Starting and Running a Robotics Club in Elementary School

THE WINONA EXPERIENCE

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Winona Elementary School

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/

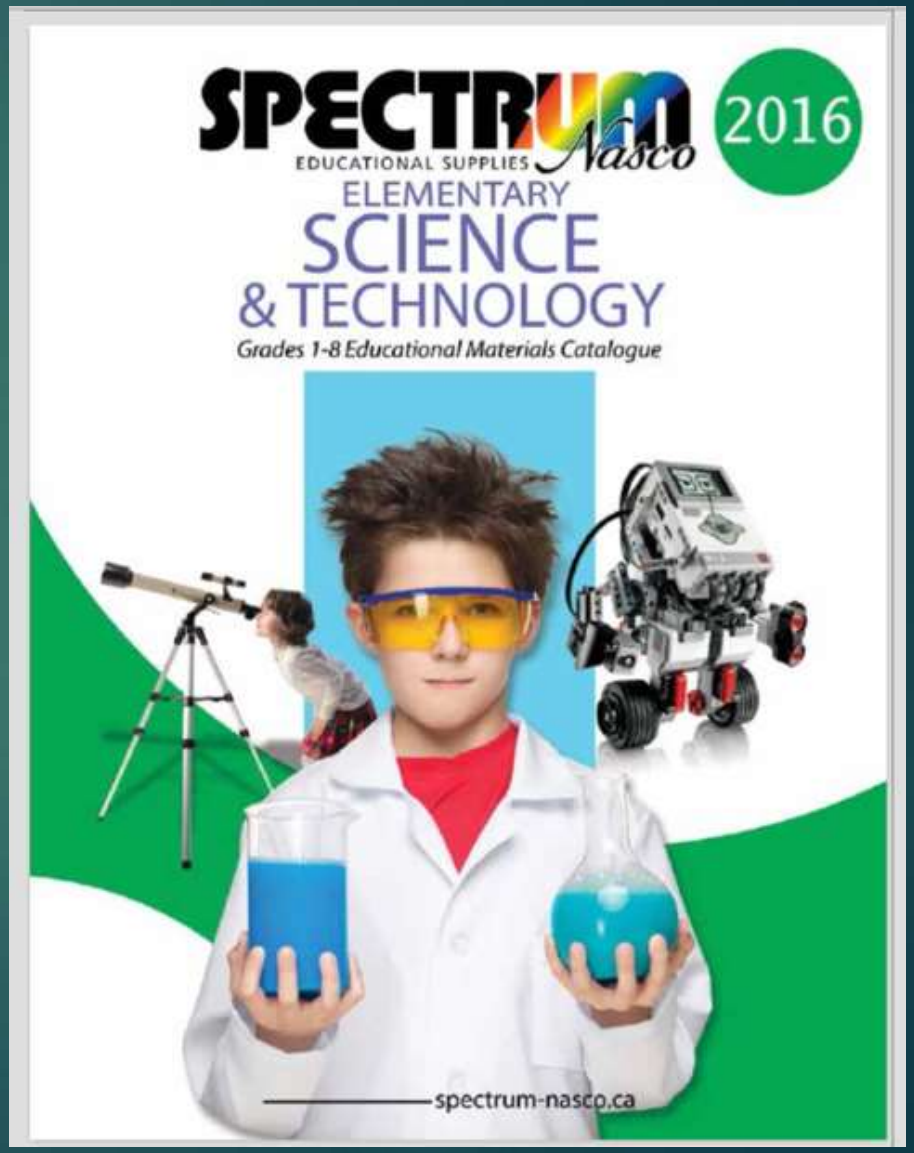
Equipment and Start-Up Costs

1. LEGO Mindstorms

Spectrum Nasco – Winona's primary "Go-To" supplier for LEGO kits and materials

2016 Elementary Science and Technology Catalogue

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



Current Platforms Available:
LEGO Mindstorms NXT
– Grade 7's at Winona use this.

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

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

VEX Robotics – New to Winona.
- Grade 8s at Winona use this.

www.vexrobotics.com

VEX IQ

modkit.com

LEGO Pricing… (2016 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

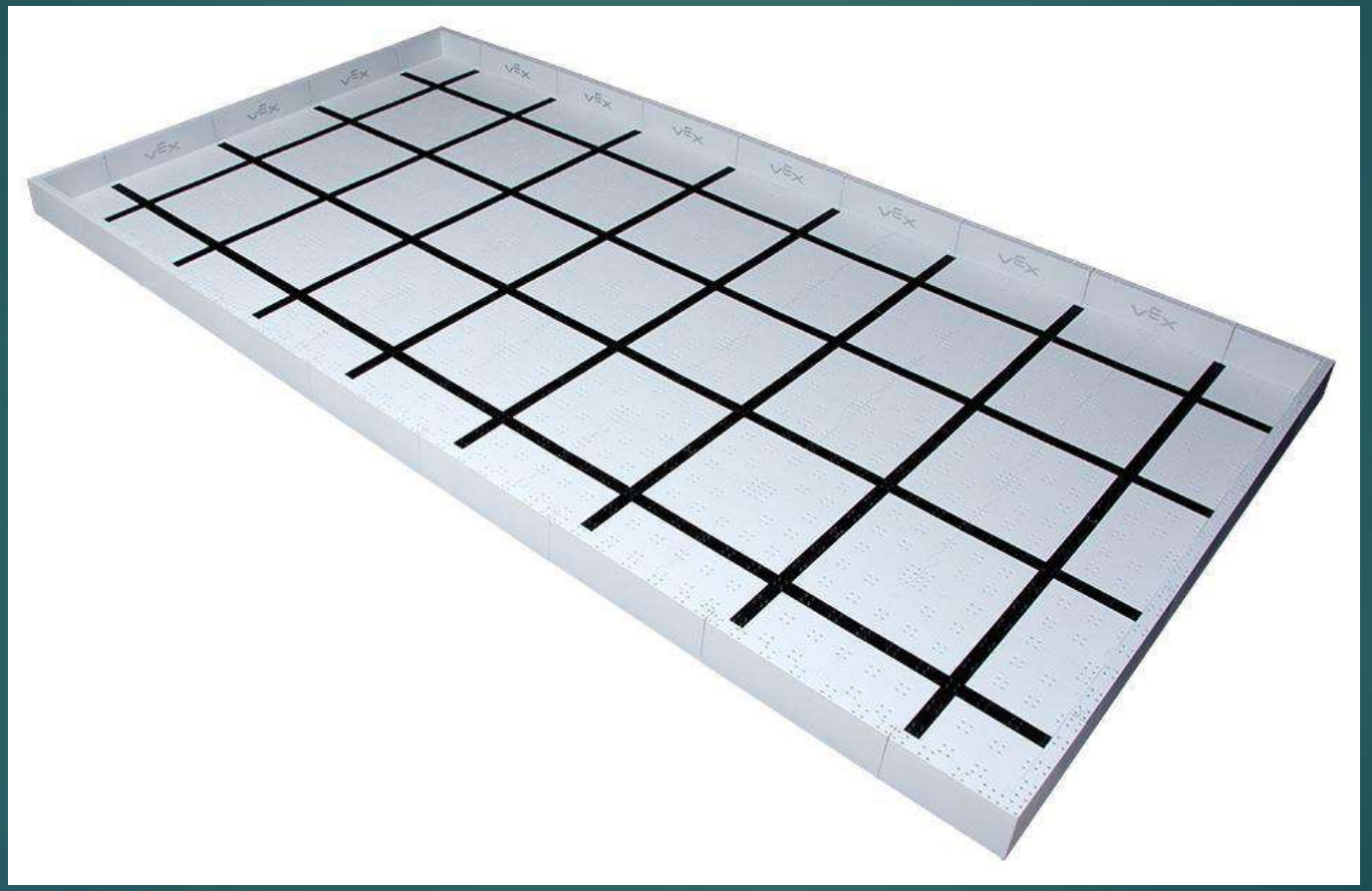
VEX IQ Pricing

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.

http://www.bonniesembroideryetc.com/wp-content/uploads/2016/02/build-better-robots-with-lego-mindstorms-education-ev3-slj-intended-for-lego-mindstorms-ev3-building-instructions.jpg

Winona's Current LEGO Kit Setup

Winona's Robotics Club uses 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

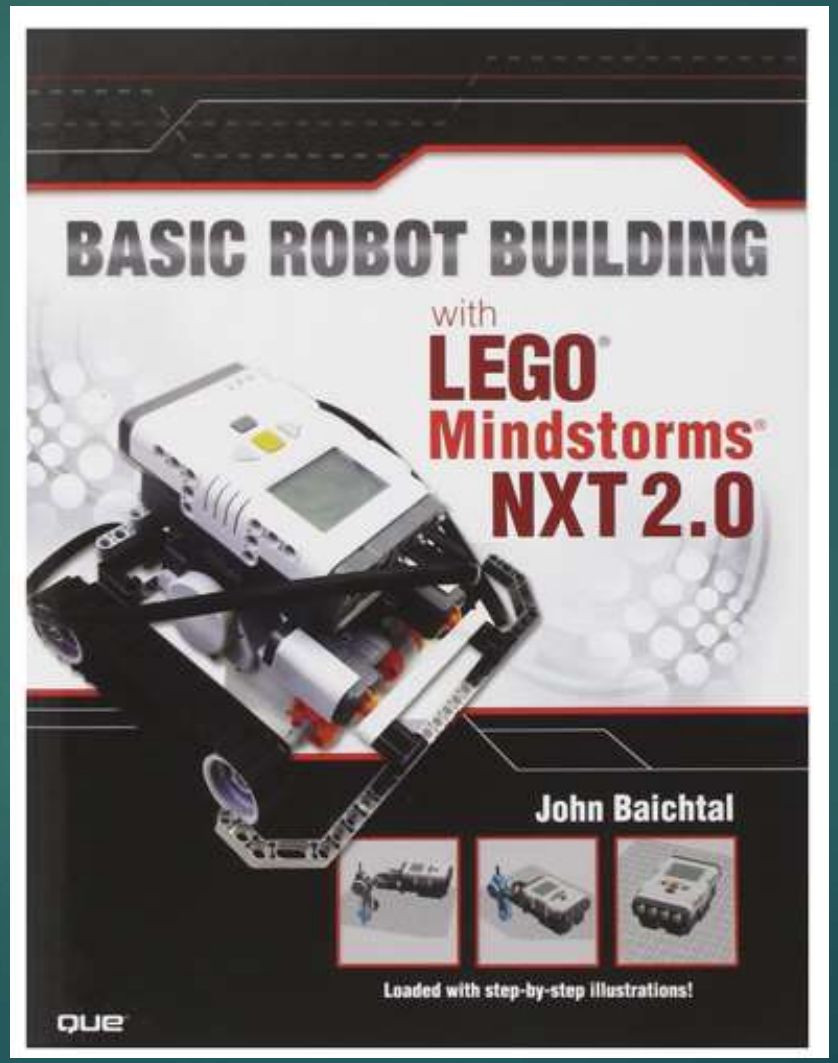
Funding initiatives, fundraising projects

Generous parents

Corporate donations

Other Resources

Books



Carnegie Mellon University – Robotics Institute

Introductory Video

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

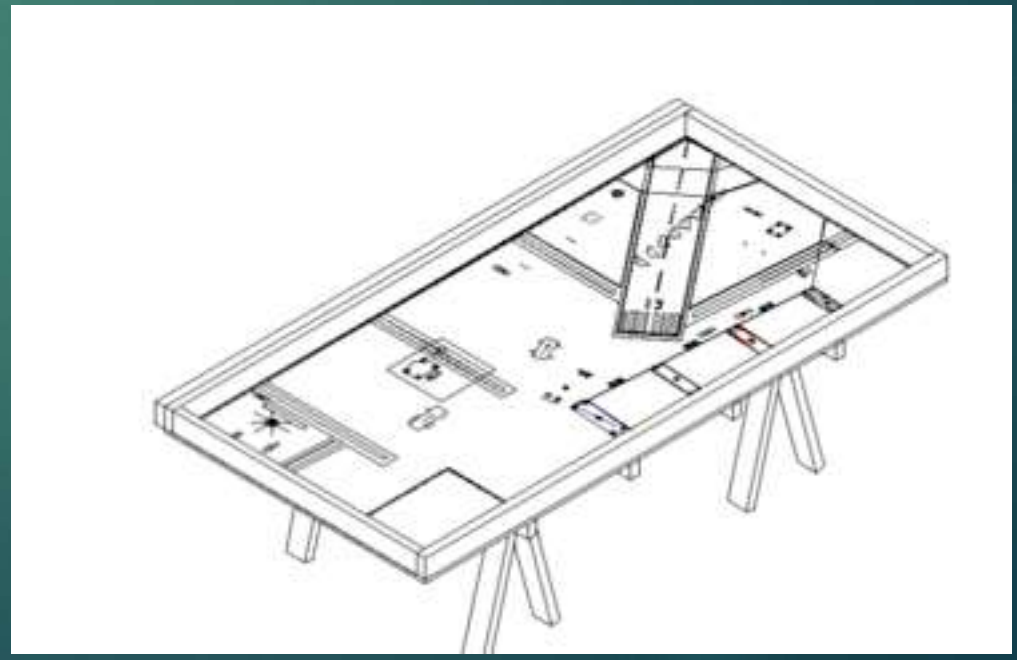
Robotics Academy and Robotics Institute

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



Philosophical Approach

Discovery learning
Cooperative and collaborative
Theme-based
Non-competitive
All may participate
Partners
Fun, learning and respect
Students become experts
Show and tell with parents
2056 Regional competition – Culminating Trip for Robotics Club

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

Schedule and Blocking

Currently offering 5 Robotics Blocks After School.

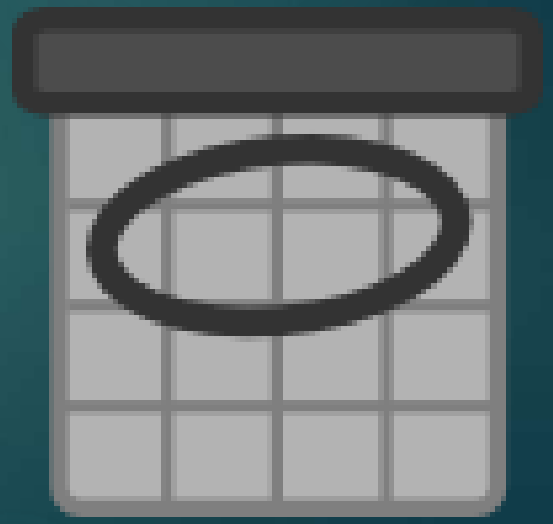
Three Blocks are for Grade 7s (LEGO Mindstorms).

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

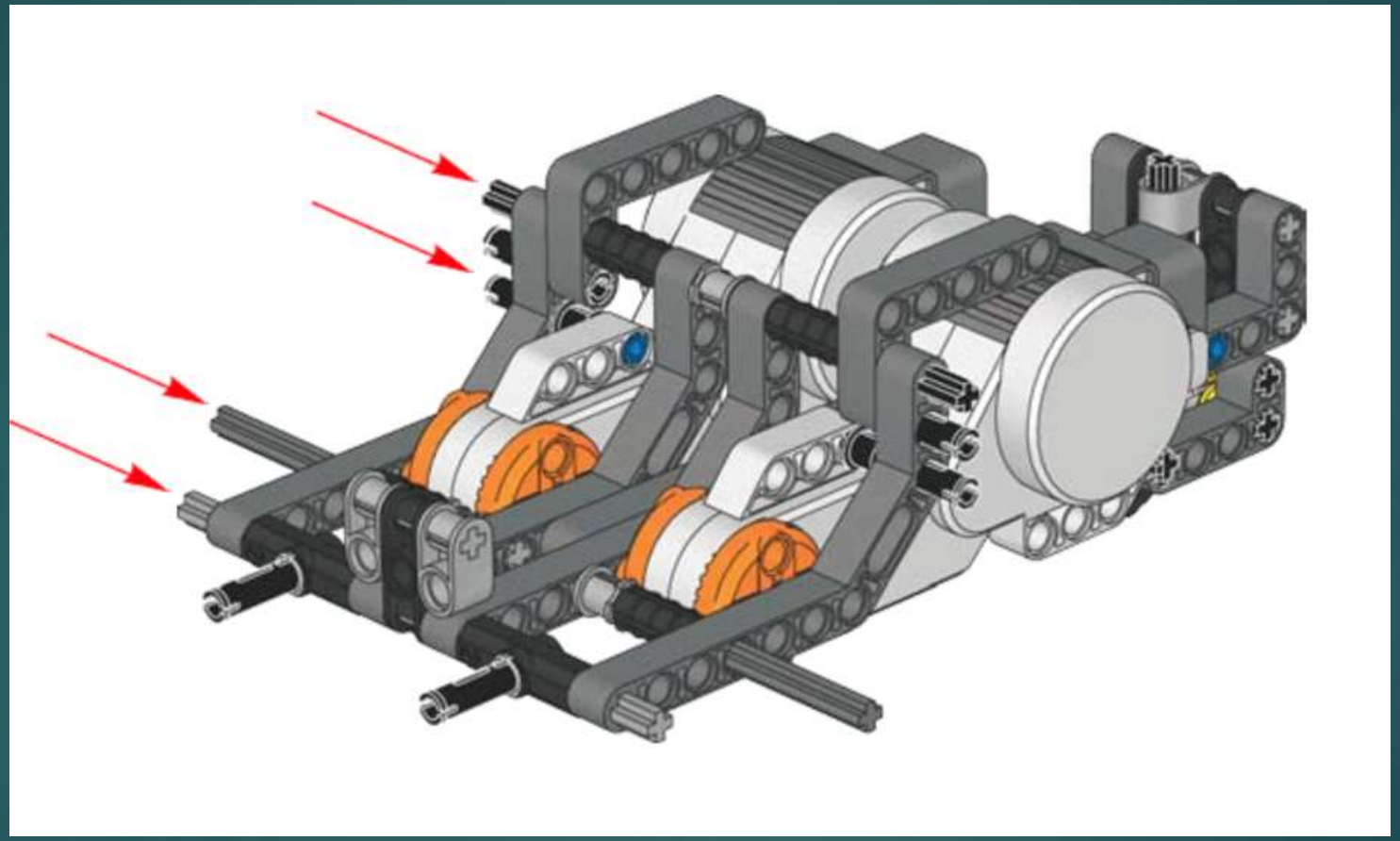
Sessions 3 – 4 – Training Modules – Forward, Reverse, Turning, Sensors, Following a Black Line

Sessions 5 – 9 – Green City Challenge

Session 8 – Parent Open House

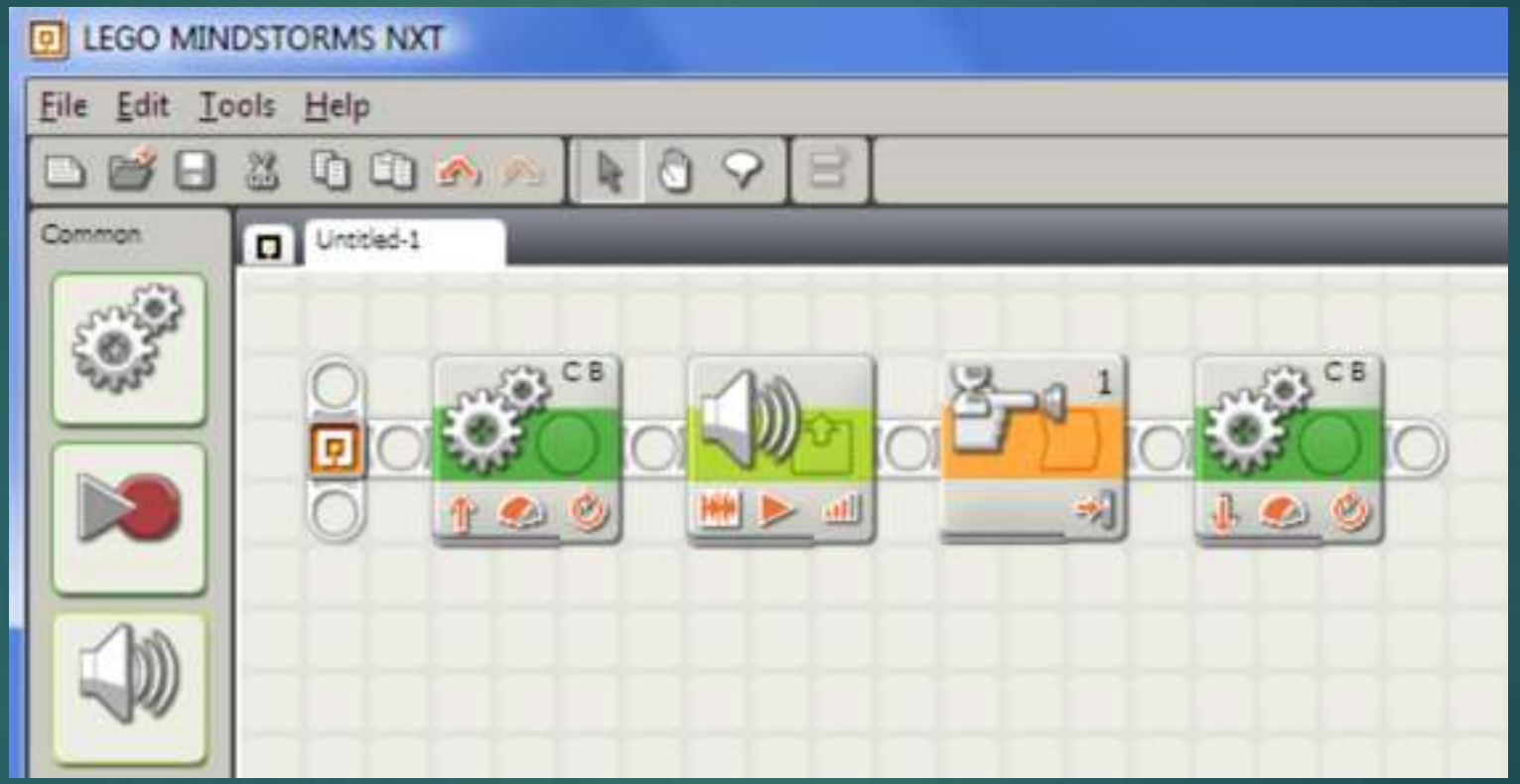
Session 9 – Parts Re-organization

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.

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.

Robotics Demonstration

Thanks to Emily, Param, Ben and Samantha for joining us this afternoon from Winona Elementary and demonstrating the LEGO and VEX kits today.