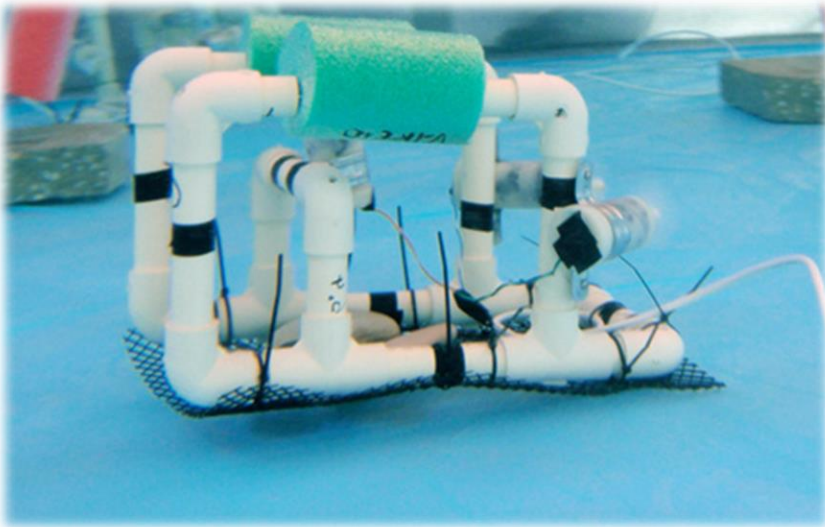
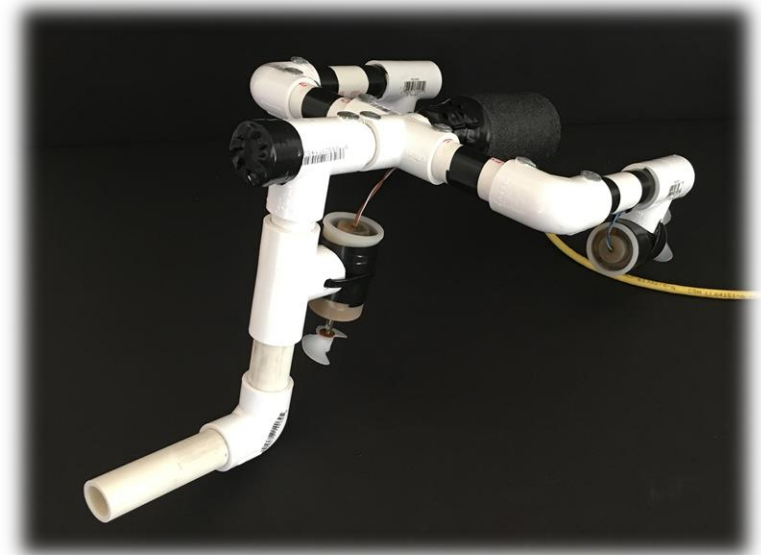


# SeaPerch

## Design Challenge and Construction Overview



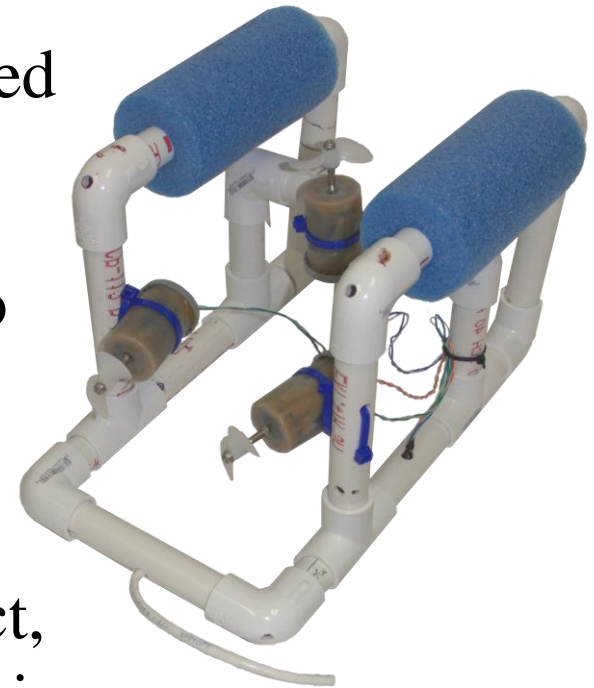
Standard SeaPerch ROV



Custom SeaPerch ROV

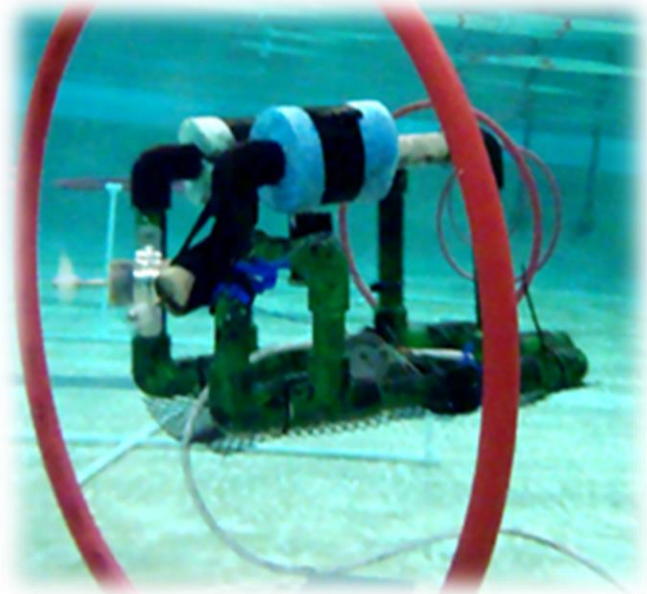
# Introduction

- The SeaPerch is a simple, yet dynamic, ROV (remotely operated vehicle) created from PVC pipe, motors, and floats.
- Teams will utilize the design process to create an ROV that meets this year's specific challenge(s).
- Students will work in teams to construct, test, calibrate, revise and deploy a working ROV for the mission.



# The Design Challenge

- Teams will work in groups of 2-4 students to complete this challenge.
- The ROV is expected to:
  - Navigate underwater and perform various task.
- Each team is responsible for creating their own design sketches and document the process in an engineer notebook.



# The Design Challenge

Each team is expected to:

1. Create 4 different sketches of your ideas for a structural system (the PVC pipe).
2. Evaluate your ideas collaboratively.
3. Select a final design idea (standard or modified structure).
4. Draw the final idea for the structure.
5. Explain reasons and benefits for your final choice (in writing).

# Design Constraints

- The frame is made of ½” PVC pipe.
- The frame must hold the propulsion assemblies (encased motors with propellers), floats, and weights (as needed).
- The motors are positioned on the frame.
- The motors are expected to submerge, surface, move forward, backwards, and turn the ROV.
- The ROV is powered by a 12-volt battery and tethered to the control box, which allows the student to maneuver the ROV.

# Design Constraints

Each team will use materials from the SeaPerch ROV kit which contains the following:

## Frame Parts

- 10 PVC 1/2" - 90 Degree Elbow
- 6 PVC 1/2" x 12" - Straight Pipe
- 4 PVC 1/2" - Tee
- 1 Mesh - 12" x 8" - Black Polyethylene
- 2 Pool Noodle - 5" Piece
- 15 Cable/Zip Ties - 6" Black
- 6 Tie Wraps - Motor Mount - 11-1/4" - Blue

## Controller Parts

- 1 SeaSwitch Control Box Kit
- 1 18 Aww Speaker Wire - 6'
- 1 Alligator Clips (Set of 2)
- 1 Black Alligator Clip Insulator
- 1 Red Alligator Clip Insulator

## Propulsion Assembly Parts

- 3 12 VDC Motor. 0.7 A - Shaft Diameter "0.091"
- 3 Film Canister - 35 mm or Plastic Vial - 50 ml
- 3 Propellers - Plastic 1/8" Shaft Size
- 3 Propeller Shaft Threaded Coupler
- 3 Threaded Insert Tee Nut
- 3 Nylon-Insert Hex Locknut 4-40 - Stainless Steel
- 1 50 ft. 350 MHz Cat 5e Stranded Cable W/RJ-45
- 1 Velcro Cable Tie
- 3 Water Proofing Diecut Set for Motors

# Tools

In order to build the SeaPerch ROV, teams will use a variety of tools. The following list of tools are tools contained in the SeaPerch Tool Kit:

Power Drill – Corded

1/4" Drill Bit

3/32" Drill Bit

Phillips Screwdriver - #2 x 4"

Wire Cutters

Needle Nose Pliers

Nut Driver - 1/4" Non-

Magnetized

PVC Cutter - Ratcheting

Adjustable Vice - Clamp-On

Scissors

Soldering Iron - 25 Watts

Soldering Iron Stand

Desoldering Pump

Sandpaper Sheet - 220 Grit

Digital Multimeter

Krazy Glue

Alligator-Alligator Motor Test Leads

Electrical Tape

Water Proofing Diecut Set for

Motors

# Construction Overview

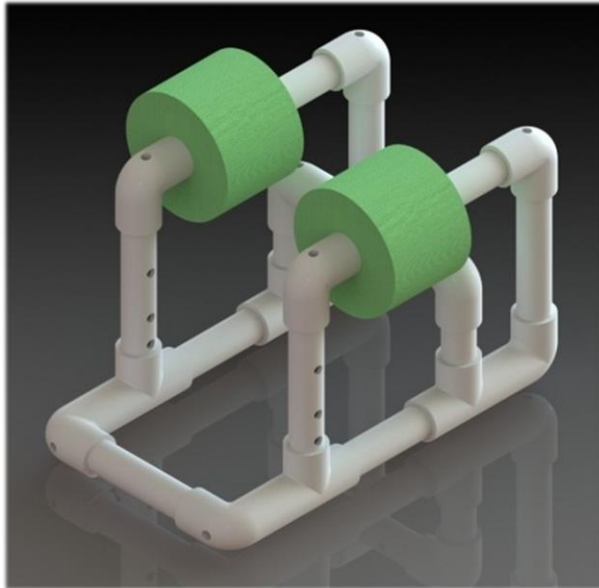
- There are four different steps to the construction of a SeaPerch ROV:
  - Structural System
  - Mechanical System
  - Electrical System
  - Integration/Quality Control/Testing





# Structural System

- Design the frame to be made out of ½” PVC pipe.
- The frame must hold motors, floats, netting, and weights as needed.
- Teams may use a standard structure (pictured at left) or develop a modified structure design of their own.



# Mechanical System

- Identify the position and direction for the three propulsion assemblies.
- The propulsion assemblies must power the ROV to provide the following movements:
  - Forward & reverse
  - Turn left & right
  - Submerge & surface
- The motors must be sealed in the canisters using wax or must otherwise be waterproofed.

