

Concept Generation and Evaluation

By: Pacific Garbage Patch C3
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Project Description

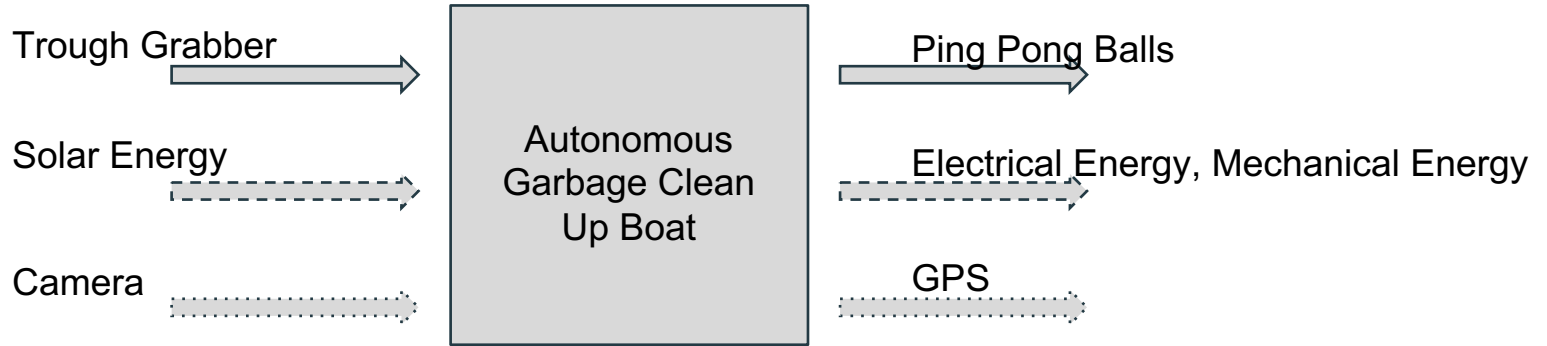
There is currently 80,000 metric tonnes of plastic, which is 1.8 trillion pieces, in the Great Pacific Garbage Patch [1].

The Pacific Garbage Patch team is developing a prototype plastic cleaner for the ocean. The device must not interfere with the ecosystem.

The prototype device is expected to perform throughout the day on solar power to autonomously locate and pick up 20+ ping pong balls.

Dr Trevas is our client

Functional Decomposition



Decision Matrix

		Camera		Solar Panels		Grabber		Boat		Navigation	
Criteria	Weight	Score (1-5)	Weighted	Score (1-5)	Weighted	Score (1-5)	Weighted	Score (1-5)	Weighted	Score (1-5)	Weighted
Doesn't damage ecosystems	5	1	5	1	5	5	25	5	25	3	15
Durable	1	5	5	5	5	5	5	5	5	5	5
Portable	1	2	2	1	1	4	4	4	4	2	2
Picks up trash down to 5 mm in length	1	1	1	1	1	5	5	1	1	1	1
Waterproof	3	5	15	5	15	3	9	5	15	5	15
Solar powered	3	3	9	5	15	3	9	3	9	2	6
Sensors	3	5	15	4	12	2	6	1	3	5	15
Cheap	1	4	4	3	3	2	2	4	4	2	2
Fast	1	1	1	1	1	3	3	3	3	2	2
Safety	1	1	1	1	1	3	3	4	4	1	1
Effectiveness	3	5	15	4	12	5	15	2	6	3	9
Easy operation	1	2	2	1	1	5	5	1	1	2	2
Total		35	75	32	72	45	91	38	80	33	75

Design Considered: Trough Grabber

Advantages

- Collects more trash
- Allows water drainage
- Durable
- Effective
- Easy operation

Disadvantages

- Expensive
- Slower at collecting big pieces

Pugh Chart: Collection

Criteria	Weight	Design Concepts			
		Trough grabber with holes	Arcade claw	Ice cream scooper	Reach grabber
Doesn't damage ecosystems	5 (+)	S	(-)	DATUM	
Durable	1 (+)	S	(+)	DATUM	
Portable	1 S	S	S	DATUM	
Picks up trash down to 5 mm in length	1 (+)	(-)	(+)	DATUM	
Waterproof	3 S	S	S	DATUM	
Solar powered	3 S	S	S	DATUM	
Sensors	3 S	S	S	DATUM	
Cheap	1 (-)	(+)	S	DATUM	
Fast	1 (-)	(+)	(-)	DATUM	
Safety	1 S	S	S	DATUM	
Effectiveness	3 (+)	(-)	S	DATUM	
Easy operation	1 (+)	(-)	S	DATUM	
Total +		5	2	2	
Total S		5	7	8	
Total -		2	3	2	
Overall Score		3	-1	0	
Weighted Overall Score		9	-3	-4	
Rank		1	2	3	

Design Considered: GPS Navigation

Advantages

- Can be solar powered
- Accuracy
- Wireless

Disadvantages

- Cost
- Complexity

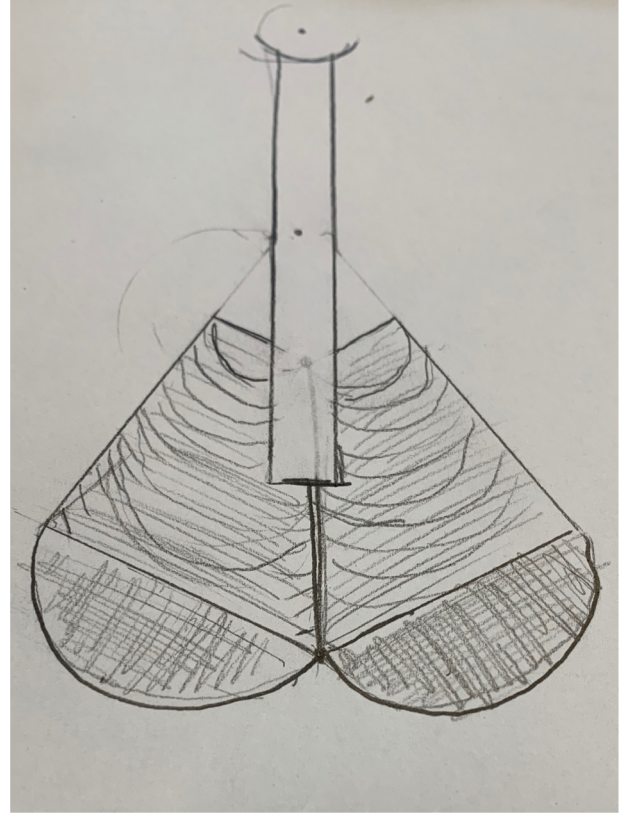
Pugh Chart: Navigation

Criteria	Weight	Design Ideas			DATUM Design
		GPS Navigation	SmartNavi Navigation	SkyPass Navigation	Autonomous Navigation
Doesn't damage ecosystems	5	(+)	(+)	(-)	DATUM
Durable	1	(+)	(-)	(-)	DATUM
Portable	1	(+)	(+)	(-)	DATUM
Easy to find garbage	3	(+)	(-)	(-)	DATUM
Waterproof	3	S	(-)	S	DATUM
Solar powered	3	(+)	(-)	(-)	DATUM
Sensors	3	(+)	(+)	(+)	DATUM
Cheap	1	(-)	(+)	(-)	DATUM
Fast	1	(-)	(-)	(-)	DATUM
Safety	1	S	S	S	DATUM
Effectiveness	3	(+)	(-)	(-)	DATUM
Easy operation	1	S	S	S	DATUM
Total +		7	4	1	
Total -		2	6	8	
Total S		3	2	3	
Overall Score		5	-2	-7	
Weighted Overall Score		17	-4	-15	
Rank		1	2	3	

Design Selected

- Trough Grabber
- GPS Navigation

Trough Grabber



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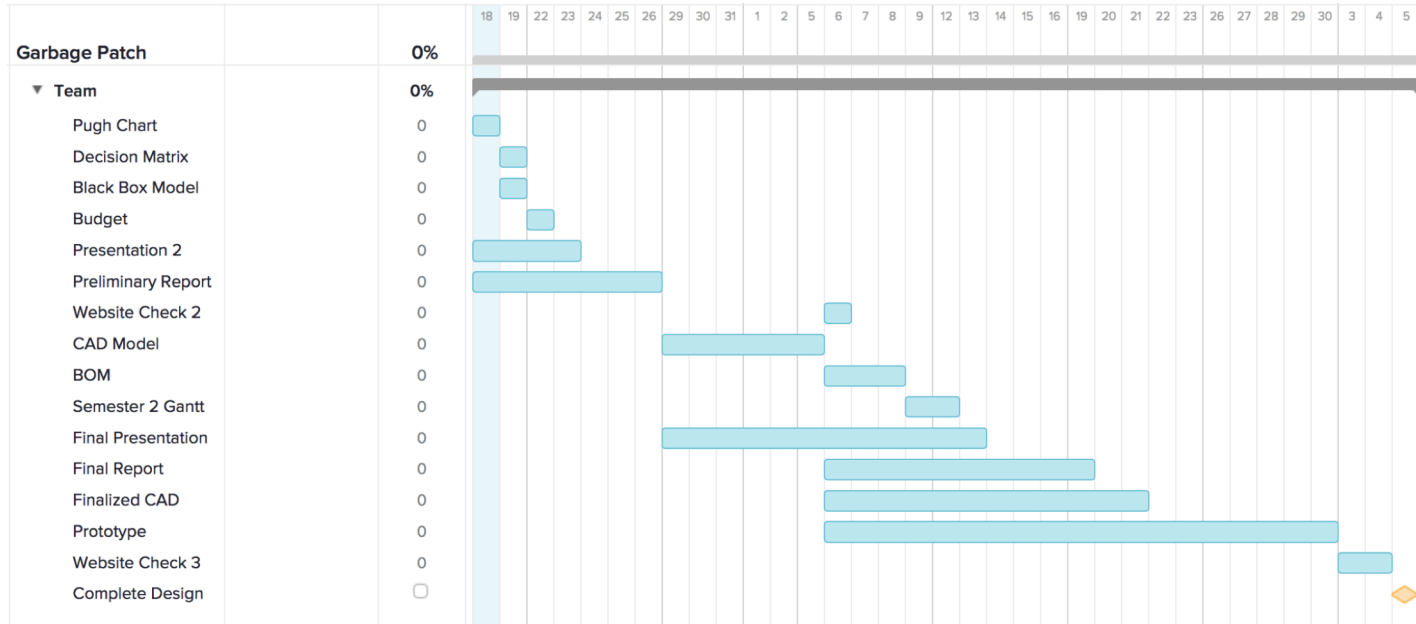
Budget

- Budget
 - \$1500 available
- Anticipated Expenses
 - Boat
 - \$150
 - Solar Panels
 - \$250
 - Grabber
 - \$200
 - Camera
 - \$200
 - Navigation
 - \$300-400
- Expenses to date
 - \$0
 - \$1100-1200 (Expected)
- Resulting Budget
 - \$1500

Schedule

- The team is currently on schedule
- The team divided each team assignment equally for each member

Gantt Chart



References

[1] The Ocean Cleanup, w. (2018). *The Great Pacific Garbage Patch - The Ocean Cleanup*. [online] The Ocean Cleanup. Available at: <https://www.theoceancleanup.com/great-pacific-garbage-patch/> [Accessed 23 Oct. 2018].

Comments and Questions