

Technical Design Report Instructions

2021 SeaPerch Challenge

<http://www.phillynavalstem.com/>

Paper Preparation Overview:

The format of the written paper must adhere to the following guidelines. **Papers that do not meet all of these guidelines will have 10 points deducted from the total score.**

- **5 page limit** (*excluding References, Acknowledgements, and Appendices*)
- 8.5 x 11 in. page size
- Margins \geq 0.8 in.
- Font: Times New Roman, 12pt
- Single Spaced
- Footer on every page including team name and page number
- Submitted in pdf format only

Paper Contents:

The written paper consists of seven mandatory Sections and three mandatory Appendices. Additional sections may be included; however, there is an overall limit of 5 pages for the first 6 section (no limit for References, Acknowledgements, and Appendices). The sections must appear in the order listed below. It is strongly suggested that papers be typed. However, hand-written submissions will be accepted.

1. Abstract (1/2 page – 5 points)

The abstract is a short summary of the main points in the paper. The paper should primarily describe your unique SeaPerch design and the engineering design process you completed to result in your final design described in the paper.

2. Task Overview (1/2 page – 5 points)

In order to design and build a successful ROV, it is imperative to understand the tasks that your team aims to successfully complete. This section should include an overview of the task(s) your SeaPerch will attempt during the SeaPerch Challenge competition. In particular, this section should discuss the characteristics and features of the tasks that affected how you designed your ROV. Avoid directly quoting the course descriptions and instead use your own words to describe what your ROV will do within the mission course.

3. Design Approach (2 pages – 30 points)

Given the tasks, describe your team's strategy and approach to developing a novel SeaPerch design. Novelty may occur at various levels of the design and modeling process including specific components, collections of components, or even team approaches to the process. Focus attention on the creative aspects of your system and how your team conceived of, refined, and implemented these ideas. Describe your experience in making design decisions and how prospective ideas were considered among the team. Include engineering and scientific terms

and concepts to demonstrate the team’s understanding of the challenges of designing and operating an underwater ROV.

4. Results (1 page– 20 points)

This section should describe the results of your design and modeling efforts. What was your resultant design? How did your modeling efforts impact your team’s subsequent design(s)? Include images, charts, and figures as appropriate to document and demonstrate your results.

5 . Reflection & Next Steps (1 page – 5 points)

This section should describe various activities and/or tests that you plan to accomplish between submitting this report and the day of competition and even beyond if working all virtual. What does your team expect to accomplish with these activities?

6. Acknowledgements (no page limit – 5 points)

Participating in the competition involves identifying resources and support beyond the efforts of individual team members. This support can take many forms, such as technical advice, labor, equipment, facilities, and monetary contributions. Acknowledging those who have supported your efforts is important.

7. References (no page limit – required – 5 points)

As with any technical publication, original ideas and content not generated by the paper’s authors should be properly cited. While there are many citation styles, the American Psychological Association (APA) style guide should be used (<https://apastyle.apa.org/style-grammar-guidelines/references>). Use in-text citations, where appropriate.

Appendix A: Budget (no page limit – required – 5 points)

Include all components included in your SeaPerch design. This information should reflect the total materials cost of your ROV beyond the materials provided in the base SeaPerch kit. Add as many rows as necessary to complete this budget. Please include justification for your budgets such as links to websites selling materials that show costs. You do not need to purchase materials to complete your digital design.

For the required “SeaPerch: Bounty Hunter” mission, all teams must have a total cost of equal to or less than \$25. For teams competing in the Admiral’s Class, no cost limit is provided for the “SeaPerch: In the Wild” missions.

Component	Vendor	How was component used?	Cost (in USD)
TOTAL COST OF SEAPERCH			\$

Appendix B: Fact Sheet (required – 10 points)

A foundational purpose of the SeaPerch Challenge is to showcase and engage the broad SeaPerch community. This fact sheet includes information that introduces teams and their SeaPerches to the community. Submitted team fact sheets will be made available during the 2021 SeaPerch Challenge to highlight the various designs included in the competition. Enter your team's respective information in the Fact Sheet template. You must use the Fact Sheet template to collect points for this component. Information includes:

- Team Name and location
- School/Organization represented
- Image of SeaPerch design
- Competition Class (ie. Middle School / High School & Captain's Class / Admiral's Class)
- Overview of SeaPerch Design: Use this section to provide a high-level explanation of your SeaPerch design
- Number of years your team has participated in the SeaPerch program (this should include years that you have been involved in building a SeaPerch and/or competed in a SeaPerch competition)
- Number of times your team has competed at the International SeaPerch Challenge including your anticipated participation at the 2021 Challenge (ie. If this is your 1st year, you will put "1st year")
- Complete the statement "Our SeaPerch is unique because..."; highlight what you think makes your design innovative
- Complete the statement "Our biggest takeaway this season is..."; focus on your team's experience and what you learned from working together on your design
- Roster with first names and grades of students on your team (note: please DO NOT include last names)
- Name(s) and organizational affiliation(s) of mentor(s)
- Team photo

A draft layout is provided on the next page for informational purposes only. An editable template will be provided prior to registration opening for the 2021 International SeaPerch Challenge.

Appendix C: Additional Information (optional)

Examples of additional information are research results, engineering calculations, process photos and drawings, etc.

Submission Requirements:

Teams are required to submit their Technical Design Reports (TDRs) to seaperchnotebooks@gmail.com by March 29, 2021. Teams should use the following e-mail subject line & file name when submitting TDRs: "<SCHOOL NAME>_<MS or HS>_<CAPT or ADM>_SP TDR 2021". (ex. Seaperchville High School_HS_ADM_SP TDR 2021)

TEAM NAME

City, State, Country

A large rectangular area with a light grey background. In the center, the text 'SeaPerch Image' is written in a dark grey font. At the bottom of this area, the text 'COMPETITION CLASS' is written in a white font. Below this entire grey area is a solid dark blue horizontal bar.

Years participating in SeaPerch:

Times at the International SeaPerch Challenge:

Our SeaPerch is unique because:
(50 words MAX)

Our biggest takeaway this season is:
(50 words MAX)

SeaPerch Design Overview:
(100 words MAX)

A large rectangular area with a light grey background, intended for a team image. The text 'Team Image' is centered within the box.

Team Members:
First Name, Grade #
First Name, Grade #
First Name, Grade #
First Name, Grade #
First Name, Grade #

Mentor(s)
Full Name, Organization
Full Name, Organization
Full Name, Organization