

Project Plastic Abatement

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PROBLEM STATEMENT

In order to minimize the amount of plastic present in local rivers and lakes, a fully autonomous rover was designed to collect surface-level plastic.



Figure 1: Image of Plastic Collecting Rover

BACKGROUND

- Plastic waste is an increasing problem as it makes its way from rivers into the ocean. Humans are currently producing an estimated 360 million metric tonnes of plastic waste every year.¹
- Estimates show that up to 19% of coastal plastic emissions originate from river sources which equates to $0.8 - 1.5 \times 10^6$ tons per year.²
- Our goal was to focus on a more localized area (be it lakes or low current rivers) where trash and plastic debris would collect and settle to keep these areas as clear as possible and prevent it from reaching the ocean.

1. Harris, P.T., Westerveld, L., Nyberg, B., Maes, T., Macmillan-Lawler, and M. Appelquist L.R., "Exposure of coastal environments to river-sourced plastic pollution", Science of the Total Environment.
2. Christian Schmidt, Tobias Krauth, and Stephan Wagner, "Export of Plastic Debris by Rivers into the Sea", Environmental Science & Technology

SUMMARY OF WORK

- We built a reliable structure out of PVC pipes in a trapezoid shape. The base has 4 inch diameter PVC while the cross beams are 2 inch.
- We utilized the Durandal H7 PX4 as the "brain". This device runs ArduPilot which allow us to have the rover be fully autonomous.
- We also installed two thrusters on each side of the rover in order to take advantage of differential thrusting.
- Lastly we integrated all our components on a board as seen in Figure 2.

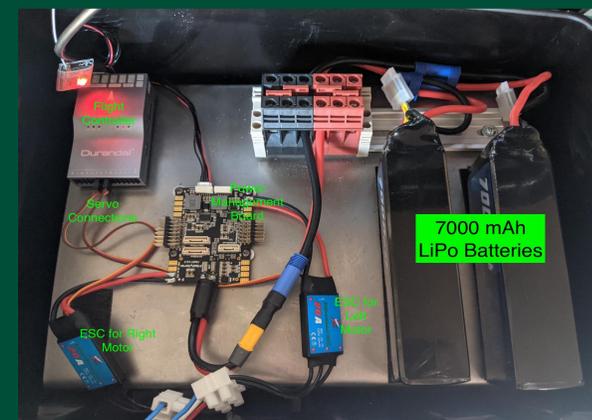


Figure 2: Hardware and Electrical Components



Figure 3: Ground Station

IMPACT ON COMMUNITY

- The autonomous collection of plastic present in local water bodies will minimize the need for human operated vehicles.
- A decrease in plastic present in lakes and rivers will minimize the harm done against marine wildlife.
- Provides a more affordable option for aquatic plastic collection in comparison to models currently available on the market.