



Maritime  
RobotX  
Challenge

# Maritime RobotX Challenge Rules

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*Version 1.0, Updated 28 November 2016*

[www.RobotX.org](http://www.RobotX.org)

*Honolulu, Hawaii, USA*

*December 2016*

## Official 2016 Maritime RobotX Website

The official competition website is [www.RobotX.org](http://www.RobotX.org). The documents posted at [www.RobotX.org](http://www.RobotX.org) are the official documents for this competition. All documents referenced here and in other RobotX documents are available at the official competition website. These documents are updated regularly. It is the Teams' responsibility to check the website for the most recent revisions.

## Team Eligibility and Requirements

### Eligibility

1. Student teams from anywhere in the world are eligible to participate.
2. Interested teams should apply using the [2016 RobotX Registration Form](#) found at [www.robotx.org](http://www.robotx.org). Based on the competition venue space, the number of teams may be limited.

### Industry and Student Participation

1. Teams may comprise a combination of students, faculty, industrial partners, or government partners.
  - a. Students may be high school, undergraduate and/or graduate students. Interdisciplinary teams are encouraged.
  - b. Multiple educational institutions may join together to form a single team.
  - c. Members from industry, government agencies, or universities (in the case of faculty) may participate; however, students must compose at least 75% of each team.
  - d. Student participants must be enrolled at their schools as students for the quarter/semester during the competition to be considered students.
  - e. The student members must make significant contributions to the development of their unmanned systems.
2. All teams must have a member of the team from industry.
  - a. The industry team member may provide technical support, financial support or both technical and financial support.
  - b. Former students and team members who have graduated and joined industry are encouraged to continue as team members and would fulfill the above requirements.

## On-site Rules and Regulations

1. During a qualifying run, the ASV system must operate autonomously, with no control or guidance from any person.
2. One student member of the Team must be designated as the "Team Captain." The Team Captain, and only the Team Captain, will speak for the Team during the competition runs.
3. Only student members of each team are eligible for cash awards.

4. Competition Officials will be responsible for recovering errant unmanned systems, but cannot guarantee that they will be able to do so without damage to the system(s). All Teams recognize that by entering the competition, they risk damage to, or the loss of, their unmanned system. The Judges, Officials, Hosts, Staff, volunteers, spectators, and Sponsors can bear no responsibility for such damage or loss.
5. Competition Officials will suspend the competition at any time they determine that it is required by safety or security considerations.
6. Teams are responsible for following rules and regulations of their own nation as well as the host nation with respect to radio frequencies, power, vessel markings, etc.
7. Teams are responsible for shipping their unmanned systems and equipment to and from the competition site. A shipping address and point of contact will be provided on the [www.robotx.org](http://www.robotx.org) website. Teams must submit a shipping plan as directed on the RobotX.org website no later than **1200, UTC on 01 October 2016**.
8. Shuttles will convey Teams between the official competition hotel and the competition venue daily in accordance with a schedule to be posted at a later date. Parking at the competition venue is extremely limited. Each Team will receive a single parking pass for the competition venue.

## Platform Requirements

### Surface Craft Requirements

1. All teams are required to use the WAM-V surface craft manufactured by Marine Advanced Research (MAR) ([www.wam-v.com](http://www.wam-v.com)) as their primary competition boat.
  - a. Previous entrants may use their original WAM-V from RobotX 2014, provided they meet all 2016 Platform Requirements.
  - b. New teams are required to acquire the WAM-V and other equipment using the Teams' resources. The WAM-V can be purchased from AUVSI Foundation. For more details, email [info@robotx.org](mailto:info@robotx.org).
  - c. An industry partner, university, or government agency may provide the boat for the teams.
2. All Teams are **required** to equip their WAM-V surface craft with buoyancy pods for the 2016 competition. Examples of previously used pod designs are presented in the [RobotX Guide: WAM-V Propulsion Examples](#) paper. Pods are also available directly from the vessel manufacturer.
3. Each surface craft must have at least four (six, if the motor pods need to be supported during lifting operations) clearly identified lift points and at least two tow points.
  - a. The lifting and towing points must be marked with bright orange lettering, indicating a "LIFT" or "TOW" point as appropriate.
  - b. The lift points allow the surface craft to be launched and recovered using both the trailers and cranes to be provided on-site.
  - c. The tow point is needed to tow the ASV off the course if it suffers a failure during in water operations.

- d. Teams must **bring their own** lift sling and accessories, which were provided with the WAM-V.
4. Given the tropical location of Hawaii, the competition efforts will continue through a potential rain shower (light or heavy) so it is recommended that teams design their systems with the local tropical weather in mind.

### Off-board System Requirements

1. Anything deployed from the WAM-V must be recovered back to the WAM-V prior to completion of an operational run.
2. Off-board systems may operate tethered or untethered from the primary surface platform as long as they do so in a safe manner.
3. Unmanned Air Vehicles (**UAVs**) **will not be permitted** in the 2016 Maritime RobotX Challenge. This is based on our proximity to Honolulu International Airport and current United States Federal Aviation Administration restrictions.

### System Management and Monitoring Requirements

1. Each Team's unmanned system must include an Operator Control Station (OCS) capable of limited control and monitoring of the system.
  - a. The OCS must have the ability to start and stop autonomous mode so that after driving the ASV to the start point, the Team can switch control modes for the ASV to autonomously execute the mission.
  - b. The OCS must be able to operate safely aboard competition support boats, which will not have external power available.
  - c. Teams are required to provide a display for judges showing the results for the tasks that require reporting using the Teams' own links. The display must comply with the display requirements documented in the **2016 RobotX Task Descriptions**.
2. Teams are required to implement a clearly visible indicator on the ASV showing in which mode the ASV is operating as described in the **RobotX Visual Feedback** document.

### Preliminary Safety Requirements

1. The ASV must have two methods to stop ASV operation as detailed in the [RobotX Kill Switch Specifications](#) document on the robotX.org website.
  - a. A physical kill switch **easily accessible** from a nearby support vessel (i.e., near the perimeter of the ASV).
  - b. A remote (software/hardware) kill switch integrated onto the unmanned system that is compatible with the system detailed in the [RobotX Kill Switch](#) document on the RobotX website. This switch must be demonstrated to disable ASV thrusters within 1 second of activation in all ASV modes.
2. A Safety Judge will complete a safety checklist, verifying successful operation of all safety features **at each unmanned system launch**.
3. All considerations to maintain safety for operators and the surrounding area must be made, especially mitigating hazards due to props, sensors, sharp objects, man-portability, etc.

4. All Radio Frequency (RF) equipment must be operated within the rules and regulations of the host country for such equipment. This includes, but is not limited to frequency, transmitting power, antenna height, etc.
5. ASV power systems must follow the safety rules and regulations of the host country as well as the Team's home country.
6. Competition Officials may suspend the operation of an unmanned system at any time for safety considerations.
7. Teams must provide battery specifications, Material Safety Data Sheets (MSDS), and proper disposal procedures as part of their Technical Submission Package, described in the *RobotX Task Descriptions* document. This documentation is to be provided directly from the battery manufacturer.
8. A Safety Judge will verify successful operation of all safety features at each unmanned system launch for practice or competition.

Before operating in the water, all unmanned systems must pass a safety inspection. During the safety inspection, Teams will demonstrate compliance with all of the requirements above, as well as identify all actuators and moving parts and their associated protection mechanisms (shrouds, etc.). Verification of both kill switches' operation (remote and physical) will be repeated each time a Team wishes to enter the water to ensure the safety of all involved.

### Weight and Size Constraints

The baseline WAM-V comes without power, propulsion, or control systems. The student teams are responsible for building and integrating these components. Basic WAM-V specifications are available on the Maritime RobotX Challenge website. These specifications include maximum payload weight.

### Change Log

This change log lists many of the most significant changes made in this revision of the Rules. It may not be all-inclusive, as minor corrections and changes may not be listed. Teams should review and understand the entire document.

Version	Changes	Date
v0.1	First release of Preliminary Rules.	02 March 2016
v0.3	Updated the Team Eligibility and Requirements and Platform Requirements section.	13 July 2016
v0.4	Updated small typos.	01 November 2016
v1.0	Changed to FINAL.	28 November 2016