2018 Maritime RobotX Challenge
Task Ideas

Introduction
This document is to serve as an overview of the tasks that are currently being planned for 2018 Maritime RobotX Challenge. Our objective for RobotX is to engage, challenge and educate you on the principles of systems engineering. The competition is poised to take place at the Sand Island on Oahu, Hawaii, December 8-15, 2018. Competition dates and other specifics will be released at a later point. Teams interested in participating in 2018 RobotX should reference documents listed under the Rules & Requirements section of the RobotX website (RobotX.org) in conjunction with this task ideas document, as an initial and preliminary source of information to begin preparing for the 2018 Maritime RobotX Challenge.

Task Ideas

Demonstrate Navigation Control
This task will remain as is for 2018 RobotX. This is a mandatory task that allows teams to demonstrate safe and effective control of the unmanned system. It also helps competition officials evaluate a vehicle’s autonomous behavior, if present.

Find Totems and Avoid Obstacles
This task will be modified to provide a more representative real world challenge. For 2018 RobotX, the obstacles, and probably the totems, will be placed throughout the operating areas rather than being grouped as a separate task, as has been done in previous years.

Identify Symbols and Dock
This task will be modified for 2018, though the final form is still in development. Input from participants will help define the final version of this challenge. The potential change to construct the dock in a cruciform shape, as viewed from above. The dock identifiers will be in the center of this shape.

SCAN THE CODE-type displays will be expanded and modified to show color and shape so they can be used in the IDENTIFY SYMBOLS AND DOCK and DETECT AND DELIVER challenges in place of the banners used in past years. Red, green, and blue will be the primary colors available on the LED displays. With this in mind, teams are requested to provide input on the following questions:

1. Are the current displays sufficient for teams to use for color and shape detection to use for the DETECT AND DELIVER and IDENTIFY SYMBOLS AND DOCK challenges?
   a. If there is a preference for larger or smaller display, please recommend preferred dimensions (within reasonable dimensions).
   b. What methods for shading the displays for these challenges are teams interested in seeing?

Detect and Deliver
This was a popular task in 2016. For 2018 RobotX this task may be modified such that the DETECT AND DELIVER target may be placed in the center of the cruciform dock as shown in Figure 1. The unmanned system could be required to dock in the correct dock while attempting the DETECT AND DELIVER task. Note that the displays to be used may be expanded versions of SCAN THE CODE displays as described in the IDENTIFY SYMBOLS AND DOCK task idea description.

Acoustic Pinger-Based Challenges
Acoustic pinger-based challenges will likely be expanded in 2018 to account for the real world visibility considerations of the competition environment. The pingers frequencies for the 2018 event may vary through the course of the day. Multiple frequencies will be
employed within each course to reduce interference. The following acoustic challenges are under consideration:

- Acoustic pinger-based transit – This would be very similar to the 2016 RobotX version, serving as the entrance and exit gate for the course.
- Acoustic homing with underwater visual shape identification at the site of the pinger.

**Scan the Code**
This task will remain very similar to the challenge from the 2014 and 2016 Maritime RobotX Challenges.

**Underwater Shape Identification**
This task may be combined with an acoustic pinger homing challenge and will require a close-up inspection by an underwater vehicle to determine the shape. We are considering mounting a black and white shape on the underside of an object floating on the surface. The shape will only be seen from below. The shapes from the 2016 challenge may be re-used. **Teams will be required to use an underwater vehicle for this task.**

**Other tasks**
Please submit any other task ideas you have! The TD will recommend that judges recognize any contributions that are accepted and used for the RobotX Challenge.

**Offboard System Launch and Recovery**
A deployed offboard system will be needed to complete the underwater challenges in 2018. The Technical Director is working with judges to clarify the requirements and definitions of these systems. The WAM-V platform imposes size and weight restrictions by default. We are seeking student input on the following questions:

1. Should there be a requirement for the offboard platform to be untethered or do teams prefer to allow tethered operation from the surface craft?
2. What constitutes “recovery” of the offboard system?

**Rules Considerations**
The competition rules, safety requirements, kill switch requirements, and design documents from 2016 RobotX should be strictly followed as they will become the basis for 2018 RobotX rules, safety and design documents. This documentation can be downloaded from the **Rules and Requirements** section of the RobotX website (robotx.org).

Additional Rules Considerations:

- In addition to the Visual Feedback system required at 2016 RobotX, teams will be required to implement a heartbeat broadcast system similar to that required in 2014 RobotX. The heartbeat will be an element of scoring.
- Teams may be required to submit video and technical documentation that they have implemented the mandatory buoyancy pods and that both the remote and on-board kill switches are functional several months before the 2018 Maritime RobotX Challenge in Hawaii. This is to ensure that these systems are ready for use and streamline the process of getting teams in the water when they arrive on site.

**Feedback**
Teams are encouraged and requested to provide feedback using the Maritime RobotX online COMMUNITY (https://plus.google.com/u/1/communities/11490313222774658499) or directly to one of the following people:

- **Technical:** Aamir Qaiyumi <aamir.qaiyumi@robotx.org>
- **Logistics:** Cheri Koch <koch@auvsifoundation.org>