

inspire





Letter from Joe Astroth, Ph.D. Chairman of the Board of the REC Foundation

Focus on Inspiration

More than 30 years ago I began working with students, first as a university professor and later as the leader of the education team at a well-recognized technology company. All along the way, I have continually been inspired by students' eagerness to learn and grow intellectually when school work is placed within the context of experiential problem solving in areas that they find meaningful and relevant to their lives. I am also inspired by the difference that a single individual – parent, teacher, mentor, or friend – can make in a young person's life. That difference has a range of outcomes for our youth, encouraging them to pursue their studies with a passion, building self-confidence, furthering their education at a higher level, or informing their career aspirations.

Over the past year, as Chairman of the Robotics & Education (REC) Foundation, I have been further inspired. The tangible outcomes of the REC Foundation and VEX Robotics Competition (VRC), our flagship program, are distinctive and evident in the over 75,000 students who participate inside and outside the classroom. And while the word "inspiration" is perhaps overused and in many cases not well understood, I can say that in the case of the VEX-related programs in the more than 400 competitions around the world, it is entirely appropriate. In this report you will read about the growth of our programs and hear from some amazing people involved in our efforts. While it was difficult to profile only a few of the members of the REC Foundation and VRC community, I am confident that reading these stories you will come to understand that for each of those included here there are hundreds more stories yet to be told.

For us at the REC Foundation it is always about the young people; about inspiring them to engage, persevere, communicate, collaborate, lead; learn from failure and celebrate each and every success – large or small. What about inspiration for the rest of us? As an educator, a parent, a robotics team mentor, and a supporter of robotics as a platform for learning and teaching STEM, I can say with certainty that participating in a REC Foundation program will have a lasting impact on you. It will inspire you to remember what's important for our young people, what's critical for the future of our nation, what was fun and rewarding when you were in their shoes. I believe you will be inspired to find a way to contribute further to our future scientists, educators, workforce and informed citizens. For those of you who making that contribution today – Thank you for all that you do. That's inspiring for us. For those of you learning about and joining a competition event for the first time – Welcome! We hope that you are inspired to join us in our mission to inspire and support the students of today to become our future of tomorrow!



Letter from Jason Morrella President of the REC Foundation

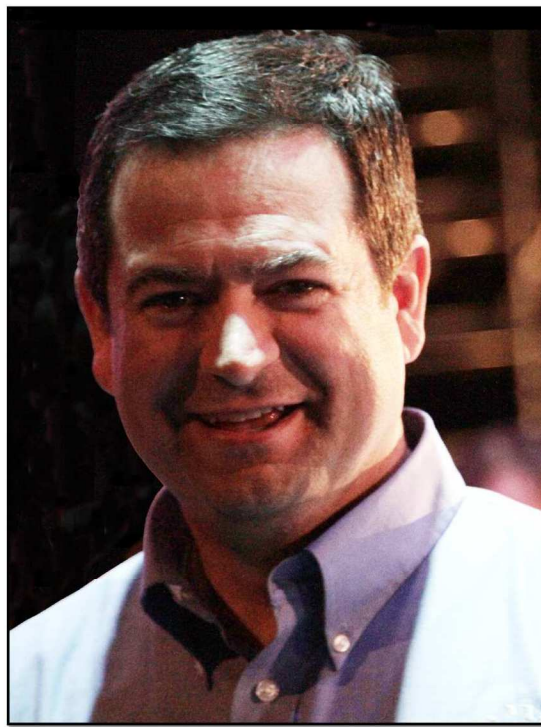
Focus on Impact

I want to join our Chairman of the Board, Joe Astroth, in welcoming you to the 2013 VEX Robotics Competition World Championship. And I want to thank the competitors, mentors, volunteers, parents, sponsors, and guests joining us for our largest ever event, the 2013 World Championship.

We at the REC Foundation want to provide opportunities, challenge, motivate, and empower students by opening doors and opening their eyes to all the opportunities available to them today. Inspiration is what we are about – lighting that spark, connecting those dots that not only give young people the opportunity to design, build and compete in a VEX Robotics Competition (VRC) program or event, but also give them the learning, the hands-on experience and the self-confidence to continue studies or careers in robotics and STEM. It isn't simply inspiration, and it's definitely about more than just a single robot. But think about it: Over the past 8 years, we estimate that more than 210,000 students participating in our competitions have built over 20,000 robots. That's pretty inspiring, but more important, I believe, is the impact on students of what they have experienced through the VRC program. Some of these young VRC participants go on to design the robotics for the next generation of a NASA Rover, or to deploy a sophisticated robotics system to monitor the impact of an environmental incident or natural disaster. Others may take what they love and learn about robotics and STEM into related engineering fields. The impact of their VRC experience is huge, and it matters not only to these young people but – by extension – to us. The impact the classroom and competition experience has on them shapes them, and these young people are shaping our future. Our future is, quite literally, in their hands. As you see their hands at work over the days of this 2013 VEX Robotics Competition World Championship you will rest easy that our future is in capable, strong, spirited, and focused good hands.

Thomas Edison said that genius is one percent inspiration and ninety-nine percent perspiration. In terms of what we at the REC Foundation support and hope to see as the impact of our programs, we look toward balancing that equation. Look at the young people here, you'll find them sweating (from time to time); you'll find them inspired (nearly all the time); and you will find the genius in them. In the following pages of this report you'll learn about the growth and impact of our program; you'll read about the personal impact participating in our programs has on individuals. We hope you will be inspired. We hope you will recognize the positive impact of participating in our programs. And we hope you will contribute to our efforts in any way you can. Your participation will enrich and extend the positive impact we strive to have on the young, the young at heart, our nations, and our world.

Jason Morrella



Students Making News

“This is a great way to engage students in a STEM (Science, Technology, Engineering and Math) activity. It ties into the new core curriculum as well. Programs like this provide hands-on activities and learning, and the competition puts what they learn into context.”

*Bill Andoe, Deputy Director
of Education Services for Cherokee Nation*

“Robotics on a roll: OH State Scholarships Awarded”

The Marion Star, February 23, 2013

“Local students battle their bots at VEX Robotics Competition”

St. Louis Today, March 2, 2013

“We’re delighted with the continued growth of this program. The competitions are fun and challenging, and they are generating increasing interest in STEM with our young people, which is our goal.”

Sandra Evers-Manly, President, Northrop Grumman Foundation

“Robotics competition held in Cape Elizabeth”

WLBZ, Bangor, February 4, 2013

“Students show robotics skills”
Manchester Union Leader, February 2012

“Robots rumble at VEX Robotics event at Cleveland State University”

The Plain Dealer, February 2, 2013

“Girls add to growth of robotics competition”

Chicago Daily Herald, February 1, 2013

Nationwide broadcasts from the 49th BT Young Scientist & Technology Exhibition

RTE News, January 11, 2013

“Bayshore High robotics leagues offers more competition opportunities for Florida students”

Bradenton Herald, January 20, 2013

“A big part of the Army All-American Bowl goes beyond football to include robotics. This is cutting edge stuff, bringing the best of the best together and what I hope is that we will excite enough youngsters to meet the requirements that the nation will need.”

*Lt. General Thomas Bostick,
Commanding General and Chief of Engineers,
at Army All American Bowl VEX Robotics Competition
January 2013*



VEX Robotics Competition by the Numbers

7,336	Teams
407	Events <i>May 2012-April 2013</i>
50	States
26	Countries
51%	Team Growth <i>May 2012-April 2013</i>
56	Scholarships Awarded <i>January-April 2013 valued at \$1M</i>

Twitter:
STEMconnector@STEMConnector
@NorthropGrumman Foundation & @REC_Foundation
partner to create 200 new @VEXRobotics teams worldwide!
?http://buff.ly/14Gd4Md #STEM #OMGrobots

**Smaller schools say VEX offers
economical robotics alternative**
The Manchester Union, February 2012

**Hawaii Convention Center hosts
Pan-Pacific VEX Robotics
Championship**
*Pacific Business News,
February 2, 2013*

**Who should be in the
Robot Hall of Fame?**
CNN, August 27, 2012

Twitter:
Lockheed Martin @LockheedMartin
@rec_foundation Delighted to support.
Kudos to all the Vex Robotics
Competition participants!

**It's robot vs. robot as teams of
young techies go head to head**
San Francisco Chronicle, Jan. 29, 2012

**Robotics: the convergence of
core training—1000 Chinese
teams participate**
The Chosun Ilbo, February 2012

**Syracuse middle, high school students
face off in robotics competition**
*Syracuse Post Standard,
January 17, 2013*

**Maine schools to vie in
robotics championship**
*Associated Press,
February 2, 2013*

**40 Marion County high
schools compete in Indy
robotics city championship**
*Indianapolis Star,
January 20, 2013*



VEX Robotics Competition

The VEX Robotics Competition (VRC), managed by the Robotics Education & Competition Foundation, is an international middle, high school and college robotics competition that pits students against their peers.

In addition to learning about science, technology, engineering, and math (STEM), participants gain valuable teamwork and problem-solving experience. Teams compete year-round at local events with the season culminating in April at the VEX Robotics Competition World Championship.

VRC is the largest and fastest growing middle and high school robotics program, attracting more than 70,000 students worldwide in 2012-2013. Each year in April, following the VEX Robotics Competition World Championship, a new game is announced. This year teams competed in VEX Sack Attack, which is played on a 12'x12' square field with two alliances – one “red” and one “blue” – composed of two teams each. Teams compete in matches consisting of a fifteen second autonomous period followed by one minute and forty-five seconds of driver-controlled play.

The object of the game is to attain a higher score than the opposing Alliance by Scoring Sacks and Bonus Sacks in your colored Floor Goals, Troughs and High Goal, and by having the most Robots of your color Parked at the end of the Match. VRC teams design, program and build their robots for the competition with opportunities throughout the season to reiterate their designs leading up to competition.

VEX Robotics College Competition

The VEX Robotics Competition (VRC), managed by the Robotics Education & Competition Foundation, is an international middle, high school and college robotics competition that pits students against their peers.

VEX Robotics College Competition (VRCC) provides the world’s top engineering students with a fast-paced sports style robotics event that will pique their interest.

VRCC uses the traditional VEX game field with no modifications. However, the college competition has some very specific game and tournament rule modifications that have been developed to make the game more challenging. These rule modifications are:

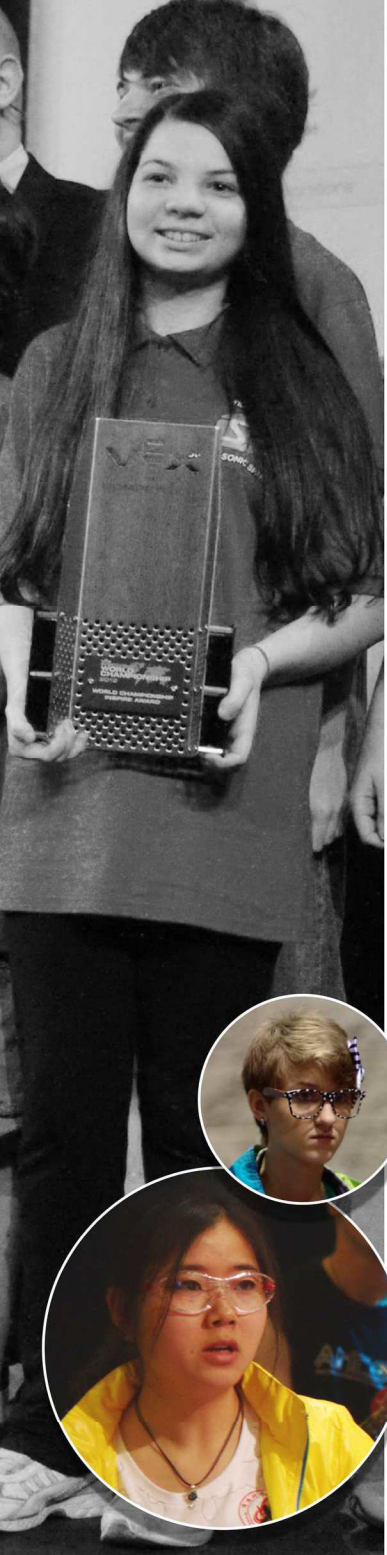
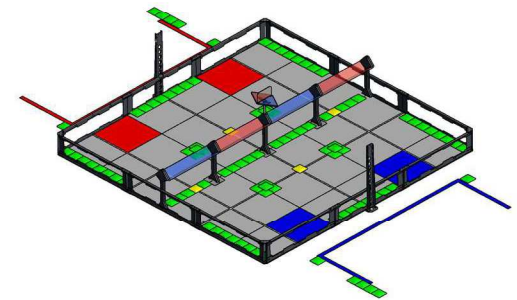
Instead of a 2-team vs. 2-team format, the VRCC is played 1-team vs. 1- team, with a twist: each team uses **two** robots in each match. This means every team gets to build their own partner!

Teams may build as many robots as they like, but only two are used on the field during a single match.

All robots must pass inspection before they are allowed to compete.

College teams build different-size robots than the high school teams.

An elimination tournament is conducted and at the end of the competition, one team is the event champion. The VRCC places a higher premium on autonomous performance than high school and middle school competitions. The autonomous period and driver control period are each 60 seconds long. This style of program allows for increased focus on programming as well as attention to style and design.



STEM Hall of Fame

In 2012, the Robotics Education & Competition Foundation announced a multifaceted STEM Hall of Fame to recognize and honor the exceptional accomplishments of individuals across the community who come together to support student engagement in science, technology, engineering and math. By recognizing six distinct areas, the REC Foundation is able to pay tribute to the many individuals whose passion and dedication advances student involvement in STEM education. The areas are: Teacher Hall of Fame, Mentor Hall of Fame, Volunteer Hall of Fame, Team Hall of Fame, Partner Hall of Fame, and STEM Heroes Hall of Fame.

In each of these areas, our inductees have demonstrated the highest level of achievement in STEM education including the future development of our next generation of scientists, technologists, engineers and mathematicians. It is our hope that by recognizing the accomplishments of many outstanding individuals, we will help inspire and motivate the exceptionally bright and talented students in our programs.

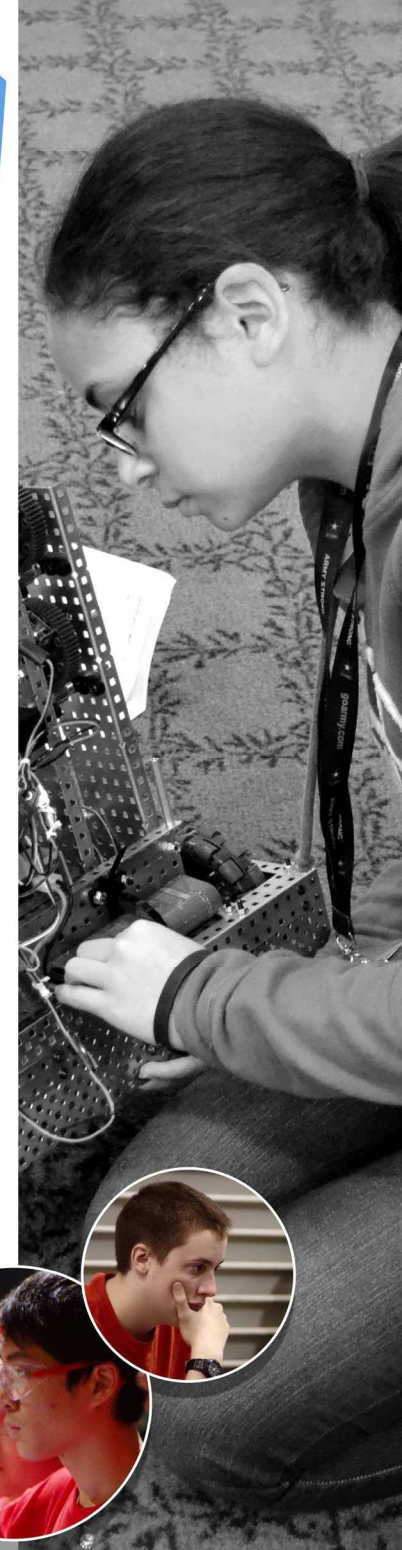
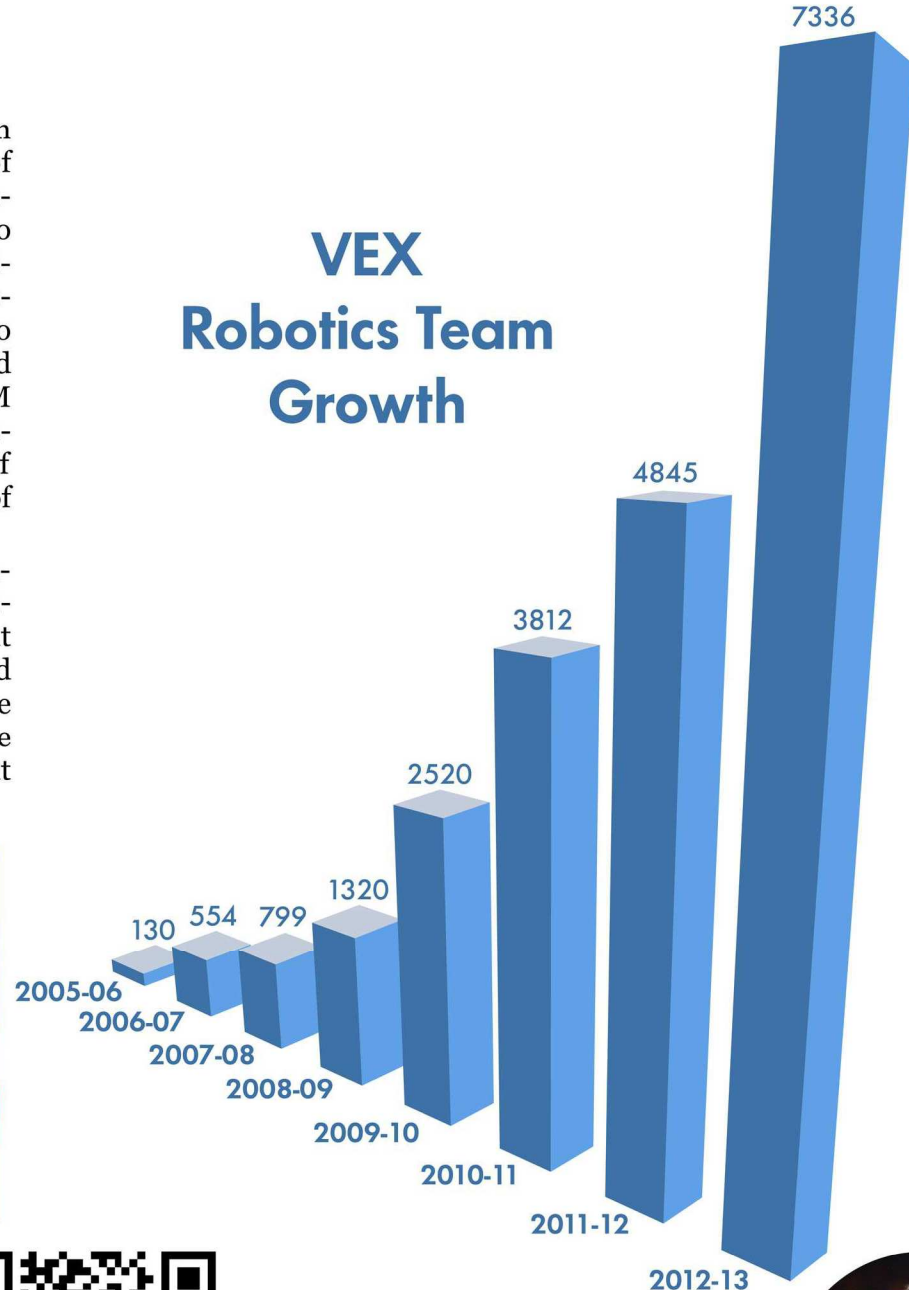


The REC Foundation STEM Hall of Fame

<http://www.roboticseducation.org/for-participants/stem-hall-of-fame/>



VEX Robotics Team Growth





Online Challenges & Classroom Resources

The REC Foundation Online Challenges:

The REC Foundation Online Challenges provide students with an opportunity to showcase their work, win prizes, and even get a chance to compete at the VEX Robotics Competition World Championship. Going beyond in-person robotics events, the Online Challenge program gives students a chance to participate in engineering competitions in subjects such as robot construction, sustainable engineering, robotics game animation, video production, and website design. Students from all over the world have participated in past challenges.

The Online Challenge program began in 2009 with just three challenges and has quickly grown to include seven challenges with hundreds of entries from around the world:

The Online Challenges are generally open September through January for submission and results are announced in early March. The REC Foundation is proud to recognize the following sponsors for their support of this area: Autodesk, EMC Corporation, the FUTURE Foundation, and VEX Robotics.

The complete list of the 2013 Online Challenges:

Autodesk® Sustainable Design Challenge

EMC Corporation® Robotics Team/Club Website Challenge

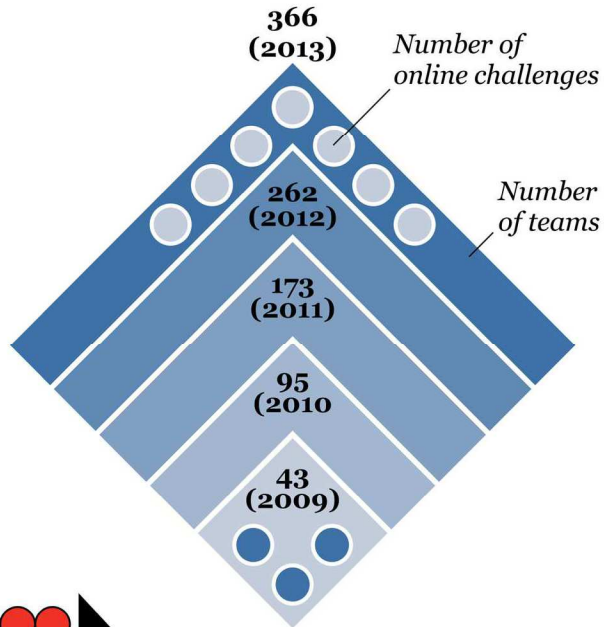
FUTURE Foundation Design Challenge

VEX® Robotics Game Design Animation Challenge

VEX® Robotics Competition Promote Award

REC Foundation Team Educational Video Challenge

VEX® Robotics Essay Challenge



*Online Challenge Promote Award 1st Place:
The VEX Experience – Cold Fusion, Team 2323Z*



online
CHALLENGE

Curriculum & Classroom Competition:

VEX Robotics Curriculum

With more and more schools adopting VEX Robotics as a platform to enrich and enhance science, technology, engineering, and math (STEM) courses, there is a need for an integrated program which allows teachers to seamlessly add VEX into their classrooms. Working with a number of partners, VEX Robotics is proud to provide an array of VEX curriculum offerings, each tailored to the specific needs of teachers wishing to incorporate VEX in their classroom. Each offering was developed by forward thinking organizations, experienced at creating tools to keep STEM education exciting and inspiring.

Currently, there are five professionally developed classroom curriculum for use with the VEX Robotics Design System, which are:

Autodesk VEX Robotics Curriculum

intelitek's Robotics Engineering Curriculum

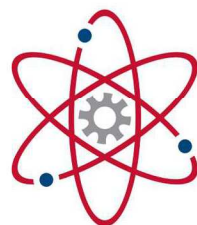
Carnegie Mellon Robotics Academy

Project Lead the Way

Analytical Integrated Math (AIM)

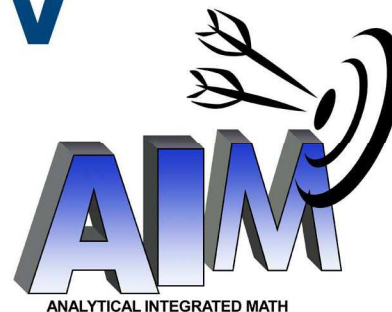
VEX Robotics Classroom Competition

In addition to classroom curriculum, VEX Robotics also offers teachers and students a selection of classroom games that provide the same excitement and challenge as the annual VEX Robotics Competition. Each game is designed to stimulate student learning and engages participants to solve a variety of math, science and engineering problems. Games are designed for various levels of experience and can be adapted for use with any educational robotics system that you may be currently using. Components typically include scoring goals, scoring components, fasteners, rules, field construction plans, and scoring software. Current games include: Cone Zone™, Involution™ and Full Pull™.



PROJECT LEAD THE WAY

PLTW





In the mid-1960s rock, pop, fashion, and film in the U.S. picked up a new beat, new look and lasting set of legends. The Beatles, the Rolling Stones and the Who took America by storm, and the hearts and minds of young people by the hundreds of thousands. James Bond and Mary Poppins were better known than some family members; young and young-at-hearts wailed “What’s New Pussycat?” incessantly. It was the time of what’s come to be known as the British Invasion. Fast forward to 2012-2013 and it’s time for turnabout to be more than just fair play. It’s the VEX Robotics Competition (VRC) invasion of the U.K.

Spectacular growth of VRC across the U.K., particularly in England, is being driven by a dedicated and talented group of teachers, partners from business and industry, parents and volunteers. As is the case wherever VEX Robotics takes hold, there are too many individuals to name, and the contributions they each make are synergistic. Among the many achieving incredible success across the U.K., here we introduce you to four educators – if you will, a “Fab Four” of VEX Robotics in England.

Profile: Stuart Higham

Stuart Higham, Subject Leader for Engineering at The John Warner School, has participated in VRC from the start. Introduced to the program with support from defense industry leader MBDA, Higham believes that engaging with industry is both a critical component of a successful program and a key benefit to participating students. Says Stuart, “It’s inspiring to see how students progress so quickly and are so committed. It isn’t a “hobby”; it’s a sense of what can be their future. And it’s a lot of fun along the way.” Student captain of the School’s Team 3116C Joshua Clancy puts it in an even bigger context, suggesting, “It’s building something out of scratch, isn’t it? Taking a bunch of parts and putting them together. A bit like starting new life...programming life...with a robot.”

Profile: Steve Taylor

Steve Taylor at the Manchester Communications Academy shares Higham’s emphasis on industry connections and relevance as a key attribute of VEX Robotics. This is personal for Taylor given his 18-year career in engineering prior to teaching and now being Lead, Professional Scientific and Technical, at the Academy. It isn’t that you need a highly-skilled industry mentor for VRC; you don’t. For Taylor, it’s about inspiring and helping his students make informed choices about their future – whether that’s aspiration for college, pathway to career, or apprenticeship with local industry. VEX Robotics affords young people in this economically challenged area of the U.K. ways to see that what you learn and do in school you can take to future studies and work. Students at the Academy get involved through an afterschool club or a Friday half-day enrichment program. For the Friday program, students can “test” from among the multiple enrichment project options; then apply for a project they find compelling as their year-long program. From initial engagement a year ago to their second season, the Manchester Communications Academy has grown from fielding a single team, to 11 teams in 2012-2013. Taylor credits that growth to multiple factors including support from his school’s leadership, connection with workplace-relevant knowledge and skills, support from industry, and sustained enthusiasm and demand from his young students. “When I was in school, I heard ‘this is what you do...and you have an hour’. This is so much a leap forward from that into the world of business & industry that it’s incredibly valuable for these students.”



Profile: Steve Sadler

Taking a leap and then leapfrogging past efforts to get even farther forward is just another day in the life of Steve Sadler who teaches at East Barnet School outside London and leads VEX Robotics efforts there, both inside and outside the classroom. Along with Higham and Taylor, Sadler was named a Teacher of the Year at the 2013 VEX Robotics U.K. National Championship. And Sadler shares his fellow educators' view of both the opportunities and the impact VEX offers young people. After a globe-trotting professional career, Sadler took on what was billed as a 5-week stint with an afterschool club at East Barnet. Now, eleven years later, Steve has brought his industry experience, commitment, passion, and sweat equity to VEX efforts in his school. "I'm like a big kid," says Steve. "I'm so committed and involved with these kids who are fantastic. I can't count how many MacDonaldis I've shared with them after school...and I'm so glad that they are committed enough to VEX to stay late enough for dinner." Often on these late evenings he and the team members are kicked out by the school caretaker, but the East Barnet spirit of teamwork survives and thrives – through to the 2013 U.K. Championship in which the four teams from the school competed against one another in the finals. Steve believes the VEX program delivers motivation, direction and skills across a broad range including CAD/CAM, rapid prototyping, understanding of the design process, and portfolio development. East Barnet team members are engaged in documentation and reportage; with live broadcasting from the U.K. Championship, podcasting, blogging, videotaping, and social media postings. Sadler identifies a near-term goal of attracting more girls to the program, and one of the two East Barnet teams at the 2013 VEX Robotics World Championship will be an all-girl squad. East Barnet team has a 100% retention rate, a growing presence in the classroom, and clear positive impact on kids. And with the nearly limitless energy and inspiration of award-winning teacher Sadler...plus an equal supply of takeaway meals... it can only get better.

Profile: Philip Holton

Making things better is a mantra for Philip Holton, Head of Design and Technology at Saint Olave's Grammar School in Kent. Following his professional experience as an industrial/product designer, Philip has been teaching for seven years; in 2009 he was awarded the Audi Foundation Innovation in Teaching Award. In heated agreement with his fellow leaders of VRC in England, Holton completely supports the industry-relevant benefits of VEX, and he adopts an industry-relevant process for team development and selection. Students apply to join the team and complete a brief test challenge, which includes identifying team members with skills required in the workplace, including CAD, systems and control, sales and marketing, leadership, and others. Accepted applicants submit an engineering-based design; in a recent case this was a snow sweeping robot design for a foot path, and the best 7 teams were selected from the 16 that applied. Teams moved in short order to design and build, presenting their progress and solutions, and one of the 7 was selected to represent Saint Olave's at the U.K. Championship. The process was rigorous, challenging and absolutely aligned with what students might expect to experience in their future careers. Holton believes, in fact, that one of the most positive attributes of the VEX program is that it isn't easy; the challenge of it is a real attractor for students. "VEX captures the imagination and generates a huge amount of excitement," says Phil. "Plus it's pure engineering. The students are so excited about taking on a real, tangible, contextual challenge. They work at it during lunch and after school. It's challenging for me, too; I need to work out things really fast to keep up with them. Among a lot of clubs at school, I expect VEX Robotics will stay for a very long time."



Profile: Keimmie Booth

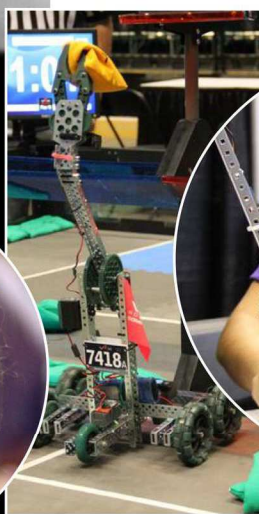
Keimmie Booth was a talented, young basketball player in Baltimore, MD, when she started exploring her options for high school. She knew leveraging her skills on the court would help her secure admittance to a top-notch high school.

Founded in 1844, Western High School is the oldest all-girls public school in the United States. Keimmie joined the school's excellent basketball program, playing Varsity her first year. As a sophomore, Keimmie was in study hall when she heard strange sounds coming from the lab. Her curiosity got the best of her and she stopped in and learned that the girls were working on a new robot, preparing for competition. After joining the team, Keimmie began to see robotics as a sport in its own right. Over the course of three years on the team, she's learned and grown in ways that she never imagined. Keimmie now views robotics as much more than a sport— it represents big possibilities the future.

"I enjoy sharing ideas and collaborating with my team to strategize, develop a concept, and incorporate feedback to build a robot ready for competition," said Keimmie Booth. "I attended the VEX Robotics Competition World Championship last year and am competing again this year. I'm always interested by the diversity of ideas that teams present. It's just amazing when you see teams from Texas and New Zealand with similar concepts to your own."

Now in her senior year, Keimmie is grateful for all the opportunities that have come her way due to robotics. She's currently captain of her team, the RoboDoves #2528, and recently landed a paid internship with a local high tech company. Through her internship, she's met a professional mentor whose encouragement has led her to explore entrepreneurship in the IT field. She will pursue a computer science and business degree at Capital College with a robotics scholarship in the fall.

"I am thankful for the support I've had from my teachers, coaches and mentors along the way," said Keimmie. "Their collective interest in me sparked my passion for robotics and changed the way I view science, technology, engineering, and math."



Profile: Randy Decker

Randy Decker: Electronics and Computer Technology, PLTW DE, A+ Computer Maintenance Teacher, Walker Career Center

Randy Decker was an early supporter of the VEX Robotics Competition and with a career spanning 25 years in education, he knows a good program when he sees one. Decker's spent much of his career at the Walker Career Center in Indianapolis, Indiana teaching all aspects of technical education to high school students. Throughout his career, he's sought to improve the students' experience and brought a number of compelling programs to the school, lobbying for support and growing participation. Decker's passion is evident and strengthened by his work as an event partner, supporting three competitions this year drawing attendees from neighboring states and across Indiana.

"I can't tell you the hours I've spent with robotics, I really enjoy watching the students discover an avenue to collaborate and explore engineering concepts," says Decker. "It's amazing to have 40 kids come together on a Saturday strictly because they want to be here. I'm focused on providing them a positive outlet and challenging them with the competitive nature of the game."

Several years ago, Decker invited Indianapolis Mayor Greg Ballard to a competition, which planted the seeds for a potential citywide competition. Just this past January, Decker was able to lend his support to ensure the first City of Indianapolis VEX Robotics Competition was successful with 40 teams competing. It was at this event that the Walker School's team 829A received the Excellence Award, qualifying them for the 2013 VEX Robotics Competition World Championship.

Decker expects his program to grow in the coming year as his school leverages new robotics lesson plans, exposes more students to competition events and engages more students in younger grades.

"There's a true sense of personal satisfaction for me, seeing the kids' excitement and enjoyment of the program. That's what brings me back each day."

Profile: Northrop Grumman Foundation

A Commitment to Education

Providing unique education experiences related to science, technology, engineering and mathematics (STEM) for students and teachers is the Northrop Grumman Foundation's top priority.

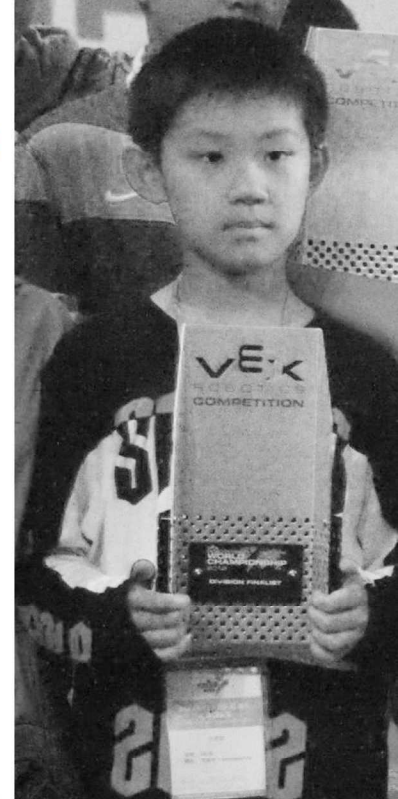
The Foundation supports diverse and sustainable national-level programs that enhance the education experience for students and provide teachers with the training and tools they need to be successful in the classroom. The VEX Robotics Competition is clearly an initiative that meets these objectives, engaging students with hands-on STEM learning experience and supporting teachers with classroom curriculum options.

"We're delighted with the continued growth of this program," said Sandra Evers-Manly, president of the Northrop Grumman Foundation. "The competitions are fun and challenging, and they are generating increasing interest in STEM with our young people, which is our goal.

Together, over the course of the next two years, the REC Foundation and the Northrop Grumman Foundation will seek to establish 200 new VEX Robotics Competition teams in locations worldwide, support the program's outreach, and sponsor the annual VEX Robotics Competition World Championship.

Northrop Grumman receives VEX Robotics Competition Partner of the Year Award.

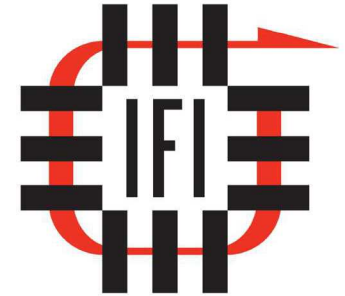
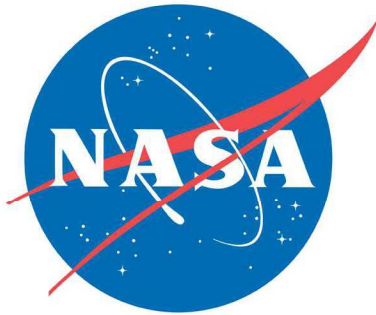
*Pictured: Carleen Beste,
Northrop Grumman Foundation;
Paul Copioli,
President, VEX Robotics;
Frank Flores,
Vice President, Northrop Grumman.*



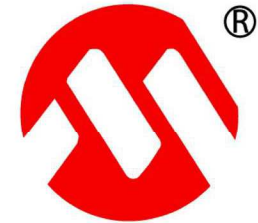
Sponsor Recognition

NORTHROP GRUMMAN

Foundation



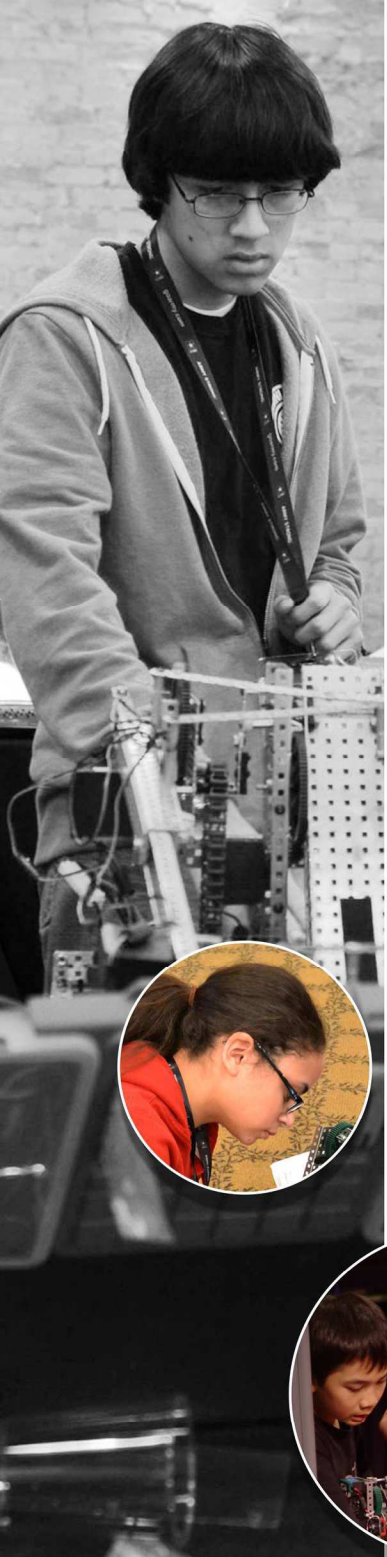
INNOVATION FIRST



Human Energy®



MICROCHIP



Volunteers

The amazing, talented, and dedicated volunteers, teachers and mentors are the true unsung heroes of this program. The REC Foundation is extremely grateful for their generosity, passion, and tireless support. Our volunteers have given their time, talent and treasure to ensure that students across the U.S. and globally have access to meaningful and enriching robotics engineering programs.





The Robotics Education & Competition Foundation seeks to increase student interest and involvement in science, technology, engineering and mathematics (STEM) by engaging students in hands-on, sustainable and affordable curriculum-based robotics engineering programs across the U.S. and internationally. The REC Foundation develops partnerships with K-12 education, higher education, government, industry and the non-profit community to achieve this work.

REC Foundation: Inspiring students one robot at a time
www.roboticseducation.org / www.robotevents.com



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