

STEM Theme

The world needs the students of today to become the scientists, engineers, and problem-solving leaders of tomorrow. Science constantly presents us with new breakthroughs and challenges, creating greater opportunities for problem-solving through technology. The solutions to these problems could help change the world, and technology-based problem solvers will be the people to make it all possible.

Each season, one Science, Technology, Engineering, or Mathematics (STEM) subject is the primary focus of the VEX IQ STEM Research Project. This year the STEM Research Project theme focuses on **Robotic Technology in the community**. Students are encouraged to think about how Robotic Technology is being used in areas they encounter on a daily basis. Teams will develop an area of study that interests them. If teams need direction to narrow down their research, the following list provides suggestions:

- How robotic technology is being used in the healthcare industry
 - Distribution of medication, surgical procedures, and research
- How robotic technology is used in farming, and food production industry
 - How to apply robotics technology in harvesting, packaging, or distributing food
- How robotic technology is used in the manufacturing industry
 - How technology is used in the invention and production of goods
- How robotic technology is used in the arts and entertainment industry
 - Production and distribution of art, music, video and live entertainment
- How robotic technology is used in the field of communication
 - What forms of communication utilize or can utilize robotic technology
- How and where robotic technology is found in the transportation industry
 - How new forms of transportation can utilize robotic technology in the future
- How robotic technology is used in education
 - How robotic technology can help students learn
- How technology and robotics are being used to assist people with special needs
 - How robotic technology has helped people or what new technology is needed

Steps

Scientists use a process called the **Scientific Method** to solve challenges. This process and the following suggested steps can help your team solve your challenge.

- Involve all of your team members in some way.
- Document your methods, decisions, and conclusion in a notebook.
- Talk to experts in your community to explore what challenges exist and how your team can solve these challenges by applying robotics technology.
- Identify one challenge topic that your team can solve by using robotic technology.
- Narrow your focus so that your team can effectively share your results in four (4) minutes or less.
- Research your challenge topic using a variety of reliable sources, including human experts.
- Identify possible solutions that have already been proposed or tried for your challenge.
- Record your bibliography, a list of the sources that your team used in your research.
- Organize, study, and explain the research that your team completed.
- Apply your research and creativity to develop your proposed solution (your “hypothesis”).
- Test your solution to make sure it works, perhaps by consulting human experts.
- If your solution does not work well, consider modifying your solution and testing it again.

- Share the results of your research through:
 - A presentation of up to four (4) minutes to VEX IQ Challenge event judges. Your team will have up to four (4) additional minutes to answer questions and share more information on your research, for a total judging session of up to eight (8) minutes. Only students are allowed in the judging room with the judges unless:
 - An adult is requested as a chaperone when only one judge is present.
 - An adult is needed to support student(s) with special needs.
 - A display at your team's table in the Team Pit Area (event practice area).
 - You are encouraged to present your results to your team's community and beyond.
- 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.

Presentation

Explore **all** of the creative ways that your team can share the solution to your challenge. Choose the format that works best for your team.

Written Formats – Set up and presented by your team in **up to 4 minutes**.

- Share a copy of pages from your notebook, which documents how you developed the solution to your challenge.
- Create a newspaper story or blog about your research and the solution to your challenge.
- Design a one-page advertisement that promotes the solution to your challenge.
- Develop a laboratory-type report, which may include the following sections: Title, Question, Introduction, Methods, Results, and Discussion.
- Any creative written format that your team chooses.

Performance Formats – Set up and presented by your team in **up to 4 minutes**.

- Prepare and present a news broadcast that reports the solution to your challenge.
- Develop and present a teaching segment, which demonstrates how you conducted your research to develop a solution to your challenge.
- Design and present a skit or a play that shares how you solved the challenge.
- Create a video or a movie that shows your team in action solving the challenge.
- Any creative performance or media format that your team chooses!

TIP: Consider a less technical format. The presentation time cannot be rescheduled or extended if technical difficulties occur. If equipment is required to deliver the presentation, it must be provided and set up by the students, within the allotted time frame.

Award Criteria

- Identifies a challenge topic of interest that relates to the STEM theme for the season
- Completes research and collects evidence using reliable sources
- Demonstrates a well-organized and documented process to study and explain research findings
- Describes how the research findings were applied to develop and test the solution
- Shares the solution in an effective and creative presentation
- Students demonstrate an understanding of the research process
- Students demonstrate teamwork and effective communication skills



STEM Research Project Rubric



Students will share the results of their STEM Research Project with VEX IQ Challenge event judges in a creative and effective four (4) minute presentation, including setup. Judges will then have up to four (4) minutes to ask questions of the students to learn more about their project.

Team Name: _____ Team Number: _____ Elementary Middle Judges: _____

For details, review the STEM Research Project and Awards Appendix on www.roboticseducation.org/vex-iq-challeng/viq-current-game/

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

Criteria	Expert (3 points)	Proficient (2 points)	Emerging (1 point)	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 collects 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 presentation	Presentation and visual aids provide clear, effective, and creative explanation of how solution was developed and how it works	Presentation provides adequate explanation of how the solution was developed and how it works	Presentation 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	All students demonstrate high levels of cooperation, courtesy, enthusiasm, confidence, accuracy and clarity	Most students demonstrate some cooperation, courtesy, enthusiasm, confidence, accuracy and clarity	Students demonstrate little or no cooperation, courtesy, enthusiasm, confidence, accuracy and clarity	
Describe the best features of this presentation and discussion with the judges (continue on back of sheet):				Total Points