

Mechanical Overview

Year: 2018 **Semester:** Fall
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Team: 6 **Project:** Garbage Collecting Boat
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Assignment Evaluation:

Item	Score (0-5)	Weight	Points	Notes
Assignment-Specific Items				
Commercial Packaging Analysis 1		x2		
Commercial Packaging Analysis 2		x2		
CAD Model Illustrations		x4		
Project Packaging Specifications		x2		
PCB Footprint Layout		x2		
Writing-Specific Items				
Spelling and Grammar		x2		
Formatting and Citations		x1		
Figures and Graphs		x2		
Technical Writing Style		x3		
Total Score				

5: Excellent 4: Good 3: Acceptable 2: Poor 1: Very Poor 0: Not attempted

Comments:

Comments from the grader will be inserted here.

1.0 Commercial Product Packaging

Since most garbage collecting boat products similar to our project in terms of size are DIY found online, we compared two commercial products in which one is a commercial remote speedboat “Exceed Vyper Electric Powered FiberGlass 920EP RACING Boat” [1] and another one is a commercial professional garbage collecting boat with an actual boat size and requiring onboard operation “Clean River Garbage Collection Boat Floating Garbage Boat” [2].

1.1 Product #1

“Exceed Vyper Electric Powered FiberGlass 920EP RACING Boat” [1] is an RC speed boat equipped with high performance 2848 KV Brushless motor. The product is packaged within a boat made by “lightweight and super strong epoxy resin Fiberglass Vee to increase speed and improve handling and stability” and features two radio channels controlling.

This product has many positive aspects and features in its packaging. First, the product uses lightweight Fiberglass materials to make the boat lighter, faster, and easy to steer with a controller; the boat is relatively spear shape which enhances the boat to run in a faster speed without heavy water drag. The weight of the boat is only about 1600g, the height is 170 mm, and the length is 860 mm. The package also equipped with a 2848 KV Brushless motor so the boat is suited for racing.

There are drawbacks existing in this product since we are making the comparison between this product and our project of garbage collecting boat. The commercial product boat is only suited for racing and entertainment. The product could not provide any ecological and environmental impacts or benefits on the water surface it runs on. The commercial product is only controllable through manual interaction with the addition controller. No information regarding the speed, battery level, and location coordinate could be viewed and sent from the boat to the user.

For our project’s design, the size of the project will be relatively bigger than the analyzed product #1, since more spaces are needed for storing all electrical components including the main microcontroller and raspberry pi microcontroller. The package of our project will also have a conveyor belt in front of the garbage collecting boat, so the feature of collecting floating garbage could be performed. Our boat project also has two triangular shaped heads and rectangular shape bodies on both sides of the boat, which will contain motors with ESC, sensors, and microcontroller. The user-interface allows information regarding the boat viewed from a remote control system.



Figure 1. Exceed Vyper Electric Powered FiberGlass 920EP RACING Boat

1.2 Product #2

The second commercial product is a “Clean River Garbage Collection Boat Floating Garbage Boat” [2] in size of an actual boat. The dimension of the package is 14.5 * 4.2 * 3 meters, meaning the size of this commercial product is way bigger than the design project, and the weight of the product is about 11 tons. This commercial product also requires diesel fuel as the primary power source. The package is built of metal.

There are certain advantages to this commercial product because of its size. Since the package's dimension is larger, the product could cover more water area and collect floating trash about 4000 m² per hour. Also, the storage capacity is 13 m³ which means it could store more trashes before the storage room is full. The package also features both front and rear collection powered by stainless steel collection belts, allowing more trashes being collected by moving in one direction.

Due to its size, this commercial product also faces several disadvantages. First, This product does not have the ability to operate on the small ponds or lakes. Second, while cleaning the water area it operates on, this product also pollutes the surrounding environment by utilizing the diesel fuel as the power source. The product requires at least one man operating in the boat even though the description of the product states “automatic”. Same with the first commercial product being analyzed, the boat could not be controlled from a remote distance thus motoring the information of the boat has to be made on board.

For designing the package for our garbage collecting boat, the body of the boat would be made from cystosepiment which will enable the boat to float on the water efficiently. The size will be much smaller compared with the commercial product so our project will be suitable for cleaning small water areas such as small lakes and ponds. The small size of the boat also means that the boat could be portable which allows the user to transport the boat from location to location easier. The boat is powered by the battery and the battery could be recharged through two different methods: one is charging through the power supply and one is charging through the solar panel.

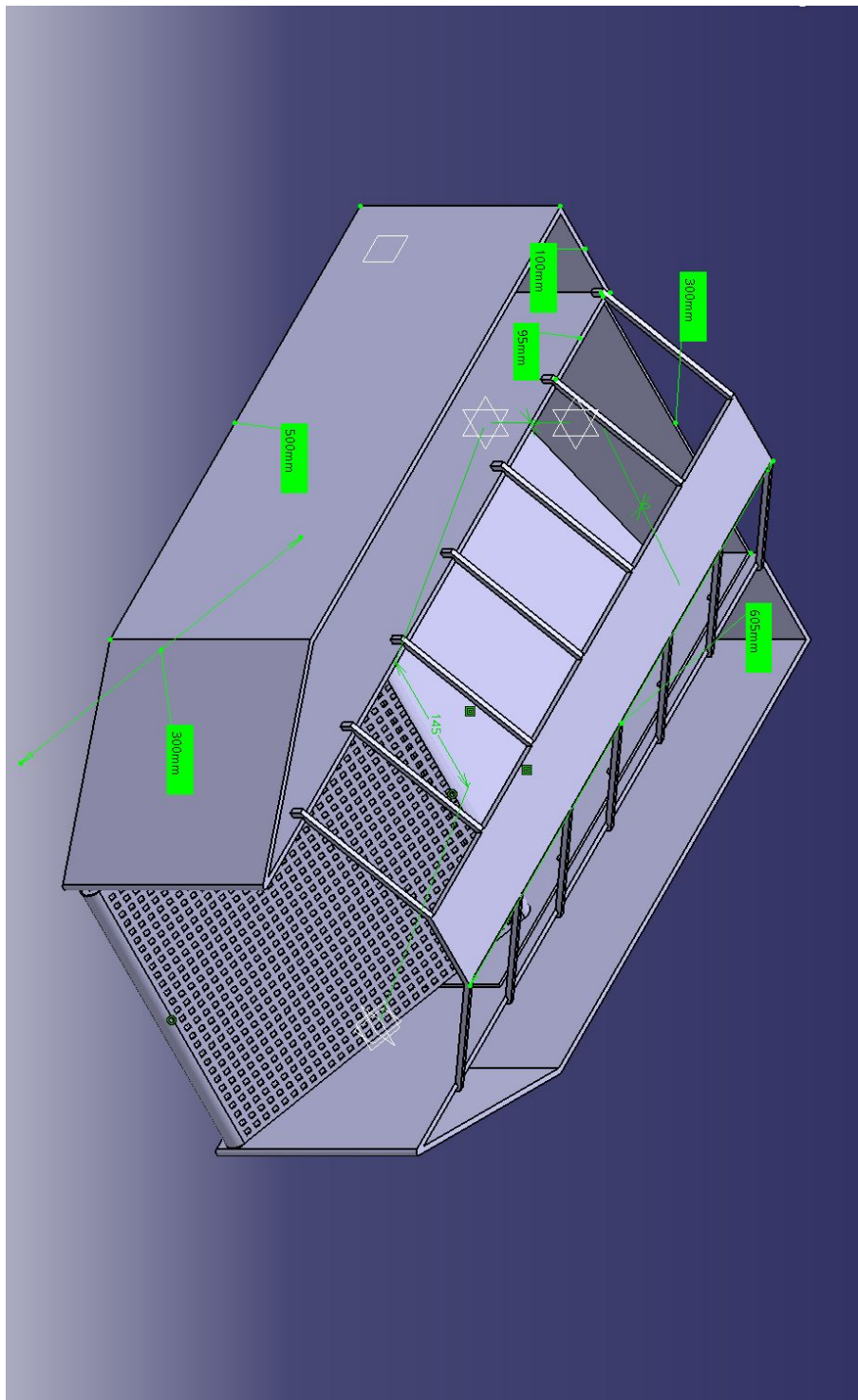


Figure 2. Clean River Garbage Collection Boat Floating Garbage Boat

3.0 Sources Cited

[1] *New Exceed Vyper Electric Powered FiberGlass 920EP RACING Boat ARTR 860mm 50A*. [Online]. Available: <https://www.nitrorcx.com/99b-10015-920-v24-ep-artr.html>. [Accessed: 22-Sep-2018].

[2] “Clean River Garbage Collection Boat Floating Garbage Boat - Buy Garbage Collection Boat,River Garbage Collection Boat,Floating Garbage Boat Product on Alibaba.com,” *www.alibaba.com*. [Online]. Available: https://www.alibaba.com/product-detail/Clean-River-Garbage-Collection-Boat-Floating_1768496404.html?s=p. [Accessed: 22-Sep-2018].

Appendix 1: CAD Model Illustrations

Appendix 2: Project Packaging Specifications

Table1. Material List

Material	Quantity	Weight	Cost
¼ inch plywood	48 in ²	1000 g	\$30
Screws	40	80 g	\$6
Lock Nuts	40	50 g	\$8
Glue	200ml	300g	\$3
Hot Glue	200 g	200g	\$1
Anti Slip Mat	10 in ²	10 g	\$2

Table 2. Tooling Requirements

Tool	Estimated Cost
3D Printing	Free with BIDC
Dremel Tool	N/A
Drill Press	N/A
Hot Glue Gun	N/A
Heat Gun	N/A
File	N/A

Appendix 3: PCB Footprint Layout