853236564
1.261	0.311655405	7.880859375	0	0	0	2.456112423	0.135200315	0.988436879
1.321	0.298669764	7.895507813	0	0	0	2.358149451	0.144427856	1.132864736
1.381	0.376583615	7.880859375	0	0	0	2.967802512	0.159778559	1.292643294
1.441	0.376583615	7.880859375	0	0	0	2.967802512	0.178068151	1.470711445
1.501	0.402554899	7.866210938	0	0	0	3.166581747	0.184031528	1.654742973
1.561	0.402554899	7.866210938	0	0	0	3.166581747	0.189994905	1.844737878
1.621	0.428526182	7.8515625	0	0	0	3.364600104	0.195935456	2.040673333
1.681	0.415540541	7.8515625	0	0	0	3.262642525	0.198817279	2.239490612
1.741	0.454497466	7.866210938	0	0	0	3.57517294	0.205134464	2.444625076
1.801	0.415540541	7.866210938	0	0	0	3.268729545	0.205317075	2.649942151
1.861	0.415540541	7.866210938	0	0	0	3.268729545	0.196123773	2.846065923
1.921	0.415540541	7.866210938	0	0	0	3.268729545	0.196123773	3.042189696
1.981	0.389569257	7.866210938	0	0	0	3.064433948	0.189994905	3.232184601
2.041	0.363597973	7.866210938	0	0	0	2.860138352	0.177737169	3.40992177
2.101	0.415540541	7.8515625	0	0	0	3.262642525	0.183683426	3.593605196
2.161	0.402554899	7.8515625	0	0	0	3.160684946	0.192699824	3.78630502
2.221	0.428526182	7.8515625	0	0	0	3.364600104	0.195758552	3.982063572
2.281	0.428526182	7.836914063	0	0	0	3.358322865	0.201687689	4.183751261
2.341	0.48046875	7.822265625	0	0	0	3.758354187	0.213500312	4.397251572

Team Meeting Notes for Group A

Meeting 1: 1/9/2019, 12:40-2:05

All team members were present.

Location: Hitchcock 224

The objective of the meeting was to set up the AEV and the Arduino. Scenario 1 was executed and coded successfully using the basic Arduino function calls.

Tasks Completed

- Scenario 1 coded led by Gillian
- The AEV was turned on and run successfully worked on by all team members
- Comments were added to the Arduino code by Gillian

Upcoming Week

- URL will be submitted
- Quiz will be taken

Meeting 2: 1/16/19, 12:40-2:05

All team members were present.

Location: Hitchcock 224

The objective of the meeting was to complete documentation, as well as build and test a sample AEV design.

Tasks Completed

- Sydney and Jess counted pieces within the AEV kit and completed all necessary documentation
- Gillian wrote the code on Arduino

- The whole team, Gillian, Jess, Rob, and Sydney, collectively built and tested the AEV

Upcoming Week

- Documentation submitted to Carmen
- Pre-lab assignments for next week's class

Meeting 3: 2/1/19, 12:40-1:35

All team members were present.

Location: Hitchcock 224

The objective of the meeting was to test and gather data on the reflective sensors for the AEV.

Tasks Completed

- Code for the reflective sensor test was written by the team but could not run because the one of the wires was broken
- The wire connecting to the automatic control system was fixed by the lab supervisor

Upcoming Week

- Finish gathering data on the reflective sensors
- Brainstorm ideas on the build of the team's AEV
- Sketch the initial design ideas orthographically

Meeting 4: 2/6/19, 12:40-2:05

Location: Hitchcock 308

All team members present.

The objective of the meeting was to learn how to efficiently analyze the AEV's performance using the Design Analysis Tool.

Tasks Completed

- Exercise 3, reflection sensor test was completed by team and data was gathered
- Individual AEV designs were completed by each team member

Upcoming Week

- Meeting on 2/7 at 5:15 in Hitchcock Hall to work on Grant Proposal and Progress Report 1
- LPQ on 2/13

Meeting 5: 2/11/19, 12:30-2:05

All team members were present.

Location: Hitchcock 216

The objective of the meeting was to complete a grant proposal for a specifically designed piece for the team's AEV.

Tasks Completed

- Base piece for AEV was designed by Gillian, Sydney, and Jess to be more lightweight and aerodynamic
- The website was updated by Rob
- Report portions were broken up and divided amongst the team

Upcoming Week

- Exercises 3 and 4 are to be completed
- Continue developing and testing the final design for the AEV