Preliminary Design Review

February 10, 2020

RoboBoat 2020

Team Introductions

Brandon Bascetta
Mechanical Engineer

Toni Weaver
Mechanical Engineer

Courtney Cumberland
Mechanical Engineer

Toni Weaver

Sponsor and Advisor

Technical Advisor
Dr. Joshua Weaver

Engineering Mentor/Academic Advisor
Dr. Damion Dunlap
Department Head

Project Mission Statement and Background

Toni Weaver

Project Mission Statement

The mission of this team is to design and manufacture the hull of the 2020 roboboat competition boat. The mission of this team is to also create software that will allow the boat to achieve basic waypoint navigation.

Toni Weaver

Project Background

Roboboat is an autonomous boat competition, created by Robonation and Sponsored by Office of Naval Research, Naval information Warfare Center as well as by several corporations.

Toni Weaver

Project Background

- Last year the Seminole Coast team did not use any design criteria for the design of the boat.
- This resulted in a capsizing of the boat.
- To prevent this from happening this year the team is tasked with designing the boat based on methods learned in EML 4550: Engineering Design Methods.

Toni Weaver

Boat Task/Definitions

Courtney Cumberland

Considerations for Boat Design

- Boat Tasks
- Physical Boat Requirements
- Environmental Conditions

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Boat Tasks:

- **Mandatory Navigation Channel**: "*demonstrate basic autonomous control and sensing capabilities"* -www.RoboBoat.org
- **Obstacle Channel**: *"demonstrates the ability to sense and maneuver through a complex path, staying within the defined pathway, and avoiding contact with obstacles along the way" -www.RoboBoat.org*
- **Obstacle Field**: To demonstrate complex path planning
- **Acoustic Docking**: "*demonstrate the ability to detect an underwater acoustic signal, localize to the source, and maneuver into and out of a defined area. The vehicle executes a sequence of docking and undocking maneuvers based on which beacon is active*. "-www.RoboBoat.org
- **Objective Delivery**: "*Successful completion of the Object Delivery requires delivery of up to four (4) objects to a target area*." –www.RoboBoat.org
- **Speed Gate**: *"Successful completion of the Speed Gate task demonstrates the ASV's hull form efficiency coupled with its propulsion system, and the resulting maneuverability."*- www.RoboBoat.org
- **Return to Dock**: "*demonstrate the ability to navigate back to the launch point while avoiding interaction with any obstacles"* –www.RoboBoat.org

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Boat Requirements:

- Size of Vessel: 6’ x 3’ x 3’ Maximum
- Weight: Must weigh less that 140 pounds; ideally under 110 pounds for bonus points
- Autonomous: Must be able to navigate and decision make on its own
- Power Source: Must be battery powered
- Safety: Must have a manual and wireless kill switch
- Must be remote-controllable, towable and provide visual feedback

Environmental Conditions:

- Fresh Water
- Lake: indicates no to small tide variance, little to no swell (waves)
- Some Wind effects

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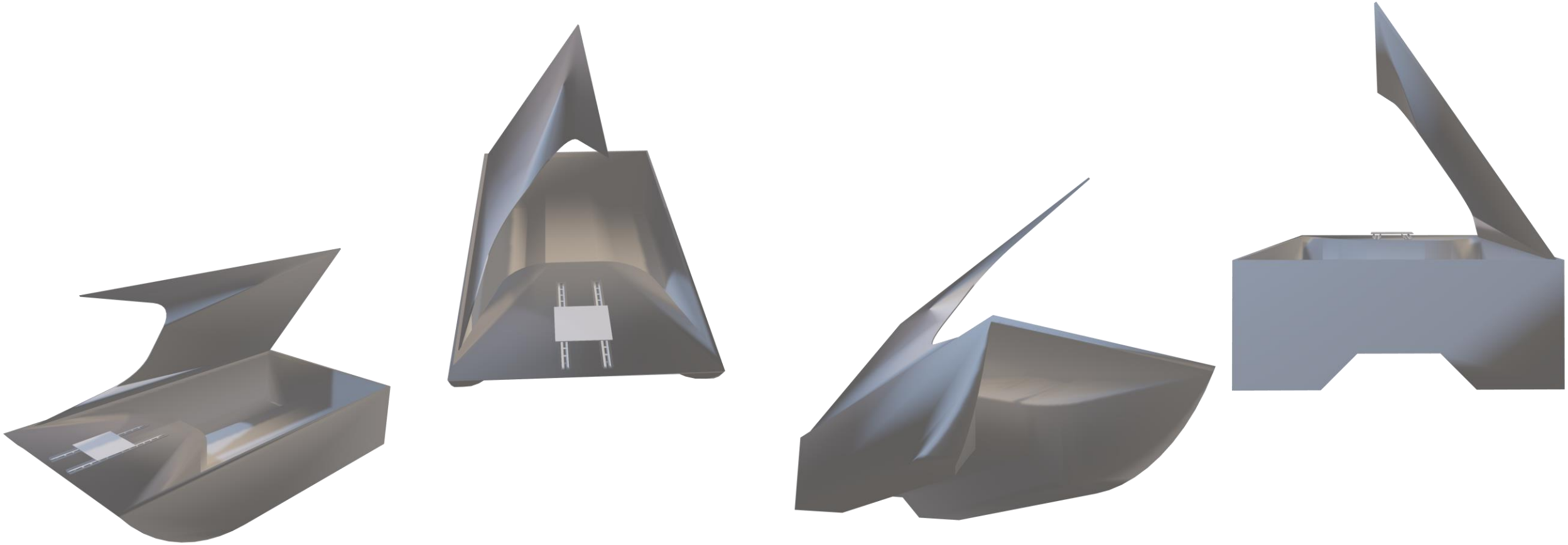
Boat Design Update

Brandon Bascetta

Previous Boat Design



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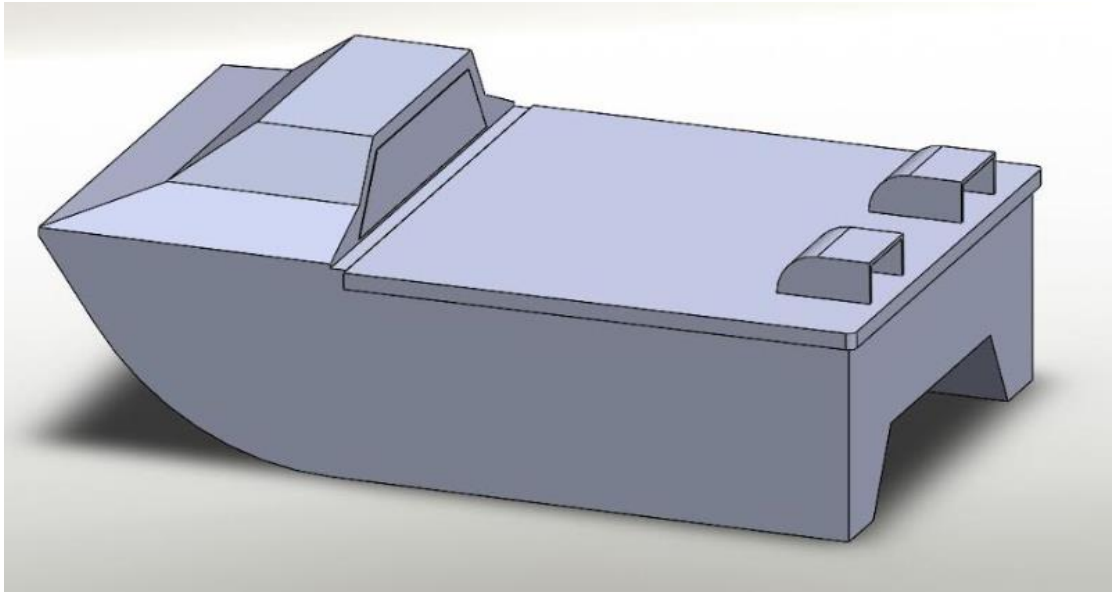
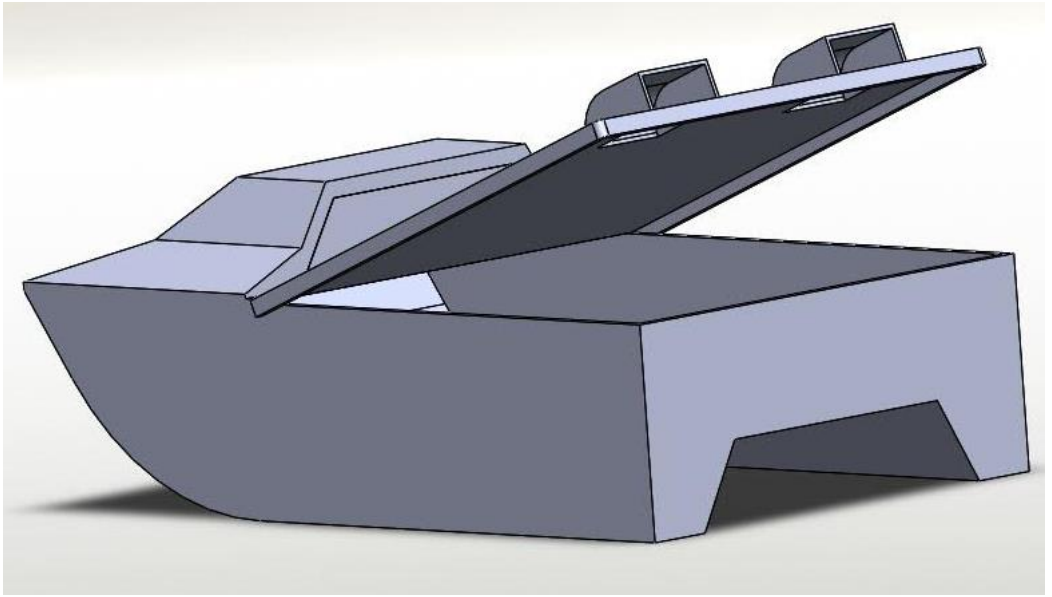
Design Status





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PROPOSED BUDGET

Toni Weaver

Budget

Material	Total
Mold	$ 66.00
Fiberglass	$163.00
Resin	$ 90.00
Paint	$ 80.00
Hardware	$ 146.00
Supplies	$ 100.00
Miscellaneous	$ 100.00
	$ 745.00

Toni Weaver

Detailed Budget

Material	Amount Needed	Cost Per Unit	Total
Mold			**$66.00**
• Foam (.5” x 4’ x 8’) • 3M #77 Spray Glue • 2” Drywall Screws	2 sheets 3 cans 1 box	$15.00 /sheet $10.00 /can $ 6.00 /box	$30.00 $30.00 $ 6.00
Fiberglass • 6 ounce plain weave	20 yards	$8.15	**$163.00**
Resin	1 gallon	$90.00	**$90.00**
Hardware			**$146.00**
• Latches • Hatch supports • Hinges • Weather Stripping • Eyebolts • Green Rope	2 2 2 10 feet 4 15 feet	$20.00 $25.00 $10.00 $1.00/foot $4.00 $0.62 /foot	$40.00 $50.00 $20.00 $10.00 $16.00 $10.00
Tools / Supplies			**$100.00**
Brushes, Rollers, Tarp, Sandpaper, Containers,			
Miscellaneous			**$100.00**

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Total Budget For Competition

Competition Costs	$ 12,310
Lodging for the Week	
Uniforms	
Food	
Sensor Costs	**$ 29,988**
Propulsion	
Vision	
Localization	
Safety Mechanisms	
Power	

Tools Costs	$ 1,642
Dremel Tools	
Tools Sets	
Storage	
Misc. Items	**$ 1,695**
Cart for hauling boat	
Battery Charger	
Wire	
Tape	
Etc.	

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PROPOSED SCHEDULE

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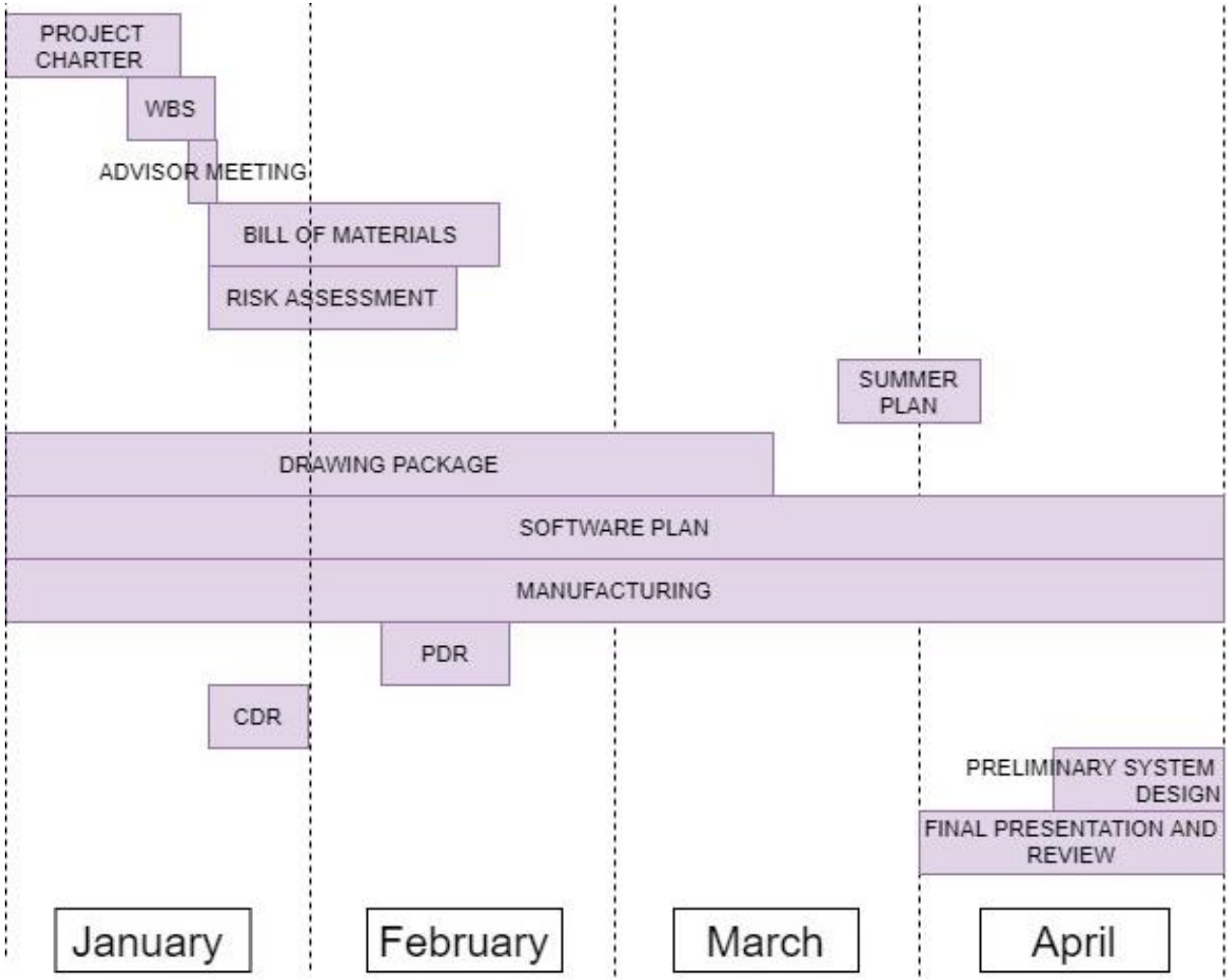
Schedule/Gant Chart



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MANUFACTURING

Courtney Cumberland

Materials

6 Ounce Plain Weave Fiberglass Cloth

Resin

Latches

Eyebolt

Green Rope

Courtney Cumberland

Manufacturing Plan

Manufacturing of the boat will follow the following steps

1. Forming mold of boat out of foam
2. Testing mold for buoyancy
3. Spraying releasing agent over mold for easier removal of final boat
4. Laying Fiber glass in boat mold
5. Removing fiber glass boat from foam mold
6. Painting fiber glass hull

HPMI
HIGH–PERFORMANCE MATERIALS INSTITUTE

Tallahassee FSU High Performance Materials Institute will be assisting in boat manufacturing technique and procedure.

Courtney Cumberland

QUESTIONS?

Thank you for your time