MODULAR ROBOTICS EDUCATION

10 cool things to do with Cubelets

Using the KT01 Cubelets

This activity plan includes 2 parts

1. Challenges that may be satisfied with single-sense, single action robots. Of course there's always the option to add more to your robots, but simple solutions exist using fewer Cubelets.
2. Additional Cubelets challenges that tackle harder problems or add more Cubelets

In the final section of the document, you will find some suggested solutions. Treat these as possible solutions, not an exhaustive list - there are many solutions to every challenge. These pictures aren't meant to limit you, just to give you some ideas. Try to come up with your own robot first, and if you do something different, be sure to let us know! http://www.modrobotics.com/blog/?forum=education

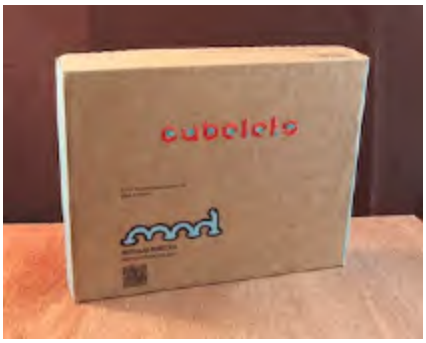
These activities have **no** suggested ages - different challenges may appeal to different people for reasons having nothing to do with age. If you're brand new to building with Cubelets you may have more initial success starting with simple single-sense (black Cubelet) single Action (clear Cubelet) robots.

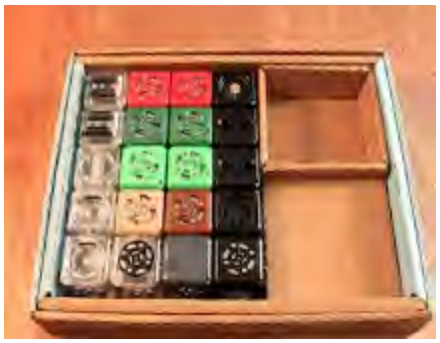
Think about robots for a minute:

Robots are devices that can sense, think, and act. Robots are different than other machines - blenders and toasters and vacuums rely on our ability to sense and react in order to operate them to produce food, clean the way we like, and turn on and off. Robots are different because they can sense and turn that information into action without human interference. This is why robots often do jobs for humans.

Get familiar with Cubelets:

Black Cubelets have senses, like our eyes and ears. Clear Cubelets are the action parts of the robots that do things. And colored Cubelets are the thinking or logic parts of the robot.





Part I: Smaller robots

These robots can be made with one sense and one action, or can be made more complex by using more Cubelets. Several of these robots will use Sense or Think functions found in the KT01 kit.

Challenge	Hints and Suggestions
1. Make driving robots that represent different creature behaviors. Some of these might even make you think of different emotions.	• Make a robot that is "afraid" and drives away • Make a robot that is "aggressive" and drives faster as it gets close to something • Make a robot that is "confused" and drives in circles • Make a robot that lets you "use the force" to control it with your hand • Make a Robot that moves sideways like a crab • What other robot creatures and emotions can you make?
2. Make a robot that acts as a motion-activated alarm light.	Motion activated lights turn off when no one is near to conserve energy and turning on to reveal when someone is trying to sneak by!
3. Imagine that your power has gone out, but your Cubelets have plenty of batteries. How could you build a robot that alerted you when the refrigerator was starting to get warm inside?	What sense will work best for this? What Action will produce the most noticeable alarm?
4. Make a conveyor belt robot that can move something across it.	• Make a conveyor belt controlled by a person. • Now make one that will work constantly when the lights are on. • How could we change this conveyor belt to know when an object was on it and then move?
5. Make a flashlight that "knows" to come on in the dark.	What sense will you need for this robot? Can you choose just a sense to check the robot's environment or do you also need a Think Cubelet - which one?

Part II: Bigger, smarter robots

These robots may use multiple senses, multiple actions, or even more than one Think Cubelet!
Several of these robots will use Sense or Think functions found in the KT01 kit.

Challenge	Hint
6. Make a robot that will "go forever" by using a*t least two* senses and two actions	Can you use one action to trigger another sense?
7. Construct an "environment" or arrange other objects around a robot so that it will "go forever" or "never quit"	What sense is easiest to use to do this? What objects or kinds of environments would give constant input to that sense?
8. Can you make a robot lighthouse that knows to come on in the dark?	• What action(s) will you need to include? • What sense will work best? • What Think block will best help this robot "know" to come on in the dark? • Is there a way to make this like a "real" lighthouse casting light around its lighthouse tower in a circle? What Cubelet do we need for that? • What additions can you make to your lighthouse to improve its function and design?
9. Using the Blocker Cubelet can you make a steering robot with sides that drive and sense independently?"	• What senses will work best? Why? • What Action Cubelets will you need? • Try having the sense Cubelets facing **UP.** Now try having the sensors facing **OUT.** Does this make a difference?
10. Make a robot that slows down and stops as it approaches objects or walls	• What will the robot need to sense? Does the robot need more than one sense? • Are more Think Cubelets needed? • What direction should the senses face? • Will the robot benefit from more actions than just the drive Cubelets? • What other considerations are important when building this robot

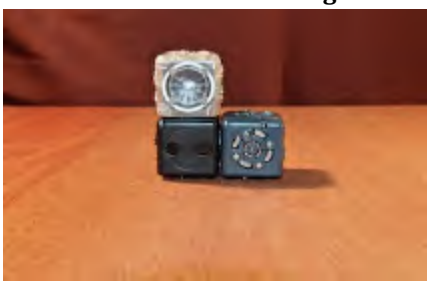
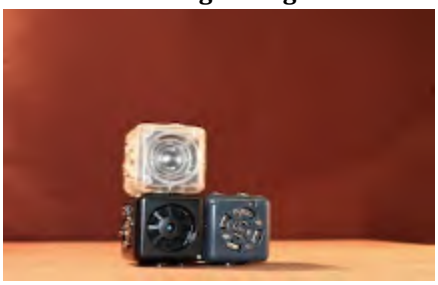
Some possible robot solutions - *No Peeking!*

Now that you've built some of these robots, you may be interested in some solutions we've come up with. For each challenge there is more than one way to make the Cubelets robot we picture, and there may be multiple robots we don't picture that satisfy the criteria using Cubelets we don't picture. This is not an exhaustive solution list, just something to look at if you get stumped. So, no peeking before you try *your h*and at building cool robots!

1. **Some driving robots that represent different creature behaviors.**



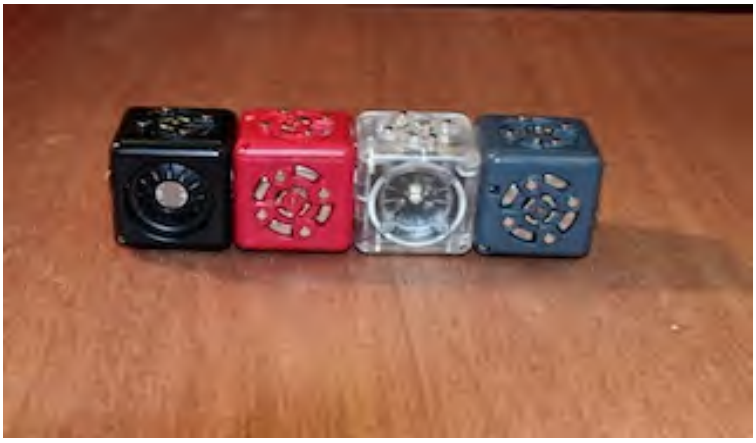

2. **Motion Activated Alarm Light** **3. Power-outage Fridge Alarm**

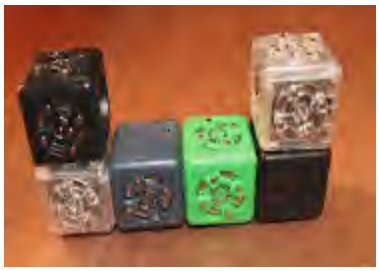
4. **Conveyor Belt Robots**



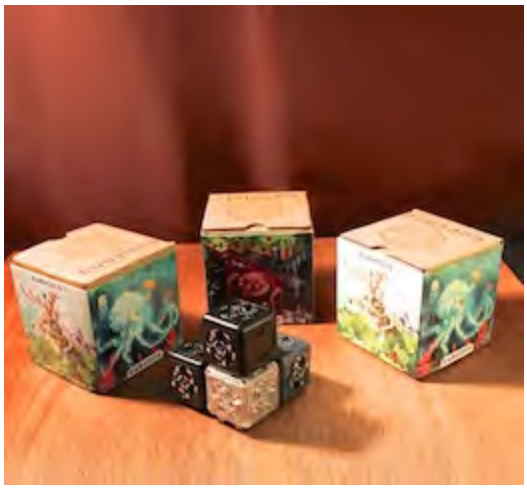
5. Smart Flashlight



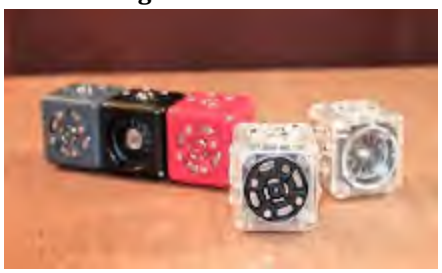
6. Make a robot that will "go forever" by using a*t least two* senses and two actions

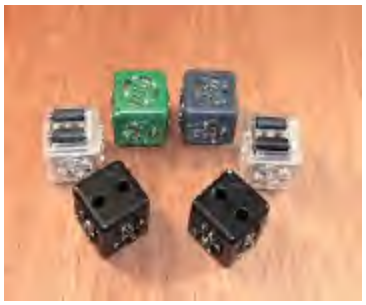
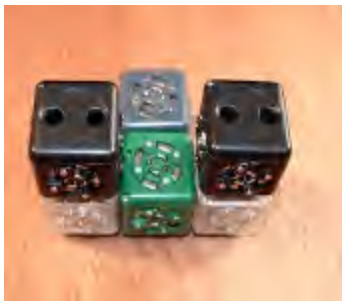
7. Arrange other objects around a robot so that it will "go forever" or "never quit"



8. A robot lighthouse that knows to come on in the dark




9. Steering robot


10. A Steering robot that knows to slow down before it hits something