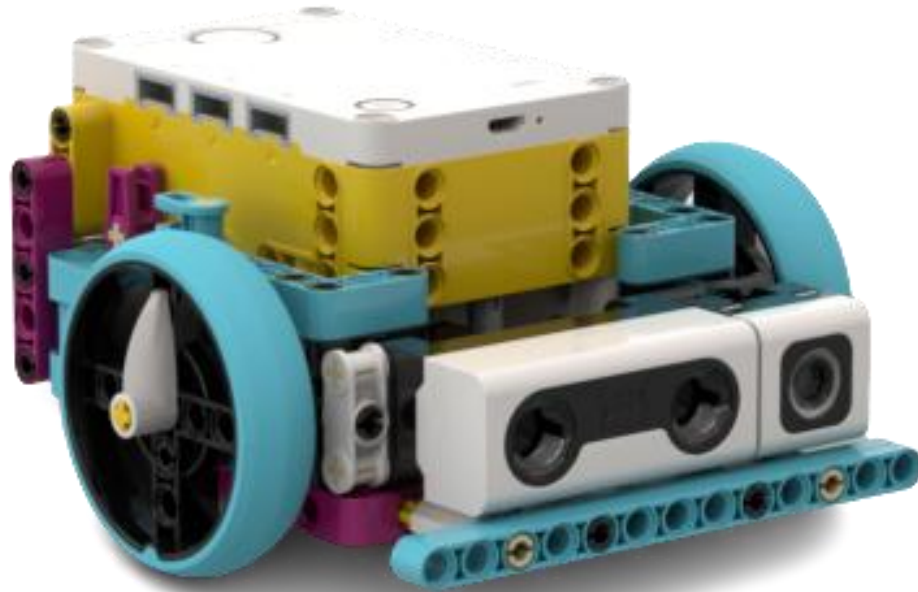


FORCE SENSOR



Force Sensor Unit Activities

Introducing the force sensor. [Force Sensor](#)

Explore how to use the force sensor. [Exploration 1](#)

More force sensor exploration. [Exploration 2](#)

Touch and count exploration. [Exploration 3](#)

Complete a force sensor challenge. [Challenge 1](#)

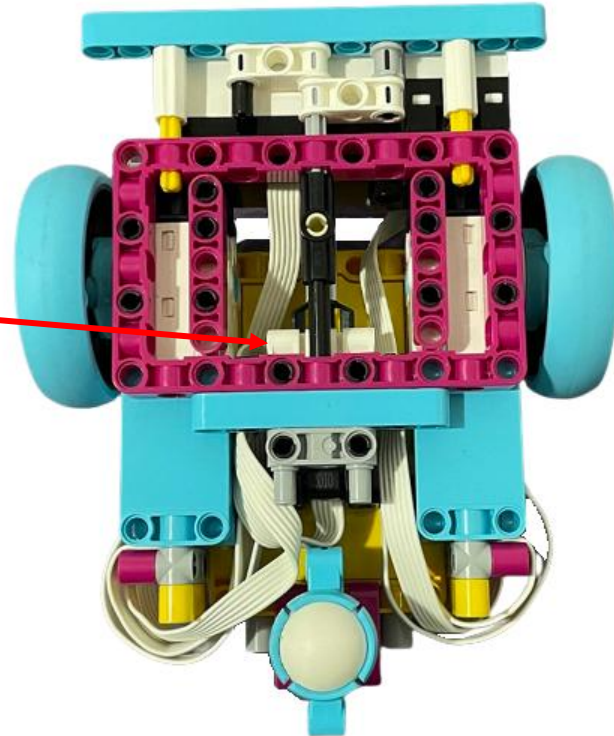


FORCE SENSOR

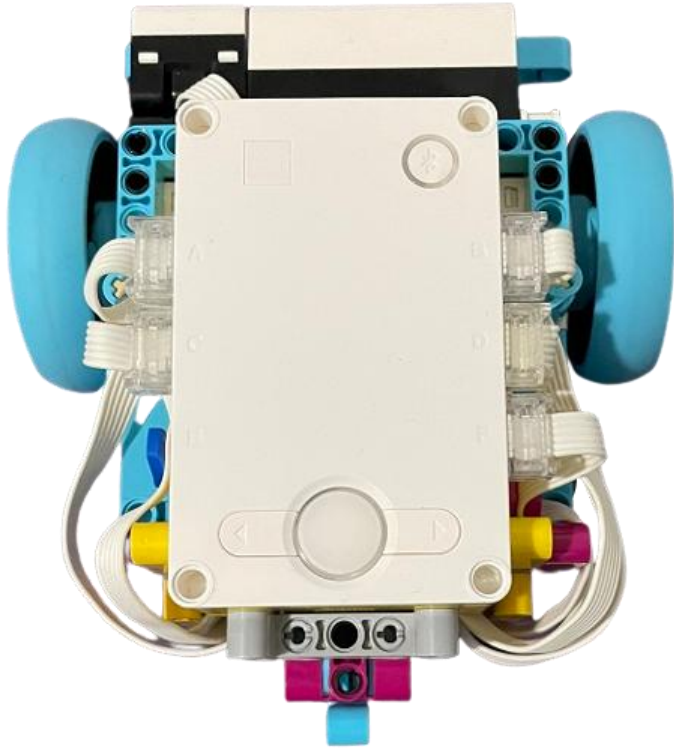
This is the LEGO force sensor.



The force sensor is essentially a push button switch. Pushed it is on, released it is off.



FORCE SENSOR



The Robocar motors are connected to ports A and B and the force sensor is connected to port F.

If for some reason any of these devices are not connected to the proper ports, please let Mr. Desmond know.



FORCE SENSOR

LEGO Education SPIKE - 2.0.6

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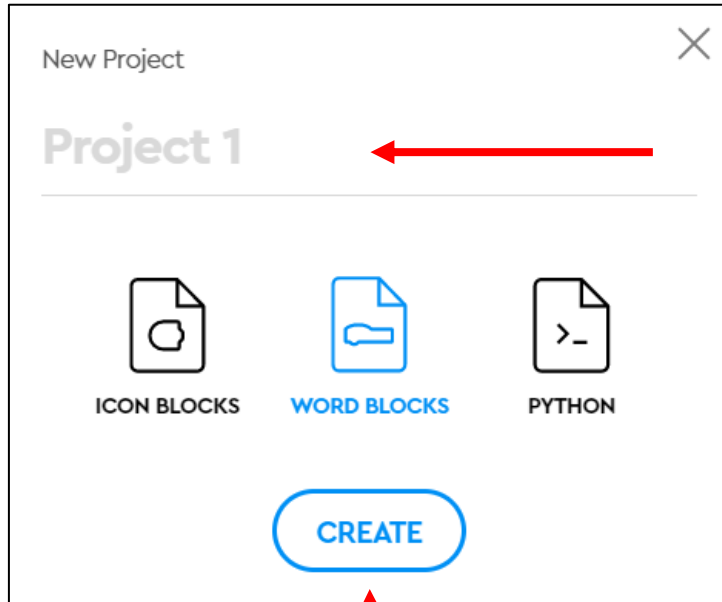
Click the New Project button.

Unit Plans

Building Instructions



FORCE SENSOR



Click WORD BLOCKS and then the CREATE button.

OR



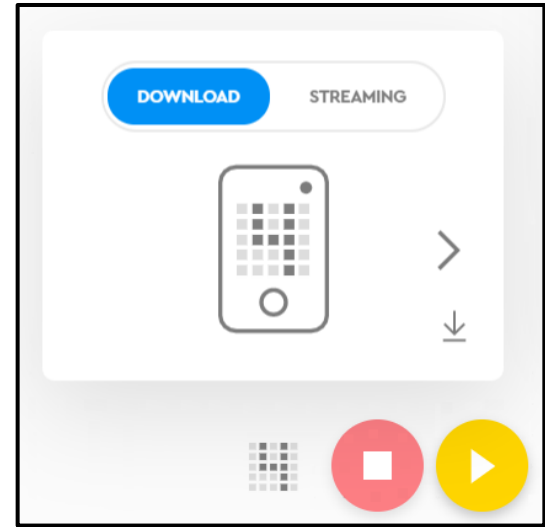
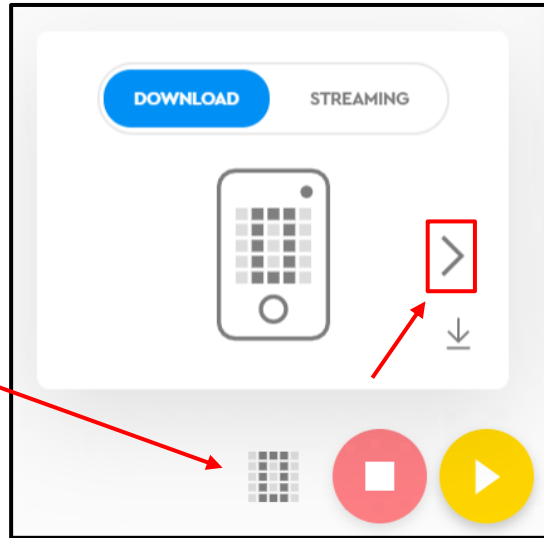
Name your program.
Click the three dots
OR click in the
New Project window.

Name your project:
Force- _____
(your names).



FORCE SENSOR

Click the program memory slot button.



Change the program memory slot to four.



Activity Goals

- 1) To explore how to use the force sensor to allow the robot to independently respond to environmental situations using input information from the sensor to direct robot actions.
- 2) To demonstrate precision of movement of the robot while using the force sensor.
- 3) To understand coding using the wait until conditional statement in combination with the force sensor.

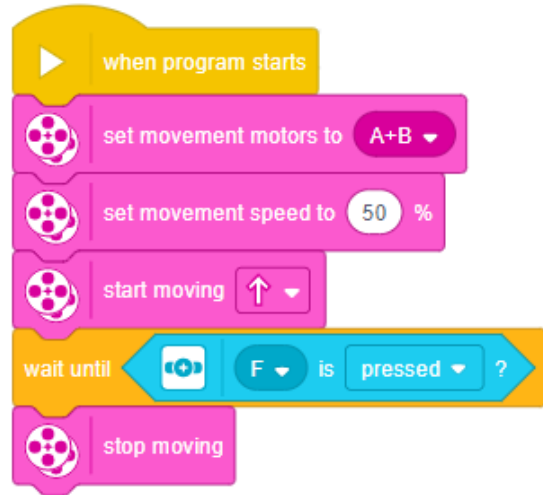


Activity Steps

- 1) Create a code sequence to move the Robocar and test how the force sensor works. [Go There](#)
- 2) Learn about the wait until conditional statement.
[Code Explained](#)
- 3) Explore how to use the force sensor. [Touch and Turn](#)
- 4) Answer questions and explain your ideas. [Explain](#)

FORCE SENSOR – GO THERE

Create a code sequence to have the Robocar move toward a large wooden block and use the force sensor to stop the Robocar when the front bumper is pushed.



Download the program to Spike.

Run the program from Spike.

Observe how the Robocar moves.



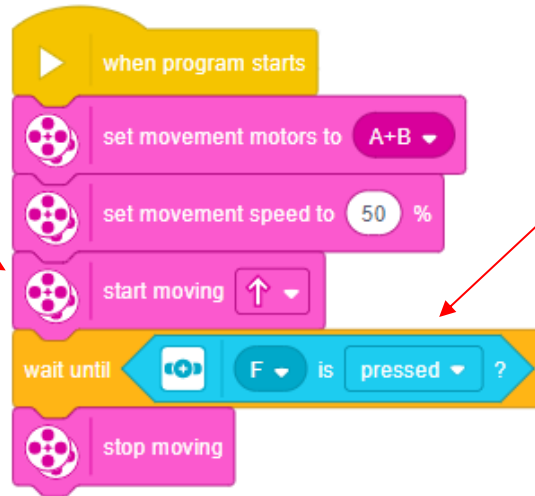
Ask for a wooden block to use as your target object.



FORCE SENSOR – CODE EXPLAINED

The “wait until” command is a conditional statement that basically monitors what the force sensor is doing. The “wait until” code block allows the commands prior to it to perform until the force sensor is pressed. Only then will the coding sequence continue.

This means move – the duration is not defined. The duration is unlimited: it could be any value above zero to infinity.



The “wait until” condition is equivalent to saying “always check to see if the force sensor has been pressed, if true then run the next command”.



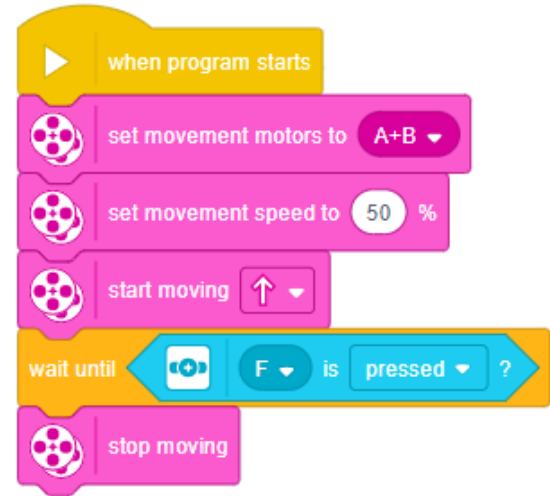
FORCE SENSOR – EXPLORATION 1

“Wait until” is a conditional statement. Without thinking about it you use it all the time.

I want to play my game. I must **wait until** it is loaded. Then I can play.

I want a slice of toast. I must **wait until** it is cooked. Then I can eat it.

In this code sequence the Robocar will move and **wait until** the force sensor is pressed. Only when the force sensor is pressed will the motors will stop moving.

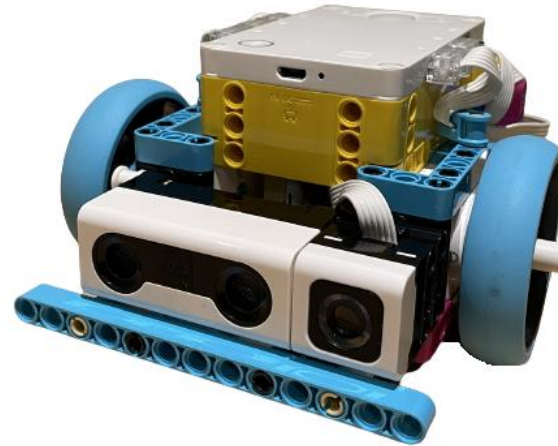


FORCE SENSOR – TOUCH AND TURN

Create a code sequence to have the Robocar move toward a large wooden block. Use the force sensor to stop upon contact with the block (when the front bumper is pushed), move backward, and then complete a 180° turn.

Download the program to Spike.

Run the program from Spike.



FORCE SENSOR – TOUCH AND TURN

Think about it, discuss your ideas as a group, and then write down your answers on a sheet of paper.



- 1) Explain what the conditional statement “wait until” means and what it does.
- 2) What is the purpose of backing up prior to turning?

Show Mr. Desmond your Touch and Turn coding and the Robocar in action.

Be prepared to explain what is happening with the Robocar and the force sensor and why.



Activity Goals

- 1) To explore how to use the force sensor to allow the robot to independently respond to environmental situations using input information from the sensor to direct robot actions.
- 2) To deepen understanding of how to use the wait until condition in combination with the force sensor.



FORCE SENSOR – PING-PONG CHALLENGE

Create a code sequence to have the Robocar go back and forth between two wooden blocks repeatedly using input from the force sensor to determine when each block has been touched and when to begin the turn around sequence.



Have the Robocar touch each block four times.
Keep the wood blocks about 50 cm apart.

Precision of movement is required to keep the Robocar as straight as possible and not veer in different directions after each turn.

Show Mr. Desmond your Ping-Pong code and the Robocar in action. Be prepared to explain what is happening and why.

FORCE SENSOR – PING-PONG COUNT CHALLENGE

Modify your code from the Ping-Pong Challenge.

Create a variable called count.

Have the Robocar count each time the force sensor is pressed.

Include the count as part of the conditional coding as the Robocar “ping-pongs” back and forth between the two wooden blocks.

Have the Robocar continue to move between the two wooden blocks until the count has reached nine.

Show Mr. Desmond your Ping-Pong Count code and the Robocar in action. Be prepared to explain what is happening and why.



FORCE SENSOR – THE FOUR WALL CHALLENGE

Create the code that will allow the Robocar to navigate around a walled area using the force sensor bumper to determine when to stop moving and turn.



The Robocar bumper must contact all four walls.



You are expected to demonstrate your success to Mr. Desmond. You will be asked to show both the Robocar in action and your code.

Create a walled area using blocks or other solid objects.