

Using LEGO WeDo kits with Scratch

Before you begin:

1. Download and install Scratch from <http://scratch.mit.edu>
2. Connect WeDo's USB hub to your computer's USB port.



3. Connect the WeDo motor to the USB hub.

Scratch Vocabulary

- **Script:** A series of icons strung together to perform a task.
- **Sprite:** An on-screen character or item that you can manipulate through a script. You can have multiple sprites within a program and they can interact with one another.
- **Costume:** A sprite can have different visual representations, or "costumes." During a program, you can make a sprite switch to a different "costume" to change its appearance.

menu

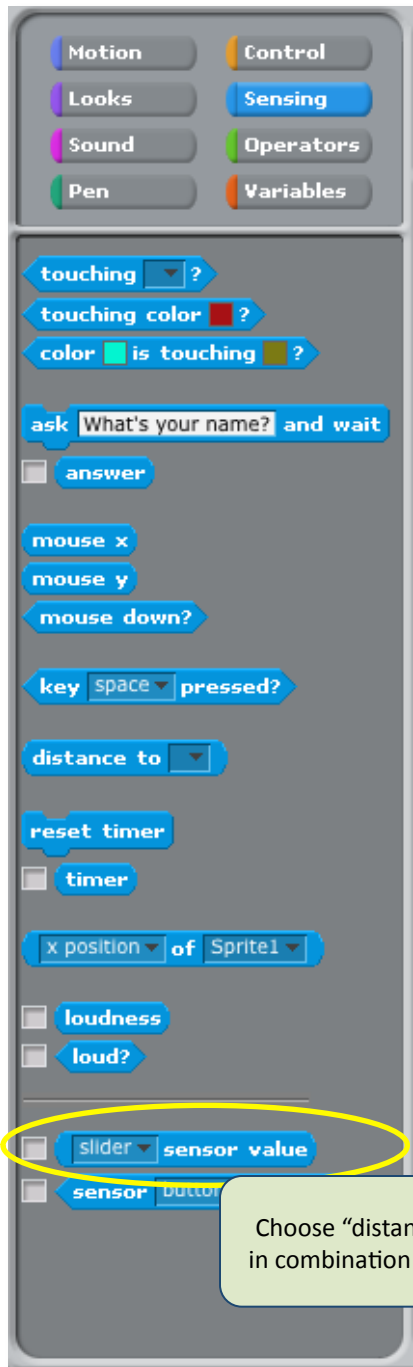
icons for each menu

Use this space to display variables and "sprites"

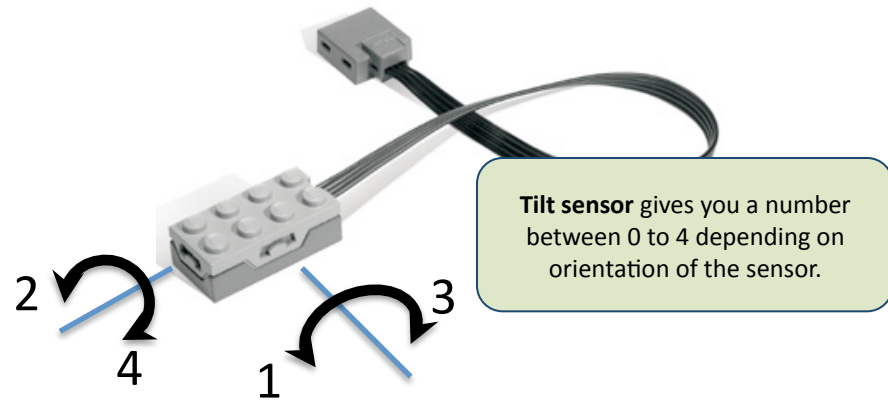
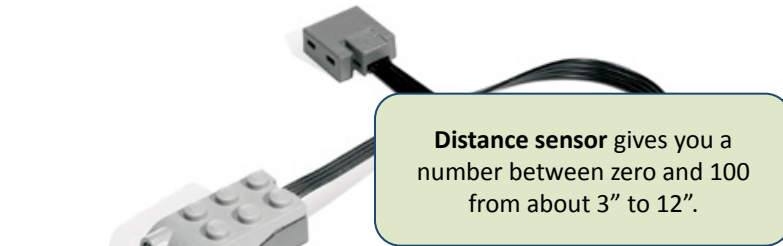
Click and drag icons from left and drop it here to make a program.

Click on script to run the program. This will turn on the motor for 1 second. You may also click on commands directly on the left pane.

WeDo Sensors



Choose "distance" or "tilt". Use in combination with other icons.



Some possible use for sensors:

Using sensor as a switch:

- Start motor when distance is greater than 10.
- Start motor when tilt is 1.
- Stop when distance is 0 (to prevent running into something)

Using sensor as a variable:

- Set motor speed to the value of distance sensor.
- Motor moves forward if tilt is 1; reverse if tilt is 3.

Using WeDo along with Scratch screen

- Control the Sprite's movement using distance or tilt sensor
- Count up or down when tilt sensor is triggered (i.e, attach tilt sensor to a door, count how many times the door has been opened)

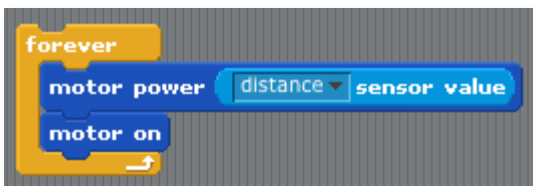
Wait

Wait block pauses the script for a specified amount of time. This script turns on the motor, waits 3 sec, and stops.



Forever

The “Forever” block repeats a script indefinitely. The example below continuously runs the motor with power setting corresponding to the distance sensor value.



Note: The “motor power” block just sets the motor power; it does not turn the motor on.

Repeat (#)

Repeat block will repeat a script for a specified number of times. This code turns on the motor for 1 sec, then stops for 1 sec, and repeats the process 10 times (total of 20 seconds).

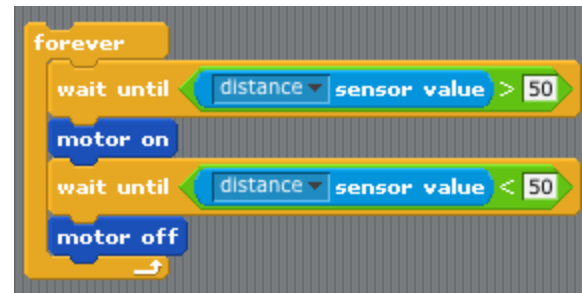


Wait until...

Turn on the motor when distance sensor reads greater than 30.

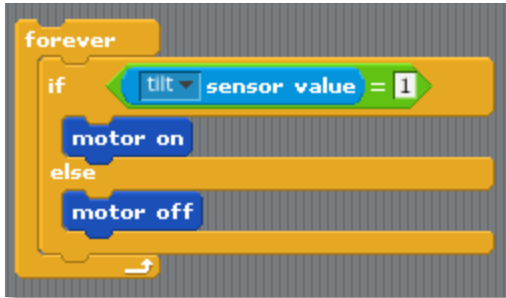


Add a forever block for a more useful code. Turn on the motor when distance sensor reads greater than 50, off when sensor reads less than 50, and repeat.

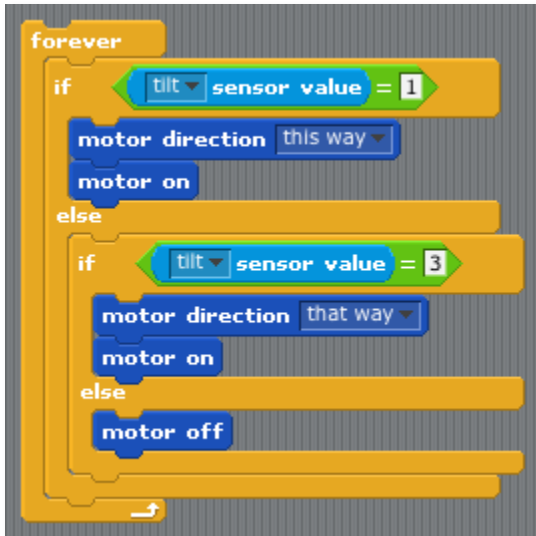


If... else...

If the tilt sensor is “1” turn the motor on. If it is in any other position, turn the motor off.



You can nest multiple if-else blocks to create more complex scripts. If tilt sensor is 1 turn motor on in one direction; if 3 turn the motor on in opposite direction; if all other values then stop.



“Sprites”

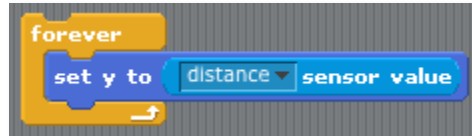


On-screen characters and items in Scratch are called “sprites”. The default Sprite is a cat but it can be changed to a different picture. You can also create one yourself.

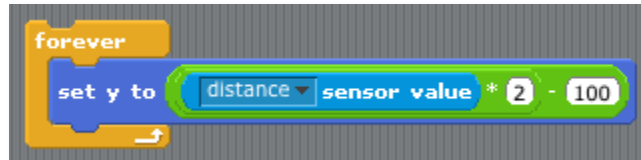
Sprites can be manipulated using the various scripts:

- Change “costume” of physical appearance
- Change positions, orientation, or size
- Interact with other Sprites (i.e., if Sprite A touches Sprite B, do this) ... and much more.

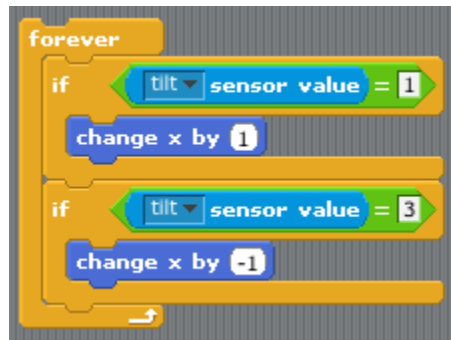
This script continuously sets the y-position of the Sprite to the distance sensor value.



This script is a variation of the script above. By numerically manipulating the distance sensor value, it increases the range of motion of the Sprite to cover the entire screen.

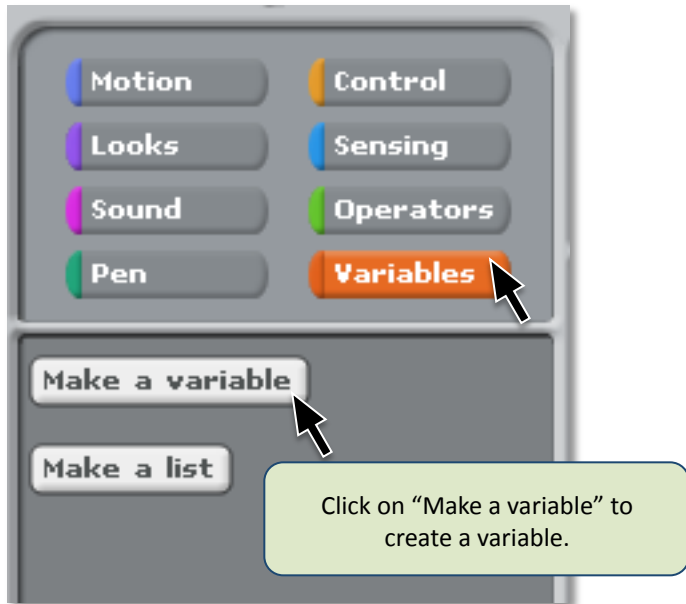


This script moves the Sprite forward when tilt sensor is tilt forward, and backwards when the sensor is tilted backward.

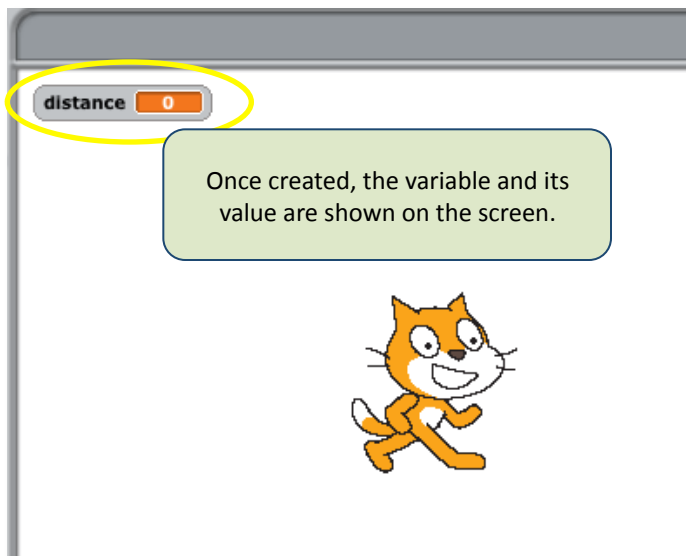


Using Variables


Variables lets you see and/or manipulate numbers in your program. You can make multiple variables in a program.



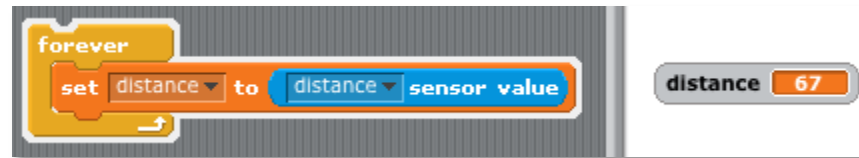
Click on "Make a variable" to create a variable.



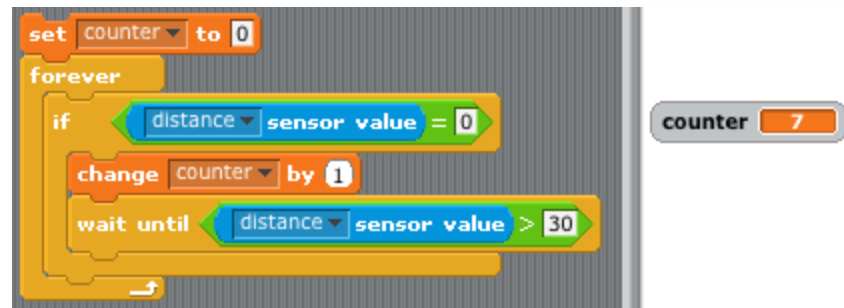
Once created, the variable and its value are shown on the screen.



This program continuously displays the value of the distance sensor on the right side screen.



This program adds 1 to the variable "counter" every time the distance reads "0." This allows us to use the distance like a counter button. "Wait until distance sensor value > 30" is added to ensure that each touch is only counted once.

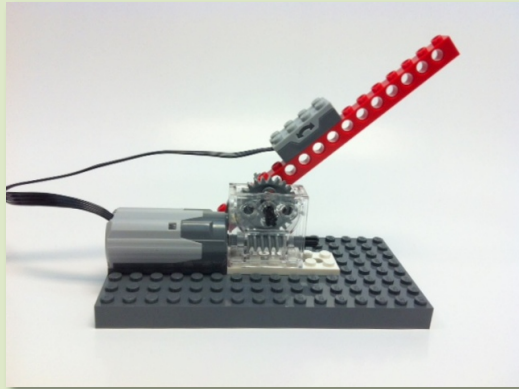


WeDo/Scratch Challenges

Build a motorized “crane” or lift-arm using the WeDo kit. The crane must be motorized and must have a tilt sensor attached to the arm.

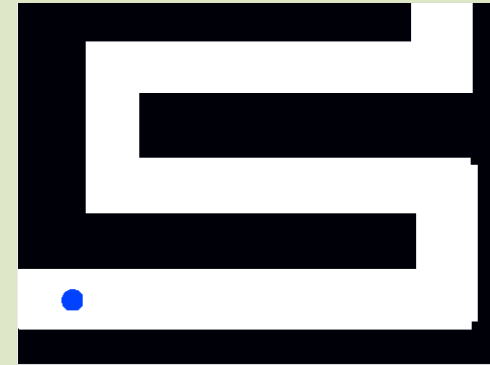
Program with Scratch so that the motor turns on and stops after the the crane is “up” (according to the tilt sensor value).

Bonus: Reverse the motor and lower the crane until the arm is down again.



Build a game controller with a tilt sensor so that you can control an on-screen Sprite to go right, left, up and down as you tilt the controller.

In Scratch, create a maze using a ball (Sprite 1) and walls (Sprite 2). Use the controller to travel through the maze.



Build a rocker switch with a tilt sensor. The switch should return to “zero” position automatically.

Program with Scratch to count how many times the switch has been pressed on each side. This device can be used as a “voting machine” for two-choice questions.

