

Sample Coding and Robotics Resources

Sphero/SPRK

Sphero is an app-enabled robotic ball which can be connected to Apple and Android devices (i.e. iPhone, iPad, iPod, tablet, smartphone). It's a robotic ball gaming device that you control with a tilt, touch, or swing of your smartphone or tablet.

It allows children to develop their computational skills through coding and programming the robot. It integrates curriculum expectations in subjects such as math, science, art, and more. Children can guide their own learning through play.

Through the SPRK Lightning Lab App, students are able to program Sphero to perform many movements. It allows for endless opportunities of ways to interact with it. Students can drive it, build race or obstacle courses for it, play with it in the water, reinvent board games with it, play multi-player games like tag, and play augmented reality games with it. This robot can be integrated into many subjects also allowing for integration amongst many subjects. Sphero allows students to learn the language of tomorrow as coding is becoming just as important as other skills necessary to living in the 21st century. The new SPRK model is waterproof (can swim) and can be used with paint.

Resources

- [Sphero Site](#)
- Many apps on iTunes and GooglePlay and the ChromeStore, start with SPRK Lightning Lab for Sphero
- On Twitter [@Sphero](#), [@SpheroEdu](#), [#Sphero](#) (many videos and ideas for projects)
- [Examples of activities from Sphero](#)

Dash and Dot

Dash and Dot (from [WonderWorkshop](#)) are interactive robots that can be programmed through several apps including Blockly and Wonder. Similar to Sphero, students can program Dash and Dot to do many things including move in any direction, move its' head, blink, talk, sing, and play music, including many other movements. Dash likes to move around while Dot stays in one place until it is picked up and used to control Dash. It can come with attachments like launcher, xylophone, bulldozer, LEGO building adapters. They are real robots that respond to voice, navigating objects, dancing, and singing. Dash is the body of the robot and Dot is the head, both can work together or apart from each other. Students can play games with their robot or create their own games with them. Through collaboration, students can have their robots do things together. Students are provided with endless opportunities to be creative and innovative with their robot.

Resources

- [Dash&Dot Site](#)
- Many apps for Dash & Dot by Wonder Workshop for the iPad and android tablets, start with Wonder and Blockly for Dash and Dot (the Xylo is very popular)
- [Intro & Lesson Ideas](#) (a great place to start)
- Twitter [@WonderWorkshop](#), [#dashanddot](#), [#makewonder](#)

Ozobot

What it can do:

- follow lines
- Follow coding with colors on paper
- Follow block programming (ozoblockly) with a computer, chromebook, tablet, phone with various levels of difficulty from K-12
- Dance

Resources

- [Ozobot Site](#)
- [Ozobot presentation with examples of cross curricular lessons](#)
- The Programming Tutorial Games.ozoblockly.com
- **Ozobot App** ([Android](#), [Itunes](#))
- **OzoParkour** App (in French on [Android](#))
- Twitter [@ozobot](#), [#ozonation](#)

MakeyMakey

MakeyMakey is an invention kit for the 21st century. Turn everyday objects into touchpads and combine them with the internet. It's a simple Invention Kit for Beginners and Experts doing art, engineering, and everything in between. The kit includes: Makey Makey, Alligator Clips, USB Cable. MakeyMakey is highly recommended to introduce students to circuits as well as teaching them how to code. It provides decent educational value and opportunity for creativity. MakeyMakey allows individuals to be creative and it teaches individuals endless ways to connect computer to the environment. MakeyMakey inspires students to imagine, build, and rebuild. It is also appropriate for students of all ages. It is highly recommended to introduce students about circuits and how to code!

Resources

- [Official Makey Makey site](#)
- Twitter [@MakeyMakey](#) and [#MakeyMakey](#)

littleBits

littleBits is a platform of easy-to-use electronic building blocks that empower students to invent anything, from their own remote controlled car, to a smart home device. The Bits snap together with magnets, no soldering, no wiring, no programming needed.

Resources

- [Official Site and Teacher Resource Page](#)
- [Complete Project Booklet](#)
- [Education Guide](#)
- Twitter [@littleBits](#)

LEGO WeDo

LEGO Mindstorms little sibling. It has sensors and a motor with gears. It is programmed with LEGO WeDo block programming. The program has lessons with a scenario video and step by step building instructions for the student for one possible answer but encourages exploration and modification. Many schools have the WeDo version 1, now there is WeDo 2.0.

Resources

- Prezi [How to use We-do in the primary classroom](#)
- Twitter [#LegoWeDo](#), [#WeDo2](#), [@LegoEducation](#)
- **Download the software and documentation for the [WeDo](#), and [WeDo2.0](#)**
- [K-2 Lesson plans](#)

LEGO Mindstorms EV3

LEGO EV3 allows children to build various LEGO Robots and then program them via the programming tool on any laptop. The app is also available on iPads and tablets. LEGO EV3 can be integrated into various curriculum subjects however it is more suitable for an older age group starting around 8 years old and up. It is easy to follow the instructions and it can still challenge individuals by using more advance programming and coding throughout the tool. The software is free however the LEGO products range in prices. LEGO EV3 is great to use collaboratively or individually

This is one of the most common kit for student competitions. It has a brick (brain) into which the program is downloaded, and multiple sensors (distance, touch, colour, gyro), and motors.

Resources

- <https://education.lego.com/en-us>
- **Create an account and download on your devices(s)**
- <https://education.lego.com/en-us/educationdownloads/signuppage>
- **WeDo for PC Windows 9 must be downloaded as app from the Microsoft App Store for free**
- <https://education.lego.com/en-us/educationdownloads/downloads?domainredir=legoeducation.com>
- <https://www.microsoft.com/en-us/store/p/lego-education-wedo-20-full/9nblggh6gs8s#xlink>
- [Download the teacher guide](#)
- [Instructions for a variety of robots](#)
- Twitter [#Mindstorm](#), [#EV3](#), [@LegoEducation](#)

Cubelets

Cubelets are small blocks that are snapped together to make an endless variety of robots with no programming, no small parts to track, and no wires. The small magnets on each side of the cube attract each other. Each cube has its own special function.

They detect each other and communicate with each other, like a flock of birds. Teaching STEM lessons with cubelets gives students a reason to apply knowledge they've already learned, to verbalize it, and to put into practice new vocabulary and literacy skills about engineering, problem solving, science, and technology.

The cubes can also work with LEGO blocks to easily add motorization, sensors, and engineering functions to any creative endeavor.

Resources

- **Main site of [ModularRobotics](#)**
- [10 Activities to do with cubelets](#)
- [Cubelet Intro Inquiry](#)
- [Lesson plans K-12](#)
- Twitter [#Cubelets](#)

Hummingbird

The Hummingbird is designed to enable engineering and robotics activities for ages 13 and up (8 with adult supervision) that involve the making of robots, kinetic sculptures, and animatronics built out of a combination of kit parts and crafting materials.

Combined with very easy-to-use software environments like [Scratch](#), [Snap!](#), the [CREATE Lab Visual Programmer](#), and [Ardublock](#), Hummingbird provides a great way to introduce kids to robotics and engineering with construction materials that they are already familiar with. At the same time, Hummingbird continues to provide new challenges by allowing programming in the [Arduino environment](#), [Python](#), [Java](#), and [Processing](#), and by supporting [Raspberry Pi](#).

Resources

- <http://www.hummingbirdkit.com>
- [Building your first robot pdf](#)
- Twitter [@BirdBrainTech](#), “[#Hummingbird AND #Robotics](#)”

Bee-Bot

Bee-bot is a programmable robot that helps you teach students the first stages of programming. Bee-bot is the ideal cross-curricular resource to teach students the first stages of programming. It can be used to help students understand what algorithms are and how simple programs can be created and then executed. The Bee-bot enables children to improve their skills in directional language and programming through sequences of forwards, backwards, left and right 90 degree turns.

Resources

- <https://www.bee-bot.us/>

Tynker app

Tynker is an app that allows children to learn programming skills in a straightforward, easy to understand way. Including beginner, intermediate, and advanced levels, this app is appropriate for students' ages 8-12. There are over 100 programming tutorials that guide students, step-by-step, through the programming process. Students have the opportunity to learn the basics by playing fun puzzles and further challenging themselves by creating their own games. Collaborating with peers is easily done through this app as students can share their games with peers, work on projects together, and remix their games together. Animations, storytelling, music, science, along with many other skills are all incorporated into this programming app allowing for integration of many Ontario curriculum strands. Most interestingly, this app can be used to program many robots including Sphero, Ollie, and Parrot Rolling Spider Drone allowing for students to advance their computational thinking.

The full version on Tynker is available with different pricing structures for schools.

<https://www.tynker.com/>

Kodable

Kodable introduces children to the logic and concepts that must be understood to participate in computer programming. This app includes step-by-step instructions involved in coding, if/then statements, and loops. It also includes a parent and teacher section with a written teaching curriculum, the ability to unlock levels for children, ideas for off-screen games to play to develop logic and coding skills, and clear instructions for enabling guided access on the iPad which is a way to ensure children stay focused on a single task at a time. It helps students to acquire problem-solving skills, higher level thinking skills, communication skills, and critical thinking skills. Kodable provides a structured transition from symbols into written codes for easy understanding and scaffolding of learning. Students cannot skip levels and therefore, must go through the easier levels, even if they are not challenging enough for them. Kodable provides the support students need when working through the programming as short videos are used to demonstrate how to use each new concept that is introduced.

<https://www.kodable.com/>

Hopscotch

Hopscotch is a coding app that lets students code in a creative way. It provides students with the tools to create artwork, stories and games that can be shared with their peers and friends. It is a fun way to code that helps students learn the fundamentals of coding.

<https://www.gethopscotch.com/>

Tickle

Tickle is an app that allows the user to connect to and code with a variety of popular programmable devices including Sphero's, BB8s, Arduino's and more using Bluetooth technology. Being available on the iPad only is one of the few downsides to this otherwise highly relevant and engaging app. Using a drag and drop block coding system in the Swift 3.0 language users can program their paired device to executed code they write or complete activities and challenges. It was specifically designed with accessibility in mind; it is the world's first programming app to supports VoiceOver, allowing blind or low vision users to seamlessly access and use the app. The app allows users to program a variety of devices and characters to interact with each other, making the problem-solving and collaboration opportunities ideal for a school setting. In addition to providing a wide variety of educator and user resources and projects, the app also support the Hour of Code, making it highly relevant for classroom use.

<https://tickleapp.com/>

LightBot

Lightbot is a free/inexpensive app that is a great way to introduce coding basics to elementary aged students. The app is available across multiple platforms, making it ideal for school and home settings. It is basic enough to be used by the youngest ages without alienating more mature users. However, because Lightbot is generally to be used as an introductory tool, its uses and the timespan for its incorporation are limited; the app has limited curricular connections for older grades beyond functioning as an introduction to coding. However, for younger grades several important mathematics concepts such as movement and direction are well taught using this app. Additionally, because there are multiple ways to solve each puzzle, the app reinforces important problem solving skills and a flexibility of thinking that is key for all grades. Being a one-time purchase, Lightbot is a great resource for students and for educators who do not have a lot of prior knowledge about programming.

<http://lightbot.com>

Bloxels

Bloxels is a programming environment that allows children and youth to create every aspect of their own video games from their characters to their environment to the story they are portraying. Students are learning all about coding while focusing on the design of their video game, integrating art, science, math, and language throughout the process. Collaboration is essential to this program as peers can play their peers games and use their own coins to download their peers' games and use them in the creation of their own games. The arcade style of the video game program makes it extremely appealing to the eye. The Bloxels board makes it easy for students to create each page of their video game and quickly take a picture of their creation to upload to the computer. Although this program may seem overwhelming, it is extremely rewarding for students to see their video game creations come to life. This would be a program that would take time to master and therefore, ample opportunity to work on their creations should be given.

<http://www.bloxelsbuilder.com/education-overview/>
<http://home.bloxelsbuilder.com/>

Resources

Ministry of Ontario resource:

<http://www.eduqains.ca/resourcesTELO/CE/CodingInterface/interface.html>

TDSB resources:

[Introduction to Coding in the Elementary Grades](#)

<https://sites.google.com/a/tdsb.on.ca/classroom-robotics/>

Scratch

www.scratch.mit.edu

<https://www.scratchjr.org/>

MinecraftEDU

<https://education.minecraft.net/>

Coding Websites

<https://hourofcode.com/ca>

<https://code.org/>

<https://www.codecademy.com/>

<https://www.codeavengers.com/>

<https://codecombat.com/>

<http://www.stencyl.com/>

<https://www.tynker.com/>

<https://www.techrocket.com/>

<http://lightbot.com/>

<https://blockly-games.appspot.com/>

<https://www.playcodemonkey.com/>

<https://www.kodable.com/>

<http://www.appinventor.org/>

<http://www.crunchzilla.com/code-monster>

<http://www.codewizardshq.com/>

<https://gameblox.org/>

<https://thimble.mozilla.org/en-US/>

Unplugged

<http://csunplugged.org/>

<https://code.org/curriculum/unplugged>

Logics Academy

<http://learn.logicsacademy.com/courses>

Sphero EDU

<https://edu.sphero.com/cwists/category>

Ozobot

<https://ozobot.com/stem-education/stem-lessons>

Little Bits

https://littlebits.cc/inventions/explore?sort=recent&page=1&per_page=9

LEGO education

<https://education.lego.com/en-us>

MakeyMakey

<http://www.makeymakey.com/>

<http://www.hourofcuriosity.com/makey-makey/>

Arduino

<https://playground.arduino.cc/Main/ManualsAndCurriculum>

Hummingbird

<http://www.hummingbirdkit.com/learning/scratch-20-programming>

Supplier	Contact	Website	Focus
	1-800-668-1108 communicationbb@bb.ca	https://bb.ca/ B&B STEM Catalogue	Bee Bot Cubelets Dash & Dot EV3 LEGO Mindstorms Tetrix LEGO WeDo 1.0 & 2.0
	1-647-793-9997 info@carobot.cc	www.canadarobotix.com	Arduino Genuino littleBits Makey Makey Raspberry Pi Remote Controlled Robots
	1-416-977 - 9258 support@creatroninc.com	www.creatroninc.com	3D Printers Arduino littleBits Makey Makey Makeblock Raspberry Pi
	1-437-886-5274 info@elmwoodelectronics.ca	elmwoodelectronics.ca	Adafruit Arduino Hifiberry Pycom Raspberry Pi Sparkfun Electronics
	1-905-731-6944 info@kidder.ca	https://kidder.ca	Engineering Kits Makerspace MakeDo motors/leds/leads Tool Kits
	1-905-604-8445 info@logicsacademy.com	http://logicsacademy.com	Dash & Dot Makebot Maker Kits
	1-888-352-0899 info@makerspacecanada.ca	makerspacecanada.ca	LittleBits Makey Makey

	<p>1-855-586-2949</p> <p>info@makerwiz.com</p>	<p>https://makerwiz.com</p>	<p>3D Cartridges 3D Extruders 3D Filaments 3D Pens 3D Printers 3D Scanners</p>
	<p>1-866-627-3178</p>	<p>www.robotshop.com/ca</p>	<p>Dash & Dot Hummingbird LEGO MINDSTORMS Ozobot Vex Robotics Many options</p>
	<p>1-905-954-4917</p> <p>kmogg@spectrumed.com</p>	<p>spectrum-nasco.ca/elementary-science-technology</p> <p>Science & Technology Catalogue in Google Drive</p>	<p>Bee-Bot Dash & Dot Hummingbird WeDo 2.0 LEGO EV3</p>
	<p>1-800-268-1268</p> <p>info@wintergreen.ca</p>	<p>wintergreen.ca/robotics</p>	<p>Bee-Bot Cubelets Dash & Dot littleBits Makey Makey Ozobot Sphero</p>