FIRST – Not a Robot

A sport where all participants can choose to become a professional.

FIRST® is ...

... a global robotics community preparing young people for the future

**Dean Kamen,
FIRST Founder**

- Lifetime Inventor, Entrepreneur, Advocate

- Holds more than 440 U.S. and foreign patents, many
  for innovative medical devices that have expanded
  the frontiers of health care worldwide

- Founded *FIRST* to inspire the next generation of technology leaders

**Dr. Woodie Flowers (1943-2019),
FIRST Distinguished Advisor**

- Pappalardo Professor Emeritus of Mechanical Engineering at the Massachusetts Institute of Technology

- Collaborated with Dean Kamen to develop the *FIRST* Robotics Competition

- Coined the *FIRST* ethos of *Gracious Professionalism*®

For Inspiration and Recognition of Science and Technology

- *What is FIRST ?*

  Video: What is FIRST Robotics? (with Dean Kamen)

- *FIRST* ethos of *Gracious Professionalism*®

  Video: Gracious Professionalism with Woodie Flowers

Bridge from Classroom to Workforce

- Teams rely on Knowledge and Skills learned in Classroom
- Students are presented with new, unscripted challenges
- Students must find new ways to apply knowledge to solve new problems
- Work shoulder-to-shoulder with professionals from community
- Develop through Experience Workforce Abilities
  - Task Management
  - Time Management
  - Teamwork
  - Meeting Presentation Skills
  - Sales and Marketing

The *FIRST* Mission

To inspire young people to be science and technology leaders and innovators, by engaging them in exciting mentor-based programs that build science, engineering, and technology skills, that inspire innovation, and that foster well-rounded life capabilities including self-confidence, communication, and leadership.

Children can join any of our three programs based on age or grade level. Ages may vary by region.

FIRST LEGO LEAGUE
AGES 4–16 | GRADES PreK–8

FIRST TECH CHALLENGE
AGES 12–18 | GRADES 7–12

FIRST ROBOTICS COMPETITION
AGES 14–18 | GRADES 9-12

Over 2.5 million youth reached globally in 30+ years

firstinspires.org

mtroboticsalliance.org

This growth of CTE programs has expanded into STEM fields, with a focus on preparing students for rapidly growing STEM jobs through active, real-world, project-based learning. The U.S. Bureau of Labor Statistics projects STEM occupations to grow 11% from 2021 to 2031, twice as fast as non-STEM jobs. That rapid growth leads to a need to grow young people's awareness of those opportunities through work-based learning. According to this fact sheet produced by Association for Career and Technical Education (ACTE):

FIRST Alumni

By their 4th year of college, *FIRST* alumni are more likely to be majoring in STEM fields than comparison group peers

DECLARE A MAJOR IN STEM (SCIENCE, TECHNOLOGY, ENGINEERING, AND MATH)

FIRST Alumni

81%

Comparison Group

64%

DECLARE A MAJOR IN ENGINEERING OR COMPUTER SCIENCE

FIRST Alumni

59%

Comparison Group

24%

Data represents those who declared a major years 1-4 of college. All differences statistically significant, p ≤ .05.
STEM fields include: biology, computer science, engineering, health professions, mathematics, physical sciences, vocational/ technical fields, and robotics.

Female *FIRST* Alumni

Female *FIRST* alumni are more likely to pursue STEM pathways through four years of college compared to their peers in the comparison group:

% OF FEMALE *FIRST* ALUMNI WHO DECLARE A STEM MAJOR COMPARED TO THEIR PEERS

Female *FIRST* Alumni

70%

Comparison Group

46%

MORE LIKELY TO DECLARE A MAJOR IN ENGINEERING OR COMPUTER SCIENCE THAN THEIR PEERS

Female *FIRST* Alumni

48%

Comparison Group

16%

Data represents those who declared a major years 1-4 of college. All differences statistically significant, p ≤ .05.
STEM fields include: biology, computer science, engineering, health professions, mathematics, physical sciences, vocational/ technical fields, and robotics.
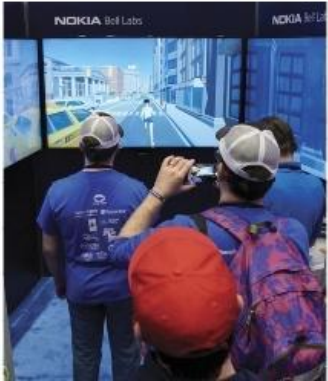
Employment in STEM

FIRST **alumni are** <u>**more likely to engage in STEM-related careers**</u>**, and consider STEM jobs and pertinent skills to be important**
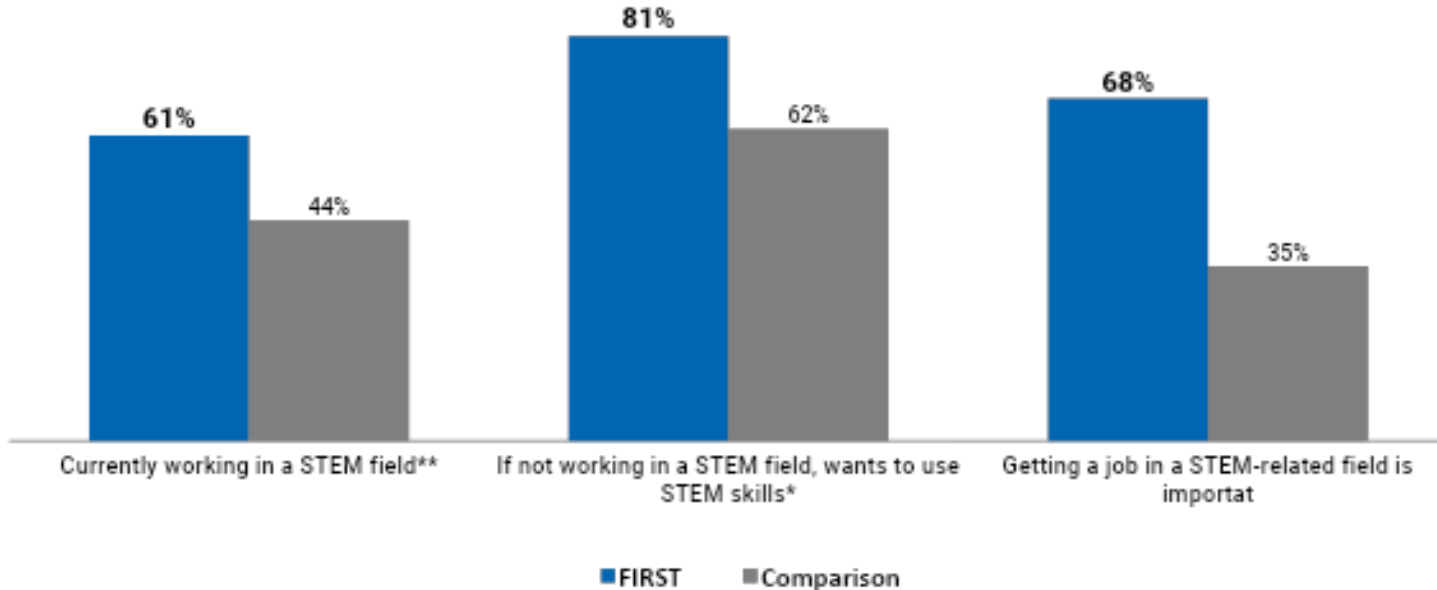
Note: Asterisk (*) indicates statistically significant at p ≤ .05. Asterisks (**) indicates statistically significant at p ≤ .01.

Innovation *hands-on* interaction and exploration

Montana Robotics Alliance
   Advocating for Youth Robotics across Montana

MTRA Website

501c3 organization created in June of 2022

Program Delivery Organization for FIRST Tech Challenge

Partners with Montana State University who is
   Program Delivery Organization for FIRST Lego League

Board Members

Sponsors

Map of Montana FIRST Teams
   FIRST Lego League, FIRST Tech Challenge, FIRST Robotics Competition

FIRST History in Montana

- Group of Robotics Enthusiast
- Original team founders are members of MTRA

- FRC - 2000 (Corvallis #473) then 2005 another half dozen or so
- FLL - 2007
- FTC - 2007

Montana 2023 - 2024 Teams

3 x FLL Explorer

75 x FLL Challenge

27 x FTC

2 x FRC high of 7 to maybe 10 teams

Team Options

- Integrated with School
    - Class Packs
    - Part of curriculum
- Option to compete
    - Clubs (do not have to be school affiliated)
    - FLL, FTC, FRC
    - After School
    - After Work

FIRST® **Class Pack**

- Flexible, high-quality PreK-12 STEM learning experiences
- *FIRST* Class Pack resources prepare educators and facilitators to guide their students
- A journey of STEM exploration using real-world scenarios and challenges.
- Class Pack events are run by the host school or organization.
- [Class Packs](#)

Eureka Public Schools MS Integrated Curriculum

- FLL is a Middle School After School Program

- Coding classes included as part of curriculum

Eureka Public Schools HS Integrated Curriculum

- Don't have to take classes to be on team, don't have to be on team if in classes
- Robotics two classes
- Coding one class
    - Java Block and Line
- Fabrications
- Supplemental - CAD Online with Certification opportunity

Eureka Public Schools HS Integrated Curriculum
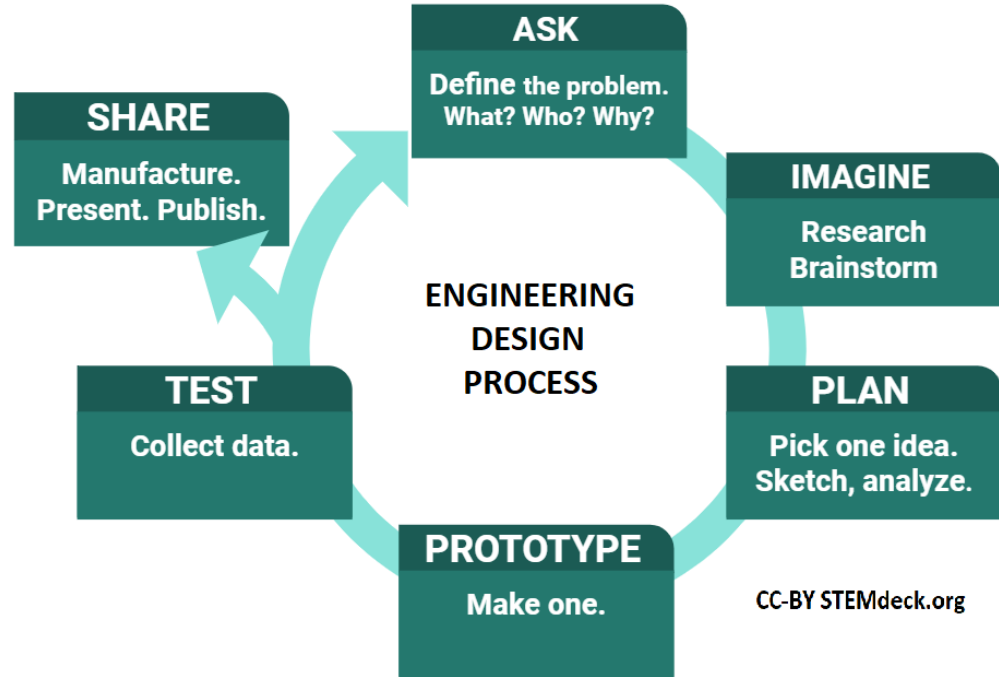
- Equipment Utilized by students

    - Robot Kits
    - Rev Control and Driver Hubs
    - Wood and Metal CNC
    - Epilogue Laser Engraver
    - 3d Printers (filament and resin)
    - Wazer Waterjet

FIRST for All

	FLL	FTC	FRC
Grades	K-8	7-12	9-12
Mentors	2	2+	5-10
Annual Budget (with travel)	$3,000	$8,000	$30,000
Students	2-10	2-15	12-20
Meetings	After School	After School/ After Work	After Work
Support System	Class or Family	School or Organization	Community

Building a Bot

- Reveal
- Game analysis
- Requirements Capture
- Brainstorming
- Engineering
- Prototyping
- Building
- Coding
- Testing
- Documentation
- Continuous Improvement - Engineering Process

ENGINEERING DESIGN PROCESS

ASK
Define the problem.
What? Who? Why?

IMAGINE
Research
Brainstorm

PLAN
Pick one idea.
Sketch, analyze.

PROTOTYPE
Make one.

TEST
Collect data.

SHARE
Manufacture.
Present. Publish.

CC-BY STEMdeck.org

Competition

- Safety - Robot and Field Inspection

- Documentation Submission

- Judging (presentation / public speaking)

- Gracious Professionalism

- Coopertition
    - Alliance & Opponent aspect promotes coopertition

- The robot game

- No school / community size divisions

- FIRST Alumni have Hands On experience

What's In It for the Students?

- Over $80 million in scholarships (Scan code →)
  - More per capita than athletics
  - Some school based (like athletics),
    Some career based (like Mechanical Engineering)
- Work Opportunities
  - Internships
  - Work Shares
- Life Skills
  - Better Communication Skills
  - Team Dynamics and Conflict Resolution
  - Professional Mentors
- Cure for Boredom
  - Advanced Manufacturing
  - Computer Vision
  - Machine Learning and Artificial Intelligence
  - Government Advocacy
  - Video Production and Animation

Additional Resources for You

- Montana Robotics Alliance (MTRA) (Scan code →)
  - Connect with Other Teams
  - Experienced Mentors available by Zoom, Phone, and Email (info@mtroboticsalliance.org)
  - Links to Funding Resources
  - Calendar of Events
- FIRST Senior Mentor (jrumple@firstinspires.org)
  - Supporting FRC, FTC, and FLL since 2016
  - Available to visit in person
  - Provide consulting on next steps and support throughout year

What You Can Do

(By Increasing Level of Commitment)

1. Watch more YouTube videos (Scan code →)
2. Encourage Students to Join a Team
3. Encourage Parents to Mentor or Start a Team
4. Include Robot-related Activities in Classroom with MTRA Assistance
5. Volunteer at a FIRST Event
6. Host an Informal Scrimmage in your Community (MTRA will bring the teams)
7. Add Robotics Course using FLL or FTC Class Pack
8. Mentor a Team
9. Start a Team