Competing for Excellence
TechBrick, formed in early 2003, is an independent robotics and STEM education club for home-schooled, public, and private school students, K-12, in Harford, Baltimore, and Cecil counties.
2003-2019 Students and Instruction Hours

2018-19 At A Glance
✓ 4 Programs
✓ 9 Teams
✓ 70 Students
✓ 40+ Mentors
✓ 23 Schools

Historical Numbers
✓ 72,000+ instruction hours
✓ 800+ students

<table>
<thead>
<tr>
<th>Year</th>
<th>FLL</th>
<th>FRC</th>
<th>FTC</th>
<th>JFL</th>
<th>Grand Total</th>
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<tbody>
<tr>
<td>2005</td>
<td>384</td>
<td></td>
<td></td>
<td>120</td>
<td>504</td>
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<td>2006</td>
<td>832</td>
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<td>100</td>
<td>932</td>
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<td>2007</td>
<td>704</td>
<td>576</td>
<td>100</td>
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<td>672</td>
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<td>864</td>
<td>80</td>
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<td>2011</td>
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<td>2,625</td>
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<td>768</td>
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<td>6,221</td>
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<tr>
<td>2013</td>
<td>3,072</td>
<td>4,375</td>
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<td>10,131</td>
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<td>2014</td>
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<td>9,878</td>
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<td>2015</td>
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<tr>
<td>2016</td>
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<td>3,250</td>
<td>2,592</td>
<td>380</td>
<td>7,758</td>
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<tr>
<td>2017</td>
<td>960</td>
<td>2,750</td>
<td>1,056</td>
<td>160</td>
<td>4,926</td>
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<tr>
<td>2018</td>
<td>1,664</td>
<td>2,500</td>
<td>1,248</td>
<td>100</td>
<td>5,512</td>
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<tr>
<td>2019</td>
<td>768</td>
<td>3,375</td>
<td>1,056</td>
<td>400</td>
<td>5,599</td>
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<tr>
<td>Grand Total</td>
<td>21,568</td>
<td>29,625</td>
<td>17,952</td>
<td>2,880</td>
<td>72,025</td>
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</tbody>
</table>
The Logo: Origins and Mystique

The name was created by Susan.

The logo was drawn by Amy.

The Parrot has appeared on numerous items and the real LEGO parrot has ridden on almost every FTC and FRC bot.
Key to Success: Parents, Mentors, and Coaches

FLL Jr
Heather Lufburrow <<
Amy Nelson
Andrew Lofburrow
Christina Bracknell
Jade Gaston
Jason Kolligs
Orion Nelson
Purvi Dholakia
Robert Schafer
Tracy Schafer

FLL
Brent Kraczek <<
Alexander Pietrocola
Earl Noble
Elizabeth Hopkins
Kraivut 'Don' Srisukkwattananan
William Milligan

FTC
David Hairston <<
Brice Dobry
Christopher Hoppel
Dawn Raiber
Jonathan Bennett
Kevin Gaquin
Wayne Simoni

FRC
Tyrone Schwenk <<
Aaron Jackson
Caitlyn Byrne
Carmen Kifer
Christy Anders
David Gibson
Jaroslav Knap
Jason Steiner
Justin Morrill
Kenneth O'Brien
Larry Kenney
Laura Pennell
Noah Zbozny
Richard Becker
Sherry Merrifield
Timothy Mermagen
Tracy Morrill

AND YOU!
There are no prerequisites for Students

We are looking for students, ages pre-K through 12th grade,

- eager to learn engineering at all levels,
- willing to focus on a very complex task,
- and engage in building a world-class robot and team, and
- existing skills are great but not required
There are no prerequisites for Mentors

We are looking for mentors who

• are interested in motivating young engineers
• eager to teach engineering, communications, management, and teamwork at all levels,
• willing to focus on a very complex task,
• and engage in building a world-class robot and team, and
• existing skills are great but not required, and
• mentors who can help with all the other important stuff like building security, hospitality, logistics, transportation, and more…
The Overall Goals

The FIRST program and competitions provide one of the best platforms for young people to get excited about the challenges and rewards of engineering.

They are pushed to the limit on every level:

- project management,
- design,
- research,
- testing,
- strategic planning,
- communications,
- and more.

In four or five years many of our early participants will be in the workplace providing the innovative solutions we need to maintain our competitive edge.
Why TechBrick Instead of Schools?

Many High Schools and Elementary Schools Are Unable to Support These Programs: Due to...

- the overall costs,
- limited staffing,
- extended practice hours,
- and limitations on the use of machine shop tools,

- and many schools simply cannot start, and more importantly, sustain these programs.
Why would you be interested in this?
Because we need bright, innovative, young engineers to create and maintain our future technologies.

✓ Good engineers and technologists are raised before they are taught. The penchant for mechanical and conceptual disciplines comes from a lifetime of involvement.
✓ For the past 13 years we have coached robotics teams under programs offered by FIRST.

FIRST programs grow engineers and technologists.
Why would you be interested in this?

Future Technologies Will Require Young, Smart, Capable Engineers

✓ We will show a program with more than 400,000 participants world-wide.
✓ We will show you a program that doubles or triples a student’s interest in science and technology.
✓ We will show you a program that will bring to our future projects the talent we need.

The programs are offered through US FIRST… What is US FIRST?
What is FIRSTInspires?

Founded by Dean Kamen and Woodie Flowers

✓ FIRST was founded in 1989.
✓ To inspire young people's interest and participation in science and technology.
✓ Provides accessible, innovative programs that motivate young people to pursue education and career opportunities in science, technology, engineering, and math, while building self-confidence, knowledge, and life skills.
What is FIRST?

For Inspiration and Recognition of Science and Technology

This is without a doubt one of the most engaging and challenging STEM education programs.
FIRST Principles

✓ FIRST Gracious Professionalism.
  ▪ With Gracious Professionalism\(^\circ\), fierce competition and mutual gain are not separate notions. Gracious professionals learn and compete like crazy, but treat one another with respect and kindness in the process.

✓ FIRST Coopertition
  ▪ Coopertition\(^\circ\) produces innovation. At FIRST, Coopertition is displaying unqualified kindness and respect in the face of fierce competition. Coopertition is founded on the concept and a philosophy that teams can and should help and cooperate with each other even as they compete.
**FIRST Core Values**

✓ We are a team.
✓ We do the work.
✓ We share our experiences and discoveries with others.
✓ We are helpful, kind, and show respect when we work, play, and share.
✓ We are all winners.
✓ We have fun!
Who is Involved?
Founded in 1989 and based in Manchester, NH, FIRST is designed to inspire young people’s interest and participation in science and technology, and to motivate them to pursue education and career opportunities in STEM fields.

Global Participation 2018-19
✓ Four programs for ages 4-18
✓ 530K+ students
✓ 250K+ Volunteer roles filled (e.g. event Volunteers, Affiliate Partners, VISTAs)
✓ 18M+ Volunteer Hours Served Per Year
✓ 61,000+ teams
✓ 45,000+ robots
✓ From 170+ countries
✓ Over $80 million+ in college scholarships
✓ 1000’s of scholarship opportunities
✓ 200+ scholarship providers

Billions of lessons learned…
FIRST® participants are significantly more likely to show gains in interest in:

- STEM
- STEM CAREERS
- UNDERSTANDING OF STEM

(than a matched comparison group of students)
87% of participants plan to take a more challenging Math or Science course.
SUBSTANTIAL INCREASE IN STEM UNDERSTANDING.

STEM KNOWLEDGE CONTINUES TO GROW THE LONGER YOU STAY

Students who persist in FIRST for more than one year show significantly greater gains than those who left after a single year.

THE IMPACT ON GIRLS IS SIGNIFICANT

Females in FIRST have a dramatically increased understanding of STEM compared to females in the comparison group.
FIRST ALUMNI ARE 2.6x more likely to enroll in an ENGINEERING course their freshman year (than a matched comparison group of students)

OVER 75% of FIRST Alumni are in a STEM FIELD AS A STUDENT OR PROFESSIONAL
GAINS IN WORKFORCE SKILLS.

**Communication**
76% of students reported gains

**Conflict Resolution**
93% of students reported gains

**Time Management**
95% of students reported gains

**Problem-Solving**
98% of students reported gains
### What are the Programs?

Four Programs Span Ages 6-17+ / Grades Pre-K through 12

<table>
<thead>
<tr>
<th></th>
<th>FIRST Lego League Jr.</th>
<th>FIRST Lego League</th>
<th>FIRST Tech Challenge</th>
<th>FIRST Robotics Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WHO</strong></td>
<td>5-8</td>
<td>9-14</td>
<td>7-12</td>
<td>9-12</td>
</tr>
<tr>
<td><strong>WHAT</strong></td>
<td>Uses the annual theme for project-based work.</td>
<td>Uses annual themes to engage young students in applied research.</td>
<td>Uses a mechanical challenge combined with real-world teamwork and cooperative efforts.</td>
<td></td>
</tr>
<tr>
<td><strong>WHEN</strong></td>
<td>Sept – Jan 4-6 meetings 1 or 2 expos</td>
<td>Aug – Feb Meetings on Tues / Thur (or home schedules) Qualifiers in Dec/Jan State Tournament Feb</td>
<td>Aug-April Meetings on Tuesdays. FRC Build Season: Jan-Feb (nearly full time) Additional meetings near tournaments. Qualifiers in Dec/Jan (FTC) * March April (FRC)</td>
<td></td>
</tr>
<tr>
<td><strong>HOW</strong></td>
<td>Based on standard science project materials</td>
<td>Based on LEGO Mindstorms EV3 Robotics System.</td>
<td>Based on an advanced robotics system.</td>
<td></td>
</tr>
<tr>
<td><strong>SIZE</strong></td>
<td>Up to 6</td>
<td>Up to 10</td>
<td>No Limit</td>
<td>No Limit</td>
</tr>
</tbody>
</table>
Four Tuition Based Programs

- JrFLL (Ages 5-8/Meets in Homes) runs from mid-Sept for about 6 weeks. Then again in January/Feb for events. per student.
- FLL (Ages 8-12/Meets at APG) runs from mid Aug through March.
- FTC (Grades 7-12/Meets at APG) runs from late Aug through March.
- FRC (Grades 9-12/Meets at APG) runs from late August through April with an intensive six week build session from Jan through mid-Feb.
What are the Programs?
JFLL: Junior FIRST LEGO League
✓ Based on LEGO Education Kits.
✓ 2-6 Students.
✓ Thematic Challenges.
✓ Basic building and research.
Really Little Kids Doing Big Science
What are the Programs?

2018-19

Join our mission into the 30th season of FIRST! Discover your sense of wonder during the 2018/2019 FIRST® LEGO® League Jr. season, MISSION MOON.

You and your team will transport to a place where you make the rules, learn to thrive in a new environment, and explore all that is around you.
What are the Programs?
FLL: FIRST LEGO League
✓ Based on LEGO Mindstorms EV3 Robotics System.
✓ 4-10 Students.
✓ Thematic Challenges: 4 Parts.
What are the Programs?

FLL: Four Judged Areas

✓ Project/Research Presentation
✓ Technical Interview
✓ Team Work/Core Values Interview
✓ Robot Performance
What are the Programs?

2018-19

Join our mission into the 30th season of FIRST®! Prepare for blast off, break out of your earthly constraints and go INTO ORBITSM.

The 2018/2019 FIRST® LEGO® League season will transport your team into space, where you’ll explore, challenge, and innovate in the vast expanse of space.
What are the Programs?

FTC: FIRST Tech Challenge

✓ Based on advanced robotics systems.
✓ 2-10 Students.
✓ Uses a mechanical challenge combined with real-world teamwork and cooperative efforts.
What are the Programs?

FTC: Skills

✓ Concepts and design
✓ Electrical and mechanical engineering
✓ Programming
✓ Communications: Web, Video, Social Media, Programs
✓ Extensive engineering records
✓ Outreach
What are the Programs?

2018-19

Join our expedition into the 30th season of FIRST®! Ready your robots to explore uncharted planets in ROVER RUCKUS™ Presented By Qualcomm.

In the 2019 FIRST® Tech Challenge season, teams will explore STEM concepts through a challenging, and out-of-this-world space-themed game. Prepare to rouse a ruckus and take your team on an adventure!
What are the Programs?
FRC: FIRST Robotics Competition
✓ Based on advanced robotics systems.
✓ 10-60 Students.
✓ Uses a mechanical challenge combined with real-world teamwork and cooperative efforts with mentors and sponsors.
What are the Programs?

FRC: Skills

✓ Concepts and design
✓ Electrical engineering
✓ Mechanical engineering
✓ Programming
✓ Strategic planning
✓ Communications: Web, Video, Social Media, Programs
✓ Business development
✓ Extensive engineering records
✓ Outreach
Who Runs FIRST in Maryland?

Operational Partner for FLL

Operational Partner for FRC

Operational Partner for FLLJr and FTC
Consider the Benefits

✓ Strengthens communications skills.
Consider the Benefits
✓ Strengthens communications skills.
✓ Builds technological literacy.
Consider the Benefits

✓ Strengthens communications skills.
✓ Builds technological literacy.
✓ Creates an incubator for interns and future employees.
Consider the Benefits
✓ Strengthens communications skills.
✓ Builds technological literacy.
✓ Creates an incubator for interns and future employees.
✓ Appreciation for highly skilled professionals.
Consider the Benefits
✓ Strengthens communications skills.
✓ Builds technological literacy.
✓ Creates an incubator for interns and future employees.
✓ Appreciation for highly skilled professionals.
✓ Critical component of creating employable students.


Program Sponsor: Rockwell Collins is the Official Program Sponsor and PTC is the CAD & Collaboration Sponsor for the FIRST Tech Challenge.
Consider the Benefits
✓ Part of a great global community
Global Reach
1.4M + Pageviews
650K+ Visitors
Most countries
100,000’s of downloads
Global Reach
1.4M + Pageviews
650K+ Visitors
Most countries
100,000’s of downloads
Consider the Benefits

Outcomes

COLLEGES AND UNIVERSITIES
Drexel
Messiah College
Franklin & Marshall College
Indiana University
Towson University
Washington College
University of Virginia
University of Delaware
University of Kentucky
University of Maryland Baltimore County (UMBC)
Harford Community College
Grove City College
Rochester Institute of Technology
Virginia Tech or University of Virginia
Virginia Western Community College
University of Maryland (College Park)
Massachusetts Institute of Technology
Liberty University
University of Minnesota

DEGREES
Agricultural Engineering
Chemistry
Computer Science
Electrical Engineering
Electronic Media and Film
History
Information Services
Marine Biology
Math & Math Education
Materials Science
Computer Engineering
Mechanical Engineering
Music Composition
Physics
Neurobiology
Special Education and Speech Pathology

EMPLOYERS
Darkhorse Studio
etsy
Marine Corp
US Army
Survey Monkey
US Army National Guard
Virginia Western Community College
Army Research Lab
Kickstarter
JHAPL
The Key Factor in Completing the Challenges

✓ You use 100’s of devices. Every day.
✓ You expect them to work. Every time.
✓ You don’t want surprises. Any time.

They are designed to work well.

You can do the same…

✓ Understand every detail of the task.
✓ Describe accurately how you can do the task.
✓ Design components or do research.
✓ Test and refine.
Methodology: Core Values

FLL Core Values

✓ We are a team.
✓ We do the work to find the solutions with guidance from our coaches and mentors.
✓ We honor the spirit of friendly competition.
✓ What we discover is more important than what we win.
✓ We share our experiences with others.
✓ We display gracious professionalism in everything we do.
✓ We have fun!
Methodology: Goals

Educational Goals

For all team participants we work to gain expertise in the following key areas:

✓ Understand team work and the benefit complementary skills.
✓ Learn how to keep excellent project records.
✓ Gain expertise in core project management skills and methods.
✓ Experience the hard work of funding your project through external support resources.
✓ How to focus on a successful solution to a challenge.
Methodology: Assumptions, Methods, Process

The Assumption:
The challenges can be done.
Someone has solved it. So can you...

The Method: Your work should be...
1. Simple
2. Reliable
3. Repeatable
4. Precise

The Process:
1. Define the task
2. Describe the task
3. Propose solutions
4. Test
5. Refine
6. Record
7. Evaluate
8. Repeat
Sponsors are Key to Our Success
What’s Next?

• Look for invites to register at FIRST
• Pay your invoices if you have not done so
• Considering being a mentor for TechBrick
• Volunteer for event management
• Be a guest speaker
• Financial Support
Questions?