

The two charts compare the Hardware and Software of EV3 and SPIKE Prime. This document is maintained by EV3Lessons.com and PrimeLessons.org.



HARDWARE			
		EV3-G/EV3-LAB	EV3 CLASSROOM (SCRATCH)
Motors		EV3 Large (2 in base kit) Speed: 160RPM Torque: 20Ncm	SPIKE Large (1 in base kit, 1 in expansion) Speed: 175RPM Torque: 8Ncm
		EV3 Medium (1 in base kit) Speed: 240RPM Torque: 8Ncm	SPIKE Medium (2 in base kit) Speed: 135RPM Torque: 3.5Ncm
Sensors	Touch / Force	Simple pressed/released analog sensor	Sampling rate: 100Hz Touch sensing: 0-2mm Force sensing: 2-8mm Output resolution: 0.1 newton Accuracy: +/- 0.65 newton
	Ultrasonic / Distance	Sample rate: 67Hz Resolution: 1mm Accuracy: +/- 1cm Max distance: 250cm Lights: on/blinking	Sampling rate: 100Hz Resolution: 1mm Max distance: 200cm Lights: 4 controllable segments Entrance angle: 35 degrees
	Gyro	Single axis Gyro Sample rate: 1000 Hz Accuracy: +/- 3 degrees Max rate: 440 degrees/second Modes: rate, angle, rate & angle	Built-in 6-axis Gyro (3 axis gyro + 3 axis accelerometer)
	Color	Known drift/lag issues sample rate: 1000 Hz optimal distance: 4-12mm (0.5 - 1.5 LEGO modules) colors detected: 7 LED color: red (reflected),	No significant drift, may have some lag sample rate: 100 Hz Optimal distance: 16mm (2 LEGO modules) Colors detected: 8 LED color: white
	Infrared	Proximity, Beacon and Remote support	N/A
		Linux-based 300Mhz ARM9, 64MB Display (178 by 128) 4 sensor ports/4 motor ports NXT/EV3 connectors 5 brick buttons USB host port for WiFi other peripherals USB client port and Bluetooth for PC connections ~30 second boot time ~25 second shutdown time Removable, rechargeable battery in core set. Charger port on battery. Battery can be charged separate from brick. On brick programming, port view, motor control	MicroPython Embedded OS 100MHz M4 processor, 32MB storage 5x5 Light Matrix 6 motor/sensor ports LEGO Power Functions 2.0 (LPF2) connectors 2 brick buttons built-in 6-axis gyro No USB host port USB client and Bluetooth/BLE 4.2 for PC connections ~5 second boot time ~3 second shutdown time Removable rechargeable battery with charger port on Hub. Battery must be in hub to charge On brick motor control
Brick/Hub			



SOFTWARE

	EV3-G/EV3-LAB	EV3 CLASSROOM (SCRATCH)	SPIKE PRIME
Motor	Separate large/medium motor blocks	Same motor block for all motors	Same motor block for all motors
	Can set power, duration, brake mode in single block	Must use separate block to specify brake mode	Must use separate block to specify brake mode.
	Must code your own stall detection	Must code your own stall detection	Can set default speed, brake modes Built-in stall detection that can be turned on/off
Movement	Can set motor ports, power, duration, brake mode in single block.	Must use separate block to specify brake mode & ports . Can set default speed, brake modes , & ports.	Built-in stall detection that can be turned on/off
	Create your own Move Centimeters as a MyBlock.	Create your own Move Centimeters as a MyBlock.	Built-in Move Centimeters. Must be configured for wheel size.
Sounds / Display / Lights	Can display image at x,y with support for custom images/image editor	Can display predefined image full screen	Can draw image on 5x5 display
	Draw line, circle, rectangle, point, text anywhere on screen	Draw text anywhere on screen	Can display scrolling text
	Brick lights – 3 colors, on/off & pulsing	Brick lights – 3 colors, on/off & pulsing	Brick lights - 6 colors, on/off, in addition some sensor lights can be controlled (e.g. distance)
Sensors	General	Wait , read and compare sensor blocks	Only read and compare sensor blocks. Must combine with generic wait block
	Touch / Force	Pressed, released, bumped	Pressed, hard-pressed, released (about 60% pressed in is "hard pressed" Newtons & % pressed (out of a total of 10)
	Ultrasonic / Distance	Centimeters, Inches Presence (passive) Single measure/continous	Centimeters, inches, %age (distance out of a total of 200); can control lights - 4 segments
	Gyro	Rate and angle (yaw)	3 axis angle (yaw, pitch, roll) - rate only shown in dashboard 3 axis accelerometer - orientation, shaking, tapped, falling - raw values only shown in dashboard
	Color	Ambient, color & reflected modes; built in calibration blocks; 7 colors	Color & reflected modes; no calibration block; 8 colors
	Buttons	Pressed, released, bumped	Pressed, released
	Infrared	Proximity, beacon and remote support	N/A
My Blocks	My Blocks that have been created can be used across different program files in the same project.	My Blocks can only be used in a single project. Note that projects do not contain multiple programs.	My Blocks can only be used in a single project. Note that projects do not contain multiple programs.
	My blocks can have inputs and outputs.	My blocks only have inputs. Outputs must be passed through global variables.	My blocks only have inputs. Outputs must be passed through global variables.
Parallel Code	Parallel Beams	Events and messages	Events and messages
Variables	Text, numeric, logic variables	Variables types are auto-detected, can be text or numeric	Variables types are auto-detected, can be text or numeric
	Numeric array, logic array	Lists	Lists
Math / Operators	Simple and complex math operators/comparisons	Simple and complex math operators/comparisons	Simple and complex math operators/comparisons
	Text switches and merge	Text merge, extract single character, substring, length	Text merge, extract single character, substring, length
Files	Read, write, delete	No Files	No Files
Other	Ability to see running block when connected		Monitors for variables during run
	Data wires		Manually assigned brick Project "numbers" - easy to find
	Datalogging		
	Bluetooth messaging		
	Daisy chain		
	Tablet and Chromebook versions (called "EV3 Programming") has a limited set of blocks		All platforms have identical experience.
	Can import third-party blocks	Unclear how to import third-party blocks	Unclear how to import third-party blocks MicroPython built into software (*new May 2020)

Download Links

	EV3-G/EV3-Lab Software	EV3 Classroom/LEGO MINDSTORMS Home	SPIKE Prime
Education	https://education.lego.com/en-us/downloads/mindstorms-ev3/software	* Select Mac OS for Mac version of EV3 Classroom https://education.lego.com/en-us/downloads/mindstorms-ev3/software	https://education.lego.com/en-us/downloads/spike-prime/software
Retail	https://www.lego.com/en-us/themes/mindstorms/downloads	https://www.lego.com/en-us/themes/mindstorms/downloads	
	https://education.lego.com/en-us/downloads/retiredproducts/mindstorms-ev3-lab/software		
Retired Mac software	Select Mac OS 10.13 or older: https://www.lego.com/en-us/themes/mindstorms/downloads		
Additional Robot Designs and Programming Lessons	EV3Lessons.com	EV3Lessons.com	PrimeLessons.org

One platform is not clearly superior to another and the purpose is not to recommend one over another. We have tried to be as factual as possible. Data is based on publicly available information and from actual use of both systems and all three programming languages. We suggest you use the data, try it out and make an educated decision for your team or school.