

Sensors

Sensors are a crucial component to any machine that calls itself a robot. Sensors provide information about itself and the environment in which it is interacting to the robot's computer. The robot's computer program then decides what to do based on the information and its own high level task instructions. RoboLab kits have 3 types of sensors, touch sensors, light sensors and rotational sensors.

Touch Sensor



Touch sensors act like a switch. When it hits an obstacle, the button on the touch sensor presses in, otherwise it stays pressed out. This sensor is useful for detecting if your robot has hit anything.



Light Sensor



The light sensor measures the amount of light that it sees. This sensor has many uses, from a simple detector to tell if someone has turned on the lights in the room to having your robot be able to distinguish between different colored surfaces.



Rotation Sensor

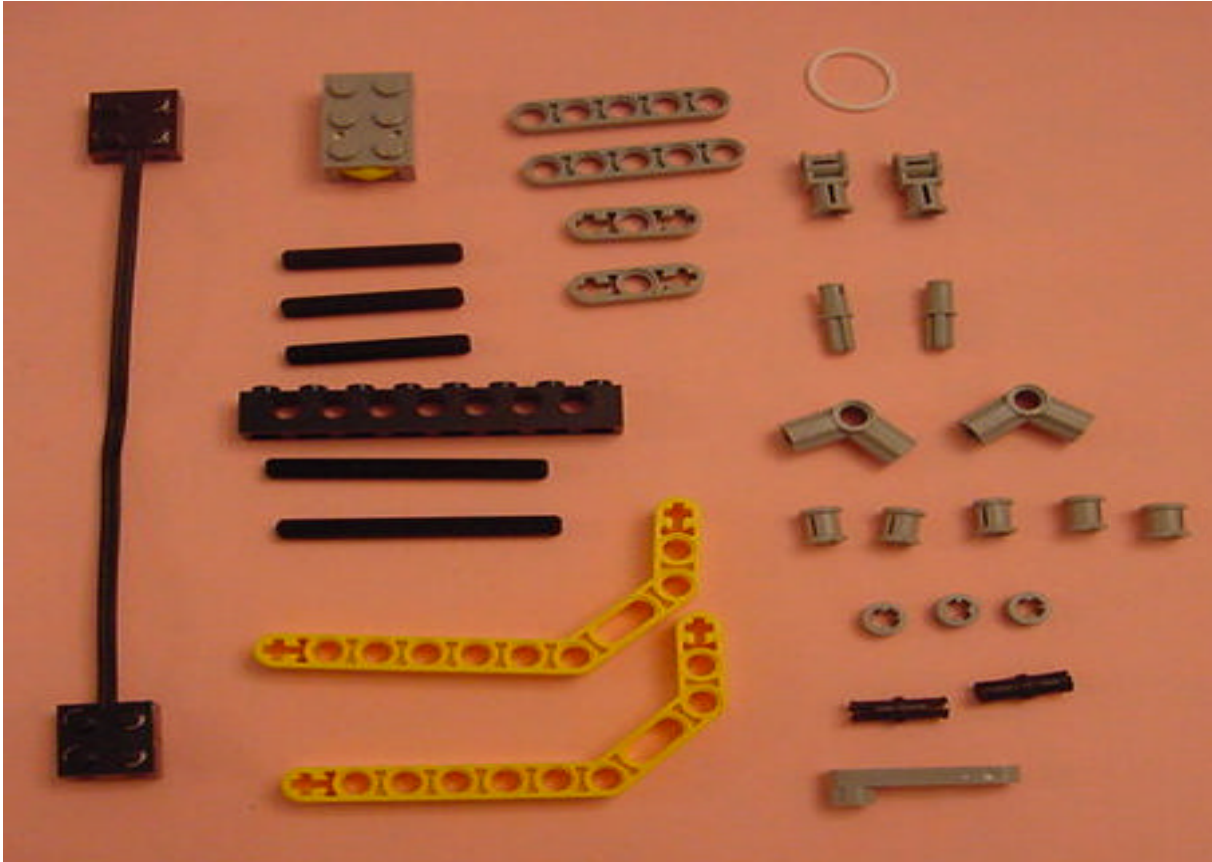


The rotation sensor measures rotation. It counts how many times an axle has turned. This is useful for controlling how far your robot moves.



Touch Sensor Bumper

Building Instructions



Step One



Step Two



Step Three



Step Four



Step Five



Step Six



Step Seven



Step Eight



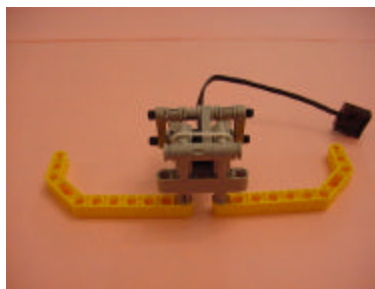
Step Nine



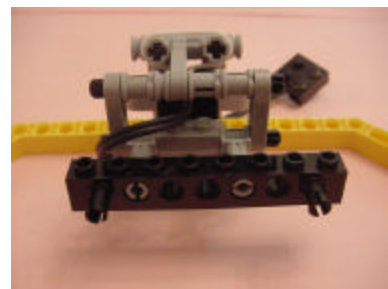
Step Ten



Step Eleven



Step Twelve



Step Thirteen



Step Fourteen



Touch Sensor

The touch sensor is a sensor that detects contact with objects in the robot's environment. The touch sensor reports to the RCX if its button is pressed in or not pressed in. Normally it is out.

A touch sensor acts like a light switch. When the button is pressed, this closes the circuit and lets electricity flow through the sensor. The RCX detects this electrical flow and knows that the button has been pressed. When the button is out, the circuit is broken and no electricity flows.

Programming the Touch Sensor

Touch sensors are programmed to detect when their buttons have been pressed or released. You need to specify which sensor port a touch sensor is connected to. The sensor port icons are in the Modifiers sub palette.

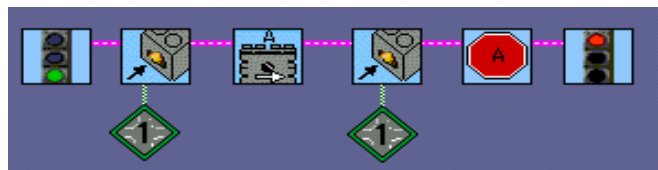
The touch sensor with an arrow pointing toward it's button means wait until the touch sensor is pressed.



The touch sensor with an arrow pointing away from it's button means wait until the button is released.



Touch sensors can be used to control the motors. This program waits forever until the touch sensor on port 1 has been pushed in. When this happens, motor A is commanded to turn on. Motor A continues to run until the touch sensor has been released, and motor A is commanded to stop.

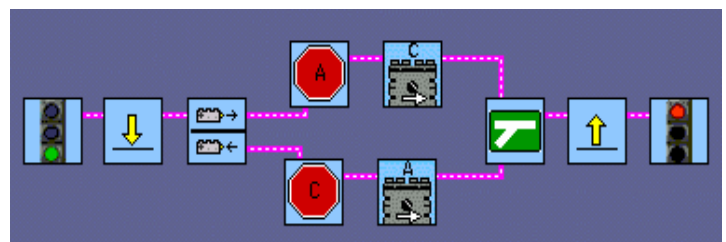


Touch Sensor Fork

With the touch sensor we introduce a new programming concept, the fork. These are also known as conditionals. A fork is a decision in the program. It specifies what the program should do depending on the value of a particular sensor.

The touch sensor has two values; button in or button out. The touch sensor fork icon can be used to have the program do different things depending on if the touch sensor is pushed in or released.

In this program, if the touch sensor is pushed in then motor A turns on and motor C is commanded to stop. If the touch sensor is released, then motor C is turned on and motor A is stopped. All fork statements need a fork merge at the end of the decision.



Name _____ Hour _____

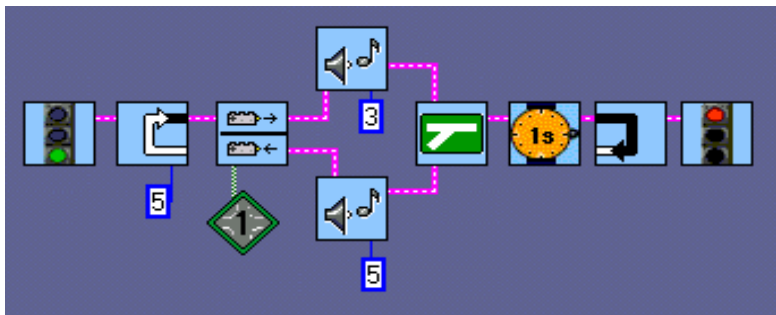
Touch Sensor Worksheet

1. Write a program that does the following
 - A. When the program is started, play a buzz sound if the touch sensor is pressed.
 - B. If the touch sensor is not pressed play a descending sweep sound.
 - C. Wait for 1 second and repeat the process 5 times.

2. Write a program that does the following when the robot encounters a wall:
 - A. The robot drives forward until it senses that it has run into a wall.
 - B. When it runs into a wall, the robot should stop and play a sound.
 - C. The robot should then back up for 1 second, and turn either to the left or right (your choice) for 1 more second.
 - D. The robot should then continue to drive forward.
 - E. The robot should do this forever.

Touch Sensor Worksheet Solution

1. Write a program that does the following
 - A. When the program is started, play a buzz sound if the touch sensor is pressed.
 - B. If the touch sensor is not pressed play a descending sweep sound.
 - C. Wait for 1 second and repeat the process 5 times.



1. Write a program that does the following when the robot encounters a wall:
 - A. The robot drives forward until it senses that it has run into a wall.
 - B. When it runs into a wall, the robot should stop and play a sound.
 - C. The robot should then back up for 1 second, and turn either to the left or right (your choice) for 1 more second.
 - D. The robot should then continue to drive forward.
 - E. The robot should do this forever.




Name _____ Hour _____


Touch Sensor Challenge

Programming Specifications:

Write a program with 2 tasks that do the following if the bumper is touched:

 The first task waits for 2 seconds , then checks the touch sensor.

 If the touch sensor is pressed, the RCX should play a fast rising sweep, otherwise it should play a buzz.

 The second task turns on Motor A and C in the forward direction for 4 seconds, then turns them off.


Name _____ Hour _____


Touch Sensor Challenge Solution

Programming Specifications:

Write a program with 2 tasks that do the following if the bumper is touched:

 The first task waits for 2 seconds , then checks the touch sensor.

 If the touch sensor is pressed, the RCX should play a fast rising sweep, otherwise it should play a buzz.

 The second task turns on Motor A and C in the forward direction for 4 seconds, then turns them off.

