Marine Debris Collector

Green A: Sketch Model Review

The Debris Collecting Vessel

- Pontoon boat $525
  - Capacity 400 lbs
  - Length 9 ft, width 5 ft
  - Floats in 3” water
- Trolling motor $300
  - Electric (no fuel spills)
  - Speed 1-2 mph

Most Critical Module:

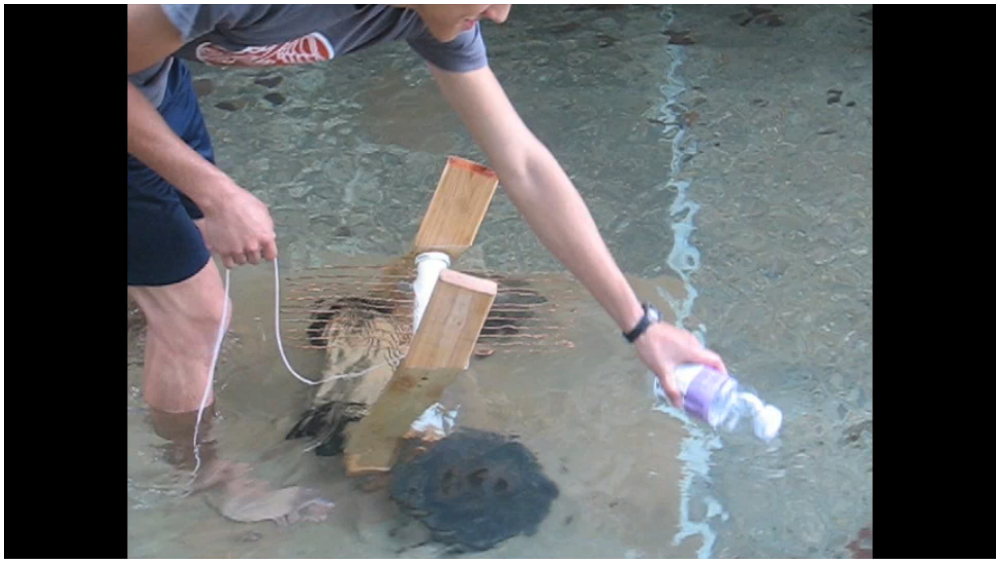
- Mechanism for picking debris up out of the water

Mechanism Idea: Paddle Wheel

- Concept
  - Frame with screens rotates
  - Power calculations show possible to power by human
- Testing
  - Screens create large drag force
  - Debris may cling to screens

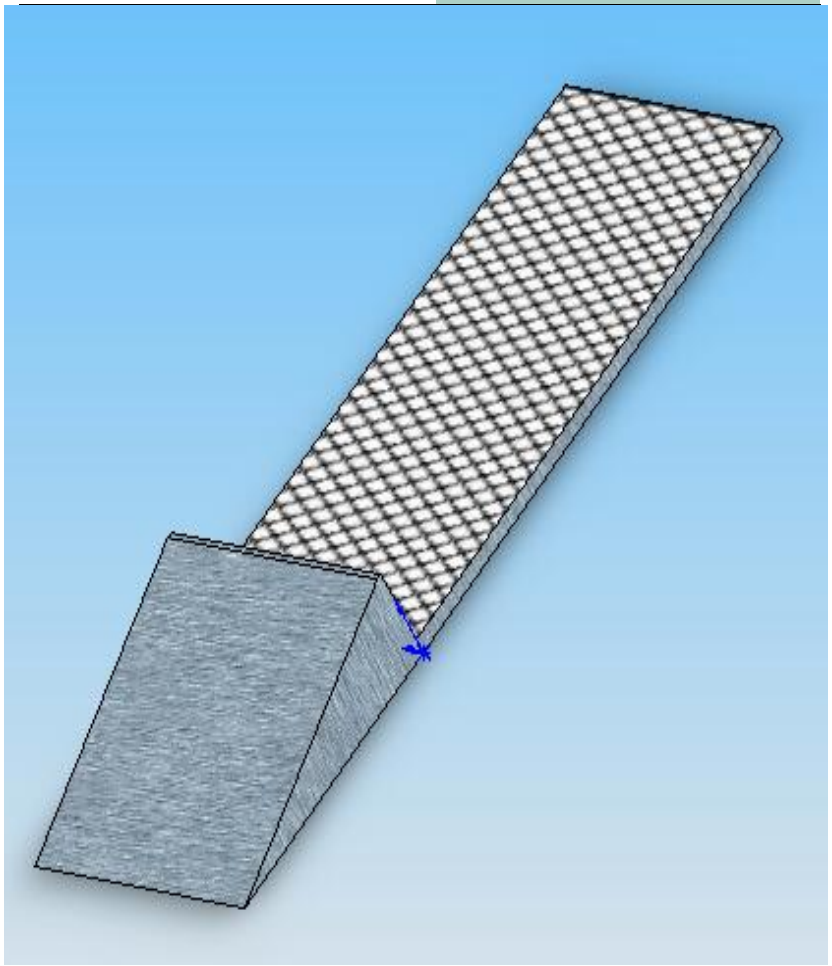
Mechanism Idea: Rake Wheel

- Concept
  - Similar to paddle wheel, but collection bin has raked front, allowing debris to be removed from wheel
- Testing
  - Successfully captured trash
- Further issue
  - Still possible to have clogging issues with seaweed



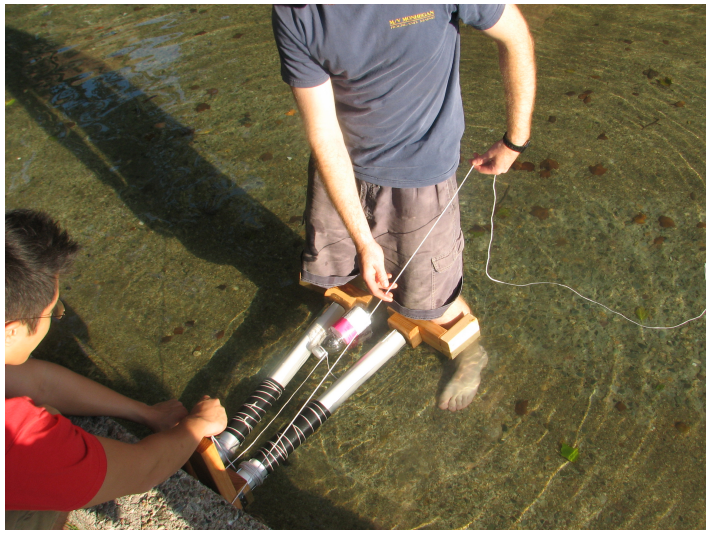
Mechanism Idea: Momentum

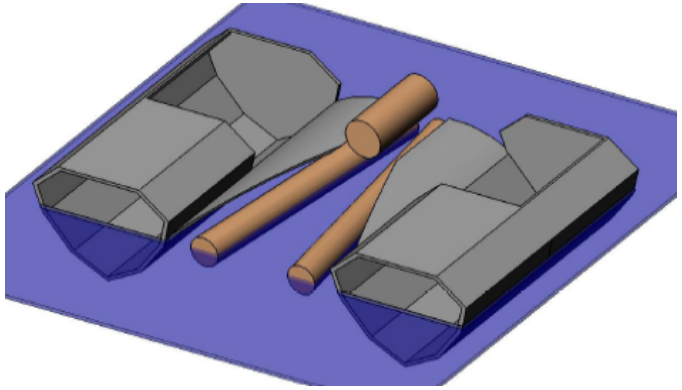
- Concept
  - Incline plane uses momentum to move water and debris into netted holding area
  - Force of friction must be less than inertial force, if dry motion
- Testing
  - Large force on the inclined plane
  - Force varies with shape of wedge



Mechanism Idea: Rollers

- Concept
  - Angled rollers rotate bottles, not seaweed, into bins
  - Uses water drag to push trash against rollers
- Testing
  - Bottles stay on top of rollers
- Further issues
  - Need third roller to move debris into bins
  - Spring joint to prevent jamming





The Problem

- Current Practice
  - labor and time intensive
  - use fishing nets
  - ~20 bottles per outing
  - 88% of floating debris collected in the Boston Harbor is smaller than a plastic bottle

Market and Customer Needs

- Coastal and marine waters
  - generate $54 billion in goods and services
  - support 28.3 million jobs
  - polluted by 4,500 tons of coastal trash yearly

- Customer Needs
  - manned one-person operation vessel
  - collects more per outing than manual methods (100 pieces of debris per outing)
  - ability to collect along coasts

Future Work

- Waves and water conditions
- Seaweed
- Marine life
- Vessel maintenance
- Larger scale