Team Submissions

2020 RoboSub (Online) *www.robosub.org*

Thank you for your interest in participating in the online efforts for RoboSub 2020! Unfortunately, we will not have the opportunity to see your impressive systems performing in California, we are excited to see all the work you've planned out for this year.

Each team leader (or the individual that registered your team) will receive access in their Submittable account to additional forms for each of the following submissions, listed below. Only the team leader and RoboNation staff will have access to the teams' submissions. Each team leader is responsible for adhering to the instructions and deadlines listed below.

SUBMISSIONS

1. **Team Information | DUE June 15, 2020**
2. **Advisor Information | DUE June 15, 2020**
3. **Website | DUE August 9, 2020**
4. **Technical Design Report | DUE August 9, 2020**
5. **Video | DUE August 9, 2020**

OPTIONAL SUBMISSIONS

6. **Resume / Curriculum Vitae (CV) | Rolling Deadline**

1 Team Information | DUE June 15, 2020

List each team member who has participated in developing your system for 2020 RoboSub.

2 Advisor Information | DUE June 15, 2020

List each advisor who has assisted in developing your system for 2020 RoboSub.

3 Website | DUE August 9, 2020

Teams have been asked to document their efforts leading up to the competition by building a website. All elements of the competition will be conducted in English.

Team websites have been collected upon registration but will not be judged until after the August 9 deadline. If you have any changes to your website url, please notify Julianna Smith (Band App: @Julianna Smith, Email: jsmith@robonation.org).

4 Technical Design Report (TDR) | DUE August 9, 2020

Each team is asked to submit a TDR that describes the design of their vehicle, as well as strategies for their approach to the tasks. The TDR should also include rationale for design choices. Teams must follow the official TDR instructions, provided below.

4.1 Paper Presentation Overview:

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

- **5 page limit (excluding References and Appendices)**
- 8.5 x 11 in. page size
- Margins ≥ 0.8 in.
- Font: Times New Roman 12pt
- Header on every page including team name and page number
- Submitted in pdf format

Access all past competitor's papers at **robosub.org/past-programs** by clicking on the desired past year and scrolling to the Team list area.

4.2 Paper Contents:

The written paper consists of **six mandatory Sections and two mandatory Appendices**. Additional sections may be included; however, the overall limit of 5 pages applies (excluding References and Appendices). The editorial style for IEEE Transactions should be followed: https://www.ieee.org/conferences_events/conferences/publishing/style_references_manual.pdf.

The two column format is optional. If you wish to refine the use of English in your paper (encouraged), please collaborate with colleagues at your institution or on the event forum. Professional editing services are also available: https://secure.aje.com/en/default/submitb/select.

1. Abstract

The written paper should primarily describe how your overall competition strategy drove the design for autonomy and the associated system engineering. The abstract is a summary of the main points in the paper. Be specific about your vehicle's capabilities for autonomous underwater behavior and your creativity in system engineering.

2. Competition Strategy

This section should discuss how the team plans on maximizing its score by accomplishing a set of specific tasks and how the vehicle design supports this goal. Accomplishing all of the tasks requires a complex vehicle; accomplishing a subset of the tasks simplifies the design. In your project, did complexity compromise reliability? How were complexity and reliability assessed? Teams have a limited number of working hours to prepare for the competition; this time can be spent adding new hardware and software and/or testing and improving the reliability of an integrated system. How did you manage (balance) component development, system integration and in-water testing time?

3. Vehicle Design (Novel Aspects)

This section should describe the high-level vehicle design as a system (e.g., mechanical, electrical, and software). **Unique and creative elements of the design and approach should be highlighted.** Do **not** include detailed component descriptions and/or specifications not of original design. List off-the shelf components in Appendix B.

4. Experimental Results

This section should briefly describe how the team accomplished testing (*e.g.,* on the bench, in simulation). Discuss any studies, calculations, or estimates that the team has performed in the areas of reliability and robustness (e.g., failure analysis, reliability modeling, risk assessment, etc.). In testing, both failures and successes are valuable in developing a high-performance system. **Any lessons learned during the testing phase should be documented here.**

5. Acknowledgements

Fielding a vehicle in the competition, as in all research projects, involves marshalling resources and support beyond the efforts of the individual team members. Acknowledging such support is professional best practice and should be as comprehensive as possible.

6. References

As with any technical publication, original ideas and content that are not generated by the paper's authors should be properly cited. While there are many reference styles, the submitted paper should use the IEEE transactions citation template: http://www.ieee.org/web/publications/authors/transjnl/index.html.

Appendix A: Component Specifications

In the past, a detailed list of components constituted the bulk of many paper submissions. This practice is discouraged as it distracts from the underlying strategic thinking, system engineering decisions, or novel contributions. For the record, teams should list the components actually used in the vehicle in the table below.

Component	Vendor	Model /Type	Specs	Cost (if new)
Buoyancy Control				
Frame				
Waterproof Housing				
Waterproof Connectors				
Thrusters				
Motor Control				
High Level Control				
Actuators				
Propellers				
Battery				
Converter				
Regulator				
CPU				
Internal Comm Network				
External Comm Innterface				
Programming Language 1				
Programming Language 2				
Compass				
Inertial Measurment Unit (IMU)				
Doppler Velocity Log (DVL)				
Camera(s)				
Hydrophones				
Manipulator				
Algorithms: vision				
Algorithms: acoustics				
Algorithms: localization and mapping				
Algorithms: autonomy				
Open source software				
Team size (number of people)				
HW/SW expertise ratio				
Testing time: simulation				
Testing time: in-water				

Appendix B: Outreach Activities (optional)

A foundational purpose of RoboSub is to strengthen and enhance the community. Teams are encouraged to participate in educational outreach activities. The static judging score includes extra points for educational outreach.

5 Video | DUE August 9, 2020

In lieu of the in-person RoboSub Competition, students are invited to participate in distance learning opportunities to showcase the maturity of their system developed for RoboSub 2020. This visual effort is designed to serve as a replacement for your team video and on-site competition presentation. This video will be scored and will be published online on the RoboNation YouTube Channel.

5.1 Video Content:

Students should prepare a video representing the below categories:

1. Team Introduction

At the start, team members should introduce themselves (name, academic discipline and level of education) and highlighting their role on the team.

2. System Overview

This section should contain a brief overview of the Autonomous Underwater Vehicle (AUV). Overview for mechanical, electrical and software sub-systems should be a summary of the details discussed in the Technical Design Report (TDR).

3. Competition Strategy

Teams should discuss their competition strategy, based on the system they have created. This section should also discuss rationales for designing the system that you have developed and assign a confidence rating (for successful completion) for tasks the team is planning on attempting.

4. Development Testing

Understanding that teams have not been able to meet to work on their vehicles, this section should address any remote efforts teams have experimented with to continue their development. Please describe what has worked well, and what has not worked well (so others may benefit from your experience).

5.2 Video Requirements:

1. Teams must abide by all applicable social distancing protocols.
2. Video must not be longer than 15 minutes.
3. Videos must be submitted in .MP4 format.

5.3 How-to: MPEG Streamclip

To compress the video, please use the following:

- Format: .MP4
- Compression: H.264
- Quality: 50%
- Sound: MPEG-4 AAC 128 kbps
- Frame Size: Unscaled

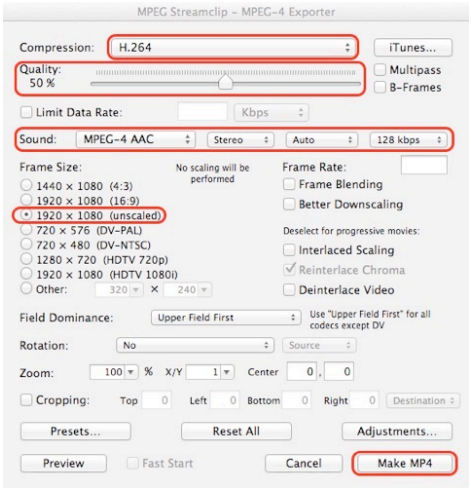

Figure 1: Example of MPEG Streamclip settings

6 Resume / Curriculum Vitae (CV) | Rolling Deadline*

Submit your team members' Resume or Curriculum Vitae (CV) as they are complete and ready to share with sponsors. RoboNation will collect these throughout the months of the online competition season to share with sponsors.

You may submit new versions of your resume throughout the online competition season, by notifying RoboNation of the new version or indicating on the file submission.

**Submission is open now and will remain open until close of competition season.*