

Starting and Running a Robotics Club in Elementary School

THE WINONA EXPERIENCE

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Winona Elementary School



WAYS TO INSPIRE
CONFERENCE

Saturday, September 30 , 2017

The Early Days - A Little History of Robotics at Winona

- ▶ Began in 2002 – no experience required!
- ▶ Train the Trainer – 6 teachers in 6 elementary schools
- ▶ LEGO Mindstorms – RCX Platform
- ▶ Aquabots
- ▶ Robotics Challenge, Sheila Rhodes
- ▶ Cooperative Learning
- ▶ Setting and Lessons: Multiple classrooms extending down a long hallway, limited contact and interaction between students, isolated and non-collaborative, testing on the hallway floor, build your own robots from scratch, lessons in structural instability



<http://www.stemcentric.com/rcx-tutorial/>

Equipment and Start-Up Costs

1. LEGO Mindstorms

Spectrum Nasco – Winona’s primary “Go-To” supplier for LEGO kits and materials

2017 Elementary Science and Technology Catalogue

<http://spectrum-nasco.ca/generic.htm?ecinfo=elementary-science-technology>



Platforms Available at Winona: LEGO Mindstorms NXT



<http://stjosephsjarrow.co.uk/lego-nxt-robot-programming/>



<http://www.conrad.com/ce/en/product/190613/LEGO-8547-MINDSTORMS-NXT-20-D>

LEGO Pricing... (2017 Spectrum Nasco)

Education NXT Software - Single User \$85.45, Site License \$351.85

NXT Base Set \$299.95

NXT Resource Kit (supplemental to base kit – extra parts) \$106.95



LEGO Pricing... (2017 Spectrum Nasco)

Education EV3 Core Set with Software – \$414.95



VEX IQ Pricing



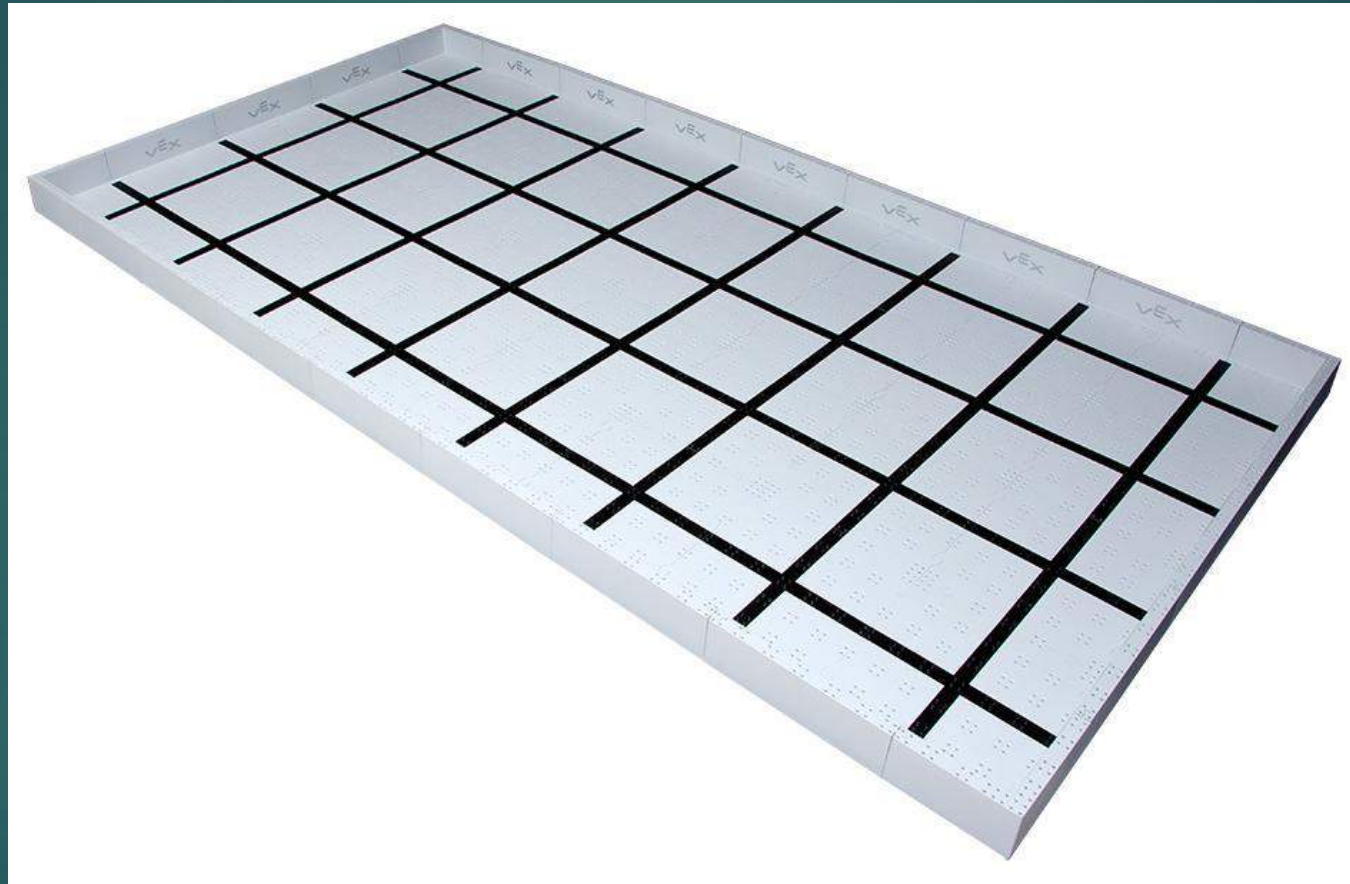
VEX IQ Super Kit \$429

Playing Field \$259.98

Free Modkit Software available online.



VEX Field and Modkit Application



www.vexrobotics.com

Current LEGO Robotics Technology

EV3 Systems

Consider high costs of constant upgrading of equipment

Recommendation:

Stick with one platform and use it until it conks out.

Just getting started? Latest technology is worth considering.

Benefits of previous version technology:

Available parts, books and resources, familiarity with summer camps and programs, students may own kits at home.

Winona's Experience with NXT is a case in point.



Winona's Current LEGO Kit Setup

Winona's Robotics Club has 8 NXT kits.

Seven are used for partner work.

One kit is reserved as a parts kit

Why?

- Replacement parts in case of missing, lost components
- Also useful for adding onto base kit
- NXT brick (Robotic microcomputer may encounter issues and require replacement)
- No maintenance available on defective NXT bricks

Other Equipment and Storage Needs

- ▶ Stanley Parts Organizers
- ▶ Parts bins
- ▶ Separate “mini” bins to store each model in progress
- ▶ TIP: Label each mini-bin and matching base kit with names of students working on that particular robot. Avoid any mixing of parts.
- ▶ Power bars
- ▶ Robotics table or field
- ▶ Computers – desktops, laptops – must have adequate hard drive space to be able to load and store software. Computers do not need to be latest/greatest.

Other Sources for Kits and Parts

- ▶ Commercial Retailers – hobby shops, specialty toy stores
- ▶ LEGO.com
- ▶ Kijiji
- ▶ eBay - definitely bargains to be had
- ▶ Donations – Kits lying dormant at home
- ▶ Be careful about cast-offs that might not be compatible – boxes and boxes of unused parts – Cupboard Clutter...

Other Sources for Kits and Parts

Consider what you might already have...

e.g. Dacta materials, Simple Machines activity cards...

These materials might also be cupboard clutter at other schools and some might be willing to part with this.

Accessing Funds

School Council – Wish list...

School science budget

Slush funds - \$5.00 per student

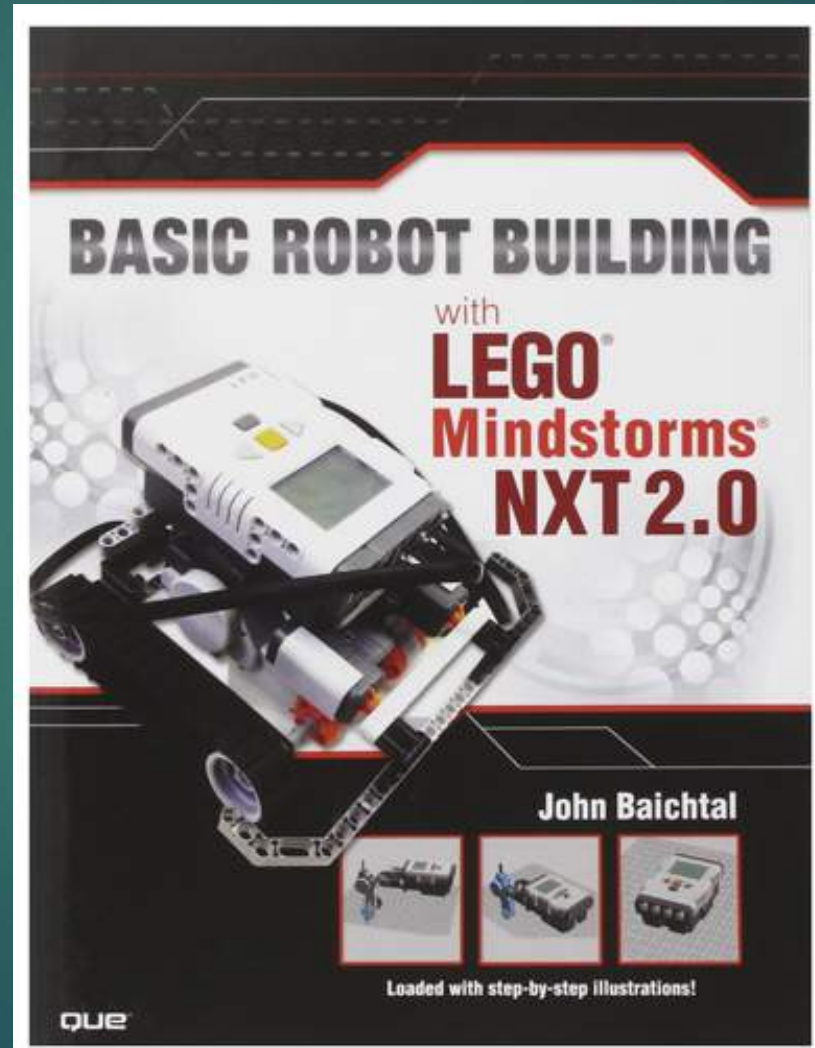
Funding initiatives, fundraising projects

Generous parents

Corporate donations

Other Resources

Books



Carnegie Mellon University – Robotics Institute

[Introductory Video](#)

<http://education.rec.ri.cmu.edu>



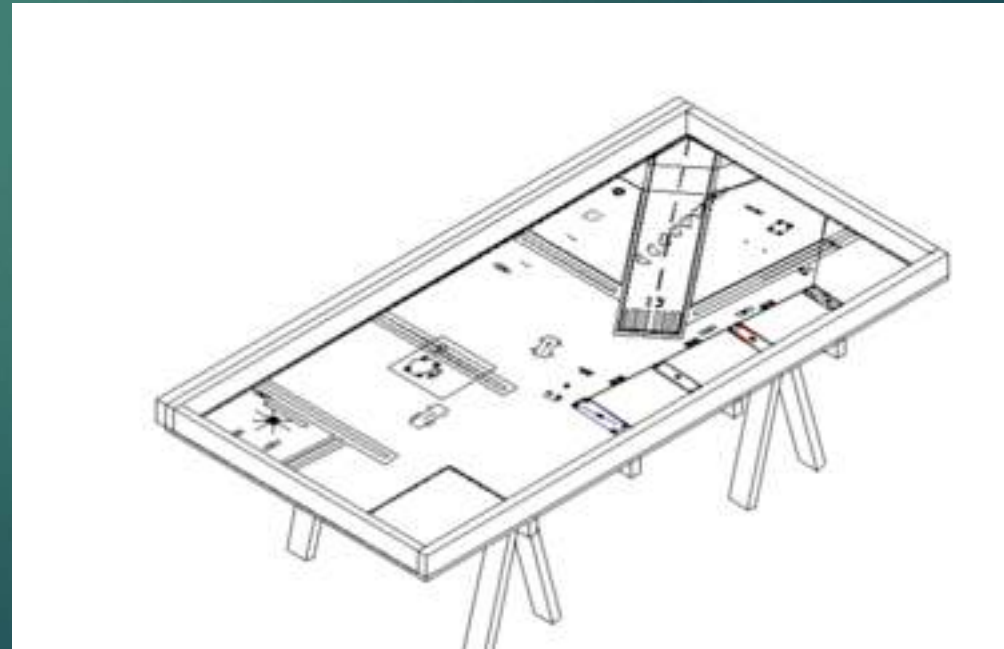
Robotics Academy and Robotics Institute

<http://education.rec.ri.cmu.edu/lego/getting-started/>

- Offers professional development for teachers including online courses
- Offers excellent training software options

Building a Robotics Table

- ▶ First Lego League Tables
- ▶ Instructions for Building a Table... (also found in package)
- ▶ http://www.firstinspires.org/sites/default/files/uploads/resource_library/fll/table-build.pdf



Pros... No Cons!

Discovery learning

Cooperative and collaborative

Theme-based

Non-competitive

All may participate

Partners/ Teambuilding

Fun, learning and respect

Students become experts

Show and tell with parents

High School Mentorship Opportunities

2056 Regional competition – Culminating Trip for Robotics Club



<http://www.alpcentauri.info/legonxtsensors.htm>

Schedule and Blocking

Currently offering 5 Robotics Blocks After School.
Three Blocks are for Grade 7s (LEGO Mindstorms).
Two Blocks are for Grade 8s (VEX).
Begins in September, continues to end of March.
Each block is 9 sessions long.
A session runs from 3:00 to 4:30 p.m.



Setting – Where Do We Meet?

Computer Pod Outside Science Classroom

- Allows for easy access to stored robots, kits and parts in classroom cupboards
- Robotics table is also stored in pod
- Batteries are recharged in science room after each session
- Need to be careful about number of people joining and space – 7 pairs of students plus 1 teacher plus 2 mentors means that there may be at least 17 people in the pod at a time. Tight confines for a small group.

Block Sessions

Session 1 – Introduction, Building a First Robot

Session 2 – Introduction to Programming

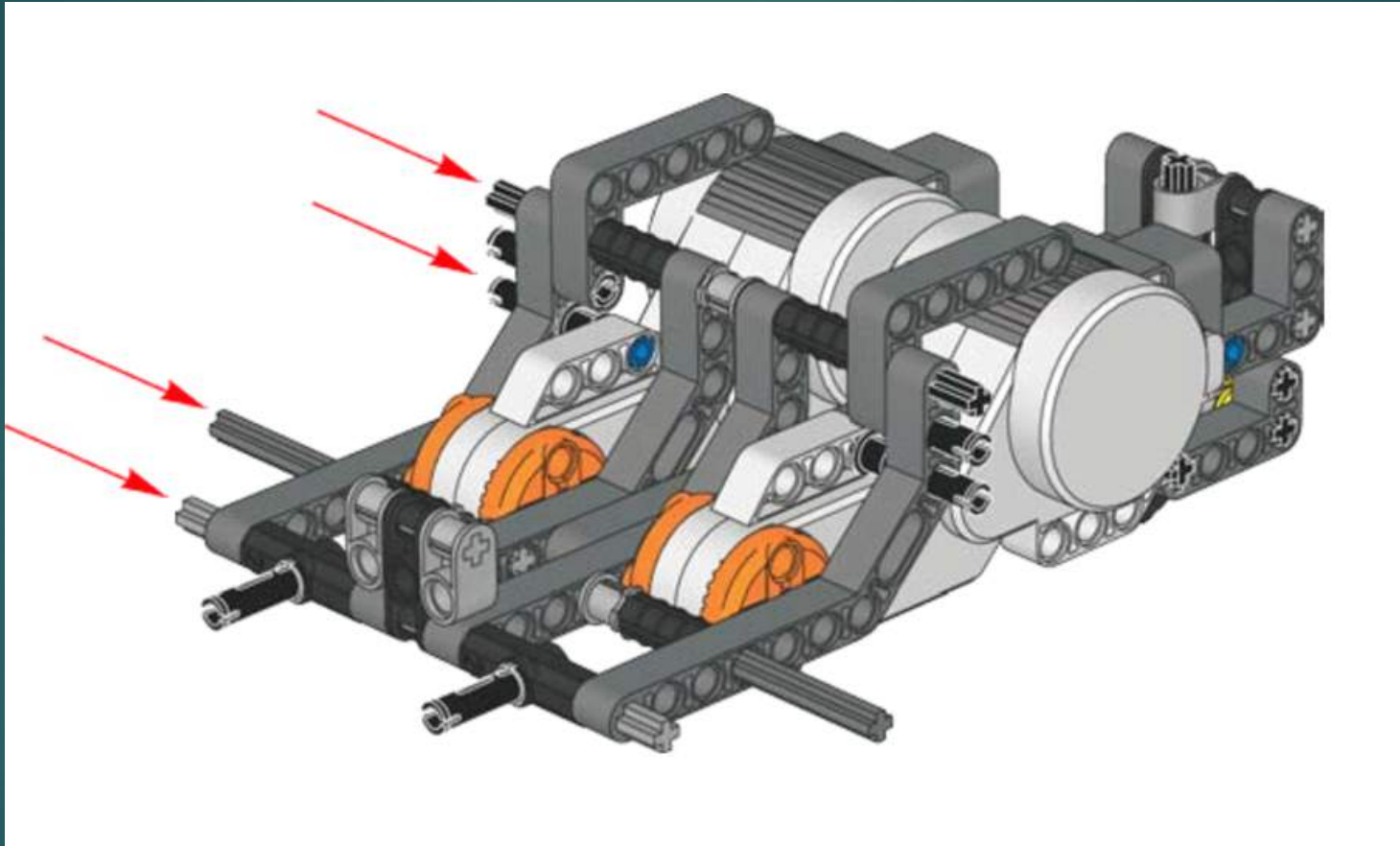
Sessions 3 – 4 – Training Modules – Forward, Reverse, Turning, Sensors, Following a Black Line

Sessions 5 – 9 – Green City Challenge

Session 8 – Parent Open House

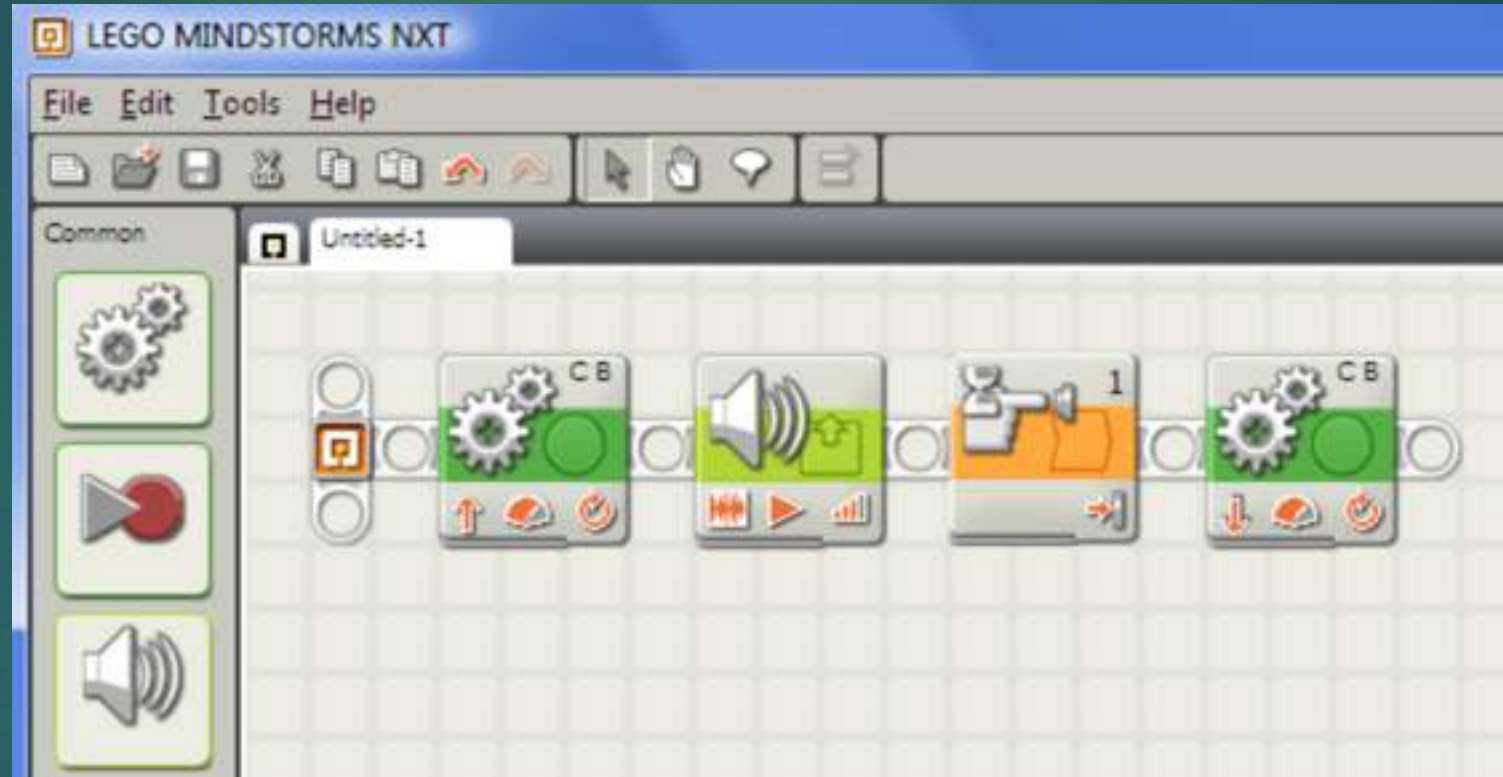
Session 9 – Parts Re-organization

Building Robots from Plans **



http://www.education.rec.ri.cmu.edu/content/lego/building/build_shows/taskbot.pdf

Programming Software for LEGO NXT**



http://www.education.rec.ri.cmu.edu/previews/nxt_products/nxt_video_trainer/partial_product/

Green City Challenge

- ▶ Resource available through Spectrum-Nasco.
- ▶ Environmental Stewardship theme-based Robotics challenge
- ▶ A series of challenges used to develop robotics skills
- ▶ Kit includes props for challenge – wind turbine, solar panels, dam, etc.
- ▶ Students work at own pace to complete challenges.
- ▶ Differentiation of challenge levels.
- ▶ Includes mat that fits regulation Robotics table.
- ▶ Can be used to train for First LEGO League.

VEX Robotics at Winona - now in its 3rd year...



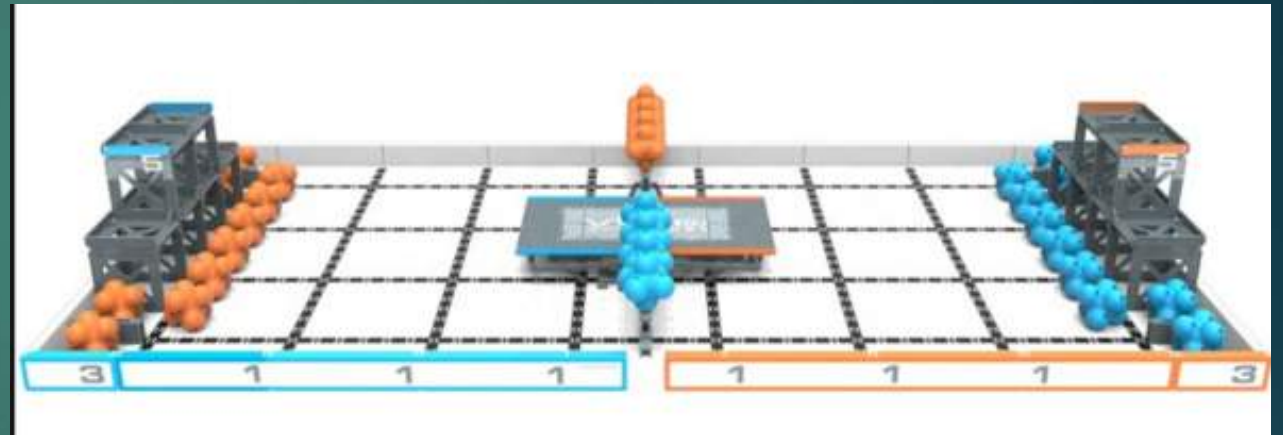
www.vexrobotics.com



modkit.com

VEX IQ Board Level Challenge

An HWDSB Initiative to encourage elementary schools to explore STEM Robotics Technology ...



<http://www.robotshop.com/en/viqc-crossover-full-field-game-elements-kit.html>



2016 – 17 VEX Crossover Challenge

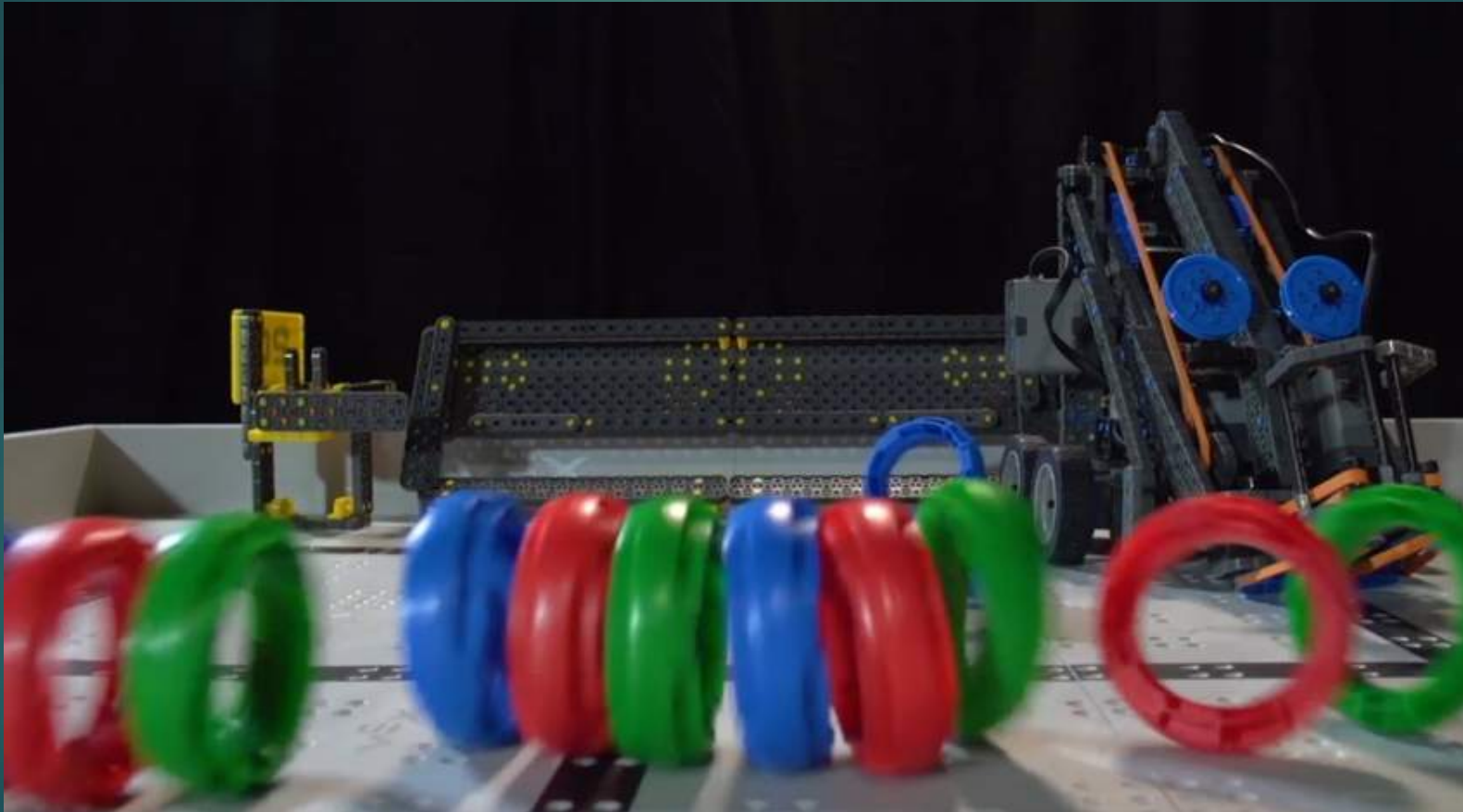
16 HWDSB Schools Participated

High Energy, Excitement, Teamwork & Cooperation

Winona had 13 students working together as a team to design an robot to accomplish the challenge.



2017-18 HWDSB VEX Challenge



<https://www.youtube.com/watch?v=L7suUU7fsU>

Contacts for HWDSB VEX

Enzo Ciardelli (eciardel@hwdsb.on.ca)

Dave Weir, Elementary Student Success
Teacher (dweir.commons.hwdsb.on.ca)

Getting Started with VEX IQ

iDesign Solutions Webinar – October 24, 2017
2:00 – 2:45 p.m.

(Getting Started with VEX IQ SuperKit)

<http://www.idesignsol.com/events/details/getting-started-with-vex-iq-k-8->

Questions? Needing More Information?

Feel free to contact me by email.

My school email address is
pmenican@hwdsb.on.ca.

You can also drop by if you want to see the
Robotics club in action after school.