Amphibious Waterway Cleaner
- Hull and Propulsion

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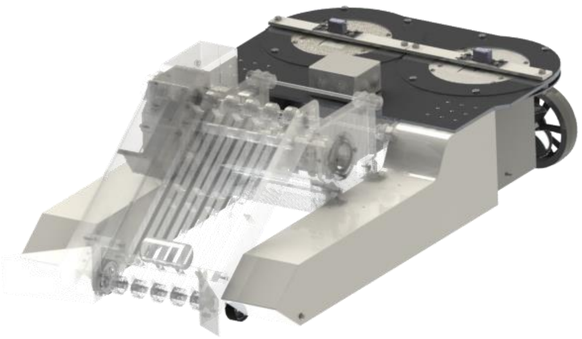
INTRODUCTION AND BACKGROUND

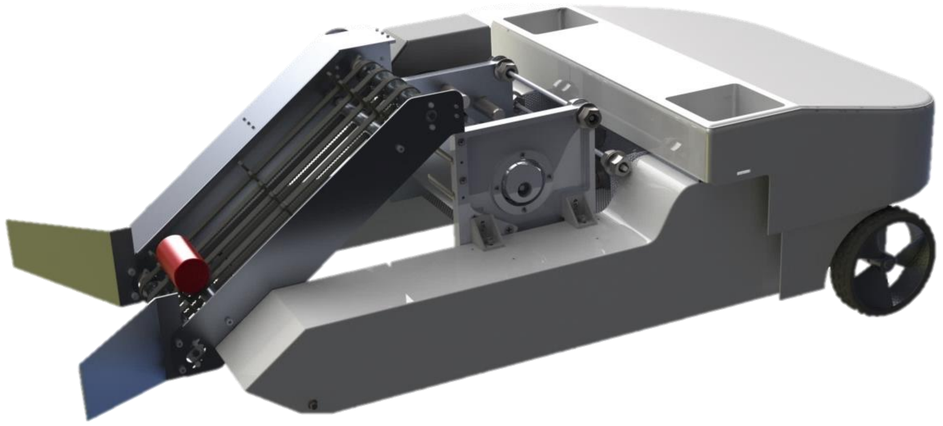
- This Amphibious Robot is designed to collect rubbish from waterways and dispose of it on land.
- Consists of the Collection, Storage & Discharge and Hull & Propulsion sub-assemblies.



1st Iteration CAD model – highlighting the hull and propulsion assembly

FEATURES

- Cleans up to 500ml bottles and cans in a 1-mile radius from starting point.
- Can transition between water and land propulsion modes.
- Sub-assembly dimensions:
  L: 1.37m W: 0.74 m H: 0.37 m
- The propulsion system can achieve speeds of up to:
  3km/h in water, 4.5 km/h on land
- The robot is controlled using a remote control.



2nd Iteration CAD Model for the complete assembly

MANUFACTURE AND ASSEMBLY

- 1st Iteration budget of **£2370** approved.
- Testing was carried out to validate the proof of concept of the design.
- Integration of 3 sub-groups done by attaching the Collection and Storage assemblies to the hull.

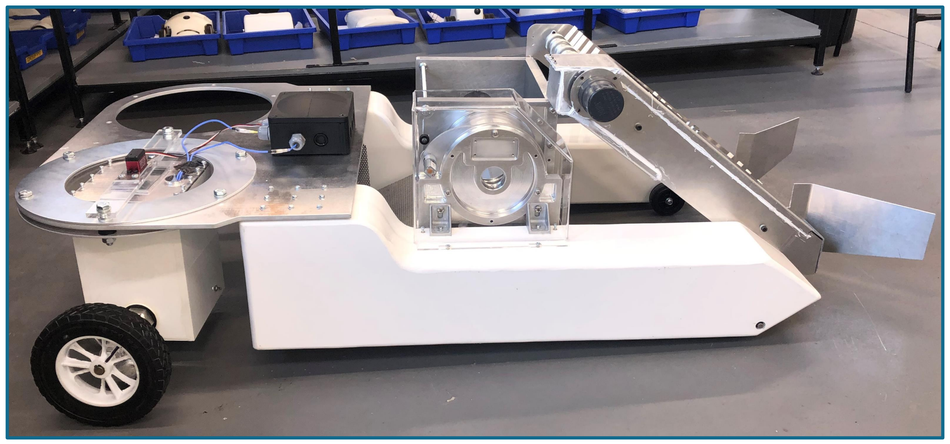
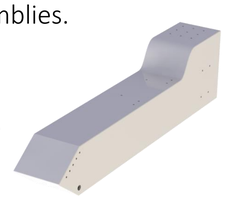


Image of the Manufactured Assembly

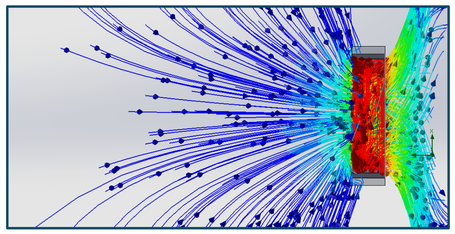
HULL DESIGN

- Catamaran inspired design: natural stability & unrestricted access to other subassemblies.
- Cut, Bent and Welded from Polypropylene.
- Tank-style steering used.



PROPULSION SYSTEM

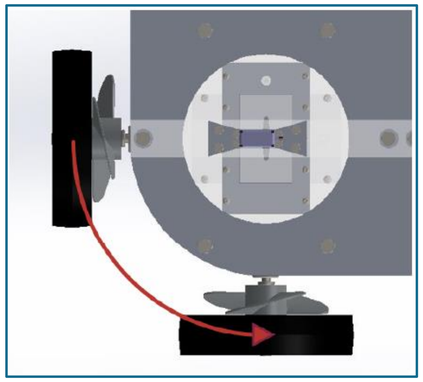
- Single DC motor for land and water operation.
- Uni-body aluminium propeller-wheel
- CFD used for optimized water flow and adequate thrust.

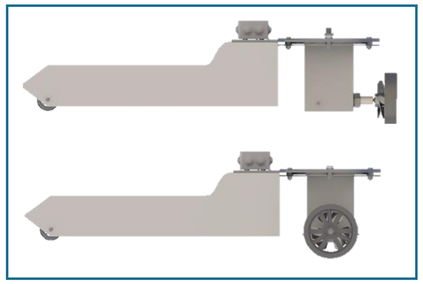


Top – Propulsion system housing the DC motor and propeller-wheel
Bottom – CFD analysis of the propeller-wheel

TRANSITIONING

- Propeller-wheel assembly is rotated 90° using servomotors.
- Water mode: Propeller is engaged.
- Land mode: Wheels are engaged.





Top – Propeller-wheel rotates 90 degrees using servomotors
Bottom – Robot in water and land mode (top to bottom)

2ND ITERATION IMPROVEMENTS

- Ball bearing transition mechanism.
- Watertight Motor Arms.
- Cover.
- Unibody propeller-wheel.