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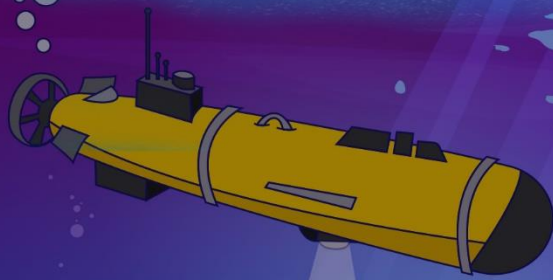


UNDERWATER ROBOTICS
CHALLENGES
MORE THAN A CHALLENGE...

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Underwater Robotics
Technology Center



**WATER SPORTS
ENTERTAINMENT AND SAFETY**

📍 New Alamein City, Egypt

📅 February 13 - 19, 2021

🌐 /UWRChallenge
www.UWRChallenges.org



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1. Cost Analysis Criteria

The team should prepare and send a cost analysis of their vehicle with max score **20 points**.

The team should upload the cost analysis in Excel sheet format with max size 2 MB on Google drive naming it with [2022_ChallengeName_ Category_TeamName_CostAnalysis_Submission] and it send to info@uwrchallenges.org before February 17, 2022.

The sheet should contain the following:

1. Product Costs

Product costs are the costs directly incurred from the manufacturing process. The three basic categories of product costs are detailed below:

- **Direct Material:** Direct material costs are the costs of raw materials or parts that go directly into producing products. For example, if Company A were a toy manufacturer, an example of a direct material cost would be the plastic used to make the toys.
- **Direct labours (if applicable):** Direct labour costs are the wages, benefits, and insurance that are paid to employees who are directly involved in manufacturing and producing the goods. For example, workers on the assembly line or those who use the machinery to make the products.
- **Manufacturing overhead:**
 - **Indirect materials:** Indirect materials are materials that are used in the production process but that are not directly traceable to the product. For example, glue, oil, tape, cleaning supplies, etc. are classified as indirect materials.
 - **Indirect labours (if exist):** Indirect labour is the labour of those who are not directly involved in the production of the products. An example would be security guards, supervisors, and quality assurance workers in the factory. Their wages and benefits would be classified as indirect labour costs.

2. Period Costs (if applicable)

Product costs are costs necessary to manufacture a product, while period costs are non-manufacturing costs that are expensed within an accounting period:

- Marketing costs
- Sales costs
- Rent of the working place

Example:

Company A is a manufacturer of tables. Its product costs may include:

- Direct material: The cost of wood used to create the tables
- Direct labour: The cost of wages and benefits for the carpenters to create the tables
- Manufacturing overhead (indirect material): The cost of nails used to hold the tables together



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- Manufacturing overhead (indirect labour): The cost of wages and benefits for the security guards to overlook the manufacturing facility
- Manufacturing overhead (other): The cost of factory utilities.

Company A produced 1,000 tables. To produce 1,000 tables, the company incurred costs:

- \$12,000 on wood
- \$2,000 on wages for carpenters and \$500 on wages for security guards to overlook the manufacturing facility
- \$100 for a bag of nails to hold the tables together
- \$500 for factory rent and utilities

Total product costs: \$12,000 (direct material) + \$2,000 (direct labour) + \$100 (indirect material) + \$500 (indirect labour) + \$500 (other costs) = \$15,100. As this is the cost to produce 1,000 tables, the company has per unit cost of \$15.10 ($\$15,100 / 1,000 = \15.10).



2. Cost Analysis Scoring Sheet

| | | |
|-------------------------|--------------------------|------------------|
| Team Name: | Judge Name: | |
| Category: | Team Score | ..... |
| | Total Score | 20 Points |

| Criteria | Details | Max Points | Team Points |
|--|--|------------------|-------------|
| 1. Organizing | <ul style="list-style-type: none"> • Sheet formatting • Follow Rules | 5 | |
| 2. Alternatives | <ul style="list-style-type: none"> • Include the options and alternatives • Include Product cost and Period cost of each one | 5 | |
| 3. Direct materials and Direct labors | <ul style="list-style-type: none"> • Raw materials • Parts • Components | 5 | |
| 4. Manufacturing Overhead and Period Costs (if exists) | <ul style="list-style-type: none"> • Indirect materials • Indirect labors | 5 | |
| Total Points | | 20 Points | |



3. Proposal Criteria

Each team will be asked to send a proposal for their product before the competition to show how the product, your vehicle, will be suitable to RFP - **15 points**.

The team should upload the proposal in PDF format with max size 2 MB on Google drive naming it with [2022_ChallengeName_Category_TeamName_Proposat_Submission] and send it to info@uwrchallenges.org before February 17, 2022.

The proposal should cover the following points:

- Identify the team
- Identify the problem
- Explain the solution
- Explain the product strategies created
- Indicate the costs (total expected budget)
- Specify the reasons for you to be chosen
- The client's benefits from your product



4. Proposal Scoring Sheet

| | | |
|-------------------------|--------------------------|------------------|
| Team Name: | Judge Name: | |
| Category: | Team Score | ..... |
| | Total Score | 15 Points |

| Criteria | Max Points | Team Points |
|--|-------------------|--------------------|
| 1. Organizing the document and following the format | 2 | |
| 2. Identify the team | 1 | |
| 3. Photo of the team members | 1 | |
| 4. Identify the problem from all aspects | 1 | |
| 5. Derive a solution and discuss the components of your vehicle | 2 | |
| 6. Photo of your vehicle | 1 | |
| 7. Explain the technical strategies you've followed in your solution | 2 | |
| 8. Estimate the total cost | 1 | |
| 9. What makes you special | 2 | |
| 10. What the client's benefits are | 2 | |
| Total Score | 15 Points | |



5. Technical Report Criteria

Each team should prepare a technical-wise document and send it before the competition - **30 points**.

The team should upload their technical report on Google Drive by naming it [2022_ChallengeName_ Category_TeamName_TechnicalReport_Submission] in PDF format with max size 5 MB and send it to info@uwrchallenges.org before February 17, 2022.

The team can use any required visuals to support your report

The document should demonstrate:

| | |
|---|--|
| 1. Mechanical design | <ul style="list-style-type: none">• Vehicle materials• Isolation• Thrusters• Stability• Buoyancy• Drag force calculations• Mobility• Equations of motion ... etc. |
| 2. Control Systems (Software) | <ul style="list-style-type: none">• Serial and parallel communications• Movement techniques• Stability techniques• Autonomous system• Image recognition techniques ... etc. |
| 3. Control systems (Hardware) | <ul style="list-style-type: none">• Vehicle components• Station components ... etc. |
| 4. Electric power | <ul style="list-style-type: none">• Fuses• Power conversions• Power distribution ... etc. |
| 5. Fluid power | <ul style="list-style-type: none">• Software and hardware components ... etc. |
| 6. Additional devices | <ul style="list-style-type: none">• Mechanical structure• software and hardware components ... etc. |
| 7. SIDs: shows the power and signals diagram | <ul style="list-style-type: none">• Electrical SID• Fluid SID• Additional devices SID |
| 8. Events | <ul style="list-style-type: none">• If the team participated in any events before with the vehicle. |
| 9. Future plans | <ul style="list-style-type: none">• The plans that the team is seeking to do them. |
| 10. Acknowledgments | <ul style="list-style-type: none">• Acknowledgments for the team supporters. |
| 11. References | <ul style="list-style-type: none">• Show the references of presented info. |



6. Technical Report Scoring Sheet

| | | |
|-------------------------|--------------------------|------------------|
| Team Name: | Judge Name: | |
| Category: | Team Score | ..... |
| | Total Score | 30 Points |

| Criteria | Details | Max Points | Team Points |
|---------------------|--|------------|-------------|
| 1. Organizing | <ul style="list-style-type: none"> • Formatting • Font size 12 • Using images and diagrams for clarification • pages from 20 to 25 | 2 | |
| 2. Mechanical | <ul style="list-style-type: none"> • Vehicle design • Isolation • Thrust power • Buoyancy calculations • Drag calculations • Stability | 5 | |
| 3. Control | <ul style="list-style-type: none"> • Components (vehicle and station) • Techniques • Sensors and Autonomous techniques • Image Recognition | 5 | |
| 4. Electrical Power | <ul style="list-style-type: none"> • Power cables • Converters • Distributions on components • Components power • Fuses used and calculations | 2 | |



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|-----------------------|--|----|--|
| 5. Fluid Power | <ul style="list-style-type: none">• Fluid Components• Control circuit | 2 | |
| 6. Additional devices | <ul style="list-style-type: none">• Mechanical design• Control components• Power circuit• Fuses | 3 | |
| 7. SIDs | <ul style="list-style-type: none">• Electrical SID• Fluid SID• Additional Devices SID | 5 | |
| 8. Events | <ul style="list-style-type: none">• Show Your participation in events | 2 | |
| 9. Future plans | <ul style="list-style-type: none">• Discuss your plans | 2 | |
| 10. Acknowledgment | <ul style="list-style-type: none">• Acknowledgments for the team supporters | 1 | |
| 11. References | | 1 | |
| Total Score | | 30 | |



7. Safety Document Criteria

Each team will be asked to submit a safety document that will be added to the onsite safety score - **15 points**.

The document should be in PDF format with max size 3 MB, upload it on Google drive with naming [2022_ChallengeName_ Category_TeamName_Software_Safety], and send to info@uwrchallenges.org before February 17, 2022.

Moreover, this document should demonstrate your own procedures you took to make your product safe.

The document should demonstrate:

- The IP rating of sealing and how the motors and control box are sealed
- How the motor propellers are shrouded in front and back
- The main fuse connection
- Fuse calculation

Example:

| | | | | | | |
|---|---------|---|------|---|----|-----|
| 6 | Motors | * | 3 | = | 18 | Amp |
| 2 | Servos | * | 0.5 | = | 1 | Amp |
| 4 | Cameras | * | 0.25 | = | 1 | Amp |
| 2 | Valves | * | 0.5 | = | 1 | Amp |

Total rated current = 21 amp, the overcurrent = $1.5 * \text{total rated current} = 31.5$ amp; you should use a 30 ampers fuse.

- Other fuses: you should protect the components in the low level
- Isolation of DC and AC components from each other and mark them with labels
- Electrical Diagram should demonstrate electrical connection, joints, and power. The diagram should have 2 sections (one for underwater system and one for the station)
- Fluid Diagram should demonstrate fluid connection, joints, and power. The diagram should have 2 sections (one for underwater system and one for the station)
- There are no exposed wires
- Strain reliefs used
- Any additional device(s) used to aid the Vehicle in the task
- No sharp edges in the vehicle

The document should also include some pictures of your vehicle to visualize the points mentioned above.



8. Safety Document Scoring Sheet

| | | |
|-------------------------|--------------------------|------------------|
| Team Name: | Judge Name: | |
| Category: | Team Score | ..... |
| | Total Score | 15 Points |

| Criteria | Details | Max Points | Team Points |
|-------------------------------|---|------------------|-------------|
| 1. Organizing | <ul style="list-style-type: none"> • Formatting • Using Images • Using Diagrams | 2 | |
| 2. Isolation | <ul style="list-style-type: none"> • IP Rating • Motor Isolation • Control box Isolation | 3 | |
| 3. Propeller shrouded | <ul style="list-style-type: none"> • Include the design • Specs and Affection on Thrust Force | 2 | |
| 4. Fuse Protection | <ul style="list-style-type: none"> • Main fuse calculation • Other fuses | 3 | |
| 5. Images to demonstrate that | <ul style="list-style-type: none"> • No exposed wires in control box and any electrical components • No sharp edges • Strain relief used | 3 | |
| 6. SIDs | <ul style="list-style-type: none"> • Electrical SID • Fluid SID • Additional Device SID | 2 | |
| Total Score | | 15 Points | |



9. Onsite Safety Criteria

Prior to the underwater trial, each team must pass the onsite check, the judge will decide whether the team is allowed to compete or not.

The judge will evaluate according to the following:

- The motors are shrouded
- The motors and control box sealing and strain reliefs
- The main fuse
- Exposed wires
- AC and DC labels
- Additional devices safety
- Sharp edges
- Fluid power and regulators

Safety Check Rules

- Only four members from each team will be allowed to attend the Onsite Safety Check
- Each team will be asked to make a dry test to check the vehicle, so there will be a power supply for this test
- If the team uses their own power supply, it must be tested
- Each team uses fluid power will be asked to test the fluid elements and their fluid power source
- The team should take the comments of the judges in consideration and try to solve the problem within maximum 20 minutes, after these 20 minutes if the problems are not solved, the team will not be allowed to do the underwater mission
- Each comment about a problem to be solved, the team will get zero point for this part. However, the team must solve the problem to be allowed to participate in the underwater mission
- The teams that pass the safety check will receive a card and the pool judge should take this card from the team before the mission starts



10. Onsite Safety Scoring Sheet

| | | |
|-------------------------------------|---------------------------|------------------|
| Team Name: | Judge Name: | |
| Category: | Team Score: ..... | ..... |
| | Total Score: | 35 Points |
| Team Leader signature: ..... | ..... |  |

| Criteria | Details | Max Points | Team Points |
|-----------------------|---|------------------|-------------|
| 1. Following Rules | <ul style="list-style-type: none"> Organizing Collaboration Respecting Judges | 5 | |
| 2. Isolation | <ul style="list-style-type: none"> Motor Isolation Control box Isolation | 5 | |
| 3. Propeller shrouded | <ul style="list-style-type: none"> With Mesh size 1 cm square Front and back | 5 | |
| 4. Fuse Protection | <ul style="list-style-type: none"> Main fuse showing the rating written on it | 5 | |
| 5. Show that | <ul style="list-style-type: none"> No exposed wires in control box and any electrical components No sharp edges Strain relief used Labeling | 5 | |
| 6. Dry Test | <ul style="list-style-type: none"> Test the vehicle with the power Check the maximum current | 5 | |
| 7. Fluid Power Test | <ul style="list-style-type: none"> Check the fluid elements Check the regulator | 5 | |
| Total Score | | 35 Points | |



11. Onsite Pitching Criteria

Pitching Criteria

- Each team should prepare for the final pitching for the final evaluation - **20 points**.
- The team will be asked to present a pitching to a jury panel
- Each team has 5 minutes to present, and the judges have 10 minutes for questions and evaluation
- The competition will provide a data show for presenting
- The team can use any software or hardware requirements to help them in the purpose of the pitching
- It is preferred that 3 team members max to do the Onsite pitching, but the others can join for answering the questions
- The team may present in Arabic or English with no additional score
- The team should cover some aspects:
 - **Problem/ opportunity:** in which the team describes the problems that they solve in the RFP
 - **Your solution description:** in which the team gives an overall description of your solution; describing the best value proposition you give to the customer
 - **Solution features:** in which the team shows their vehicle features to solve the problem and how the solution is special
 - **Competition and market landscape:** in which the team shows the competition that they will face in the market and how to stack up with them
 - **Progress status:** in which the team shows the progress of their solution, vehicle,
 - **Future plan:** in which the team give a brief on where they are going to forward in the development of the solution
 - **The team:** by showing the team members, their field of experience and their roles in the team



12. Onsite Pitching Scoring Sheet

| | | |
|-------------------------|--------------------------|------------------|
| Team Name: | Judge Name: | |
| Category: | Team Score | ..... |
| | Total Score | 20 Points |

| Criteria | Details | Max Points | Team Points |
|---|---|------------------|-------------|
| 1. Organizing | <ul style="list-style-type: none"> • Formatting • Use of Images • Animation | 2 | |
| 2. Presenting | <ul style="list-style-type: none"> • Presenting Skills | 2 | |
| 3. Evaluation | <ul style="list-style-type: none"> • Responding to questions | 5 | |
| 4. Problem statement and Solution description | <ul style="list-style-type: none"> • Describe the problem clearly | 2 | |
| 5. Features | <ul style="list-style-type: none"> • Describe the technical features • Mechanical system • Control system • Techniques image processing • Autonomous | 4 | |
| 6. Competition and market landscape | <ul style="list-style-type: none"> • Market needs and competition | 2 | |
| 7. Progress status | <ul style="list-style-type: none"> • Solution progress | 2 | |
| 8. Future plan | | 1 | |
| Total Points | | 20 Points | |



13. Underwater Mission Scoring Sheets (ROV - Seniors)

| | | |
|---------------------------------|--------------------------|-------------------|
| Team Name: | Judge Name: | |
| Challenge: ROV - Seniors | Team Score: | ..... |
| | Total Score: | 180 Points |
| Team Leader signature: | ..... |  |

| Task | Subtask | Steps | Checks | Max Points | Score |
|--------------------------------------|--|--|--|--------------------------|-------|
| Task 1: Underwater Entertainment | Film an underwater scene – 20 points | <input type="checkbox"/> ROV must start from the start point to get the points of this subtask | <input type="checkbox"/> | - | - |
| | | ROV correctly followed the trajectory without showing more than one line of the trajectory within the camera frame (<i>only two trails are allowed</i>) | A <input type="checkbox"/> | 15 | |
| | | | M <input type="checkbox"/> | 7 | |
| | | ROV must keep in the end position for 10 seconds | A <input type="checkbox"/> | 5 | |
| | M <input type="checkbox"/> | | 3 | | |
| | Retrieve the lost camera from the cave – 20 points | ROV reaches the location where it can find the lost camera | - | 5 | |
| | | Correctly identify the camera | - | 5 | |
| | | Pick the camera and return it to the surface | - | 10 | |
| | Guide the diving group – 20 points | <input type="checkbox"/> Teams must correctly check the presence of the hazardous object to get the points of this subtask | <input type="checkbox"/> | 10 | |
| | | Collect the object and return it to the surface | - | 10 | |
| Task 2: Underwater Monitoring System | Install new monitoring equipment to the target position – 40 points | Correctly calculate the area | - | 5 | |
| | | Correctly determine the number of the equipment | - | 5 | |
| | | - Produce a correct map - Teams will <i>lose 2 points</i> for each incorrect location - <input type="checkbox"/> Teams must get no more than 2 incorrect locations to get points for this step | <input type="checkbox"/> | 10 | |
| | | - Install the equipment to the right slots - Teams will <i>lose 2 points</i> for each incorrect location - <input type="checkbox"/> Teams must get no more than 2 incorrect locations to get points for this step | <input type="checkbox"/> | 10 | |
| | | - <input type="checkbox"/> Teams must install all the equipment in the last step to work on this step (even if they are installed in incorrect locations) - Correctly connect the equipment - Teams will <i>lose 2 points</i> for each incorrect location - <input type="checkbox"/> Teams must get no more than 2 incorrect locations to get points for this step | <input type="checkbox"/> <input type="checkbox"/> | 10 | |
| | | Remove the waste covering the equipment – 20 points | <input type="checkbox"/> Teams must correctly identify all the equipment that are covered with waste and correctly identify their type to get points for this subtask, this is by reporting to the judge the number of the waste and the type (color) of each before moving them | <input type="checkbox"/> | - |
| | - Detach the waste from the equipment - Teams will <i>lose 2 points</i> for each equipment moved away from its slot when trying to detach the waste from it - <input type="checkbox"/> Teams must get no more than 2 equipment moved away from its slot to get points for this step | | <input type="checkbox"/> | 10 | |



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|---|--|---|--------------------------|------------|---|
| | | <ul style="list-style-type: none"> - Move each waste to its correct container - It is allowed to do this step and the one before simultaneously by detaching the waste and moving it to the container then carry on detaching the next one | - | 10 | |
| | Inspect the already existing equipment and detect the faulty ones – 10 points | <ul style="list-style-type: none"> - Correctly count the total number of the equipment for 5 points - Teams will <i>lose 1 point</i> for each incorrectly counted equipment <input type="checkbox"/> Teams must get no more than of 2 incorrect counts to get points for this step | <input type="checkbox"/> | 5 | |
| | | <ul style="list-style-type: none"> - Correctly count the total number of the faulty equipment for 5 points - Teams will <i>lose 1 point</i> for each incorrectly faulty equipment - <input type="checkbox"/> Teams must get no more than of 2 incorrect counts to get points for this step | <input type="checkbox"/> | 5 | |
| Task 3: Search and Rescue | Determine the lifting capability of your ROV – 10 points | <ul style="list-style-type: none"> - Teams should compile a document detailing their lift capability and include descriptions of any tests performed. - This document is limited to one-page, single-sided. - Teams will receive 10 points when they provide their lift capability document to the station judge. | - | 10 | |
| | Search for the missing diver – 10 points | <input type="checkbox"/> Teams must find the diver to get points for the next part of this task | <input type="checkbox"/> | - | - |
| | | <ul style="list-style-type: none"> - Teams will get 10 points when they correctly calculate the force - The value of the calculated force is accepted within a tolerance of 3% of the correct value - Teams will lose 1 point for each extra 3% error - <input type="checkbox"/> Teams must get no more than 24% error to get points for this step | <input type="checkbox"/> | 10 | |
| | Remove the weighting belt – 10 points | Successfully unbuckle the belt | - | 5 | |
| | | Move the belt away from the diver | - | 5 | |
| | Drag the diver to the surface – 20 points | Drag the diver to the surface and handle it to a team member | - | 10 | |
| Finish all steps of Task 3 within 3 minutes . | | - | 10 | | |
| Total Score | | | | 180 | |

Comments:

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14. Underwater Mission Scoring Sheets (ROV - Juniors)

| | | |
|---------------------------------|--------------------------|-------------------|
| Team Name: | Judge Name: | |
| Challenge: ROV - Juniors | Team Score: | |
| | Total Score: | 180 Points |
| Team Leader signature: | ..... |  |

| Task | Subtask | Steps | Checks | Max Points | Score |
|---|--|--|--------------------------|------------|-------|
| Task 1: Underwater Entertainment | Film an underwater scene – 20 points | <input type="checkbox"/> ROV must start from the start point to get the points of this subtask | <input type="checkbox"/> | - | - |
| | | ROV correctly followed the trajectory without showing more than one line of the trajectory within the camera frame (<i>only two trails are allowed</i>) | - | 15 | |
| | | ROV must keep in the end position for 10 seconds | - | 5 | |
| | Retrieve the lost camera from the cave – 20 points | ROV reaches the location where it can find the lost camera | - | 5 | |
| | | Pick the camera and return it to the surface | - | 15 | |
| | Guide the diving group – 20 points | <input type="checkbox"/> Teams must correctly check the presence of the hazardous object to get the points of this subtask | <input type="checkbox"/> | 10 | |
| Collect the object and return it to the surface | | - | 10 | | |
| Task 2: Underwater Monitoring System | Install new monitoring equipment to the target position – 40 points | Correctly calculate the area | - | 10 | |
| | | Correctly determine the number of the equipment | - | 10 | |
| | | - Install the equipment to the right slots - Teams will <i>lose 2 points</i> for each incorrect location <input type="checkbox"/> Teams must get no more than 2 incorrect locations to get points for this step | <input type="checkbox"/> | 20 | |
| | Remove the waste covering the equipment – 20 points | <input type="checkbox"/> Teams must correctly identify all the equipment that are covered with waste and correctly identify their type to get points for this subtask, this is by reporting to the judge the number of the waste and the type (color) of each before moving them | <input type="checkbox"/> | - | - |
| | | - Detach the waste from the equipment - Teams will <i>lose 2 points</i> for each equipment moved away from its slot when trying to detach the waste from it <input type="checkbox"/> Teams must get no more than 2 equipment moved away from its slot to get points for this step | <input type="checkbox"/> | 10 | |
| | - Move each waste to its correct container - It is allowed to do this step and the one before simultaneously by detaching the waste and moving it to the container then carry on detaching the next one | - | 10 | | |



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| | | | | | |
|---|--|--|--------------------------|------------|---|
| | Inspect the already existing equipment and detect the faulty ones – 10 points | <ul style="list-style-type: none"> - Correctly count the total number of the equipment for 5 points - Teams will <i>lose 1 point</i> for each incorrectly counted equipment <input type="checkbox"/> Teams must get no more than of 2 incorrect counts to get points for this step | <input type="checkbox"/> | 5 | |
| | | <ul style="list-style-type: none"> - Correctly count the total number of the faulty equipment for 5 points - Teams will <i>lose 1 point</i> for each incorrectly faulty equipment - <input type="checkbox"/> Teams must get no more than of 2 incorrect counts to get points for this step | <input type="checkbox"/> | 5 | |
| Task 3: Search and Rescue | Determine the lifting capability of your ROV – 10 points | <ul style="list-style-type: none"> - Teams should compile a document detailing their lift capability and include descriptions of any tests performed. - This document is limited to one-page, single-sided. - Teams will receive 10 points when they provide their lift capability document to the station judge. | - | 15 | |
| | Search for the missing diver – 10 points | <input type="checkbox"/> Teams must find the diver to get points for the next part of this task | <input type="checkbox"/> | - | - |
| | Remove the weighting belt – 15 points | Successfully unbuckle the belt | - | 10 | |
| | | Move the belt away from the diver | - | 5 | |
| | Drag the diver to the surface – 25 points | Drag the diver to the surface and handle it to a team member | - | 10 | |
| Finish all steps of Task 3 within 3 minutes . | | - | 10 | | |
| Total Score | | | | 180 | |

Comments:

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15. Underwater Mission Scoring Sheets (AUV - Seniors)

| | | |
|---------------------------------|--------------------------|-------------------|
| Team Name: | Judge Name: | |
| Challenge: AUV - Seniors | Team Score: | |
| | Total Score: | 180 Points |
| Team Leader signature: | ..... |  |

| Task | Subtask | Steps | Checks | Max Points | Score |
|--------------------------------------|---|--|--------------------------|------------|-------|
| Task 1: Underwater Entertainment | Retrieve the lost camera – 60 points | <ul style="list-style-type: none"> - <input type="checkbox"/> AUV must start from the start point to get the points of this task - Only two trials are allowed - First trial gets full points - Second trial gets only 50% of the points | <input type="checkbox"/> | - | - |
| | | AUV correctly followed the trajectory in the correct directions till the end | - | 30 | |
| | | AUV correctly Identified the camera and report back its location | - | 30 | |
| Task 2: Underwater Monitoring System | Install new monitoring equipment to the target position – 70 points | <ul style="list-style-type: none"> - <input type="checkbox"/> AUV must start from the start point to get the points of this task - Only two trials are allowed - First trial gets full points - Second trial gets only 50% of the points | <input type="checkbox"/> | - | - |
| | | AUV correctly followed the trajectory in the correct directions till the end | - | 20 | |
| | | <ul style="list-style-type: none"> - AUV correctly determined the number of the missing equipment - Teams will <i>lose 5 points</i> for each wrong count | - | 25 | |
| | | <ul style="list-style-type: none"> - AUV correctly determine the order of the missing equipment relative to the first one | - | 25 | |
| Task 3: Search and Rescue | Search for the missing diver – 10 points | <ul style="list-style-type: none"> - <input type="checkbox"/> AUV must start from the start point to get the points of this task - Only two trials are allowed - First trial gets full points - Second trial gets only 50% of the points | <input type="checkbox"/> | - | - |
| | | correctly followed the trajectory in the correct directions till the end | - | 25 | |
| | | AUV correctly determined the diver's position along the search direction | - | 25 | |
| Total Score | | | | 180 | |

Comments:

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