Application for a Free WAM-V (It's a Boat)

RobotX 2022   *www.robotx.org*

RoboNation, in cooperation with the United States Office of Naval Research (ONR) and The Australian Defence Science Technology, will host the 2022 Maritime RobotX Challenge in Sydney, Australia. The Maritime RobotX Challenge (herein referred to as RobotX) is designed to increase student interest in autonomous robotic systems in the maritime domain with particular emphasis on autonomy and sensor/platform integration. This is an international event open to student teams from around the world.

The base platform for RobotX 2022 is the Wave Adaptive Modular Vehicle (WAM-V), which teams must outfit with propulsion, control systems, sensors, and other systems necessary to accomplish the competition challenges. All teams competing in RobotX must use the same core platform as the basis for their multi-vehicle, multi-domain autonomous maritime system of systems.

RoboNation intends to award a limited number of the WAM-V platforms to teams that commit to participate in this and future Maritime RobotX Challenges and Forums. The RobotX WAM-V application process is explained in this document. Applications will be reviewed and evaluated by RoboNation. Highly regarded applications may be awarded a WAM-V, however, there is no guarantee that any WAM-V platforms will be awarded.

Applicants selected to receive a WAM-V will be supplied a platform consisting of a hull, upper bridge structure, and propulsion system connectors. The WAM-V will be shipped in a specially designed stowage crate which can be reused for future shipping. Applicants must consider how they will outfit the platform with sensors, electronics, propulsion system, and other hardware and software systems to make the vehicle operational and autonomous. Applicants must also consider logistics of round-trip transportation for the team, the autonomous platform, systems and support equipment, and accommodations near the venue in Sydney, Australia.

1. Application Guidelines

To be considered for this opportunity, please complete the application process by composing a proposal that adheres to the following guidelines:

1. Express interest here: robotx.org/apply
   This will create your official RobotX application account.
2. Review application criteria (below)
3. Submit your proposal via your RobotX application account
   Directions received after completing Step 1.

2. WAM-V Application Timeline

- **03 April 2021** – WAM-V Applications Open
- ~~**30 April 2021**~~ – WAM-V Applications Close
  (deadline extended to 03 May 2021 at 12:00pm EDT)
- **18 June 2021** – WAM-V Award Recipients Notified

3. Format

The format of the written paper shall adhere to the following guidelines:

- **6 page limit (excluding Title Page)**
- 8.5 x 11 in. page size
- Margins ≥ 0.8 in.
- Font: Times New Roman 12pt
- Header on every page including page number
- Submitted in pdf format

Application/Proposal Content must address the following sections:

Title Page should include the Applicant's administrative and technical points of contact, telephone numbers, facsimile numbers, and email addresses. If there are multiple technical contacts, please indicate the principal contact.

Technical Approach and Justification (3.0 Page Maximum) – Describe the technical approach that your team will use to achieve the degree of autonomy necessary to accomplish each of the tasks in the competition as described on the [RobotX 2022 competition page](#). The technical rationale and approach must identify the RobotX tasks that will be attempted, strategies to complete the tasks, and proposed approach to address any technical issues encountered. The Applicant's capacities must be discussed as they relate to achieving success in the project. A timeline for system development and testing should be included.

Team Qualifications (0.5 Page Maximum) – Describe the qualifications, capabilities, academic level, and experience of the team members who will support preparing the vehicle for competition.

Facilities (0.5 Page Maximum) – Describe available test venues and technical facilities, expected methods or techniques (or combinations of these) that will be used to prepare your vehicle and its sensor suite for the competition.

Sponsorships and Partnerships (0.5 Page Maximum) – A table of potential academic, industry or government partners, and potential sponsors including their organization, name, and contact information (email and phone number).

Management Approach (0.5 Page Maximum) – Give a brief description of management approach to carry out the program successfully, including how team members will be recruited and how the team will be organized.

Rough Order of Magnitude Cost (0.5 Page Maximum) – Applications must include a table of rough order of magnitude cost showing anticipated expenditures to prepare the WAM-V for RobotX as well as all logistical costs.

Summary (0.5 Page Maximum) – Give a brief summary and final discussion of how your team will be able to successfully compete at RobotX in Sydney in 2022.

4. Evaluation Criteria

Proposals will be evaluated considering responses in three areas of equal importance.

A. Team Resources and Experience
B. Technical Approach
C. Project Management Approach

Submission of a proposal does not guarantee any award will be made. All applicants will be notified regarding the status of their application (successful/unsuccessful) by **18 June 2021**. RoboNation reserves the right to request additional information.

4.1 Team Resources and Experience

Teams may be comprised of students at all levels of graduate and undergraduate experience and may also include industry participants. Team leadership and a majority of competitors must be students.

Describe the qualifications, capabilities, academic level, and experience of the team members who will support preparing the vehicle for competition. Describe available test venues and technical facilities, expected methods or techniques (or combinations of these) that will be used to prepare your vehicle and its sensor suite for the competition. Describe your team's previous competitive experience and how those experiences have prepared you for this event.

Your responses will be evaluated considering the following:

1. Range and depth of technical facilities with respect to component design and fabrication, software development, and test facilities for autonomous systems.
2. Scope and qualifications of team members, including technical and project management capabilities.
3. Description of the roles and experience of any advisors/mentors who are not explicitly team members.
4. Previous competitive experience in robotics or autonomy competitions.

4.2   Technical Approach

The competition focuses on autonomy and its execution in an integrated system-of-systems, built around the WAM-V platform. This will require an understanding of systems engineering, including sensor fusion, autonomy development and integration, and testing across a range of environmental conditions.

Describe the technical approach that your team will use to achieve the degree of autonomy necessary to accomplish each of the tasks in the competition as described on the RobotX 2022 competition page.

Key areas of consideration include the following:

1. Summary of hardware and software approaches to accomplishing all tasks. This should include the types of sensors required to collect data in-situ, computational infrastructure to process and integrate multiple types of data and make decisions based on situational knowledge.
2. Plan for testing the approaches described (laboratory, field experiments, simulation, etc.).
3. Strategies to overcome a failure of any component or system critical to accomplishing the tasks (system redundancy, multiple sensor inputs, etc.).
4. Strategies for understanding behavior of autonomous system (situational awareness).

4.3   Project Management Approach

The scale of the RobotX competition requires a strong project management approach to facilitate a good performance at the event. Applicants should consider the overall budget required to build a competitive system, and all logistics required to participate in the competition. Recruiting team members and organizing and scheduling the team workforce are important aspects of team management. Developing a plan of action and milestones to meet system development and testing is critical.   Dedicated activities to ensure the required level of sponsorship will be necessary.

Budget
As part of your proposal, include a budget, including as much detail as possible regarding the basis for the estimates. Include areas of uncertainty and how you have addressed them in your estimate.

Consider total costs for participation in RobotX, taking into account elements such as hardware and software tools and equipment, parts, labor, shipping, airfare, lodging, food, and other factors inherent to competing at the event in Sydney, Australia.

Except in the most unusual cases, it will be necessary for each team to attract additional financial and technical support from industry, local businesses, and organizations. Describe your recent experience in attracting meaningful sponsorship in past competitions or activities.

Logistics and Personnel

Include as much detail as possible about your plans to transport the WAM-V (it will be delivered to you in its own custom, reusable shipping case), any additional paraphernalia, equipment, tools, and personnel to Sydney, Australia. Consider the logistics required to ship the equipment across international borders and allocate enough time in your project timeline. Describe in as much detail as is now known, the size of your full team, your on-site team, and team associates.

Schedule and Timeline

Consider the timeline between now and the competition and lay out a notional schedule for your project. This should include at a minimum designing, building, testing, and shipping the system to and from the competition. Estimate the time it will take to design and build or procure the parts, as well as testing time. Don't forget to take into account academic schedules, holidays, access to facilities, and any other factors that may impact your ability to prepare for and participate in the competition.

The following key elements will be considered when evaluating your Project Management approach:

1. The realism of the estimated costs and expected availability of funds for team support, vehicle shipment (inbound and outbound), team travel (to include lodging and local transportation), and other expenses.
2. Reasonableness of schedule with sufficient time allocated for elements of system design, building, and testing.
3. Plan for recruiting talent (team members and advisors), and sponsorship (monetary as well as equipment and facilities).
4. Any letters of support from industry, government, university, etc. (This will not count in your 6-page limit.)