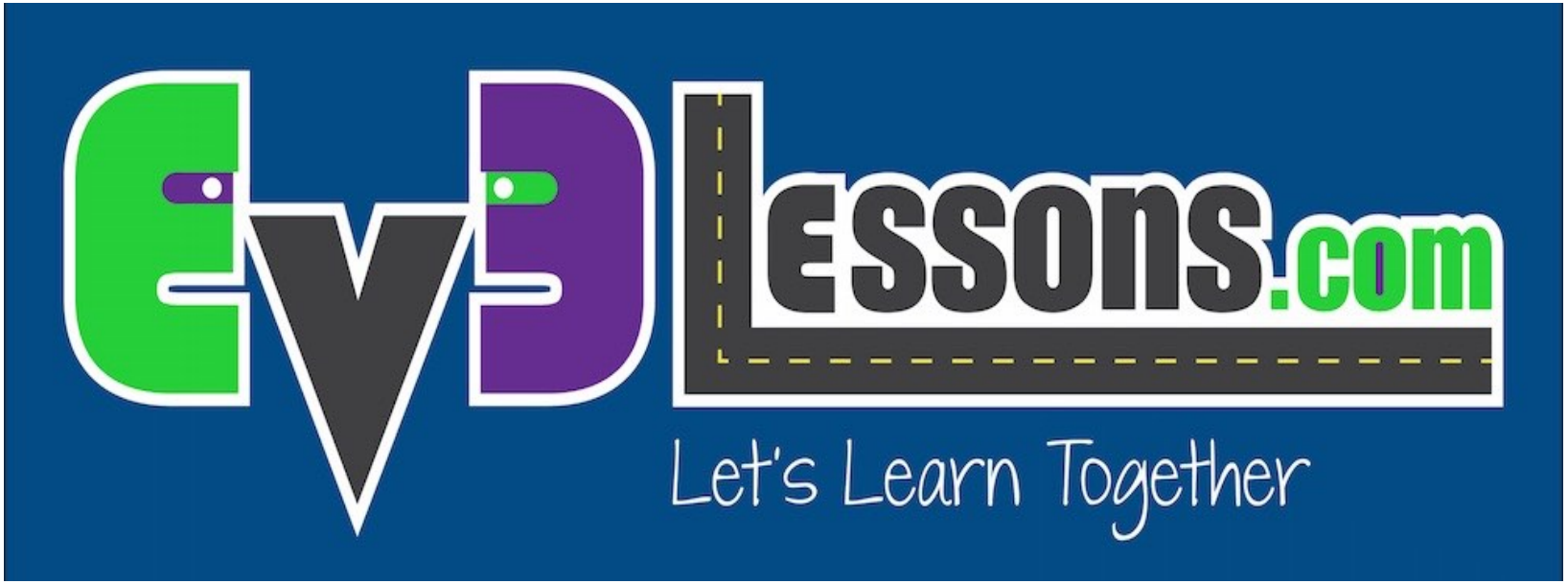



# Ultrasonic Sensor

By Sanjay and Arvind Seshan

## 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?

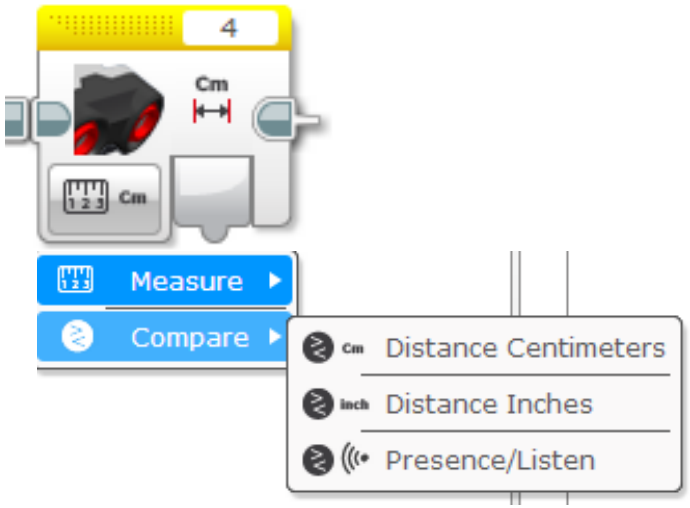
- **A sensor lets an EV3 program measure and collect data about is surroundings**
- **The EV3 sensors include:**
  - Color – measures color and darkness
  - Gyro – measures rotation of robot
  - Ultrasonic – measures distance to nearby surfaces
  - Touch – measures contact with surface
  - Infrared –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


Image from: http://www.ucalgary.ca/IOSTEM/files/IOSTEM/media_crop/44/public/sensors.jpg

# ULTRASONIC

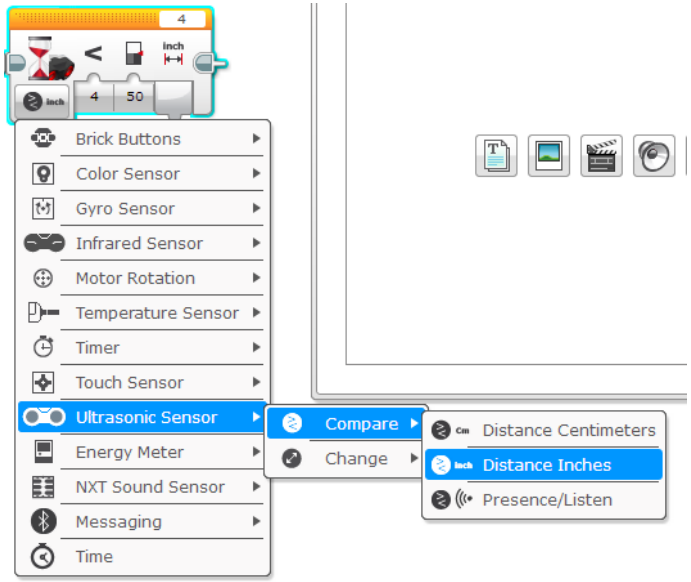
- An ultrasonic sensor measures distance.
- You use it when you need to make sure you are a certain distance away from a target.
- The distance can be measured in inches or centimeters.
- To read the ultrasonic sensor, you use the Ultrasonic Block. To use the ultrasonic to do an action until a distance,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

Read Ultrasonic




VS.

Wait for Ultrasonic



# ULTRASONIC CHALLENGE 1

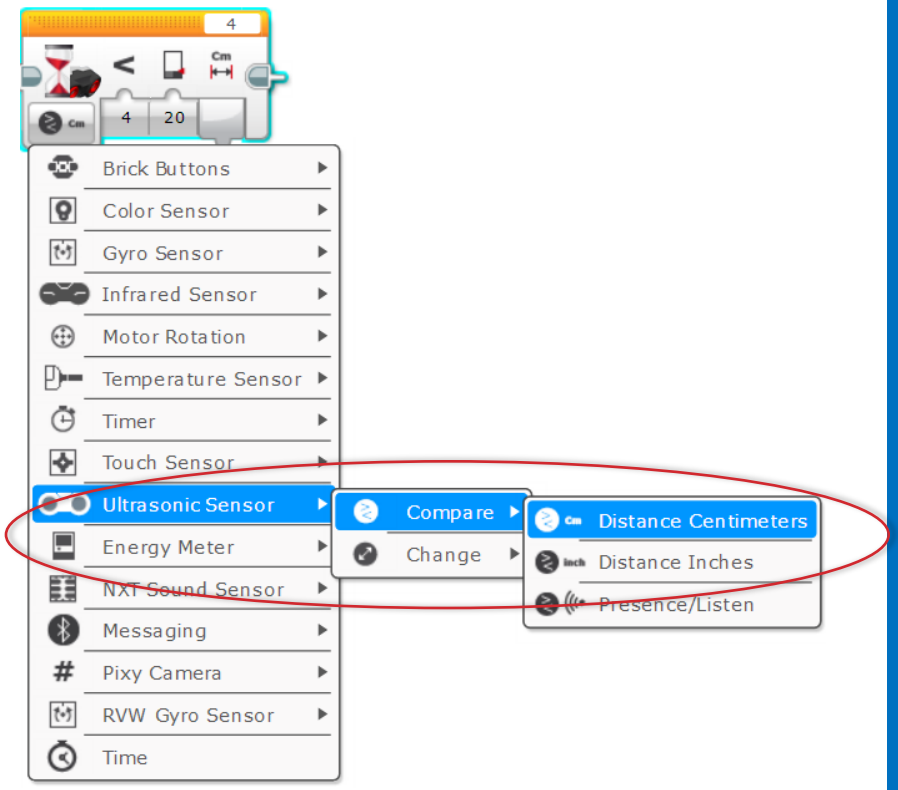
**Challenge: Make the robot move until it is 20cm away from the wall.**

**Step 1: Make a new program**

**Step 2: Set move to "on"**

**Step 3: Set wait block to use the Ultrasonic**

**Step 4: Set move block to "off"**



# CHALLENGE 1 SOLUTION

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


Set Move Steering block to "on"

Set wait block to Ultrasonic Sensor->Compare->Distance Inches and second input (inches) to 5.

Set move steering block to "off"

# 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.**

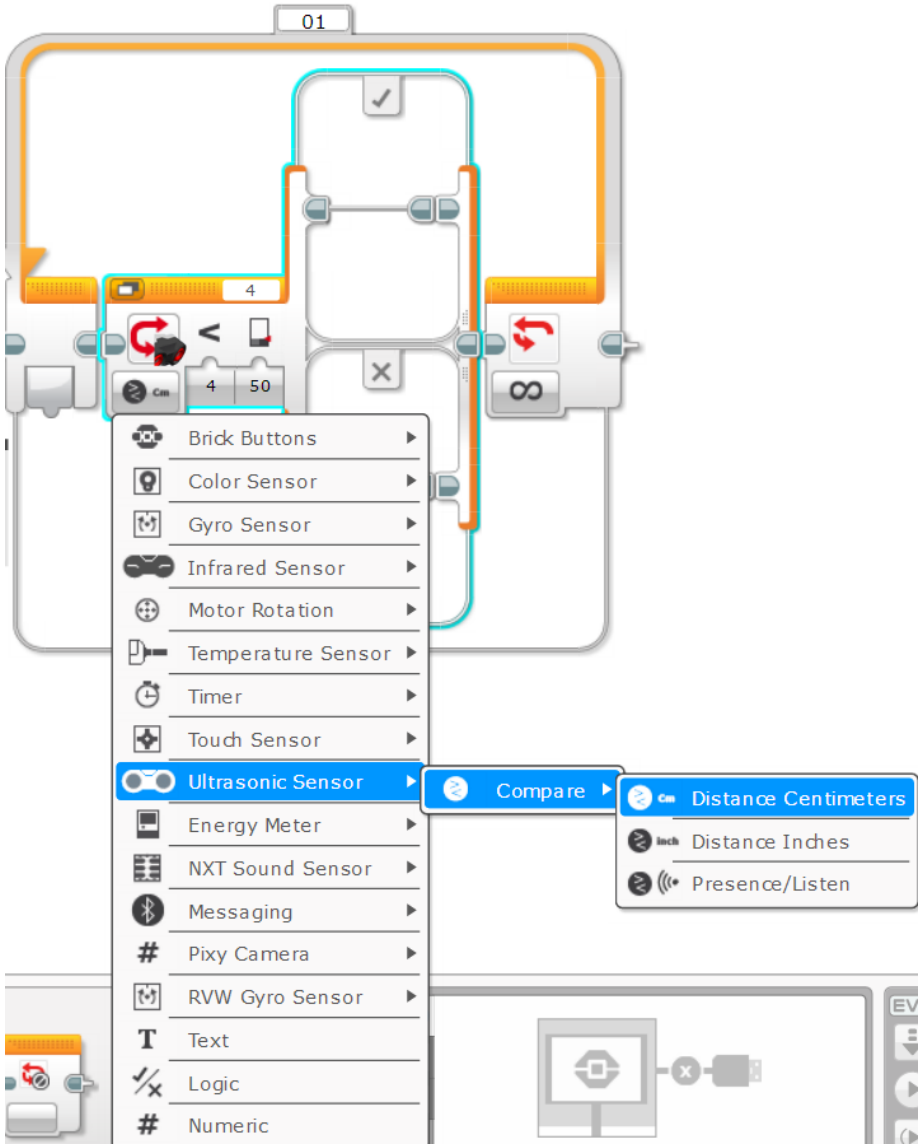
**Step 1: Drag a loop from the orange tab**

**Step 2: Drag a switch inside loop**

**Step 3: Set switch to Ultrasonic**

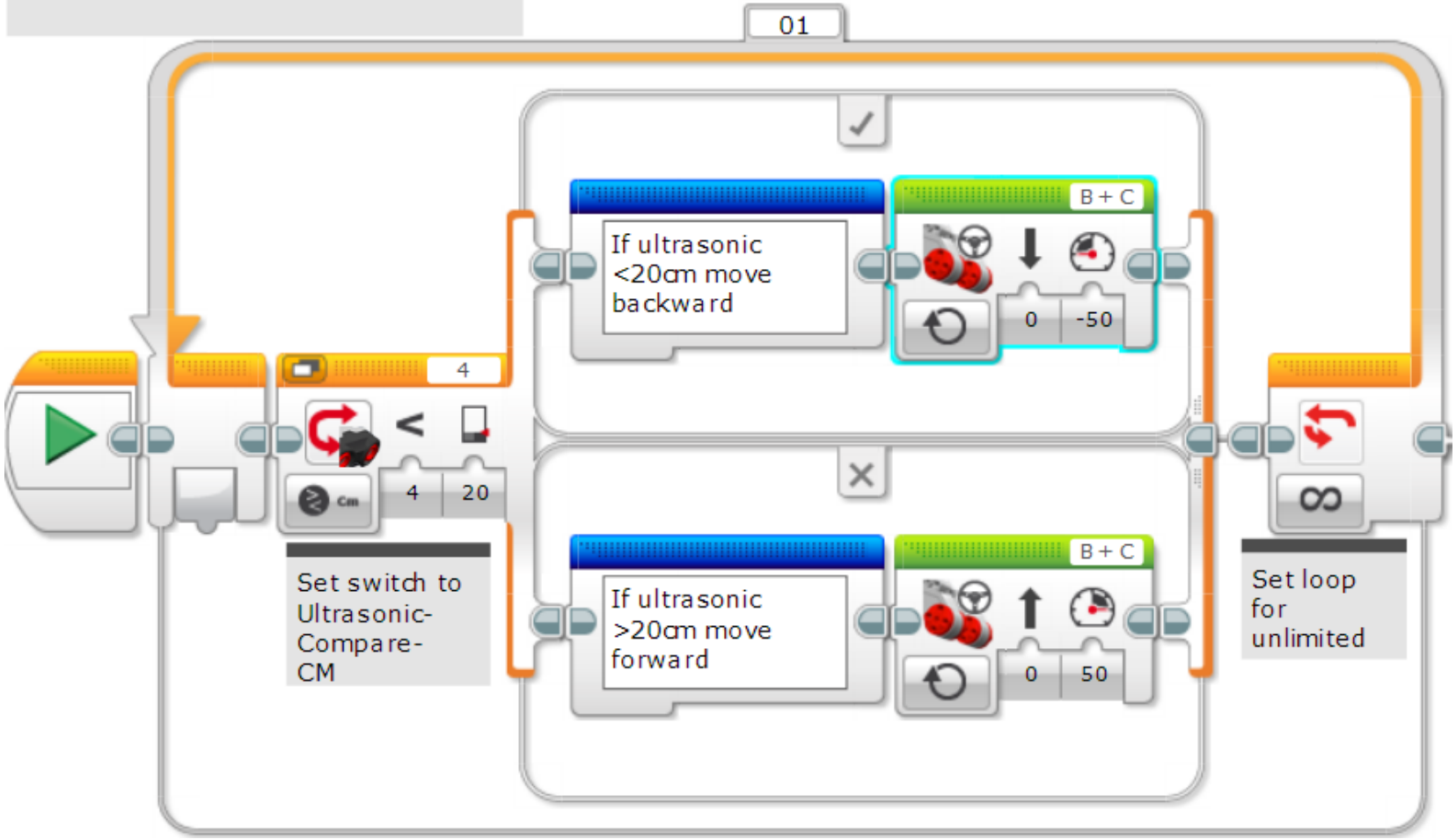
**Step 4: Set move steering block to ON with negative power and place in TRUE**

**Step 4: Set move steering block to ON with positive power and place in FALSE**



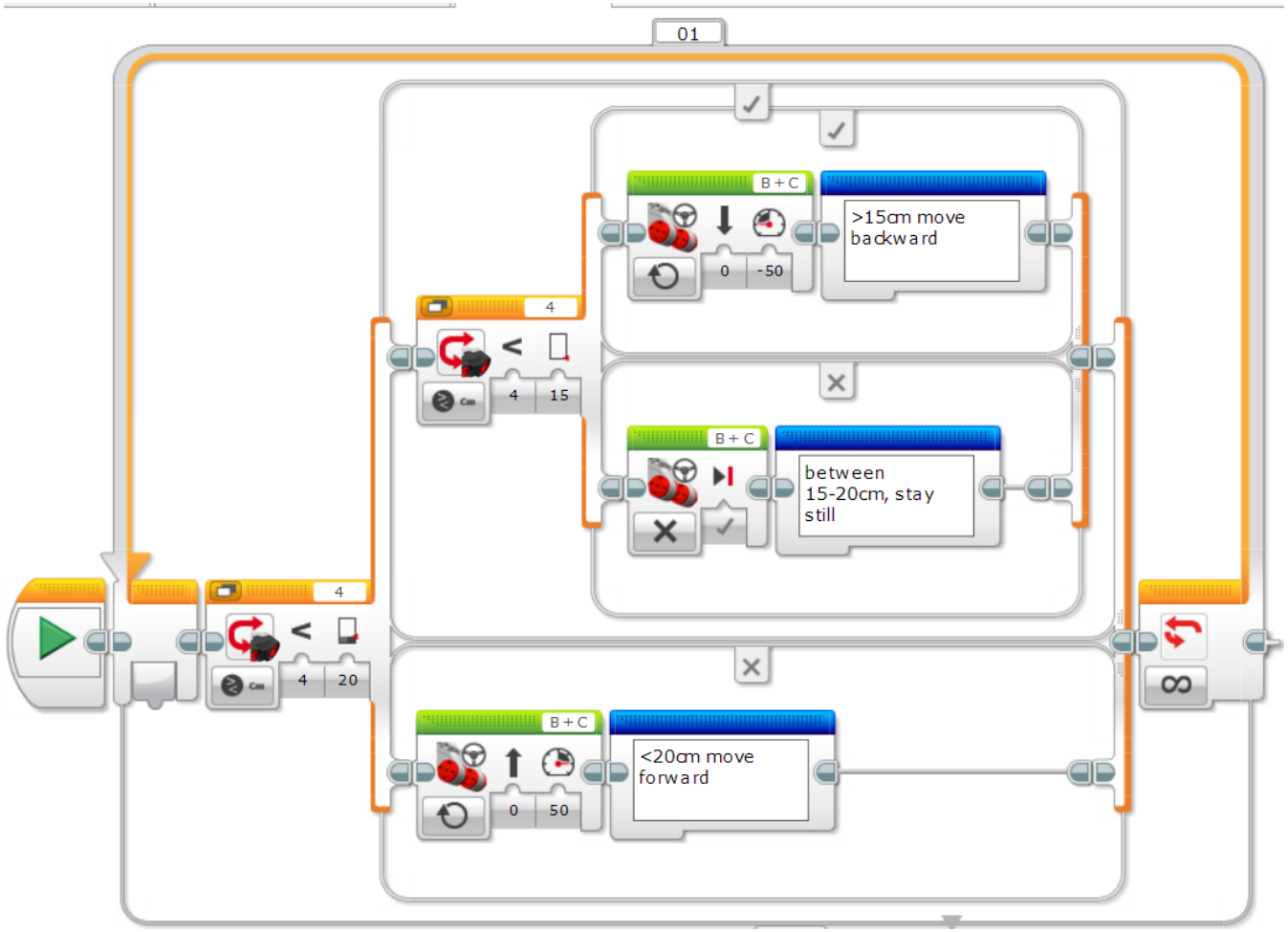
# CHALLENGE 2 SOLUTION

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



# 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**