HOVERCRAFT

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TEAM #21

SPECIFICATIONS

- Functional requirements

  What does the hovercraft need to be able to accomplish?

- Design constraints

  What are the limits that our design must stay within?

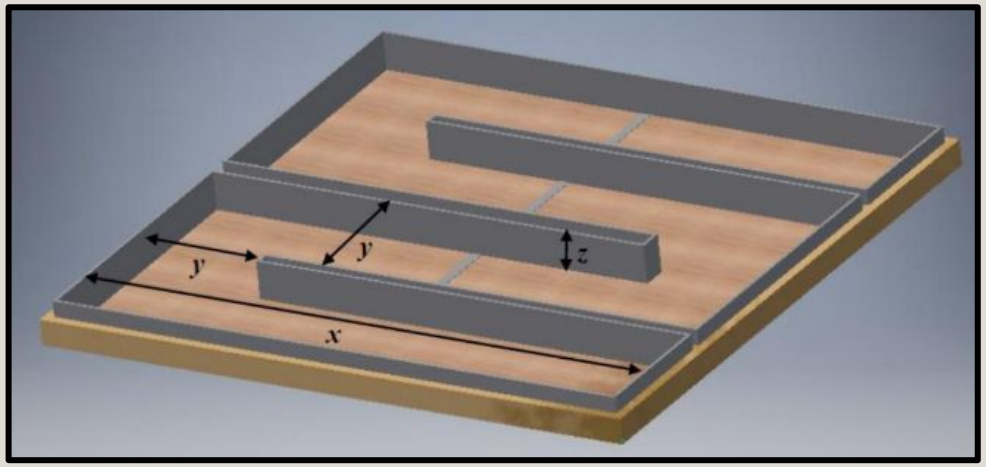
FUNCTIONAL REQUIREMENTS

1. Mission Objectives
2. Design & technical Goals

   Circular shape & width of 30 cm
3. Competition Requirements and Operations

   Finish in 2 minutes autonomously
4. Target Score Analysis:

$$score = \frac{d_{completed}}{N_c \, x \, t_{course}}$$

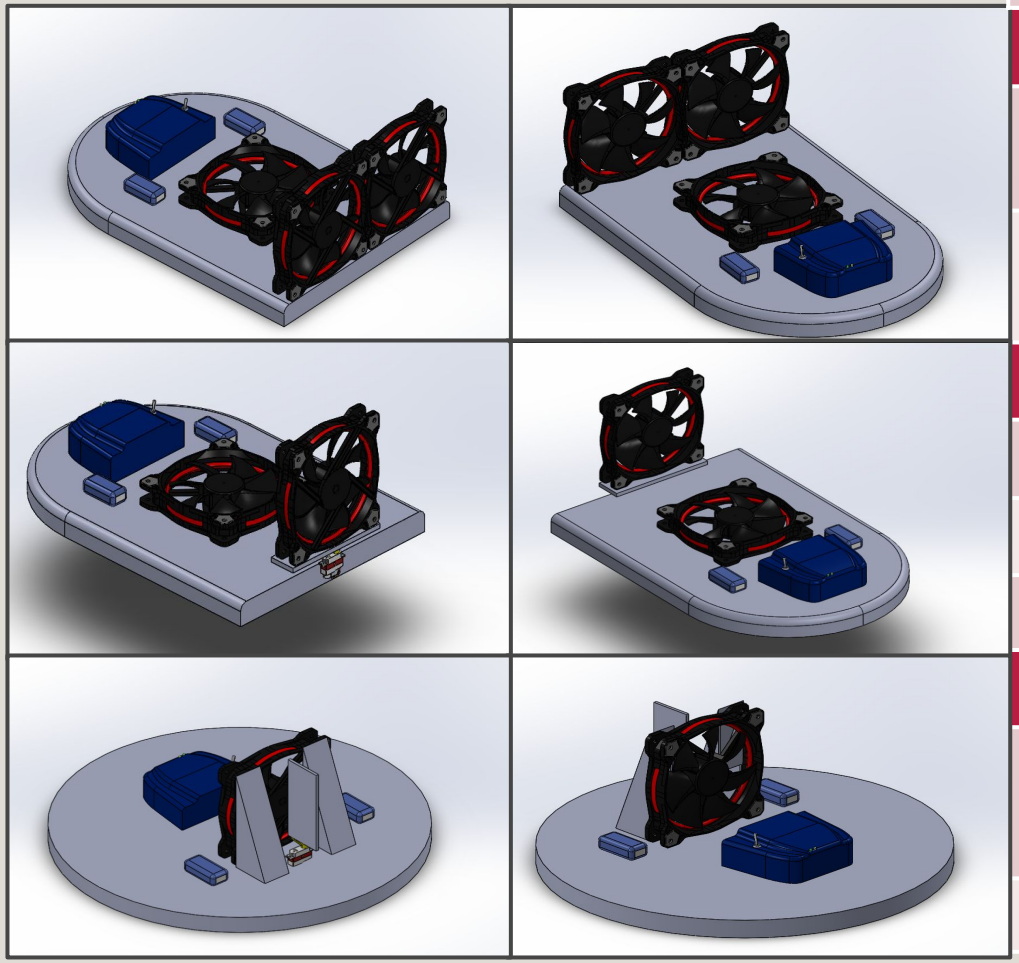


- x: 235cm
- y: 50-55cm
- z: 15cm
- up to 3mm speed bumps

DESIGN CONSTRAINTS

What	How well
Intelligence of craft	Must operate autonomously
Minimum lifting	3 mm
Complete track without discharging the battery	Battery must last >6 min
Number of components	As few as possible
Acceleration	Fast enough to complete track <2 min
Turning 180 degrees	Radius of ~25 cm
Must take a reasonable amount of time to create	By competition

DESIGNS



All models
Two Rhino 360 mAh 20C series battery
Model 1
Two MEC0251V1-000U-A99 fans thrust
AFB1212SH fan as the lift fan
Model 2
One MEC0251V1-000U-A99 fan thrust
AFB1212SH fan as the lift fan
One Servo
Model 3
One MEC0251V1-000U-A99 fan thrust and lift
One servo

SWOT ANALYSIS

Design	Strength	Weaknesses	Opportunity	Threats
1	- Number of components - Airflow under skirt for lift - Airflow for propulsion, velocity and acceleration	- Difficulty control algorithm - Volume of design - Weight - Power consumption	- Three opportunities to complete track - Knowledge of track and grading scheme - Coding framework provided	- Imperfections in floor - Airflow - Competition
2	- Difficulty control algorithm - Airflow under skirt for lift - Airflow for propulsion, velocity and acceleration	- Weight - Number of components - Power consumption	- Three opportunities to complete track - Knowledge of track and grading scheme - Coding framework provided	- Imperfections in floor - Airflow - Competition
3	- Power consumption - Weight - Number of components - Difficulty control algorithm	- Airflow under skirt for lift - Airflow for propulsion, velocity and acceleration	- Three opportunities to complete track - Knowledge of track and grading scheme - Coding framework provided	- Imperfections in floor - Airflow - Competition

AHP ANALYSIS

Normalized AHP Analysis							
	Reduced number of components	Increased lift	Higher propulsion	Reduced weight	Reduced algorithm difficulty	Reduced power consumption	Average
Number of components	0.092	0.126	0.117	0.022	0.182	0.167	0.118
Lift	0.277	0.383	0.467	0.259	0.364	0.278	0.338
Propulsion	0.185	0.192	0.234	0.432	0.273	0.222	0.256
Weight	0.369	0.126	0.047	0.086	0.045	0.167	0.140
Algorithm difficulty	0.046	0.096	0.077	0.173	0.091	0.111	0.099
Power consumption	0.030	0.077	0.058	0.028	0.045	0.056	0.049
Previous SUM	10.830	2.610	4.280	11.580	11	18	N/A
New SUM	1	1	1	1	1	1	1

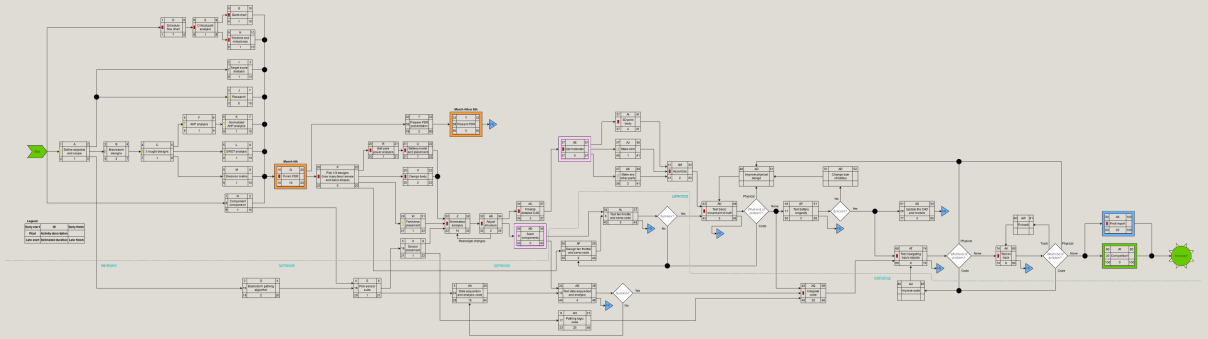
Ranked priority vector		
1	0.338	Lift
2	0.2561	Propulsion
3	0.1402	Weight
4	0.1176	Number of components
5	0.099	Algorithm difficulty
6	0.04917	Power consumption

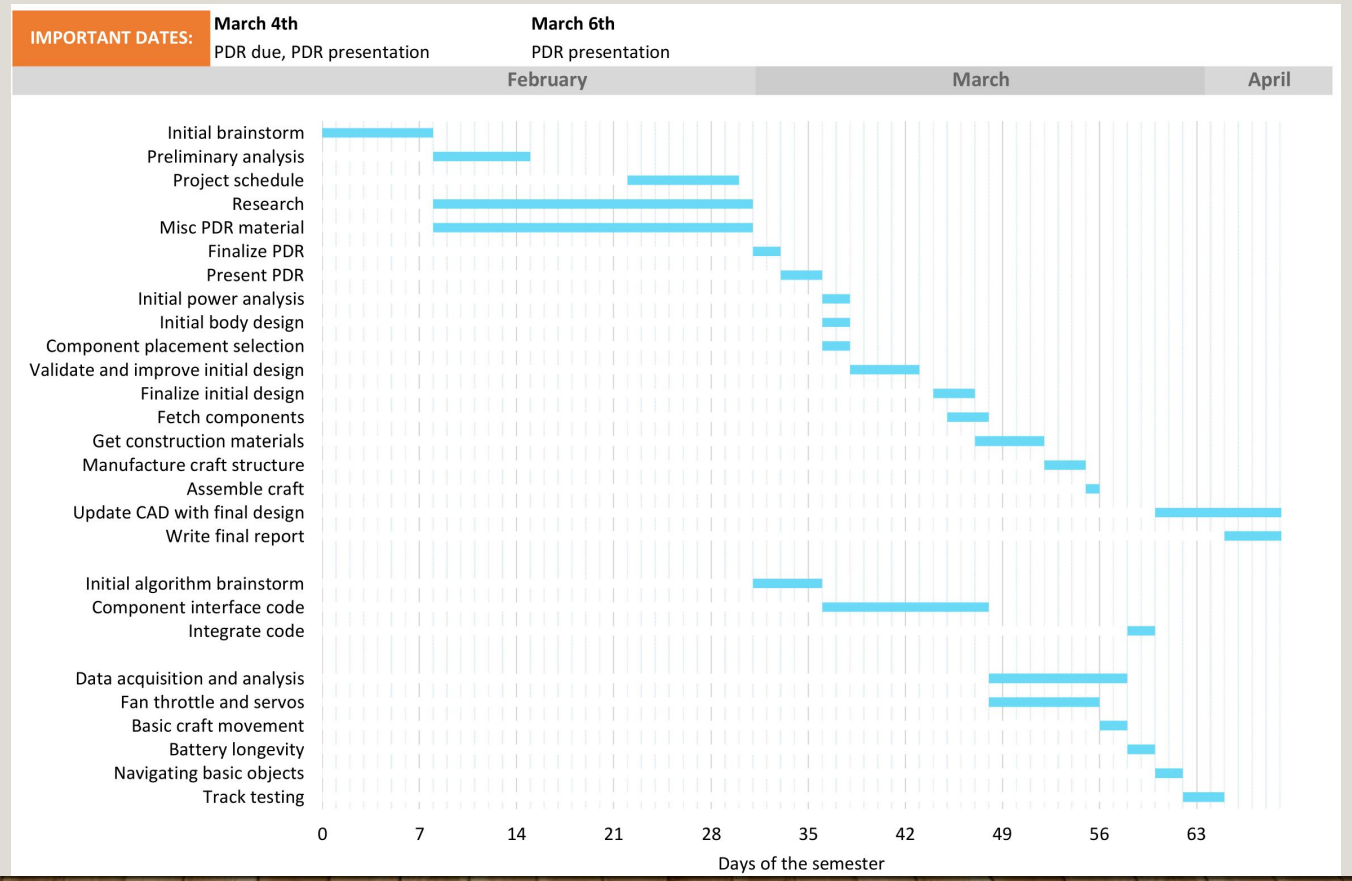
FINAL DECISION

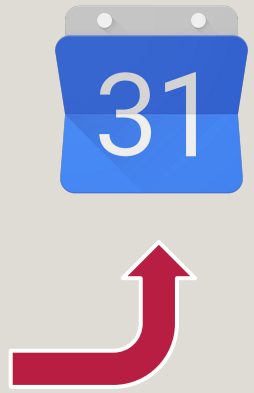
Comparison Criteria	Priority vector	Design 1		Design 2		Design 3	
		Score	Result	Score	Result	Score	Result
Lift	0.338	10	3.38	10	3.38	9	3.042
Propulsion	0.2561	10	2.561	9	2.3049	8	2.0488
Weight	0.1402	8.5	1.1917	9	1.2618	10	1.402
Number of components	0.1176	8	0.9408	9	1.0584	10	1.176
Algorithm difficulty	0.099	10	0.99	9	0.891	8	0.792
Power consumption	0.04917	9	0.44253	8	0.39336	10	0.4917
Total	1.00	55.50	**9.51**	54.00	**9.29**	55.00	**8.95**

SCHEDULE & PROGRESS

- Break whole project into small tasks
  - Don't forget tasks
  - Define input/output relationships
  - Define critical path
  - Huge/complicated to read
  - Not viewable on phones
- Create Gantt chart from diagram
  - Simplifies by combining tasks
  - Assigns tasks to dates
- Create Google calendar from Gantt chart
  - Viewable on phones
  - Gives reminders








THANK YOU AND GOOD LUCK