

# EV3 LESSONS



Ultrasonic Sensor

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BEGINNER PROGRAMMING LESSON

# LESSON OBJECTIVES

- 1. Learn about the Ultrasonic Sensor**
- 2. Learn how to use Wait Until Ultrasonic Block**
- 3. Learn the difference between the Wait Until Ultrasonic Block and the Ultrasonic Block**

# WHAT IS A SENSOR?

- A sensor lets an EV3 program measure and collect data about its surroundings
- The EV3 sensors include:
  - Color – measures color and darkness
  - Gyro – measures rotation of robot
  - Ultrasonic – measures distance to nearby surfaces
  - Touch – measures contact with surface
  - Infrared – measures IR remote's signals



Image from: [http://www.ucalgary.ca/IOSTEM/files/IOSTEM/media\\_crop/44/public/sensors.jpg](http://www.ucalgary.ca/IOSTEM/files/IOSTEM/media_crop/44/public/sensors.jpg)

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# ULTRASONIC

- An ultrasonic sensor measures distance.
- You use it when you need to make sure you are a certain distance away from a target.
- The distance can be measured in inches or centimeters.
- To read the ultrasonic sensor, you use the Ultrasonic Block. To use the ultrasonic to do an action until a distance, you use “Wait Until”



Wait for Ultrasonic Value

Compare Ultrasonic Value

Read Ultrasonic Value

The first input on all the blocks is the port number. Change this to the port (1 to 4) that the ultrasonic sensor is connected to. The default port is usually 4.

# ULTRASONIC CHALLENGE 1

**Challenge:** Make the robot move until it is 20cm away from the wall.

## Pseudocode:

**Step 1: Make a new project**

**Step 2: Drag in a Start Moving Block**



**Step 3: Drag in an Ultrasonic Wait Block**



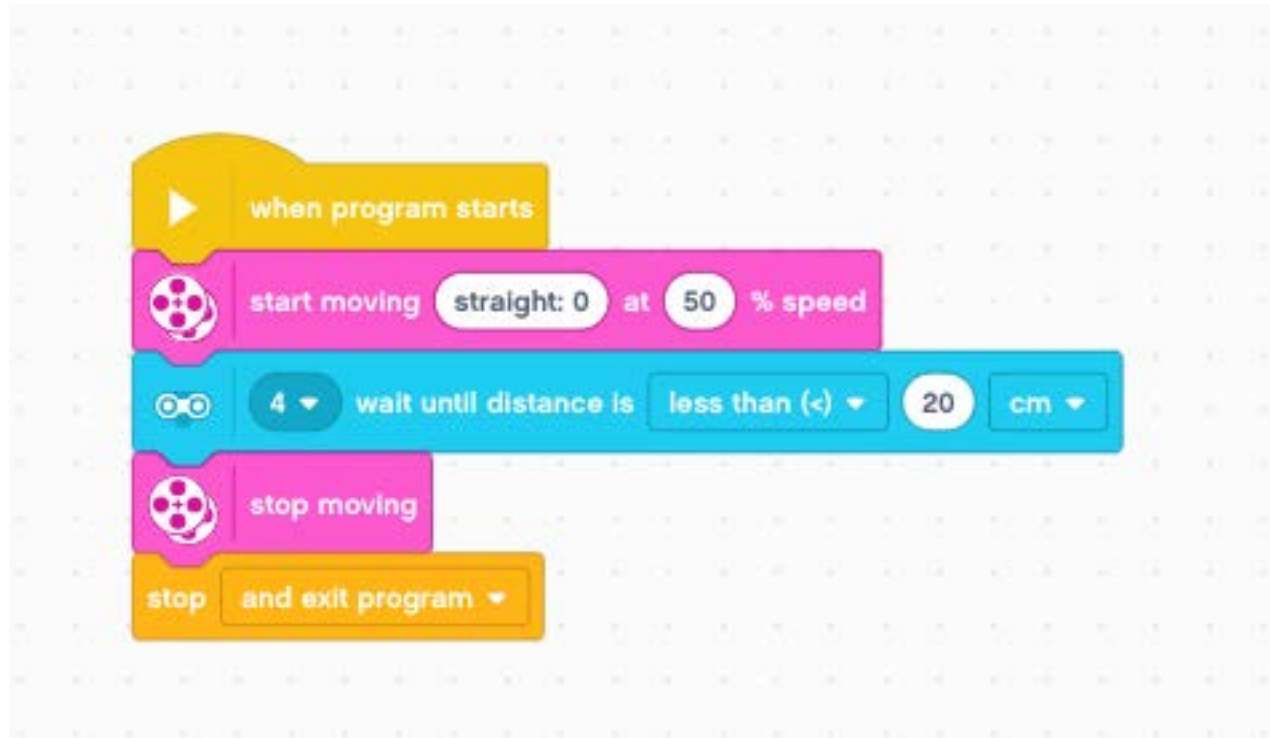
**Step 4: Wait Until Distance is less than 20cm**

**Step 5: Stop Moving**



**Step 6: End Program**

# CHALLENGE 1 SOLUTION



# CHALLENGE 2: USE THE FORCE TO CONTROL YOUR ROBOT!



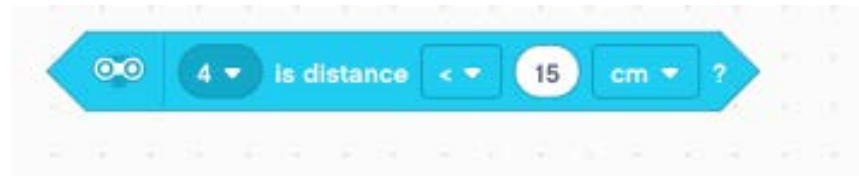
# CHALLENGE 2: PSEUDOCODE

**If the robot is closer than 20cm away from your hand move backward, otherwise move forward.**

**Step 1: Drag a Forever Loop block from the Control tab**

**Step 2: Drag an If-Else block from the Control tab**

**Step 3: Add an Ultrasonic Compare block from the Sensors tab to the if statement**

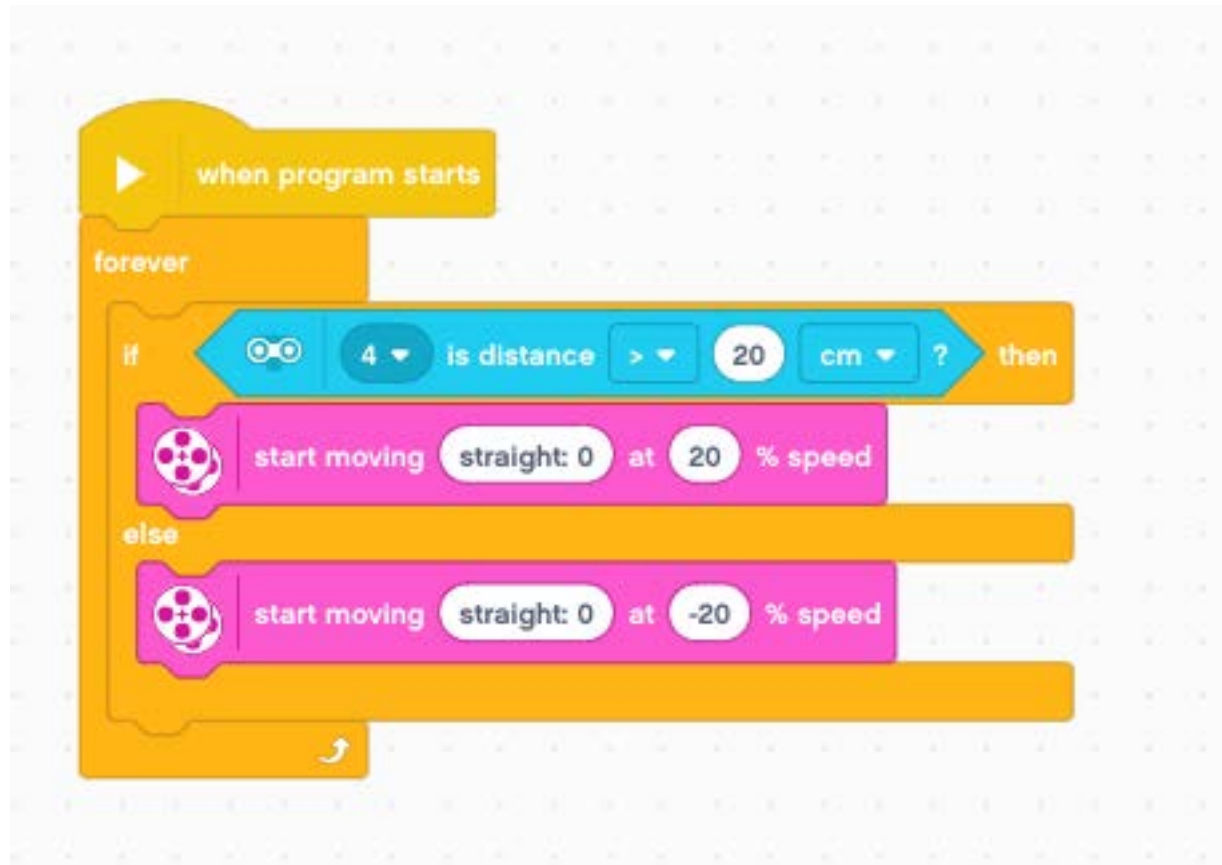


**Step 4: Add a Move Steering Movement block to move straight slowly if true**

**Step 4: Else set a second Move Steering block to move backwards slowly if FALSE**

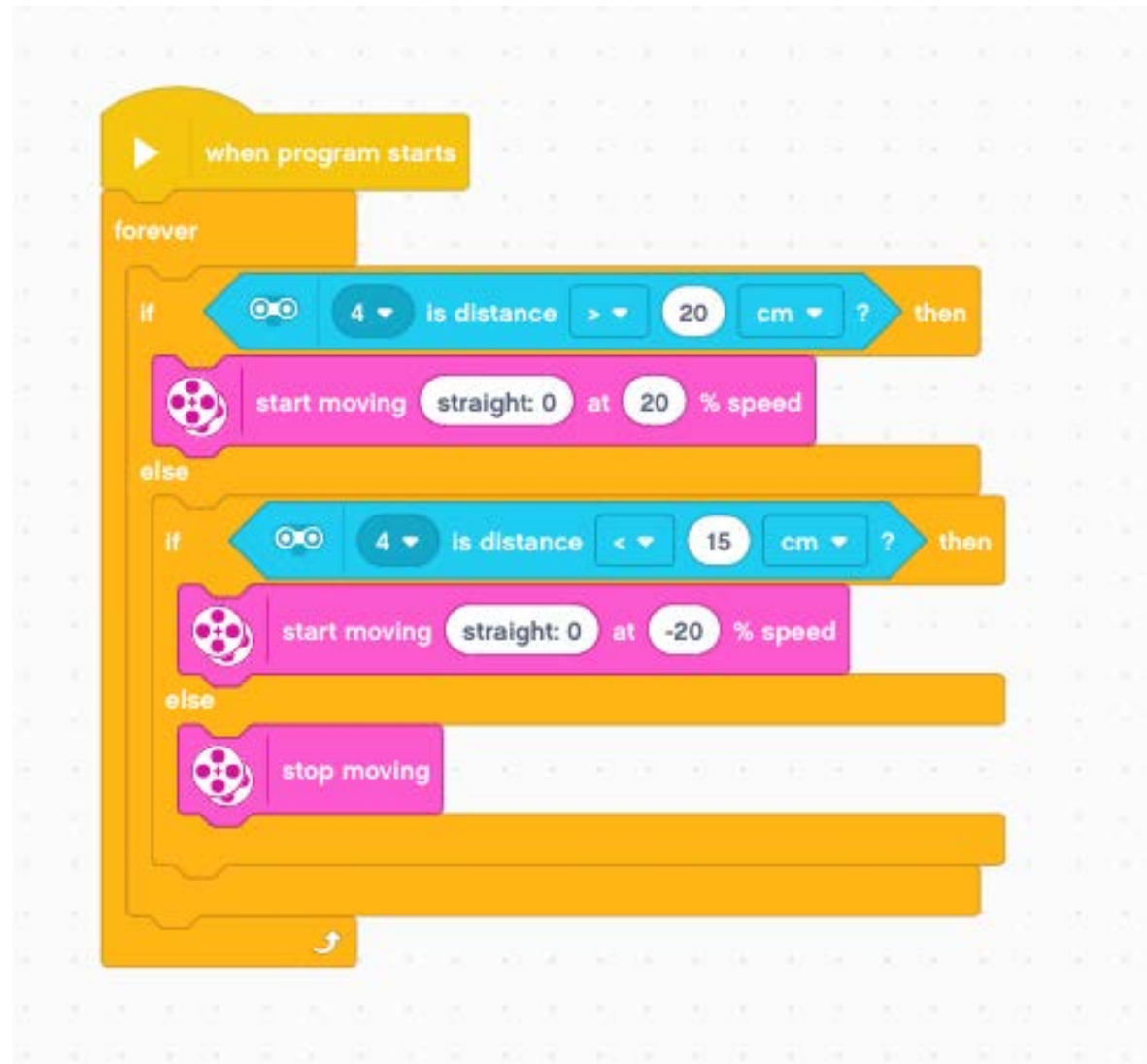


# CHALLENGE 2 SOLUTION



# LEARNING TO MASTER YOUR FORCE

The previous code kept the robot moving always. This version lets the robot rest if it is between 15-20 centimeters.



# CREDITS

- This tutorial was created by Sanjay Seshan and Arvind Seshan
- More lessons are available at [www.ev3lessons.com](http://www.ev3lessons.com)



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