

The Future of Robotics in STEM Education



CEO
PCS Edventures, Inc.

*Using robotics to
engage student learning
since 1988!*



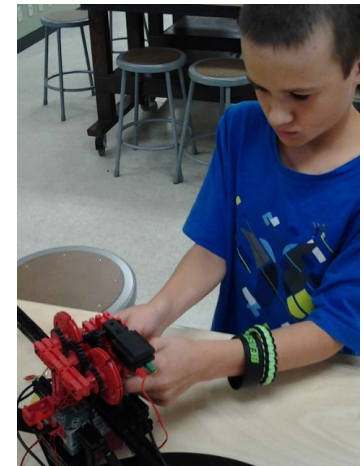
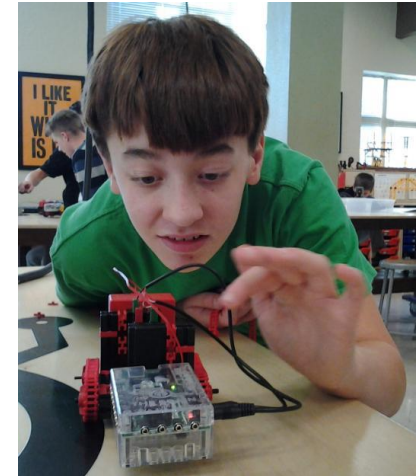
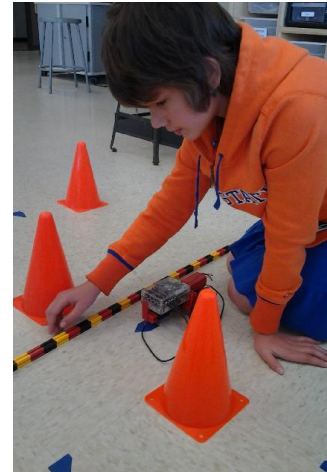
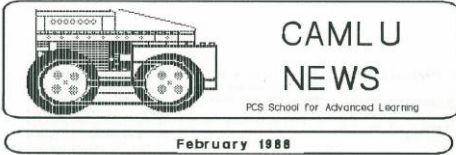
Robert Grover





We make children's lives better through engaging, educational experiences.





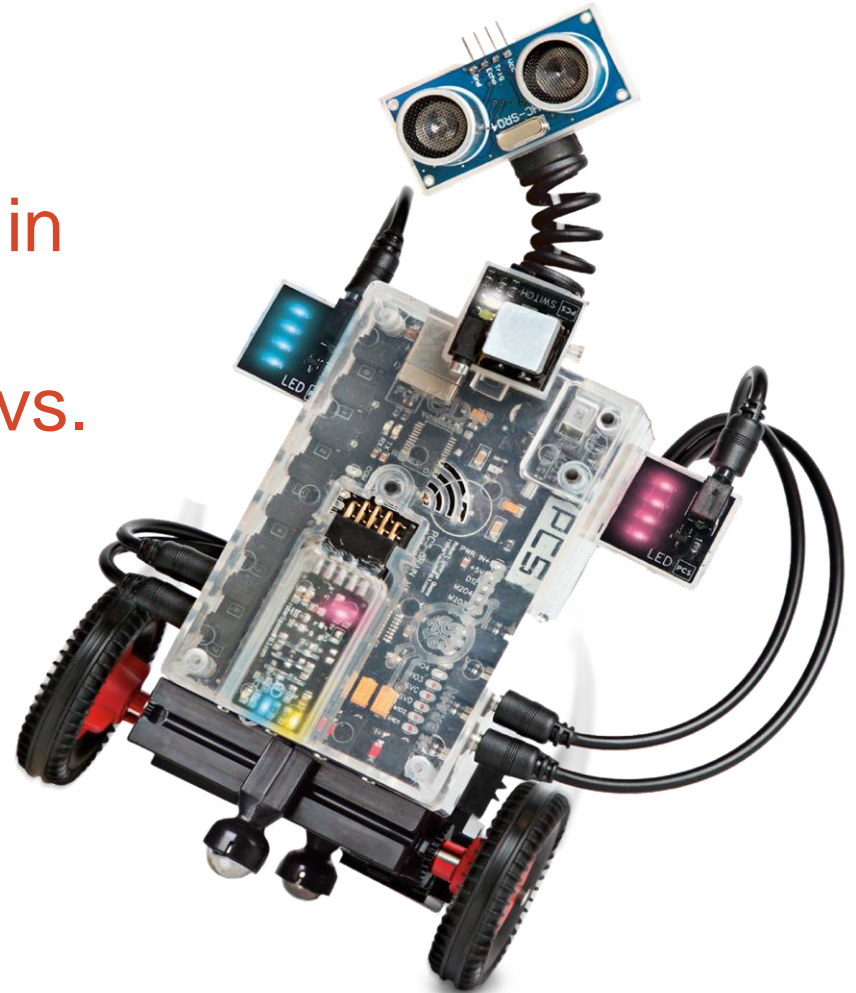
Improve the lives of 10,000,000 children per year with what we do.

- Leader in K–12 robotics education
- PCS STEM products in every elementary classroom
- Establish a global network of EdventuresLabs
- Build a virtual community of experiential learners



What's to come?

- Why Robotics in STEM Education is important
- The Future of Robotics in STEM Education
- Robotics in Classroom vs. Informal Environments
- Conclusions
- Live Q & A
- **FREE ROBOT!!!!**



Why is Robotics Important?



Engaging & Enabling

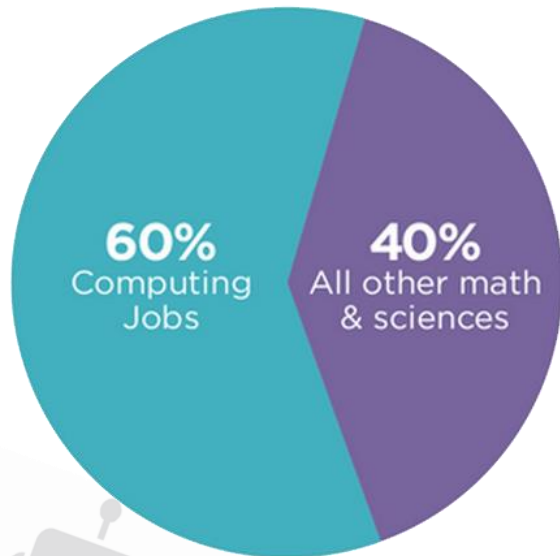
1. Students find STEM topics engaging when attached to robotic projects.
2. Interdisciplinary. Natural connections to multiple subjects PLUS 21st Century Skills.
3. Relevant – students see the basis for math and science.
4. Requires problem solving and critical thinking skills.



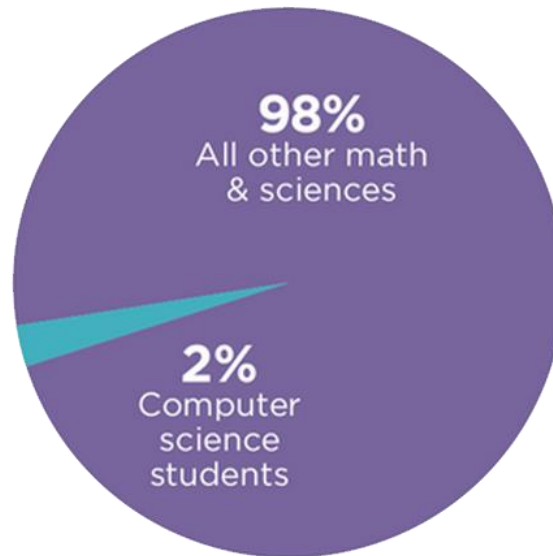
Why is Robotics Important?

Inspirational for Jobs in Computer Science *...and other STEM career areas*

The job/student gap in computer science



Jobs



Students

Less than 2.4% of college students graduate with a degree in computer science. And the numbers have dropped since last decade.



Why is Robotics Important?



Robotics
*Is one of the
fastest growing
industries on
the planet.*

Robotics Technology

Robotics is a transformative technology that is changing the way we live and work.

Global industries are integrating robotics technologies into products making them smarter, more efficient, and easier to use.

**Robotics represents a
hundred billion dollar
game changing technology
that is the future...**





Robots: The new low-cost worker

Dhara Ranasinghe | @DharaCNBC
Tuesday, 14 Apr 2015 | 2:20 AM ET
CNBC

BUSINESS INSIDER

Tech Finance Politics Strategy

RETAIL

Meet Lowe's New Robot Retail Workers

Innovation

Attention White-Collar Workers: The Robots Are Coming For Your Jobs

MAY 18, 2015 2:05 PM ET

HOME / BUSINESS /

4 Businesses that are Cutting Costs With Robot Workers

Harvard Business Review

ECONOMICS & SOCIETY

What Happens to Society When Robots Replace Workers?

Business · Food · Tech

New McDonald's In Phoenix Run Entirely By Robots

1 day ago · by Darius Rubics · 56 Comments

Forbes / Tech

Microsoft's New Industrial Revolution Of 'Perceptive' Human-Robot Workers

TECHNOLOGY | ROBOTICA EPISODE 1

Cheaper Robots, Fewer Workers

By THE NEW YORK TIMES APRIL 24, 2015

NBC NEWS HOME TOP VIDEOS ONGOING: EUROPE'S BORDER CRISIS AMTRAK CRASH

U.S. WORLD LOCAL POLITICS HEALTH TECH SCIENCE POP CULTURE BUSINESS INVESTIGATIONS SPORTS MORE

BUSINESS / ECONOMY

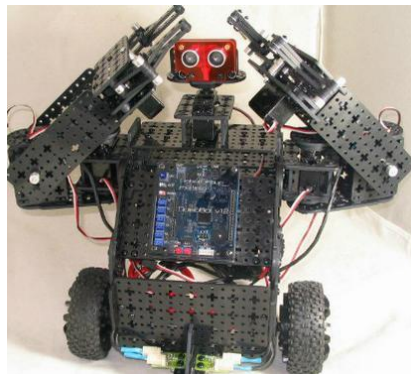
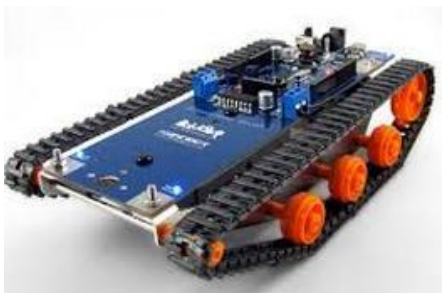
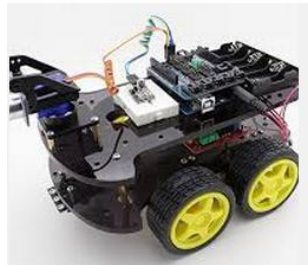
Robots Replacing Human Factory Workers at Faster Pace



1. Lots of choices!



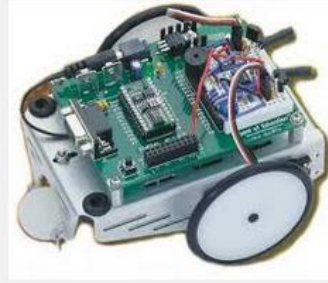
The Future of Robotics in STEM





Classroom and Competition Robotics Kits

Teach robotics in the classroom or compete globally with these popular kits.



2. Lower Prices

- Programmable
 - High quality materials
 - Expandable
 - Durable
- ↑
- Fewer features
 - Crude Materials
 - Non-programmable
 - Consumable
 - Non expandable
- \$



Line Tracking Robot Kit

Product Code : RB-Ibo-51

★★★★★ 2 Review(s)

Regular Price: USD \$29.95

Special Price: USD \$19.47

✓ In stock



Add to Cart

Compare Add to Wishlist



Robot Kit Set

Product Code : RB-Ibo-24

Regular Price: USD \$44.95

Special Price: USD \$27.44

✓ In stock



Add to Cart

Compare Add to Wishlist



Parallax Boe-Bot Robot Kit - USB Version

Product Code : RB-Plx-82

USD \$159.99

? New stock soon
Notify me



Add to Cart

Compare Add to Wishlist



Pololu 3pi Robot

Product Code : RB-Pol-73

Regular Price: USD \$99.95

Special Price: USD \$89.95

? New stock soon
Notify me



Add to Cart

Compare Add to Wishlist



Line Tracking Mouse Kit

Product Code : RB-Ibo-14

Regular Price: USD \$39.95

Special Price: USD \$24.99

✓ In stock



Add to Cart

Compare Add to Wishlist



Parallax Boe-Bot Robotics Shield Kit for Arduino (With Arduino)

Product Code : RB-Rbo-123

USD \$147.99

✓ In stock



Add to Cart

Compare Add to Wishlist



Lynxmotion Phoenix 3DOF Hexapod - Black (No Servos / Electronics)

Product Code : RB-Lyn-248

USD \$248.90

✓ In stock



Add to Cart

Compare Add to Wishlist



BIOLOID Premium Robot Kit

Product Code : RB-Rbs-32

★★★★★ 1 Review(s)

USD \$1,199.00

✓ In stock



Add to Cart

Compare Add to Wishlist



3. Ubiquitous

- Home
- Boys & Girls Clubs
- YMCAs
- Classrooms
- Libraries
- Makerspaces
- Girls Scouts
- Boy Scouts
- 4H Clubs
- Robotic Clubs
- Competitions



Amanda Kolesar wrenching on a robot kit to get a patch



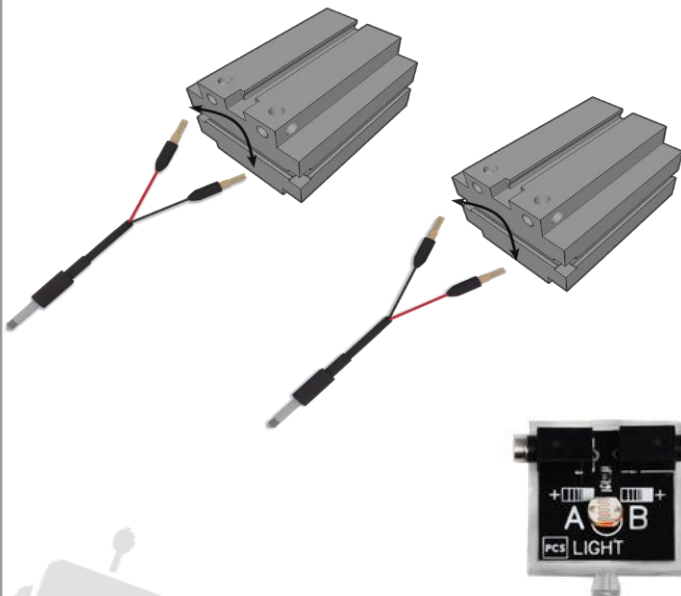
4. Communications & System Integration

- Sensor Networks
- Voice Recognition
- Vision Processing
- Individual Addressing
- Internet of Things
- Smart Devices
- Citizen Science Activities



5. Easier to Use!

- Plug and Play Hardware
- Drag and Drop Programming



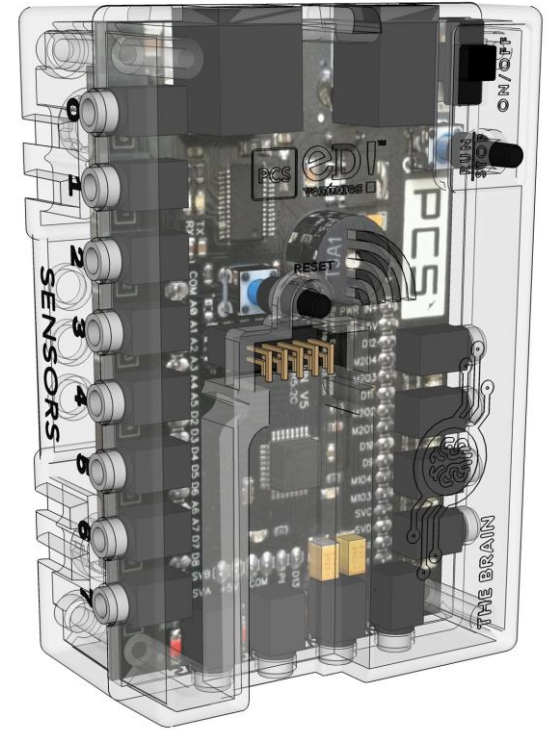
Touch Sensors and LEDs



Light Sensors

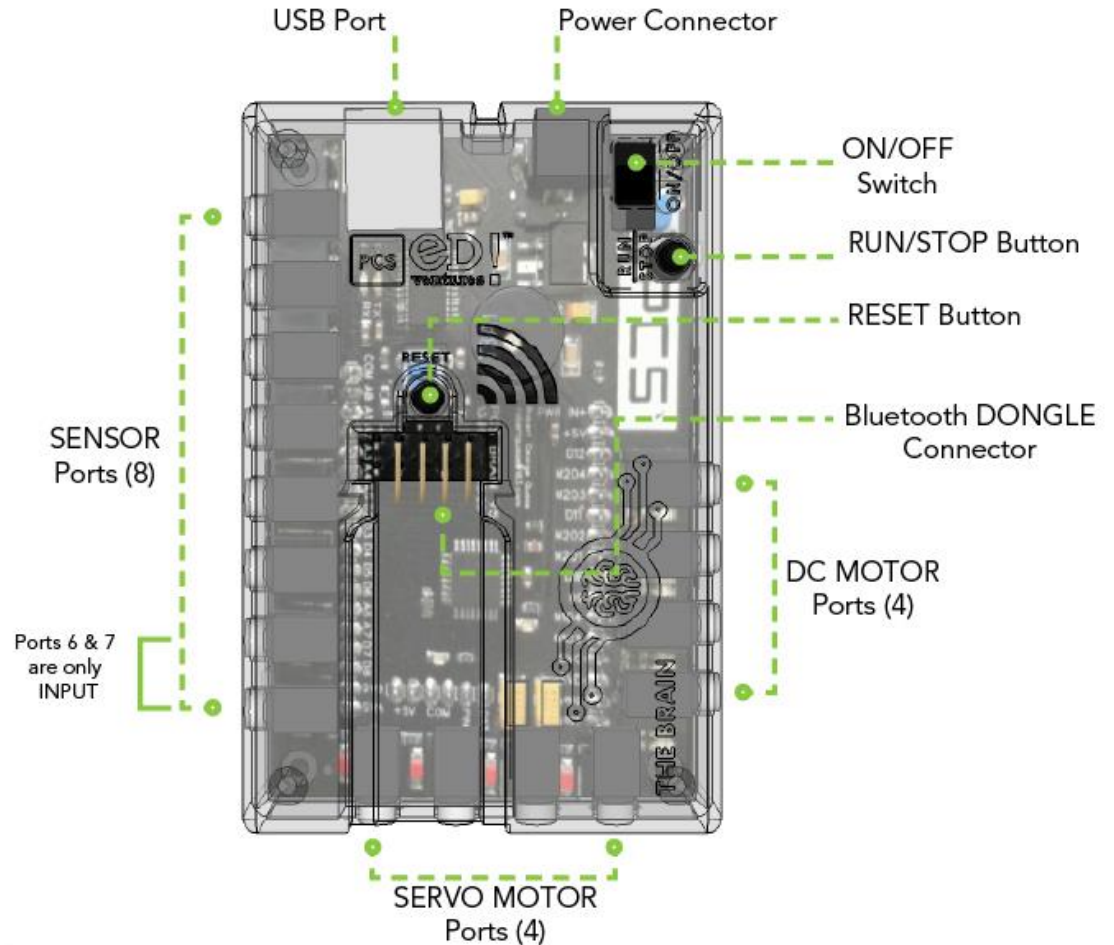


Infrared Sensors



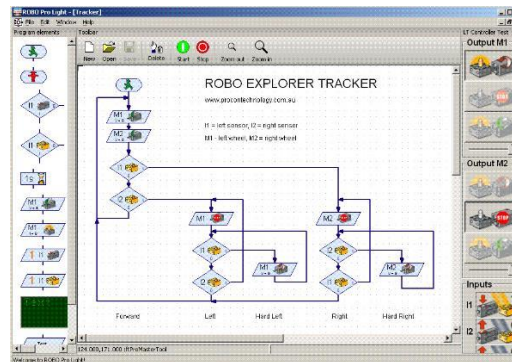
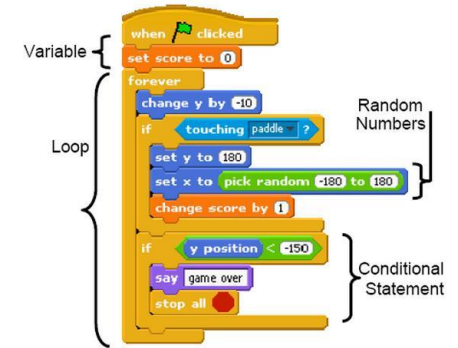
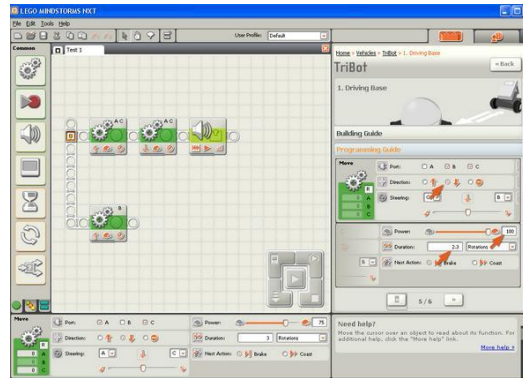
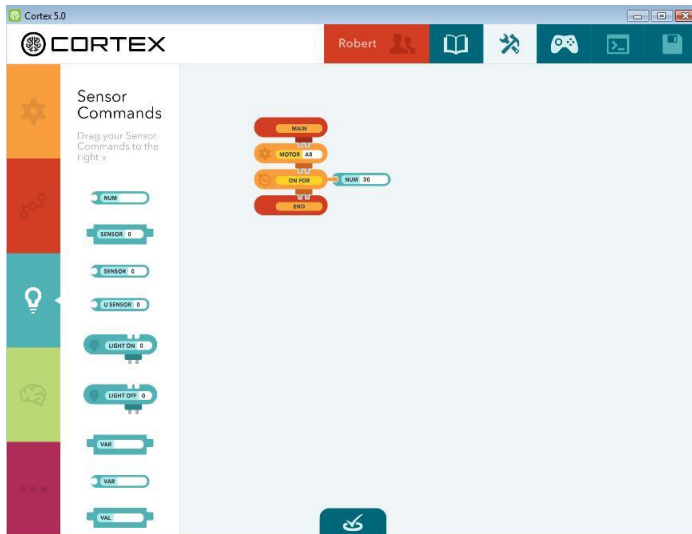
Plug & Play Hardware

- Sensor Ports
- DC Motor Ports
- Servo Ports



5. Easier to Use!

- Plug and Play Hardware
- Drag and Drop Programming



Robotics is the perfect subject area for facilitating student-driven, high-engagement activities.

- Problem-Based Learning
- Challenge-Based Learning
- Self-Guided Discovery



and... It's fun!





Preparation Questions

1. What are your objectives?
2. What is your environment – formal / informal.
2. How much time do you have available and what are the desired contact hours?
3. How technical are you and do you have technical support resources?
4. What is your budget?



1 Programming for Robotics

Common Core:
ELA-LITERACY-WHST.6-8.1.B
Support claims with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.

21st Century Skills: Teamwork, Thinking Creatively

Next Generation Science Standards:
1. Identify and define authentic problems and goals to be solved.
2. Plan and manage activities to develop a solution.
3. Collect and analyze data to identify solutions.
4. Use multiple processes and diverse perspectives to evaluate solutions.

Habits of Mind: Problem Solving

Mastery Based Assessment:
Point values are clearly stated by project and instructors will verify.
1. Student demonstrates the successfully completed activity.
2. Student verbally explain the process they used to accomplish the activity.
3. Challenge student to explain real world applications.

Programming for Robotics

Badge Overview
Robotics incorporates mechanical engineering, electrical engineering, and computer science, which deals with the design, construction, operation, and application of robots. The world of robotics is vast, and provides endless possibilities for those who pursue it!

P1 Use set power command to drive RIQ in a straight line.

- Open Cortex and click on your user profile, then click on new program. Create the program pictured below:
 - Use the SET PWR command, which is found under the Orange motor command tab.
 - Open the motor commands tab and drag the SET PWR command onto the user interface canvas.
 - You use SET PWR to set the power differently for your motors.
 - All motors are set to run at 100% power, but all motors are not created equally. Even if they are new they may run at different speeds.

Programming for Robotics

P2 Switch the polarity/direction of motors.

- Switch the red and black ends of your motor cables between MOTORS A & B and run the same program again.
- This changes the polarity and thus the direction of the motor. You can use this to adjust motors in order to address your goals. For example, if you wish to make both wheels drive forward.

C1 Make RIQ drive in a straight line 50 cm and then return to its original position. Adjust the power on one motor and if needed the polarity of one or both motors.

C2 Program RIQ to drive in one complete circle starting and ending in the same place. Go for the 50% by figuring out how to make it work easily on the first try by experimenting with RIQ speed and rotation. Be sure to save your program.

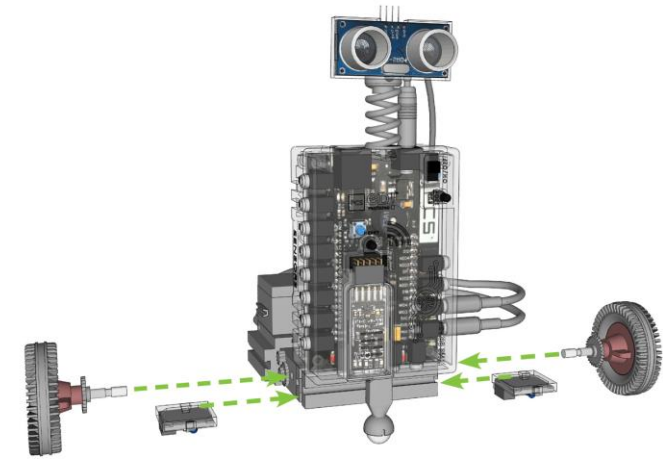
DP Now that you have taught RIQ to drive perfectly straight, program RIQ to trace out a polygon with more sides-and/or trickier-angles. Also, try to do this as efficiently as you can.

Key Terms

- Program:** A collection of code that performs a certain function.
- Polarity:** The direction of current flow. Which is why your motor changes direction when you change your motor cables.
- SET PWR:** sets power level on selected motor(s). Older command, so motors are set at set power unless otherwise specified.

Check For Understanding

- What do you create a program in Cortex?
- What do MAIN & END do in your program?
- What new commands did you use in this level?
- If BQs were asking in opposite directions, what should you check?



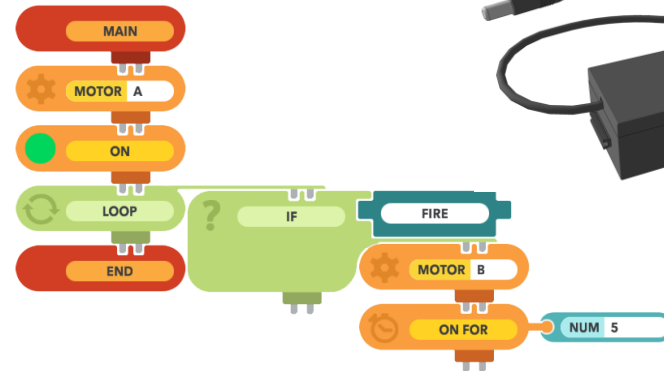
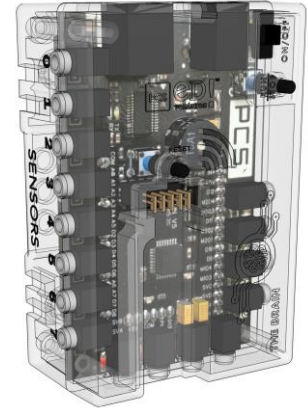
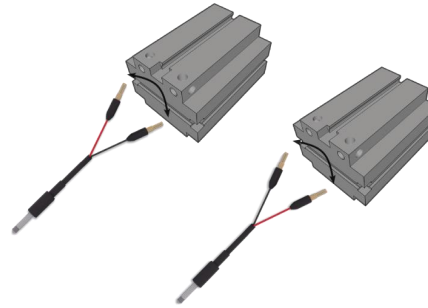
- The LABCard series is better suited for more student-driven environments such as after-school programs and home use.
- Each card has a series of projects and challenges that are easy for individuals to follow, yet pushes students to test their skills!
- The Robotics series is designed to build skills with each subsequent card level, until students have mastered enough skills to use the kit for their own imaginative projects!



- Rich curriculum with both student and instructor guides.
- Embedded journaling, reflection, and peer assisted review.
- Two assessment models, a multiple choice standardized test aligned with NGSS and a rubric based, authentic assessment.



Discover Robotics Kit Used for Both



Materials: Discover Robotics



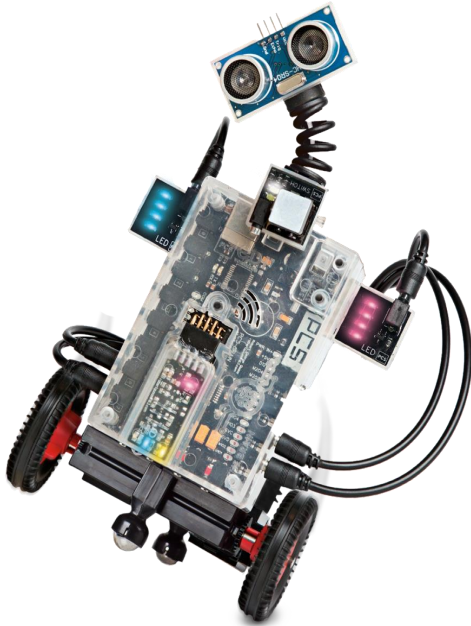
Get your kits individually, in bundles, or with storage.





By incorporating either the Discover Robotics Kit and accompanying Computer Science curriculum, or the LABCards Robotics series, it becomes easy to bring robotics to any educational setting!





Computer Science



Physics

Math

It's not about the robot, it's about the process.

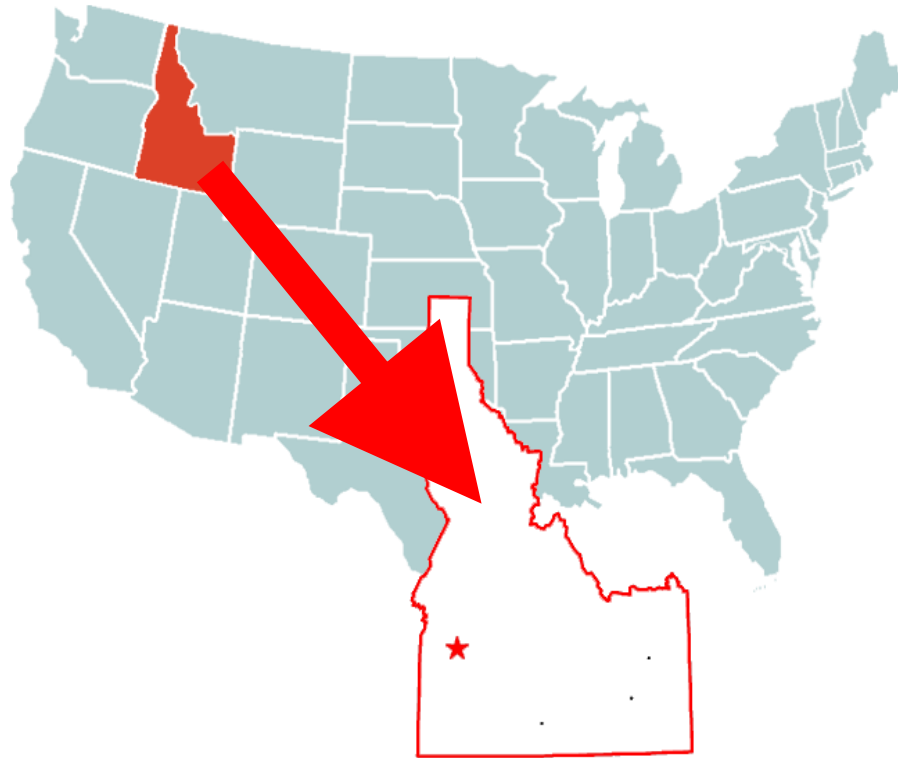


There are limitless opportunities to incorporate robotics into educational programs. Let us help you uncover yours!

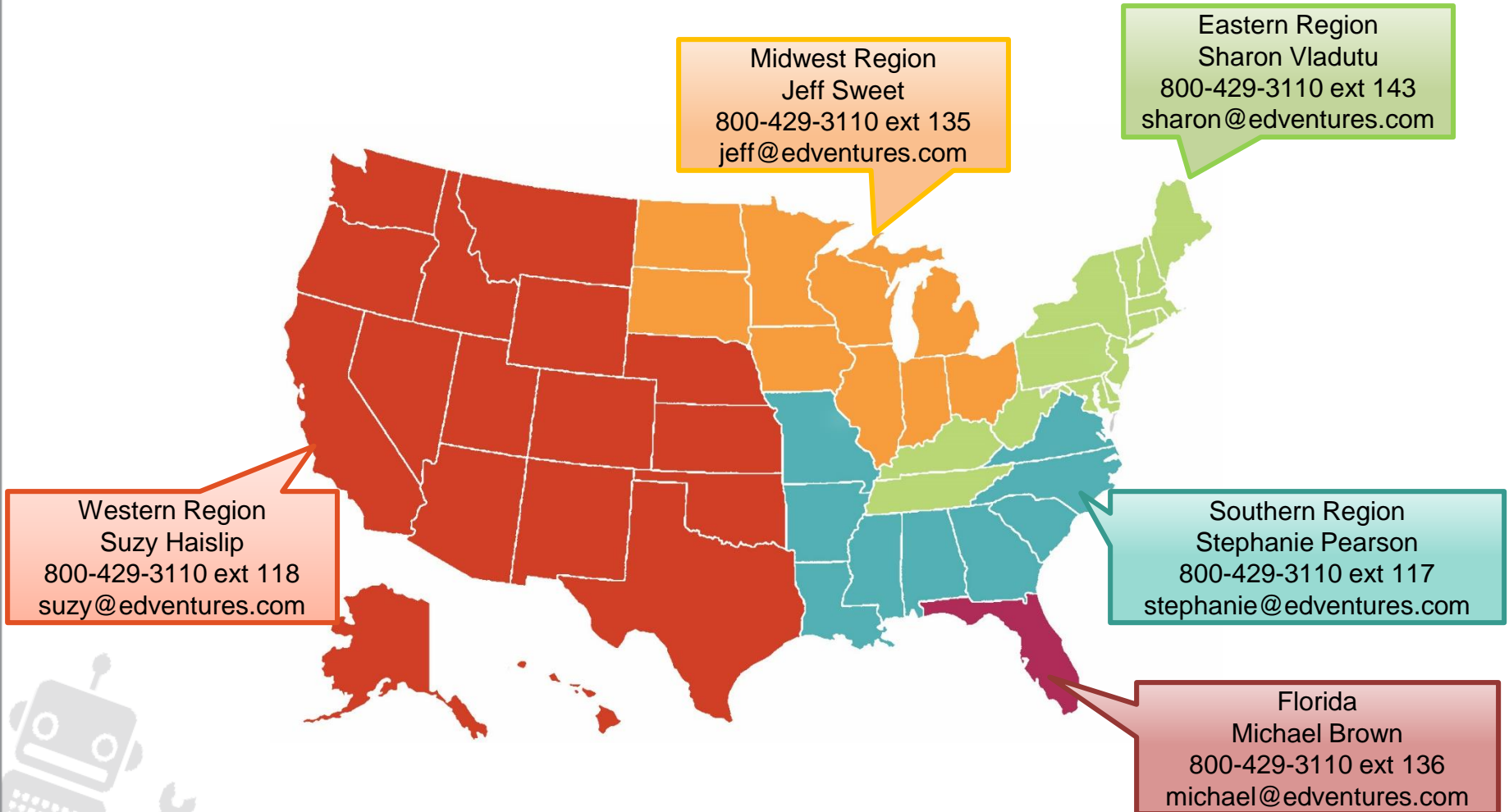
Questions?



Where Can You Find Us?

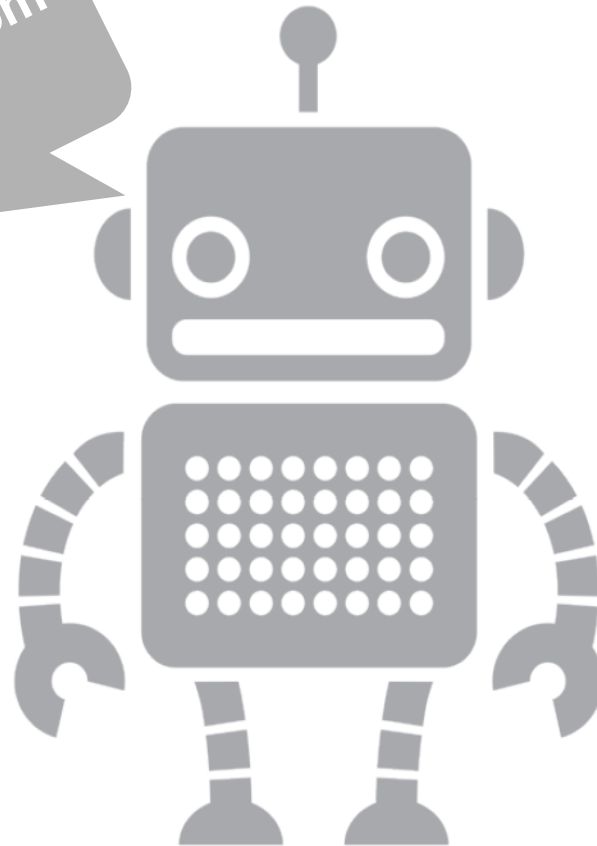


PCS in Your Neighborhood



For Additional Information:

info@edventures.com
1-800-429-3110





Thank you!

Robert Grover
CEO

robert@edventures.com
1-800-429-3110



Gorle, P., & Clive, A. (2013). Positive Impacts of Industrial Robots on Employment. International Federation of Robotics. Retrieved from http://www.ifr.org/uploads/media/Update_Study_Robot_creates_Jobs_2013.pdf

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