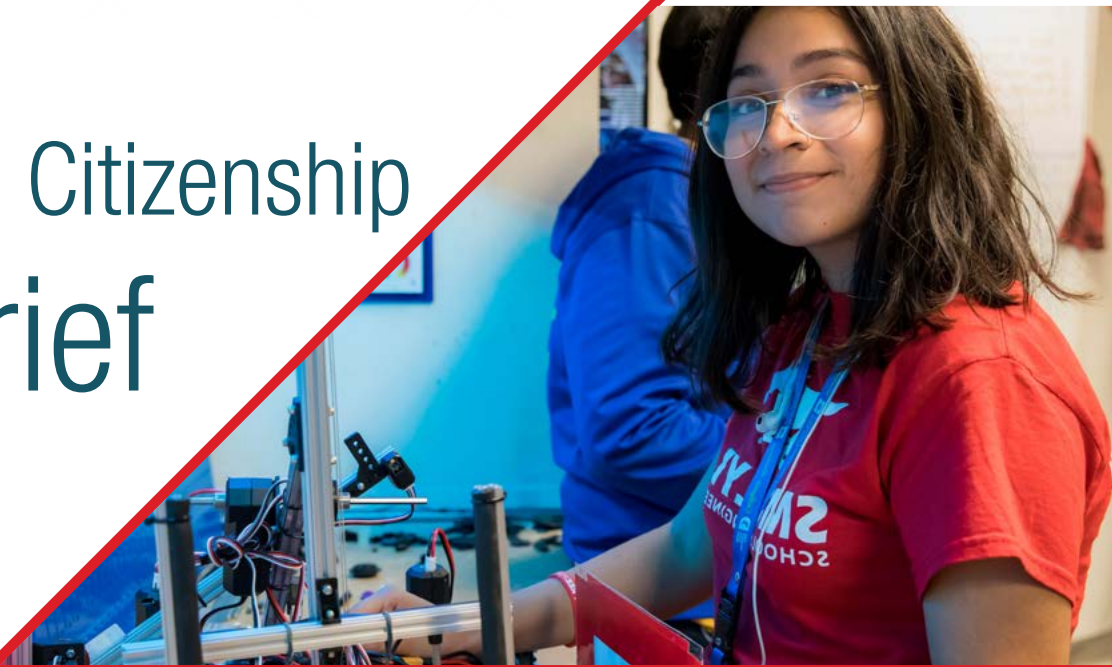


TI Corporate Citizenship Topic Brief



Robotics competitions

Robotics competitions

Why it matters

Researchⁱ shows, students involved in robotics are:

- 3x more likely than comparison students to show gains in STEM interest
- 2.6x more likely to enroll in an engineering course freshman year of college
- 3x more likely to show gains in STEM career interest



The case

We're on a quest to help bring science, technology, engineering and math (STEM) subjects to life in learning environments that open the eyes of students to the potential of careers in STEM fields.

Here's why: During the past 10 years, employment in STEM occupations has continued to grow much faster than non-STEM occupations (24.4 percent vs. 4.0 percent, respectively). This trajectory is expected to continue: STEM occupations are projected to grow by 8.9 percent from 2014 to 2024, compared to 6.4 percent growth for non-STEM occupationsⁱⁱ. Yet with only 25.6 percent of bachelor's degrees being conferred in STEM subjectsⁱⁱⁱ, it's clear that we will not meet the STEM workforce demand. In fact, less than half of U.S. high school graduates are ready for college-level math, and less than a third are ready for college-level science^{iv}. What's more, student interest in STEM professions has remained relatively flat since 2000^v.

The issue of insufficient STEM education is high-stakes. It's clear that even for students who don't choose technical careers, STEM skills are survival skills.

A proven solution

Mentor-based robotics competitions are proven solution to engage students in STEM concepts and to build the skills required of the 21st century workforce. Not only do these competitions provide a fun, hands-on environment for students to design and build robots, they encourage team work and real-world problem-solving skills needed for future STEM careers.

We are ardent believers in the effectiveness of robotics competitions. They level the STEM education playing field so that any student can become a STEM student, regardless of background, family environment, aptitude, physical ability or socioeconomic status. Robotics competitions open a pathway to STEM learning, and they teach the values and skills urgently needed to take students forward into a successful future: leadership, teamwork, problem-solving, diversity of thought, volunteerism, ethics, confidence, commitment, compassion and communication.

"We love that our team comes from so many different backgrounds because that means we have more diverse minds to expand what our future robots will look like. We also learned that even though we're individuals, we are a family on the field and our 150-pound robot was only possible because we worked together."

**– Benny Reyna, FRC team 1745,
J.J. Pearce High School,
Richardson, Texas**

How we support

Mentors

TI engineers volunteer as mentors of local robotics teams, providing technical guidance to students while demystifying what a career in engineering looks like. However, robotics mentorship and volunteerism isn't just for engineers. Learning needs extend far beyond technical skills. Students are responsible for writing and submitting entries to competitions, project management, presenting to judges, and budgeting for projects and expenses, and guidance is also needed in these areas.

“When you have enough mentors so the kids can learn, they become mentors themselves.”

– Steve Clynes, Tier and volunteer robotics mentor at Woodrow Wilson High School, Dallas, Texas

Technology

Our vast portfolio of semiconductors is found in competition kits supplied to contestants, as well as individual teams' choice of technology. We're also putting STEM in motion in the classroom with products that address STEM learning needs from K-12 through university.

The TI-Innovator™ Rover was created as an easy on-ramp to robotics to help middle school kids see that coding and the basics of engineering can be easy and fun. For its brain, Rover uses our TI-Innovator Hub, which is based on

TI LaunchPad™ technology – the same technology engineers use to design innovative products. Rover connects to the TI-Innovator Hub and either a TI-84 Plus CE or TI-Nspire™ CX graphing calculator and helps drive interest and curiosity in STEM subjects.

For university engineering students, the TI Robotics Systems Learning Kit (TI-RSLK) provides a deeper understanding of how electronics system design works. Its hands-on curriculum and real- world technology allow students to learn and apply principles that can be used on day one of a career as an electrical engineer.

Sponsorships

We sponsor teams and competitions within the FIRST, VEX and BEST organizations to encourage students to experience the energizing world of STEM through robotics. While each of these organizations brings a unique value to their participating teams, all have the same aim – to open the world of STEM for all students, regardless of background or skill, and allow them to practice the same skills engineers practice every day – teamwork, hardware and software design, and problem-solving.

By helping students practice and experience STEM skills through the hands-on excitement of a competitive environment, robotics competitions allow students to imagine what life in a STEM career could be like.

- Learn more about FIRST at www.firstinspires.org
- Learn more about VEX at www.vexrobotics.com
- Learn more about BEST at www.bestinc.org
- Learn more about TI's commitment to STEM education at www.ti.com/stem

ⁱ FIRST Longitudinal Study – Findings at 48 month Follow-Up/Executive Summary April 2018 Center for Youth and Communities, Brandeis University

ⁱⁱ STEM Jobs: 2017 Update, U.S. Department of Commerce, Economics and Statistics Administration, Office of the Chief Economist

ⁱⁱⁱ U.S. Department of Education: Institute of Education Sciences, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Fall 2001 through Fall 2015 Completions component

^{iv} ACT: The Condition of College and Career Readiness 2016

^v Change the Equation

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to TI's Terms of Sale (www.ti.com/legal/termsofsale.html) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2019, Texas Instruments Incorporated