GST BOCES 2019/2020 Spring Regional Underwater ROV Competition

Date:
May 6, 2020
9:00 AM – 2:00 PM

Location:
Campbell-Savona Jr/Sr High School
8455 County Route 125
Campbell, NY 14821
School Phone: (607) 527-9800

Spectators and media are welcome!

Schedule for the day:
9:00 – 9:30    Arrival and set-up in the LGI
9:30 – 1:00    Competition (Pool Area)
11:30 – 1:00   Lunch (staggered, in LGI)
1:15 – 1:30    Awards and conclusion

Bus drop-off / spectator parking:
Please pull behind the school to the Flag Pole entrance- use the normal bus loop and follow all posted signs.

ROV teachers and student groups will enter and sign-in at the greeting table near the entrance. ROV teams will report directly to the LGI (Large Group Instruction room).

Students, teachers, and spectators will all be required to sign in and follow typical Campbell-Savona district policies for school visitors. Please realize that C-S students are in class while the competition is taking place.

Food:
Teams will need to make their own arrangements for food; bring your own or have any deliveries made to the “flag pole entrance behind the school.” You MUST meet the delivery person; the main office will not accept delivery for you. We suggest requesting bagged lunches from your school if possible.
Details about pool:
12 ft deep end with six lanes. Plenty of room along sides for equipment setup and use. There is also a PA and bleacher seating.

Competition Day organization:
Please make sure your batteries are fully charged, your cables are organized and ready to go, and all your pieces/parts are securely attached. Please make a note of all materials and tools you bring so that they return home with you.

Team Registration (Teachers):
- Please make sure to RSVP your school to by April 1st using this link.

Media Release Forms:
Please work with your district, students, and parents to make sure we get a complete list of your students who need to be excluded from video/photo/media. Students who cannot be photographed or videotaped are the only ones we need Media Release Forms for. Please bring any media forms with you on competition day. It will be your district’s responsibility to confirm that we get an accurate list of students for the competitions.

Flipgrid Science Fair
Each team will share their experiences in all aspects of the robotics program (building, programming, testing, modifying, etc.). These explanations will be scored by judges using the attached “Communication Rubric.” Each student on the team is expected to contribute to the creation of a Flipgrid video creation on the Flipgrid website or app, ensuring that all criteria is addressed.

In addition to the discussions, teams should plan to use visuals that may include digital media, process journals, engineering notebooks, or any other artifacts to help explain their experiences with the robotics. Images can be uploaded as “stickers” within the Flipgrid and videos can be created through the platform.

Every team will have their products reviewed by two different judges. The overall scores from each judge will be added together for a total of up to 60 points.

Students should follow the directions stated within the Flipgrid while also keeping the scoring rubric in mind.
**Student directions within Flipgrid:**

In your video, explain and demonstrate how you approached one challenge.

Be sure to:

1. Explain which challenge felt the easiest.
2. Explain which challenge felt the most difficult.
3. Share how tasks were divided among team members.
4. Reflect on one skill you learned through collaborating and working on robotics that you can now apply to real life.
5. Students are encouraged to read and refer to the entire rubric as it is much more detailed and specific.
   - We highly encourage each team to explore Flipgrid
   - Students will need to check with Katie Cooke (catcooke@gstboces.org) to get the username and password to complete this section. Be sure to click the option for ROV as there is also an option for VEX. We want to make sure that student submissions land in the correct location.
   - The rubric is linked within the Flipgrid titled science fair, students will see it once they are on that specific page.
   - Please encourage students to give their best effort and remind them that these will be available for other students and teachers to view.

Rubric for science fair is also linked [here](#).

Please click [here](#) for an overview/tutorial of how to use Flipgrid for both introductions and the Science Fair portion.

Once Flipgrid submissions are approved by the moderator, students can check back and listen to other teams!
# ROV ROBOTICS COMMUNICATION RUBRIC

**TEAM:**

## Oral Presentation (Competition)

<table>
<thead>
<tr>
<th>When speaking, presenters are</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>* using an appropriate vocabulary and scientific concepts to support and explain how they approached building and/or programming</td>
<td></td>
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<tr>
<td>* organizing the discussion in a logical sequence that the audience can follow by maintaining a proper volume, rate, and level of enthusiasm</td>
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</tbody>
</table>

## Explanation

<table>
<thead>
<tr>
<th>When responding to questions within Flipgrid, presenters are</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>* providing the audience with the information needed to fully understand how they approached building/programming</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>* explaining what they felt the easiest part of the challenge was and why</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* explaining what they felt the most challenging part of the challenge was and why</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* sharing how tasks were divided among team members</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* enthusiastic and confident about answering questions</td>
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</tr>
</tbody>
</table>

## Demonstrating Experience

<table>
<thead>
<tr>
<th>Presenters have discussed the following points about their experiences of building, programming and operating their robot, presenters share</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>* first-hand experiences about the robot build and any modifications used</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>* discussion and demonstration of their program for a challenge - how did they solve different problems as they came up</td>
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</tr>
</tbody>
</table>

_How do they reflect upon: What is one skill you've learned through robotics that you could apply to real life?_  
Skill may be specific to coding and building or it may be a soft skill: grit, determination, perseverance, patience, etc.

## Scoring Continuum (examples):  
3 = outstanding fluency; 2 = sufficient; 1 = few details; 0 = viewed as unimportant

**TOTAL**
**Sample Competition Schedule:**
In order to keep teams on task, we will be asking them to make sure they have completed at least one challenge every hour. This will give teams time to adjust their ROVs and find time to eat yet still finish all challenges in a timely manner.

Teams will be allowed to move to the next challenge early, but the teams who are scheduled to be at an event will be allowed to finish first.

<table>
<thead>
<tr>
<th>Time</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:30–11:00</td>
<td>Rise to the Top</td>
<td>Artifact Retrieval</td>
<td>Down &amp; Back</td>
</tr>
<tr>
<td>11:00–12:00</td>
<td>Rise to the Top</td>
<td>Artifact Retrieval</td>
<td>Down &amp; Back</td>
</tr>
<tr>
<td>12:00–1:00</td>
<td>Rise to the Top</td>
<td>Artifact Retrieval</td>
<td>Artifact Retrieval</td>
</tr>
</tbody>
</table>

*this is a sample and may change prior to the competition.*
Two different classes for competition!

Because 3d printers, microcontrollers, lithium batteries, and specific ROV hardware have become more readily available in the last few years we have decided to enhance our competition format to allow for more creativity and engineering.

**Stock Class:** these ROVs are designed and built using the pieces and parts that come in the ROV kit. Pieces can be modified, but no additional materials may be used in the construction of your ROV.

**Open Class:** these ROVs can be designed using almost any materials or resources available. The following rules must be adhered to:

- All pieces, parts, and the overall ROV system needs to be safe. This includes any electrical systems, pneumatic/hydraulic systems, propulsion parts, etc. Anything deemed unsafe will not be allowed to be used.
- No parts can be completely transparent (Plexiglas, etc.) This is in case pieces or parts fall off we can find them in the pool. If you need to use clear plastic please put some colorful tape or waterproof paint on it for this reason.
- No glass or other easily breakable items unless they are inside a sealed container.
- Tethers should be no longer than 30’ yet long enough to participate in all challenges.
- Systems should stay together once in the pool. Please make sure all pieces and parts are attached well.
- Please be prepared to openly share any innovative design, engineering, or programming that you used with spectators, teachers, and other students.

ROVs in both classes will attempt the same challenges, however both classes will receive awards separately. The lone exception is The Science Fair, which will not be separated by class.

Any ROV that uses non-provided materials at any point in the competition will be classified as “Open Class”.

If there are any questions about materials, processes, or your class designation please ask!
Challenge: Rise to the Top

This challenge tests the team’s ability to make their ROV as close to neutrally buoyant as possible.

Drivers will power their robots to sit on the bottom of the pool (in the deep end). A judge will tell you to turn all motors off and will then start their stopwatch.

The ROVs should begin to rise. The task is to make them come to the surface as slowly as possible (but staying within a 2-minute time limit). You will receive one point per second that it takes your robot to rise, 120 points maximum. Time stops when your robot breaks the surface of the water.

- If an ROV surfaces within 10 seconds after that time limit they will be scored as follows:
  - $120 - (2 \times (\text{Recorded Time} - 120)) = \text{score}$
- ROVs that have not surfaced after 130 seconds will be scored with a zero.

Students may not use the tether, a motor, or any other method to help move the ROV to the surface.

Teams will be given three attempts at this challenge, if needed.

**Excel Scoresheet example:**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Test Team</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Attempt 1</td>
<td>Attempt 2</td>
<td>Attempt 3</td>
<td>Best</td>
</tr>
<tr>
<td>4</td>
<td>Time (s)</td>
<td>102</td>
<td>128</td>
<td>131</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Points</td>
<td>102</td>
<td>104</td>
<td>0</td>
<td>104</td>
</tr>
</tbody>
</table>

Formula for cell B5 >> \[=\text{IF}(\text{B4}<120, \text{B4}, \text{IF}(\text{B4}<131, 120-(2\times(\text{B4}-120)), 0))\]
Challenge: Down & Back
(formerly called “Drag Race”)

This challenge will test the team’s ability to build something well-balanced and fairly hydrodynamic.

ROVs will race from the edge of the pool to a location approximately 20’ out and then back to the pool edge. The turn-around location will be noted with some sort of marker (a pool noodle, a laser line, or some other device still under construction).

ROVs must be touching the edge of the pool when the timer begins.

No student may help propel the robot in any way. This includes pulling on the tether or pushing it to start.

ROVs can travel at any depth during this challenge.

ROVs can move in any direction (forward/backward/sideways) while attempting this challenge.

There is a 5-minute (300-second) time limit for this race.

Scoring is based on the 300 minus the measured time (s). The quicker you are, the higher your score will be.

Teams may try this challenge twice, if needed.

**Excel Scoresheet example:**

<table>
<thead>
<tr>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Test Team</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Attempt 1</td>
<td>Attempt 2</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>243</td>
<td>277</td>
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<tr>
<td>5</td>
<td></td>
<td>57</td>
<td>23</td>
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<tr>
<td>6</td>
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</tbody>
</table>

Formula for cell G5:

=if(G4>299,0,300-G4)
Challenge: Artifact Retrieval

Teams will be given three (3) minutes to pick up as many rings or tees as possible from the bottom of the pool. Time will start once the ROV is on the bottom of the pool and the driver says they are ready.

Tees are worth 2 points

Rings are worth 1 point

Scoring is done as soon as the main body of the ROV breaks the surface of the water with the artifact. The ROV can drop the artifact or a teammate can remove it and toss it back in to the pool.

ROVs must be completely out of contact with artifacts after dropping them and before trying to pick them back up.

Drivers may not look toward the pool while the challenge is happening. Teammates can watch the ROV and communicate with the driver if necessary.

Teams can only do this challenge one time.

Excel Scoresheet example:

<table>
<thead>
<tr>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Test Team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td># Rings</td>
<td># Tees</td>
<td>Total</td>
</tr>
<tr>
<td>4</td>
<td>Time (s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Points</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
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</table>

Overall Scoring:

All scores are normalized against a base score that represents our estimate for the max possible score for each challenge. This will make each challenge worth approximately the same amount.