



Cubelets Robotics

Recommended Age: 5 and up

Cubelets are a fun, creative way to work with modular robotics. A number of Cubelets with varying properties can be assembled and reassembled to perform any variety of tasks you can dream up!





Contents List

- **Set of 12 Cubelets:**
 - 1 Battery Cubelet
 - 1 Blocker Cubelet
 - 1 Bluetooth Cubelet
 - 1 Brightness Cubelet
 - 2 Distance Cubelets
 - 2 Drive Cubelets
 - 1 Flashlight Cubelet
 - 1 Inverse Cubelet
 - 1 Passive Cubelet
 - 1 Rotate Cubelet
 - 1 USB Charging Cable
 - 2 Lego® Brick Adapters
 - Booklet and Descriptive Cards
- **Book: *What Do You Do With an Idea?* by Kobi Yamanda**
- **Book: *Ada Lovelace: Poet of Science* by Diane Stanley**



Steam Kit: Cubelets Robotics
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Getting Started Guide

Refer to the “Getting Started Guide” in the binder enclosed with the STEAM kit for detailed instructions.

Here is a guide to the Cubelets in this kit and their features:



Battery Cubelet (Dark Blue-Grey)

Play longer than ever before with the redesigned Battery Cubelet! This Cubelet provides the energy needed to make your robots spin, drive and squawk. The new Battery packs 30% more power than the previous generation and easily recharges via micro USB. This Cubelet is pre-loaded with the newest Cubelets operating system, Cubelets OS 4.



Blocker Cubelet (Dark Green)

The Blocker Cubelet is a basic building block that "blocks" data from its neighbors. It still passes power, but effectively stops communication and can insulate one side of a robot from another.



Bluetooth® Cubelet (Light Blue)

Remote control or reprogram! Add to any Cubelets kit to extend your robot.

The Bluetooth Cubelet contains a tiny Bluetooth radio that you can pair with your phone, tablet or PC. It also provides a gateway to stay up-to-date with Cubelets technology.

The Bluetooth Cubelet is compatible with iOS and Android devices!

Getting Started Guide (cont.)



Brightness Cubelet (Black with lens)

Detects the amount of light hitting its sensor. The Brightness Cubelet has an analog photocell that responds to varying light conditions. Expect values near zero in a dark room, and values near one when the sensor is in front of a bright light.



Distance Cubelet (x 2) (Black with two sensors)

The Distance Cubelet detects how far it is from an object. It uses infrared light and is accurate between 10 and 80 cm. The sensor is directional, so it outputs the distance to the object in front of the sensor. At 10cm, the block will output values near 1, and toward 80cm it will output values near 0.



Drive Cubelet (x 2) (Transparent with two rollers)

Contains a motor and roller wheels for moving on a horizontal surface. The Drive Cubelet only moves in one direction, slowing to a stop with a value of zero and moving faster with higher input values.



Flashlight Cubelet (Transparent with LED light)

The Flashlight Cubelet emits a focused beam of light from a powerful white LED. Off with a value of 0, the light becomes brighter with higher input values.

Getting Started Guide (cont.)



Inverse Cubelet (Red)

The Inverse Cubelet calculates a value that is the opposite of the values it receives. Specifically, the Inverse Cubelet will (weighted) average its inputs and then output a value of one minus that average.



Passive Cubelet (Bright Green)

The Passive Cubelet is a basic building block. It carries power and data from its neighbors, but it basically acts like a smart brick. It doesn't move, sense, or change the data in any way.



Rotate Cubelet (Transparent with black spin segment)

One face spins at a rate corresponding to the block's input values—which means you decide how fast it should spin, and program it that way!



Micro-USB Charging Cable

A standard micro-USB cable that you can use to recharge your MOSS or Cubelets battery blocks.

Getting Started Guide (cont.)



Cubelets Brick Adapter (x 2) (Yellow)

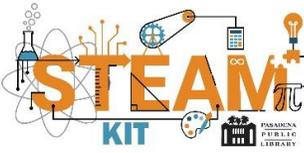
Use these adapters to connect Cubelets and LEGO® bricks!

Ten Quick Tips About Cubelets

1. You can build robots with Cubelets by combining the 3 types of Cubelets:
 - **SENSE** Cubelets are any black Cubelet
 - **THINK** Cubelets are any brightly-colored Cubelet
 - **ACT** Cubelets are any transparent Cubelet

Changing which Cubelets you connect, and how you arrange them, determines what type of robot you've built. Add more Cubelets to build bigger robots with more complex behaviors.

2. Each type of Cubelet plays a specific role within a robot:
 - Black Cubelets, or **SENSE** Cubelets, are “input” Cubelets: They take in information (like light, or distance)
 - Brightly-colored Cubelets are **THINK** Cubelets—they act like little brains. They process information, and can modify that information.
 - Transparent Cubelets are **ACT** Cubelets. They function as “outputs.” They do things, like spin around, or light up.
3. Every robot you build will need the Battery Cubelet. It provides the power for your robot, and has a switch to turn your robot on or off. If you run low on power, use the included micro-USB cable to re-charge your Battery Cubelet.



Getting Started Guide (cont.)

4. Cubelets connect using magnetic faces. You don't have to worry about orientation, because they connect with any alignment. Most Cubelets have 5 connection faces, and 1 special face which identifies that Cubelet's function. (Other Cubelets have 6 connection faces, and their function is indicated by their color.)
5. Cubelets are modular. This means you can exchange blocks of the same type within a construction. You can exchange any ACT Cubelet for any other ACT Cubelet, or any SENSE Cubelet for any other SENSE Cubelet, etc.

For example, you could build a robot that moves when it detects an object using the Distance Cubelet. If you exchange the Distance Cubelet for the Brightness Cubelet, how do you think your robot's behavior will change?

6. You can control multiple ACT Cubelets with a single SENSE Cubelet. In a robot with a single SENSE and many ACTs, the output of the ACT Cubelets is determined by the lone SENSE Cubelet.

Try building a robot using the Distance Cubelet, and add the Rotate, Flashlight, and Drive Cubelets. What happens when your robot senses an object?

7. Each black SENSE Cubelet detects some property of its environment, and turns it into a number. Transparent ACT Cubelets take the numbers they receive and turn them into action.

Think of the number as flowing from one block to the next. Numbers are flowing through each Cubelet, moving from SENSE to ACT blocks all the time. These numbers are what makes the robot behave the way it does.



Getting Started Guide (cont.)

8. When an ACT Cubelet receives numbers from more than one source, it combines or averages the numbers it receives to produce the action.

Note that numbers do not flow through SENSE blocks. Each SENSE block produces its own number, so it doesn't pass numbers from its neighbors.

9. THINK blocks influence and affect the numbers flowing through your robots. Each colored THINK has its own special function. Be sure to explore them all, to discover what they can do!

The red Inverse Cubelet's function is to turn big numbers into small numbers, and small numbers into big numbers. What does that mean?

Let's say you build a "lighthouse" robot, with a Flashlight Cubelet on top of the Rotate Cubelets with a Brightness Cubelet –so the light spins around on top of your robot when the robot senses light. Sounds fun, and it is. But lighthouses need to work in the dark, so when there's no moon, ships will still know where the shoreline is.

How could you make your lighthouse work in the dark, when there is no light to sense? If the Brightness Cubelet needs light as the input to make the ACT blocks do their thing, try adding the Inverse Cubelet to your robot (between the Brightness Cubelet and the two other blocks—what happens? What makes it work that way?

10. There are so many ways to explore what Cubelets can do. Go wild with your imagination and have fun learning and working with robotics!



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Additional Information

When returning the kit, please check if all contents are in the box. If something is missing, please inform staff.

For a full list of available Pasadena Public Library STEAM Kits visit our website at:

<https://www.cityofpasadena.net/library/steam/#steam-kits>