

Activities for LEGO WeDo in Scratch 1.4+

Barb Ericson

ericson@cc.gatech.edu

Overview

You can use Scratch 1.4 with the LEGO WeDo tilt and distance sensors and motor. The motor blocks (tiles) are in the Motion category. The motor has power levels from 0 to 100. You can change the motor direction. The sensor blocks are in the Sensing category. The distance sensor returns a value from 0 (close) to 100 (far). The tilt sensor returns 0-4 with 0 meaning level, 1 meaning tilted down, 2 meaning tilted right, 3 meaning tilted up, and 4 meaning tilted to the left.

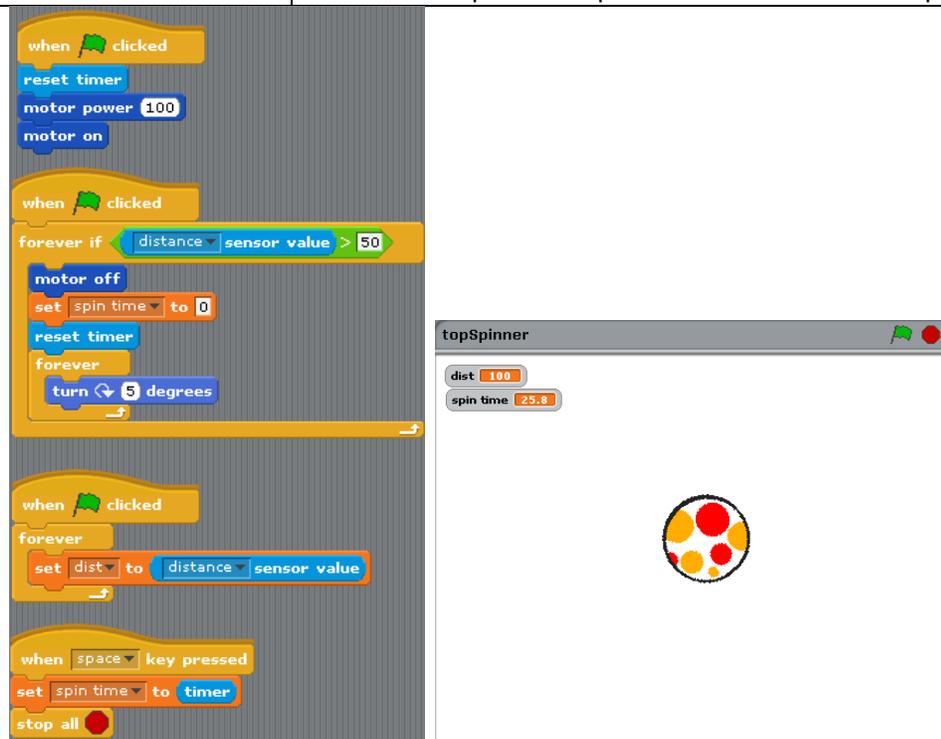
Top Spinner

Build time: 30 minutes to 45 minutes

Uses: motor and motion sensor



When the green flag is clicked turn on the motor. Also, when the green flag (you can use a second green flag) is clicked loop forever and if (use a forever-if) the motion sensor value is greater than 50 turn off the motor since the top spinning device has been lifted off the top. You can also use a variable to show the distance sensor value and set the value of the variable to the distance sensor value in a forever loop. You can also time how long the top spins. Just reset a timer when you turn the motor off and then when a space key is pressed set a variable (spin time) to the timer to show how long the top spun. You can also spin a ball sprite in Scratch while the top is spinning.



The image shows the Scratch code editor and stage for a project named "topSpinner".

Code Editor:

- When green flag clicked:
 - reset timer
 - motor power 100
 - motor on
- When green flag clicked:
 - forever if (distance sensor value > 50):
 - motor off
 - set spin time to 0
 - reset timer
 - forever loop:
 - turn 5 degrees
- When green flag clicked:
 - forever loop:
 - set dist to distance sensor value
- When space key pressed:
 - set spin time to timer
 - stop all

Stage:

- Stage name: topSpinner
- Variables:
 - dist: 100
 - spin time: 25.8
- Sprite: A ball sprite with red and yellow segments.

Ball Kicker

Build time: 10-20 minutes

Uses: motor and distance sensor

 A LEGO NXT robot built as a ball kicker. It features a red frame with a motor at the top and a distance sensor at the bottom. A yellow ball is positioned on a red track leading to the motor.	<p>When the green flag is clicked set the motor direction to "that way" and turn the motor on for .2 seconds and then wait 0.5 seconds and set the motor direction to "this way" and turn on the motor for 0.2 seconds. Try different motor power values to see what effect this has on the distance the ball is kicked. Add a distance sensor to automatically kick the ball when it is in range (distance < 2). Use the balls from the LEGO NXT kit.</p>
--	---

```
when green flag clicked
  forever if distance sensor value < 2
    motor direction that way
    motor on for 0.2 secs
    wait 0.5 secs
    motor direction this way
    motor on for 0.2 secs
```

Goal Keeper

Build time: 45 minutes to 1 hour

Uses: motor

 A LEGO NXT robot built as a goal keeper. It features a red frame with a motor at the top and a yellow ball on a red track. The robot has a yellow body and red arms.	<p>When the green flag is clicked start a forever loop. Turn on the motor one way, turn the motor on, and wait a random amount of time and then turn it the other way. Again, wait a random amount of time. Add when the space key is pressed to stop all scripts. Use this with the Ball Kicker to try and score goals and try to block goals.</p>
--	---

```
when green flag clicked
  forever
    motor direction this way
    motor on
    wait pick random 1 to 3 secs
    motor direction reverse
    wait pick random 1 to 3 secs

when space key pressed
  stop all
```

Cheering Fans

Build time: 45 minutes to 1 hour

Uses: motor and distance sensor

	<p>When the green flag is clicked turn on the motor. When the space key is pressed turn off the motor and stop all scripts. You can also have the kids record a cheering sound and then play it until done in a loop with a wait after the play sound for 1-2 seconds. You can also use the distance sensor to turn it on or off.</p>
---	---

```
when green flag clicked
  motor on

when space key pressed
  motor off
  stop all
```

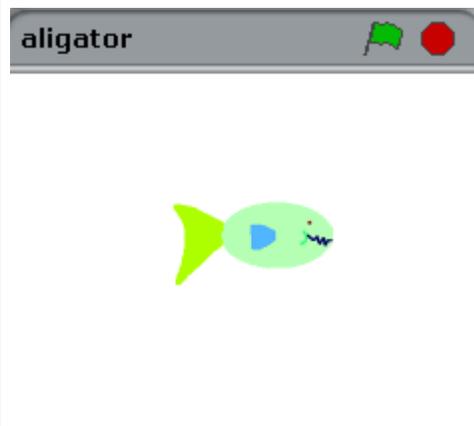
Alligator Chomp

Build time: 45 minutes to 1 hour

Uses: motor and motion sensor

	<p>Program the alligator to close the jaws (turn motor direction one way and turn on motor for 0.5 seconds) and make a crunch sound and then open the jaws again (change the motor direction and turn it on for 0.7 seconds). You can trigger this behavior with the distance sensor (< 30) or when the green flag is clicked. You can use fish1-a and fish1-b in Scratch to also show the jaws of the fish in Scratch closing and opening.</p>
---	--

```
when green flag clicked
  switch to costume fish1-a
  forever if distance sensor value < 30
    switch to costume fish1-b
    motor direction that way
    motor on for 0.5 secs
    play sound crunch until done
    motor direction this way
    motor on for 0.7 secs
    switch to costume fish1-b
```



Bird Flap

Build time: 40 minutes to 1 hour

Uses: tilt sensor and distance sensor



When the green flag is clicked loop forever and check if the tilt sensor is level (0). If it is then play a flap sound. Then wait for 0.3 seconds. You can also program the bat sprite to flap as well. You can show the tilt sensor value using a variable. You could use this to control a game where you have to keep the bird flapping to move forward or move up to avoid obstacles. You can add the distance sensor and detect when the head is down low and play a different sound then.

The image shows the Scratch code for the 'Bird Flap' project. The code is as follows:

```
when green flag clicked
  switch to costume bat1-b
  forever if tilt sensor value = 0
    play sound flap until done
    next costume
    wait 0.3 secs
```

The stage shows a bat sprite with a 'distance' variable set to 3 and a 'sit' variable set to 1. The title of the stage is 'BirdFlap'.

Lion Roar

Build time: 30 minutes

Uses: motor and distance sensor



When the green flag is clicked set the power level on the motor to 60 and make the motor go for .5 seconds to get the lion to sit up and roar (record a roar and play it). Then when a key is pressed make the lion lie down (power level 40 and .5 seconds) and sleep (record a sound). You could add the distance sensor and activate the roar when something is too close. Put it on the shoulder (under the head).

The image shows the Scratch code for the 'Lion Roar' project. The code is as follows:

```
when green flag clicked
  forever if distance sensor value < 50
    motor direction this way
    motor power 60
    motor on for 0.5 secs

  when space key pressed
    motor power 40
    motor direction reverse
    motor on for 0.5 secs
```

Monkey Drummer

Build time: 30 minutes to 45 minutes

Uses: motor



When the green flag is clicked turn the motor on. Give the monkey something to bang to make a noise. Change the cams to change the beat. Use Scratch to allow you to also make music by pressing keys for notes. Or by controlling the length and type of music being played. You can change the cams to change the beat of the drumming and also change the motor power level. You can add some Scratch sprites that dance to the music.

```
when green flag clicked
  set instrument to 1
  motor power 50
  motor on

when s key pressed
  play note 62 for 0.5 beats

when a key pressed
  play note 60 for 0.5 beats

when d key pressed
  play note 64 for 0.5 beats
```