STEM Research Topic: Science

2019-2020

What's New for the 2019-2020 Season

- At each event that qualifies teams directly to VEX Robotics World Championship, the top five (5) teams in contention for the award will deliver their presentation at the event to judges.
- At VEX Worlds, the top five (5) teams in contention for the award will deliver their presentation at the event to Judges.

Changes From 2018-2019 Season Remain in Effect:

- The STEM Research Project and Presentation is now a video submission turned in prior to the event.
- At events that do not qualify teams directly to VEX Worlds, the STEM Research Project and Presentation award shall be judged by the video submission ONLY. (Judging details appear later in this document.) STEM Presentations SHALL NOT be delivered in-person at these events.
- The STEM Research Project and Presentation is no longer a requirement for the VEX IQ Challenge Excellence Award.
- The STEM Research Project Award is optional at local events (events that do not qualify teams directly to VEX Worlds) and will be offered at the discretion of the event partner.
- The STEM Research Project Award must be offered at events that qualify teams directly to VEX Worlds, but teams are not required to submit a STEM Research Project.
- The STEM Research Project and Presentation trophy and award plate is no longer part of the Standard Event trophy pack.

STEM Research Project Award Overview

The focus for this aspect of the VEX IQ Challenge is to have students learn about the relationship among the STEM fields of Science, Technology, Engineering and Mathematics. Each season one of the fields is featured, providing students with an opportunity to learn more about how it relates to robotics and how what they are learning in the classroom has a practical application in their lives.

At Local Events

The STEM Research Project Award is optional at local events (events that do not qualify teams diretly to VEX Worlds) and will be offered at the discretion of the event partner. Teams must check the Awards tab on the VEX IQ Challenge event page to determine if the award will be offered. Event Partners that decide to offer the STEM Project Award at local events will share with teams the procedure for submitting the link for the video presentation.

At Events That Qualify Teams Directly To VEX Worlds

The STEM Research Project Award is mandatory at events that qualify teams directly to VEX Worlds. At each event that qualifies teams directly to VEX Worlds, the top five (5) contenders for the STEM Research Project Award as judged from the video submissions, will deliver their 4-minute presentations in-person to a panel of two (2) judges at the event. Additionally, judges will have up to 4 minutes for questions and answers. The winning team will be selected from the in-person presentations as judged using the STEM Research Project rubric.

STEM Research Project Award at VEX Worlds

The STEM Research Project Award is an overall award at VEX Worlds. It will be awarded to one team each at the Elementary School level and at the Middle School level. At VEX Worlds, the top five (5) contenders at each level (Elementary School and Middle School) for the STEM Research Project Award as judged from the video submissions, will deliver their 4-minute presentations in-person to a panel of two (2) judges at VEX Worlds. Additionally, judges will have up to 4 minutes for questions and answers. The winning team will be selected from the in-person presentations as judged using the STEM Research Project rubric.

To be eligible for the STEM Research Project Award at VEX Worlds, a team must have been awarded the Excellence Award or STEM Research Project Award at an event that qualifies teams directly to VEX Worlds. Eligible teams will be notified by email after the second weekend in March. The notification will include instructions on the posting and linking requirements for the video submission.

2019-2020 STEM Research Project Topic: Science

This year we are featuring the STEM field of Science and how robotics can play a role in science, especially in data collection. Science is the systematic knowledge gained through observations, experimentation and the development of models.

Follow these steps to develop your STEM research project.

1. Identify your topic of interest.
2. Search for accurate information about your topic.
3. Develop a thesis, which is a sentence that tells the reader what you believe about your topic.
4. Organize all the information that you have found about your topic.
5. Make an outline.
6. Work on your project by filling in your outline with information that you learned in your research.
7. List all books, Internet sources, magazines, encyclopedias and anything else that you used to gather information.

Other helpful steps:

- Involve each of your team members in some way.
- Talk to scientists in your community to explore what challenges exist and how robotics is being used to solve those challenges.
- Identify one challenge topic that your team can solve by using robotics to assist or collect data.
- Narrow your focus so that your team can effectively share your results in less than four minutes.
- Research your challenge topic using a variety of reliable sources, such as engineering and scientific journals and publications, electronic resources from various professional organizations, ask your librarian for help, and include human experts in the area you are researching.
- Identify possible solutions that have already been proposed or tried for your challenge.
- Organize, study, and explain the research that your team completed.
- Apply your research and creativity to develop your proposed solution (your "hypothesis"). Your research can be shown using sketches or a simple prototype.
- Test your solution to make sure it works. Consider consulting with scientists or other professionals.
- If your solution does not work well, consider modifying your solution and testing it again.
- **Students do the research**, choose the challenge and solution, make the decisions, and select the format to share their research results. Adults may offer guidance.

Here is a list of Potential Topics for your Project:

- How are robots used to perform scientific research today?
- How have robots been used for scientific discoveries in history?
- Why are the scientists using robotics or automation for their research?
- What part of the research are the robots used?
- What types of data are the robots able to acquire?
- Can you set up a robot to collect data for a scientific inquiry?
  - Which sensors can be used?
  - What types of data can they collect?
- How can machine learning be incorporated in data collection?
- How can robots assist the collection of big data and how can it be used to improve the quality of life for individuals?

Evaluation Criteria

Your video must focus on this season's STEM topic, demonstrate to the judges how your project is significant, and how your research is relevant to this season's STEM topic.

Judges will evaluate each entry using the STEM Research Project Rubric. These factors will be considered during evaluation:

- Demonstration of how this season's STEM topic played a role in their project and presentation.
- The students have demonstrated how many different components of the STEM topic played a role in their project or how the subject of their research affected the topic as we know it today.
- The video is of good quality, including resolution, editing and sound (all music must be in the public domain and credited properly).
- The video is easily understood, clearly presented, creative and is enjoyable to watch – it engages the learner.
- Demonstration that the video was produced by the students with minimal adult assistance.

Helpful Tip: Focus on making learning fun and engaging. Be creative with your presentation!

You video may be presented in any of the following forms:

- A brief documentary.
- Teaching a virtual classroom or stage a real classroom.
- Film your presentation to your community.
- Any method that appeals to an audience of your peers.

Requirements for Submitting Entries

- Create a video of your STEM Research Project Presentation, not to exceed 4 minutes plus 15 seconds for credits. You may choose to explore any one of the suggested topics or one of your own related to this season's topic.
- The video may be your team speaking, a voice over storyboard, a voice over PowerPoint or any other video format of your choosing.
- The video should summarize your project from start to finish. The video should effectively share the story of your research project and the findings of your research.
- Credits shall be provided at the end of the video and shall include the name of the entrant or entrants, the team number, the name of the video, music credits, plus any other information the entrant wants to include (software used, recognition of sponsors, etc.). The credits should be no longer than 15 seconds and must appear at the end of the video.
- All material must be original or in the public domain (for example, music must be in the public domain).
- **Students produce the video,** edit the video, add subtitles or other effects, make the editing decisions, and produce the final video. Adults may help with software or camera operation, but only enough to empower the students to do the work themselves.
- Post or upload the video to YouTube, SchoolTube, Youku, or an equivalent free video posting service. Please refer to video posting instructions available directly from the service your team chooses. Whatever service is used, the link provided to the Event Partner must open right to the video and not require a password, login or present any other impediment. Save the link to the posted or uploaded video as you will need this for the submission according to the instructions on the event web site provided by the Event Partner.
- Links to Google Drive or Dropbox or any other "cloud drive" are not permitted and do not meet the requirements.

Note: Music must be in the public domain or the video upload platform may delete the video. Use music only if necessary.

STEM Research Project and Video Presentation

Teams will share the results of their STEM Research Project with VEX IQ Challenge event Judges in a creative and effective four (4) minute video presentation. Following the video there must be a 15 second credits section which includes the name of the entrant or entrants, the team number, the name of the video.

Team #: _____

Team Name: _____

Program level: ☐ Elementary ☐ Middle

Judges: _____

For more details review the STEM Research Project and VEX IQ Challenge Awards Appendix on the VEX IQ Challenge web page.

Directions: Mark the descriptor that best describes the team's performance for each criterion.

Criteria	Expert *(3 points)*	Proficient *(2 points)*	Emerging *(1 points)*	Points
Identifies a challenge topic of interest that relates to the STEM theme for the season	Challenge topic clearly identified, with a strong connection to the STEM theme for the season	Challenge topic identified, with some connection to the STEM theme for the season	Topic not identified and/or limited connection to the STEM theme for the season	
Completes research and collect evidence using reliable sources	Provides evidence of thorough research using 3-5 reliable and credible sources	Provides evidence of research using 1-3 reliable sources	Provides evidence from no reliable sources	
Demonstrates a well-organized and documented process to study/explain research findings	Demonstrates highly organized and well documented process to study and explain the research data	Demonstrates some organization and documentation of the project	Demonstrates little to no documentation of the project	
Describes how the research findings were applied to develop and test the solution	Demonstrates an in-depth understanding of the application of the research to develop and test the solution	Demonstrates some understanding of the application of the research to develop and test the solution	Demonstrates little to no application of research to develop and test the solution	
Shares the solution in an effective and creative high-quality video	Video provides clear, effective, and creative explanation of how solution was developed and how it works	Video provides adequate explanation of how the solution was developed and how it works	Video lacks detail needed to understand the team's solution	
Students demonstrate an understanding of the research process	All students demonstrate mastery of the research process	Most students demonstrate some understanding of the research process	Students demonstrate little or no understanding of the research process	
Students demonstrate teamwork and effective communication skills in a student produced video	All students demonstrate high levels of cooperation, courtesy, enthusiasm, confidence, accuracy, and clarity	Students demonstrate some cooperation, courtesy, enthusiasm, confidence, accuracy and clarity	Students demonstrate limited cooperation, courtesy, enthusiasm, confidence, accuracy, and clarity	

Describe the best features of this video presentation: *(Continue on back of sheet)*	Add a 3-point bonus for staying within the 4-minute allotted time and including up to 15 seconds of appropriate credits.	Total Points
_____		
_____		
_____		

NOTE: This is a confidential judging document. It should not leave the Judge's room after a competition. Return to the Judge Advisor for disposal.