

18th annual

RoboBoat 2025

Week of March 4, 2025

Nathan Benderson Park | Sarasota, FL

Primer & Task Ideas

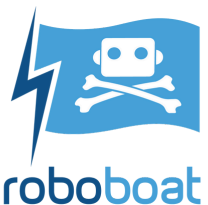
Environmental Monitoring: Guardians of the Waters

In a world where our waters are under siege...

Pollution spreads, marine life suffers, and climate change threatens to upend the delicate balance of Earth's oceans. But when the planet's future hangs in the balance, a new breed of heroes emerge - not from outer space, but from the vastness of the ocean.

Meet the **Guardians of the Waters**, a team of ASVs, armed with powerful autonomy and a cutting-edge mission to protect our blue planet.

ASV = Autonomous Surface Vehicle





Why RoboBoat?

- Increase technical proficiency;
- Establish valuable professional connections; and
- Enjoy learning and collaborating while advancing the technology of ASV systems.

The nominal winners are teams that score the most points. The real winners are participants who learn lasting lessons about working together to create an autonomous system to accomplish a challenging mission in a complex environment.



18 YEARS

Surface Vessel Full Autonomy Acoustic Navigation



- **Objective:** Build an international community of innovators ranging from high school to higher education, capable of making substantive contributions to the maritime field and pushing development of small-scale (X-Class) Autonomous Surface Vehicles (ASV).
- Teams must be comprised of:
 - 75% or more full-time students (college and/or high school)
 - Three (3) team members are required to travel to competition
- Participation in the RoboBoat Competition includes:
 - Building an ASV to compete, following RoboBoat's vehicle and safety requirements.
 - Providing design documentation discussing the team's technical design and competition strategy.

Find out more.

Contact RoboNation at competitions@robonation.org



All teams must build an ASV to compete; only one vehicle in the competition.



Teams must be comprised of:

- 75% or more full-time students
- 25% or less alumni



Most team members must be college or high school students. Teams may also include middle school students. Interdisciplinary teams are encouraged.



Minimum of three (3) team members.

COMPETITION



Autonomy Challenge

Build an ASV to showcase autonomous performance.



Design Documentation

Prepare documentation showcasing ASV design and competition strategy.

- *Team Website*
- *Technical Design Report*
- *Team Intro Video*
- *Design Presentation (in-person)*
- *System Assessment (in-person)*



What next?

Continue reading through the **CHALLENGE** presented to RoboBoat teams this season.

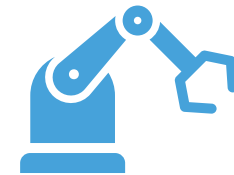
Autonomous behaviors evaluated in this year's challenge include...



Navigation



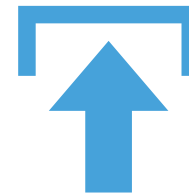
Detection



Object
Delivery



Object
Avoidance



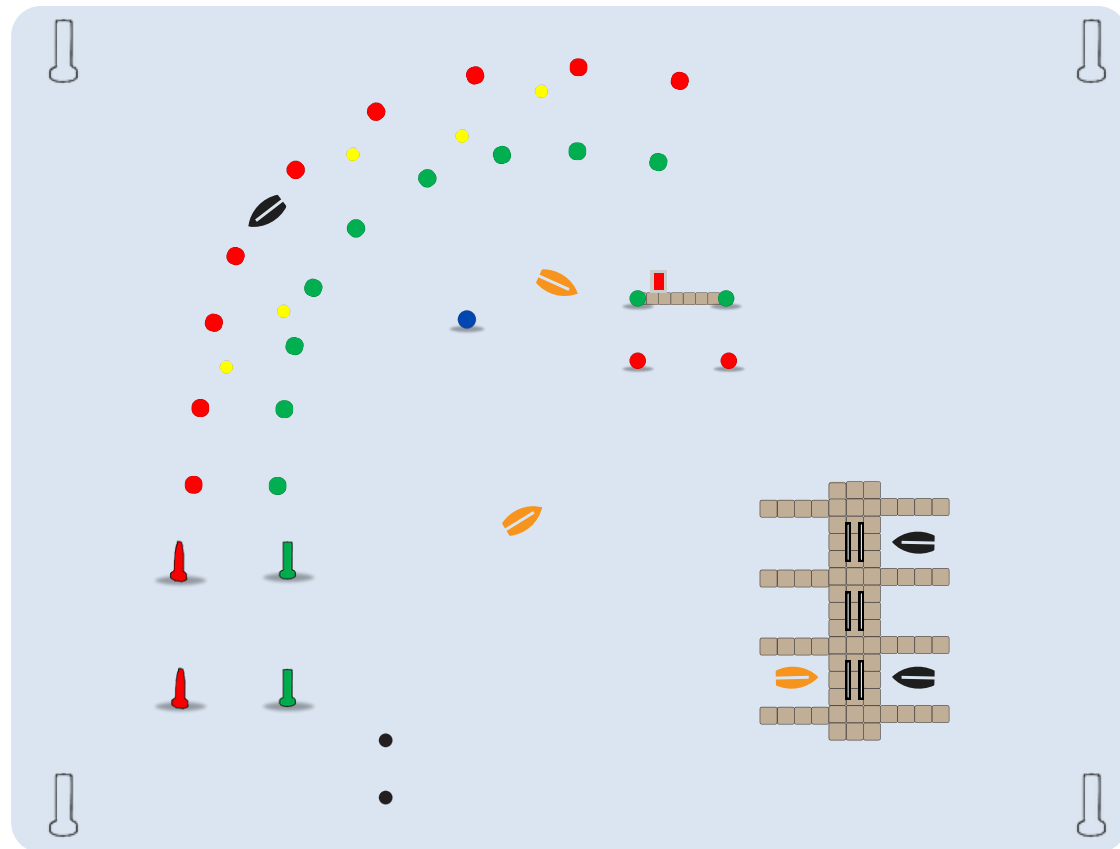
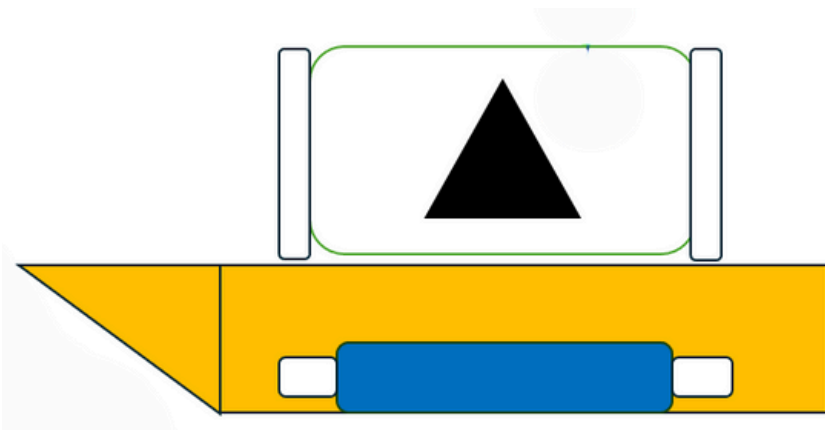
Station
Keeping



Two-step
Behaviors

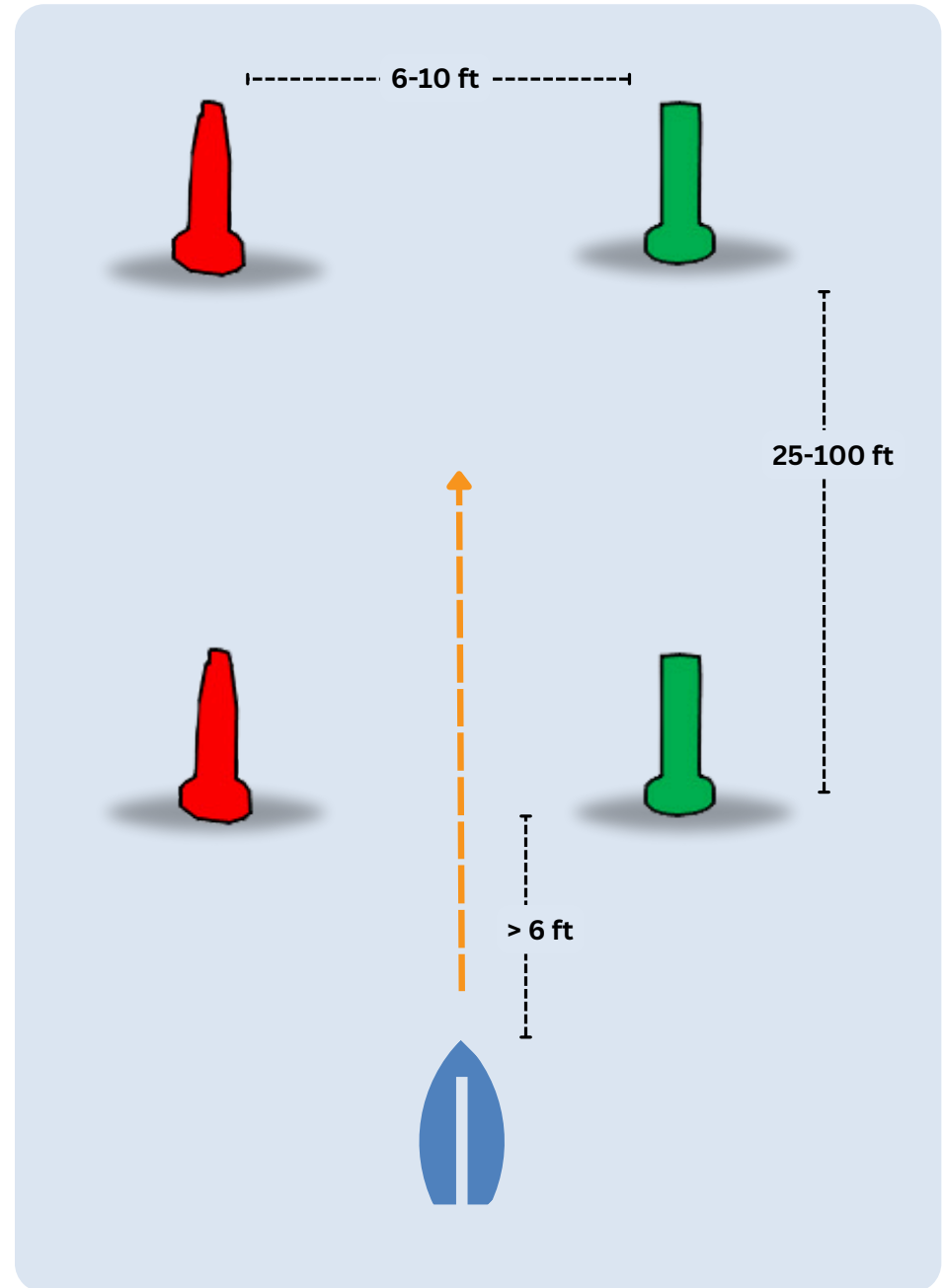
What's New for RoboBoat 2025

- This year introduces the concept of dynamic interactions with other vessels on the course.
- These vessels will be moored in different areas throughout the course.
- Teams will need to detect, classify, avoid and interact with all the vessels in order to earn maximum points during the run.
- See Task 5 for more information.



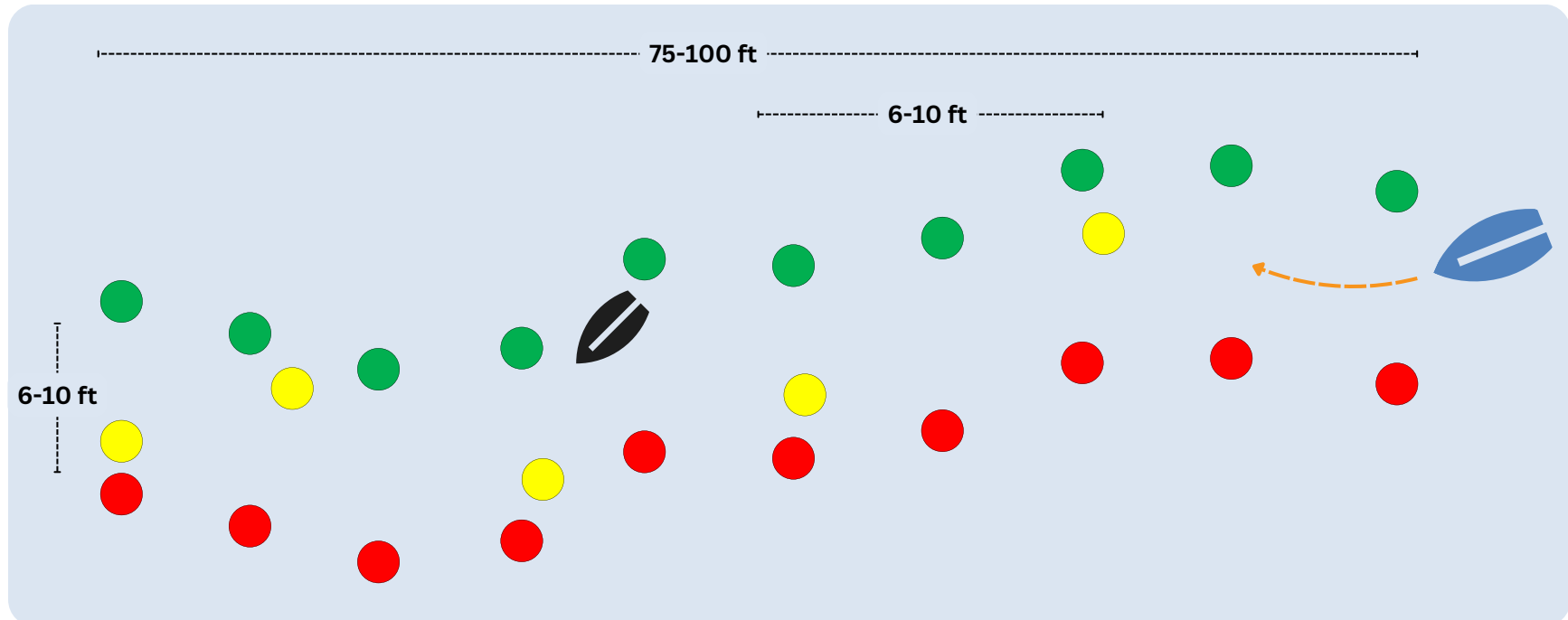
Task 1: Navigation Channel

- Mandatory before attempting other tasks.
- ASV passes through two sets of gates.
 - Gate: pair of red and green buoys
 - ASV starts autonomous navigation at a minimum of 6 ft. before the set of gates.



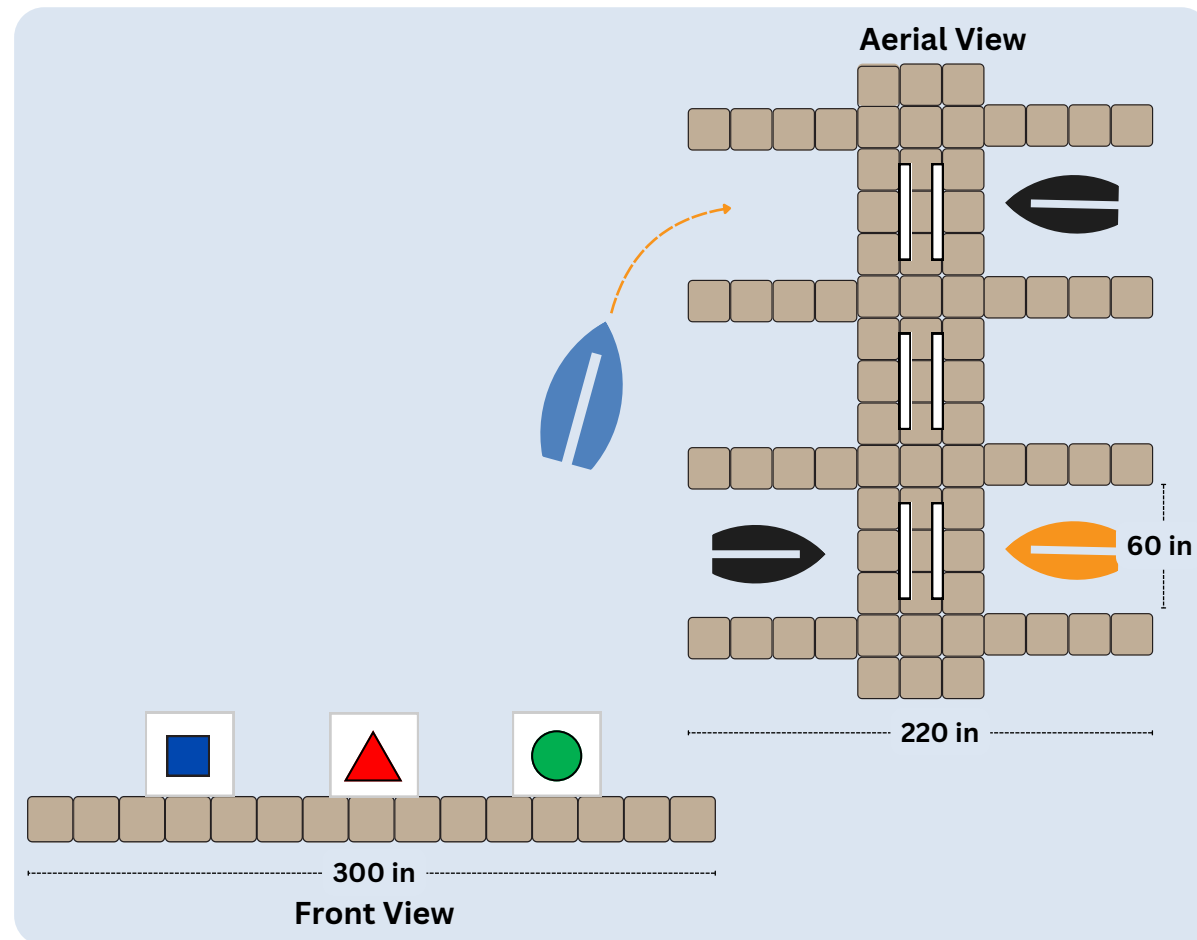
Task 2: Mapping Migration Patterns (Follow the Path)

- ASV navigates through a pathway of multiple sets of gates, counting and avoiding intermittent endangered species (yellow buoys).
- ASV detects the number of endangered species (yellow buoys) and reports its findings using one of the methods outlined on page 14, 'Reporting Guidelines'.



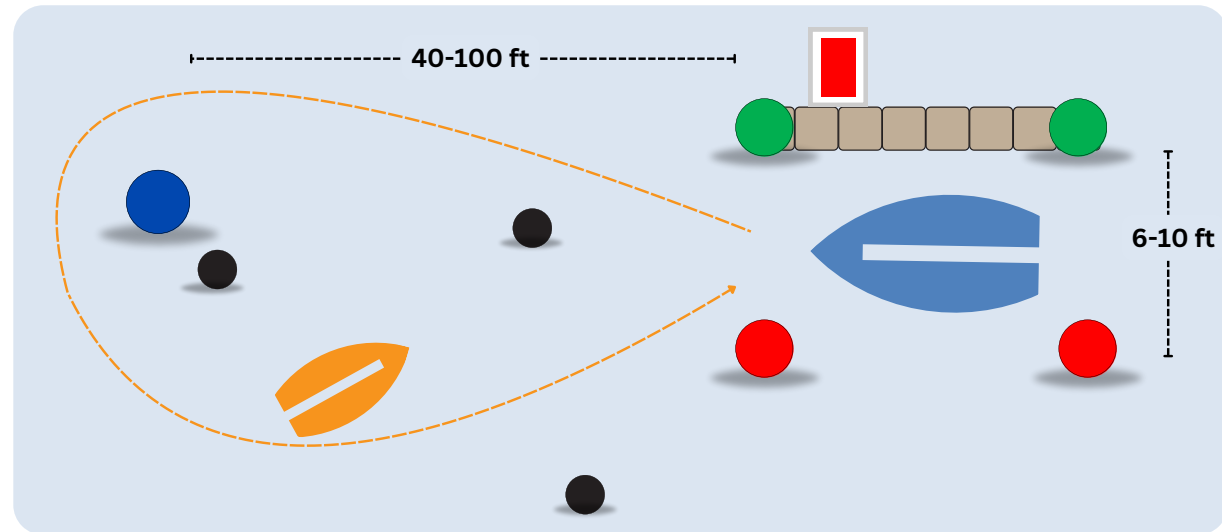
Task 3: Treacherous Waters (Docking)

- To navigate treacherous waters, the ASV detects the appropriate path and enters an empty docking bay with the correct color/shape of the day. A number of docking bays will be occupied by other “boats.”
- If the ASV encounters the correct bay is occupied, they then must avoid that bay and look for another with the same symbol / color that is available.
- Docking bays could have banners with any of the following:
 - Shapes – circle, triangle, square, plus sign
 - Colors – blue, green, red



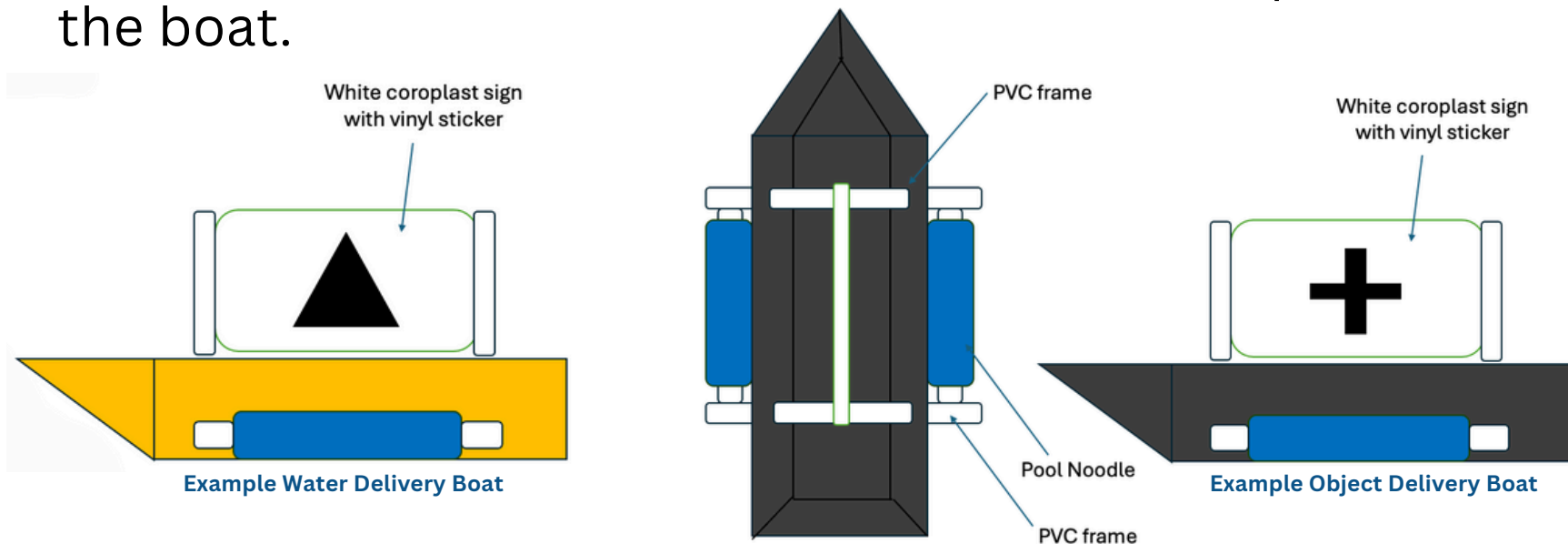
Task 4: Race Against Pollution (Speed Challenge)

- ASV enters a holding bay and observes the light panel. The light panel will change to green, indicating the ASV to pass through the gate buoys, maneuver around the blue marker buoy, and exit through the same gate buoys, as quickly as possible.
- During the maneuver, the ASV detects oil spills (black buoys), reporting its finding using one of the methods outlined on page 14, 'Reporting Guidelines'.
- The timer starts when the light panel turns green and stops when the bow (front) crosses the first set of gate buoys.



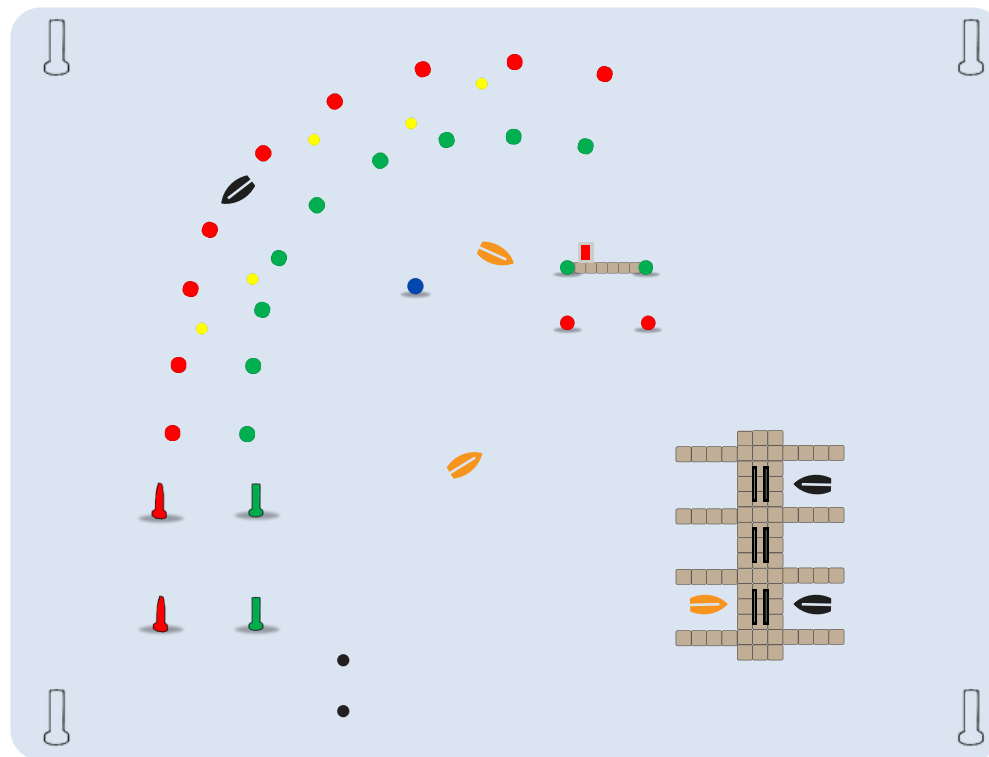
Task 5: Rescue Deliveries (Object and Water Delivery)

- ASV detects up to 3 orange boats that are anchored throughout the course, with a black triangle shape fixed to both sides of the boat. ASV should deliver water on the triangle.
- ASV detects up to 3 black boats that are anchored throughout the course, with a black plus shape fixed to both sides of the boat. ASV should deliver racquetball(s) to the boat.



Task 6: Return to Home

- ASV returns to start of course in autonomous mode, maneuvering through a pair of black buoys positioned near the start of the course.
- Some points will be earned for completing the run through the pair of black buoys. More points will be received based on the tasks attempted/completed in the run.



Time Bonus:

Multiplier applied to overall points earned, based on the number of seconds remaining on the timeslot clock.

Reporting Guidelines

- Task 2 and 4 require the ASV to report the number of detected objects (yellow or black buoys) for maximum points. This can be done one of two ways. After the ASV has completed the task:
 - Method 1: The ASV may perform a maneuver consisting of driving in circles or rotating (in Yaw) in place, where every 360 degrees of rotation signifies one object detected.
 - Method 2: The number of identified objects may visually be reported on the ASV's operator control system or computer provided by the teams. The teams must notify a judge to be ready to observe the report at the end of the task. This visual display must be clear to read, with the number display font size no less than 0.5" tall and persist on screen without intervention for at least 30 seconds.
- Either method must be completed before the ASV moves away from the task being reported on.
- Any report made before the ASV has entered the task will not be considered for points.

JAN 2024

Pre-Competition
Submission
Deadlines

FEB 2025

Pre-Competition
Evaluation
(Online
Judges)

Preliminary Schedule

MAR 4 TUE	MAR 5 WED	MAR 6 THU	MAR 7 FRI	MAR 8 SAT	MAR 9 SUN
Team Orientation (mandatory)	7:45 am Team Meeting (mandatory)				
Practice & Qualifications			Semi-Finals		Third-Chance & Finals
Design Presentations / System Assessment					
5:30 pm Team Meeting (mandatory)					
10:00 pm – 2:00 am Overnight Pool Testing (@ Hotel)					7:30 pm Awards

Stay Updated

ALL THINGS ROBOBOAT

For all the latest information and updates all week, visit the RoboBoat website!



roboboat.org

DISCORD

Stay connected and updated with the RoboBoat Discord. Scan the QR code below to get started!



JOIN TODAY!

- Scan the QR Code
- Select the RoboBoat role
- Turn on notifications!



robonation.org/discord



robonation



seaperch



seaglide



gosense



roboboat



robosub



robotx



RoboNation is a 501c3 nonprofit organization whose mission is to provide a pathway of hands-on educational experiences that empower students to find innovative solutions to global challenges. Working together with the industry, research and educators, we have grown to include over nine student competitions and programs and engage more than 250,000 students per year.

For more information contact autonomy@robonation.org