

Advanced Energy Vehicle Critical Design Report



Team H Hawks

Josh Anson-Nate Heister-Jesse Noble-Bret Ricklic

Meet Team H



Overview

Design Process

Performance

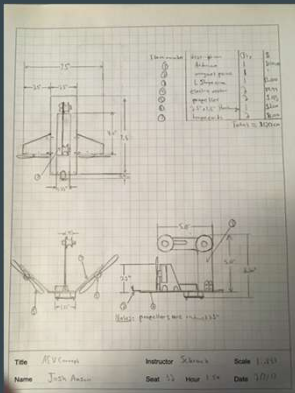
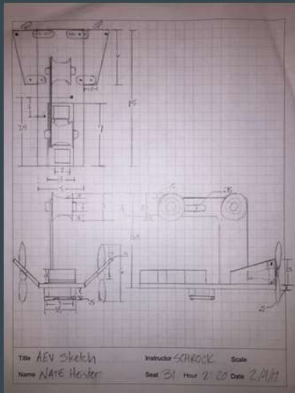
Energy Efficiency

Consistency and Control

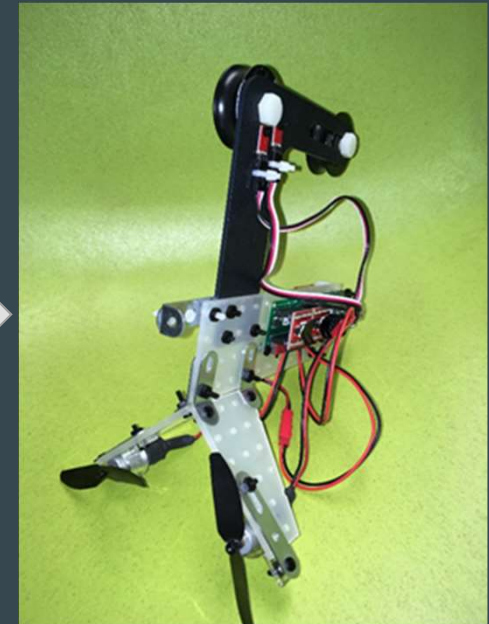
Final Design and Results

Conclusion

The Design Process



Screening Scoresheet					
Success Criteria	Reference	N	A	H	R
Balance	0	0	+	0	0
Center of Gravity	0	0	+	0	0
Power Efficiency	0	0	0	0	0
Cost	0	+	0	0	0
Weight	0	+	0	0	0
Aerodynamics	0	0	+	0	0
Consistency	0	0	0	0	0
Sum +	0	2	3	0	0
Sum -	0	0	0	0	0
Sum 0	7	5	4	7	7
Net Score	0	2	3	0	0
Continue	Revise	Yes	Yes	Revise	Revise



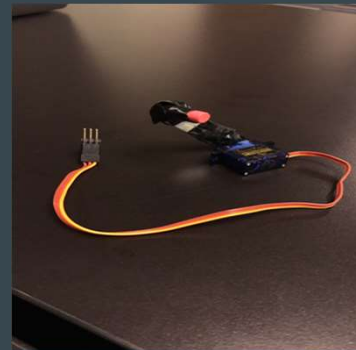
Performance (Energy and Efficiency/Consistency and Control)

-Rubber tread

-Tri blade propeller vs. bi-blade propeller

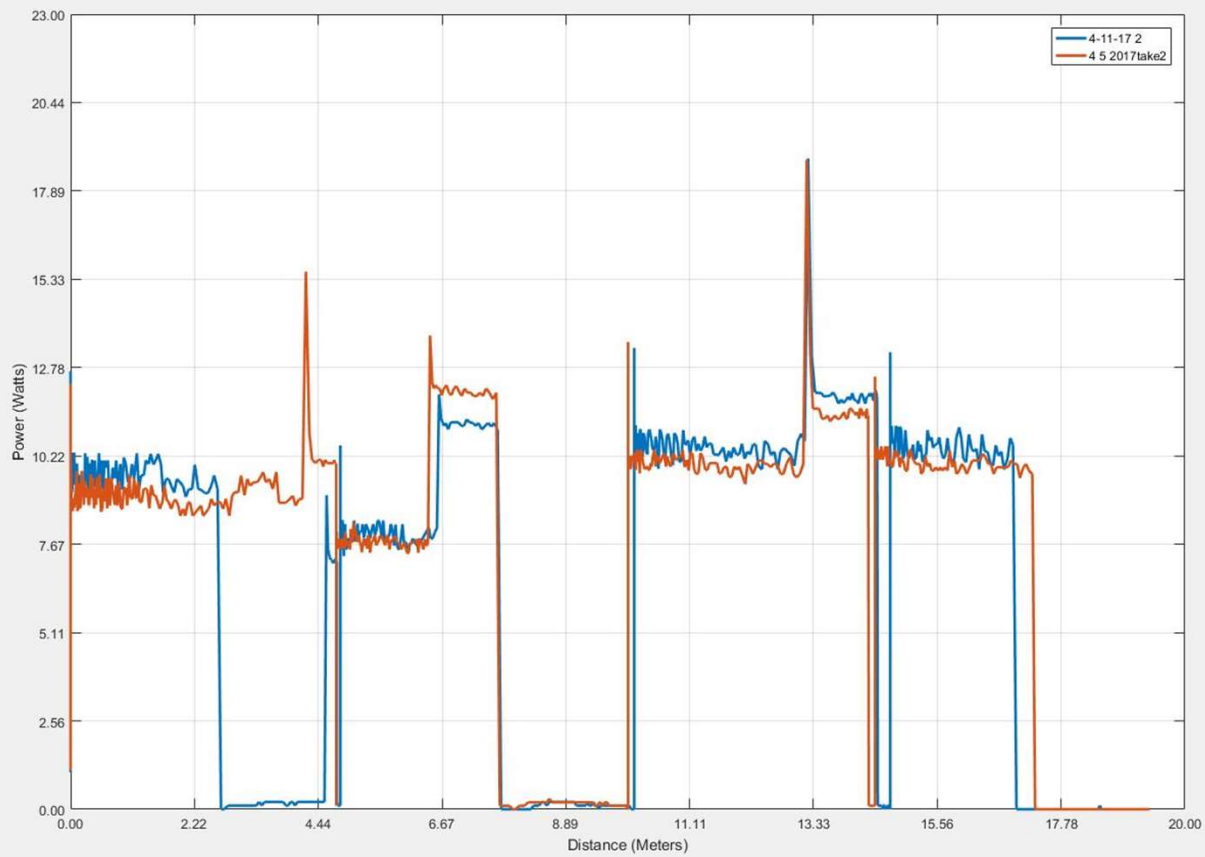
-Servo motor as a brake to reduce use reverse function

-3D print wind tunnel to make a circular tunnel around propellers (duct tubular)



Energy Efficiency

- Initial run had about 270 joules consumed
- Tweaked code
- Final run used 251 joules
- Reduced the energy consumption by about 7%



Power vs time
for
performance
test one run
(orange),
versus final test
(blue)

270 joules

251 joules

Consistency and Control

-Team H's focus was consistency

-First design

-Final design

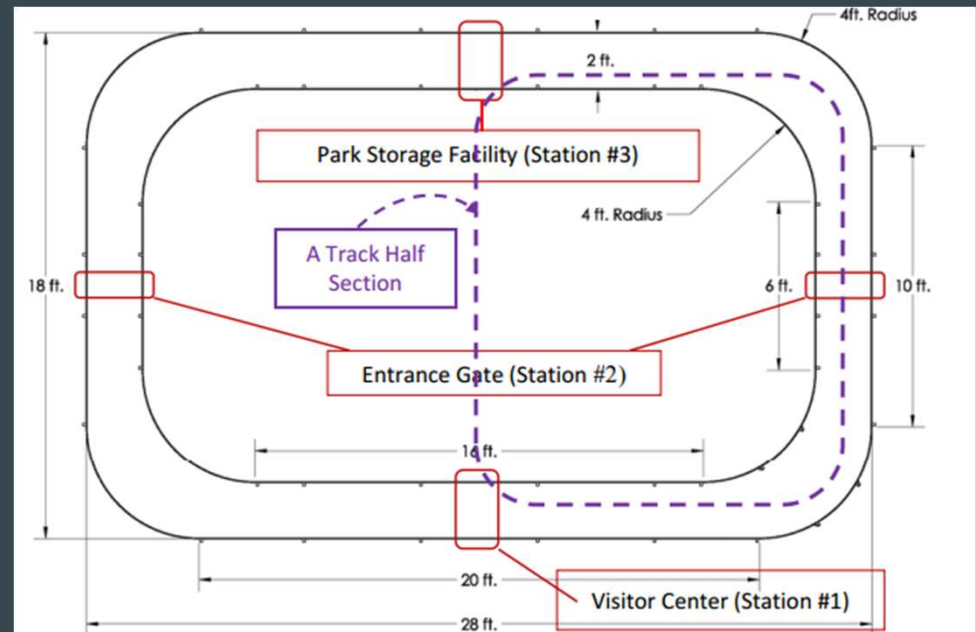
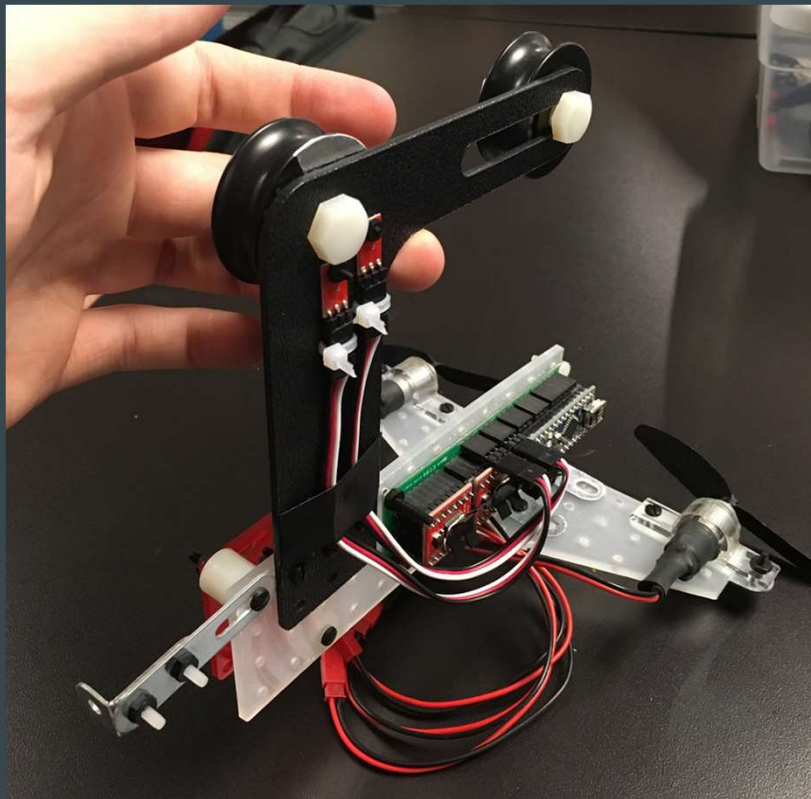


Figure 1: AEV Dimensioned Test Track Layout (Top View)

Final Design and Results



		Scoring Matrix			
		Reference		B (Final Design)	
Success Criteria	Weight	Rating	Weighted Score	Rating	Weighted Score
Balance	20%	2	0.40	5	1.00
Center of Gravity	5%	3	0.15	5	0.25
Power Efficiency	15%	3	0.45	3	0.45
Cost	10%	3	0.30	3	0.30
Weight	10%	3	0.30	4	0.40
Aerodynamics	15%	3	0.45	4	0.60
Consistency	25%	4	1.00	5	1.00
Total Score		3.05		4.00	
Continue?		No		Yes	

Conclusions and Final Discussion



ADVANCED ENERGY VEHICLE Lab 11: Performance Test 4—Final Testing

Team/Team Name: H (Hawk) Instructor: Prof. Schreck Class Time: 1:50pm

This sheet must be filled out and signed by a member of the Instructional Staff by the end of Lab. The Instructor/TA must watch the AEV complete the operational objectives and will record the results below.

Procedure	Run 1		Run 2	
	Yes	PTS Earned	Yes	PTS Earned
Team shows proper testing procedure (up to 10 points)	<input checked="" type="checkbox"/>	10	<input checked="" type="checkbox"/>	10
AEV starts and travels to first gate	<input checked="" type="checkbox"/>	10	<input checked="" type="checkbox"/>	10
Gate Routine	Stops before gate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Waits 7 seconds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Travels through gate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AEV starts and travels to second gate and waits for 8 seconds	<input checked="" type="checkbox"/>	10	<input checked="" type="checkbox"/>	10
AEV correctly stops & travels to gate (travels into configuration of 2)	<input checked="" type="checkbox"/>	10	<input checked="" type="checkbox"/>	10
Gate Routine	Stops before gate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Waits 7 seconds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Travels through gate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AEV starts and travels to starting point	<input checked="" type="checkbox"/>	10	<input checked="" type="checkbox"/>	10
Total Points Earned	100	100	100	100
Total Score = Total Pts Earned / Δt		Max Total Score		

Track Layout: inside
(Inside or Outside)

Mass of AEV: 0.062 kg
(in kilograms)

Total Energy: 25.42 J
(Joules)

Total Time Run1: 53.22 s
(seconds)

Total Time Run2: _____
(seconds)

Delta Time Run 1:
 $\Delta t1 = 150 - \text{total time}$
= 150

Delta Time Run 2:
 $\Delta t2 = 150 - \text{total time}$
= 150

Energy/Mass: 25.42 J/kg
(Joules per kilogram)

Your final score will be based on the Energy/Mass ratio (how efficient is the team's AEV) and the Total Score (time and distance requirements).

Instructor / TA Signature: _____ Date: 4-11-17

96

Questions?

