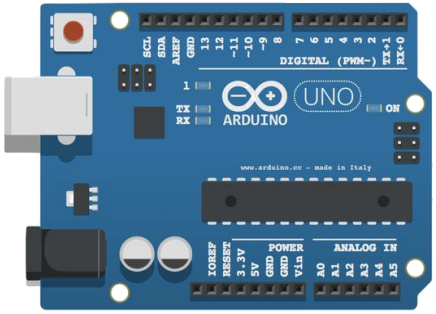
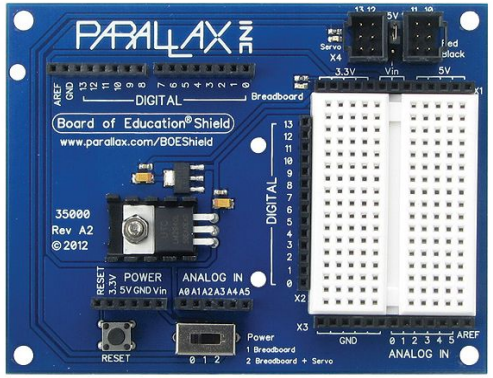
ELECTRONIC COMPONENTS

BoEbot Anatomy

Name and Picture	How It Works	Notes
Arduino 	An Arduino is a **microcontroller** that allows you to connect and control electrical circuits to your robot. The pins of the Arduino are where you connect the different electrical components. Digital pins can either act as output pins (give 5V to the circuit) or as input pins (report if they get power or not).	
Board of Education Shield 	The Parallax Board of Education shield adds additional capability to an Arduino. For example, the shield includes a breadboard on which you can create circuits to interact with the Arduino. The shield also adds pins for controlling motors (the wheels).	

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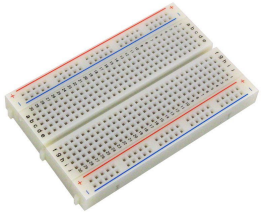
Electronics Essentials

Name and Picture	Circuit Symbol	How It Works	Notes
Breadboard 	N/A	A breadboard is a tool used to prototype electronics by allowing you to build circuits without soldering. They are powerful because, while they appear simple, they allow people to build fairly complex circuits. Each horizontal row of 5 pins are known as **terminal strips**. Those pins are all connected.	When building circuits, plug in the two ends of a component across these rows, not in the same row.
Jumper Wires 		A jumper wire is an electrical wire that is used to interconnect parts of a breadboard in order to test a circuit. Jumper wires are used by fitting their end connectors into the slots of a breadboard.	
Resistor 		A resistor is an electrical component that limits the current flowing through the wire. If you do not have a resistor, the electricity will travel so fast that the wile will heat up and potentially light something on fire!	Imagine water flowing through pipes. A resistor would be a pipe that is skinnier than the rest of the pipes, because it slows the flow of electricity.

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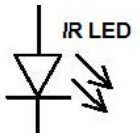
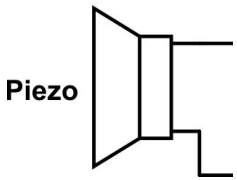
Outputs

Name and Picture	Circuit Symbol	How It Works	Notes
LED 		LEDs emit light at a certain intensity. Some LEDs can also emit light of a certain hue. Electricity can only flow through an LED in one direction, so LEDs need to be plugged in in a particular direction to work. The longer leg of the LED should go toward the high-voltage side of your circuit.	To light an LED without shorting a circuit, you must always put a resistor in series with the LED.
Infrared LED 		Infrared LEDs work like regular LEDs, except they emit infrared radiation instead of visual light. They are commonly used for communication over optical fibers and remote control devices.	
Servo 	N/A	A servo motor rotates and can be used to move a component of a robot. A servo motor works by taking input on how its position should change, in order to control its motion. This means that, to control the motor, you must tell it how many degrees and in which direction it must rotate.	
Piezo 		A piezo element makes buzzing noises at varying frequencies. To use the piezo element, you must designate the frequency and duration of the tone you want it to play.	Piezos make sound by converting between electrical output and mechanical vibration.

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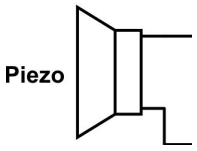
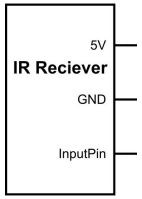
Inputs

Name and Picture	Circuit Symbol	How It Works	Notes
Piezo 		A piezo element can also be used as an input. If you touch the top of the piezo, your finger adds some resistance to your circuit. If you set up your program to read the piezo as an input, you can use this value in your code.	
Whisker Sensor *Part 1: Whisker*  *Part 2: 3-pin header* 		The whisker wire is a piece of metal that has been bent in a useful way for reaching out in a direction. It is used to detect obstacles. The 3-pin headers are used to connect the whiskers to the rest of a circuit.	For more details, check out How Whisker Switches Work (pg 151).
Phototransistor 		A phototransistor is a sensor that can be used to determine the amount of light that hits it. Transistors are gates that allow electricity through different areas, depending on a switch. In a phototransistor, that switch is an amount of light.	
Infrared Receiver 		An infrared detector is a sensor that can be used to determine the amount of infrared light that hits it. Infrared sensors emit light and detect how much they get back.	
Push Button 		Push buttons are generally used as on/off switches. A push button breaks a circuit when it is not pushed, and completes it when it is.	