Lecture 5: Educational robotics. Ultrasonic Sensor.

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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

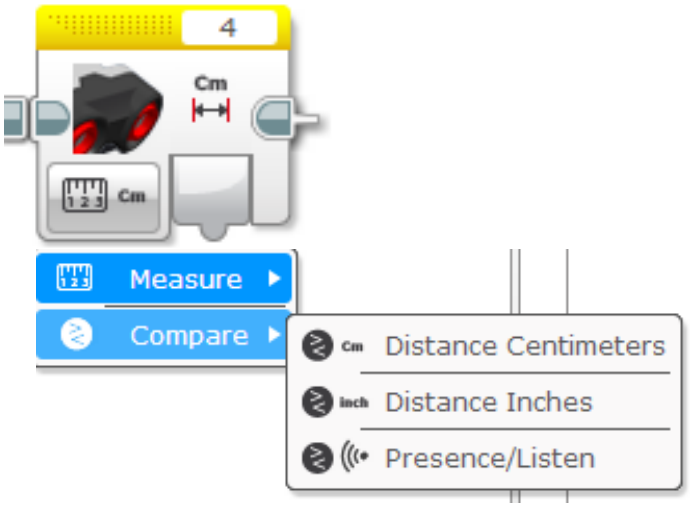
What is a sensor?

- 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

ULTRASONIC

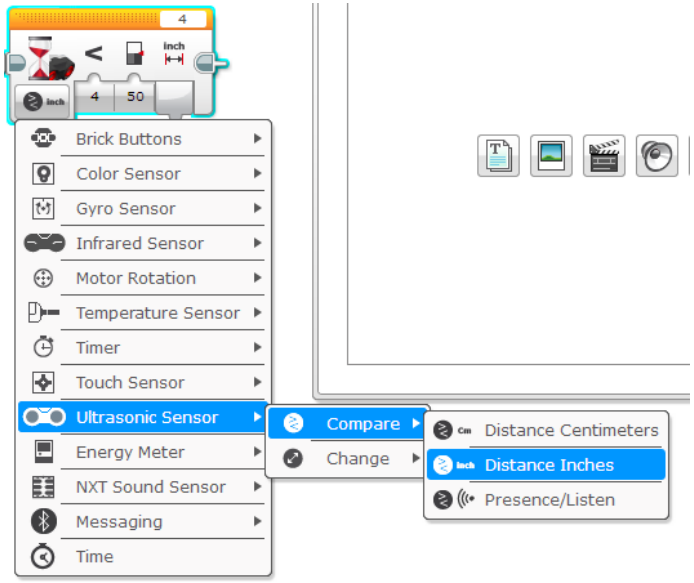
- An ultrasonic sensor measures distance.
- You use it when you need to make sure you are a certain distance away from a target.
- The distance can be measured in inches or centimeters.
- To read the ultrasonic sensor, you use the Ultrasonic Block. To use the ultrasonic to do an action until a distance,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

Read Ultrasonic



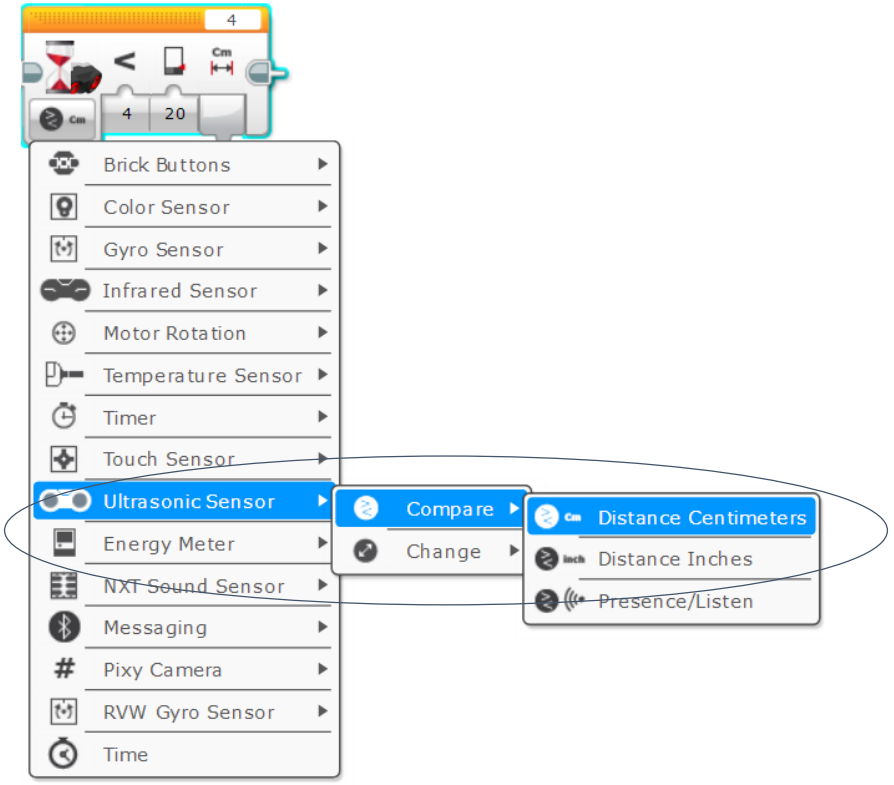
VS.

Wait for Ultrasonic



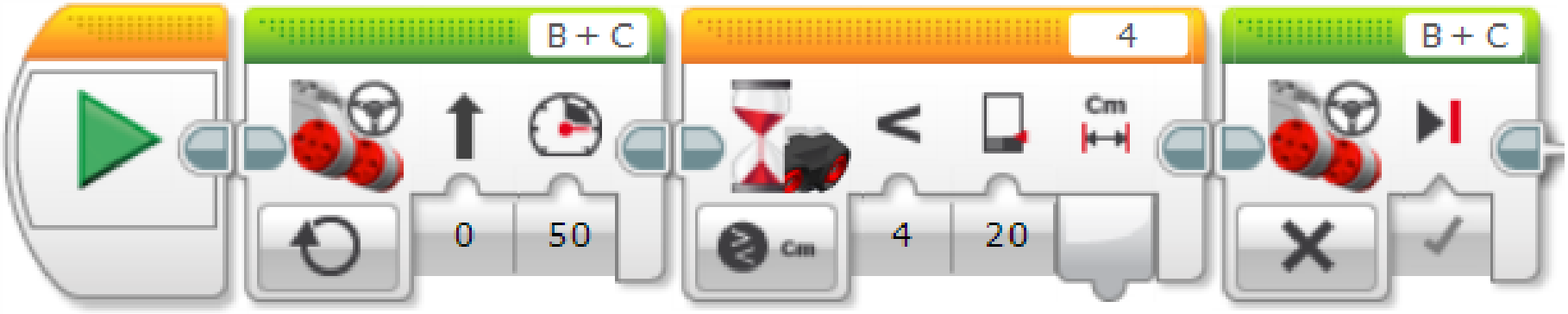
Ultrasonic CHALLENGE 1

- 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: PSEUDOCODE

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

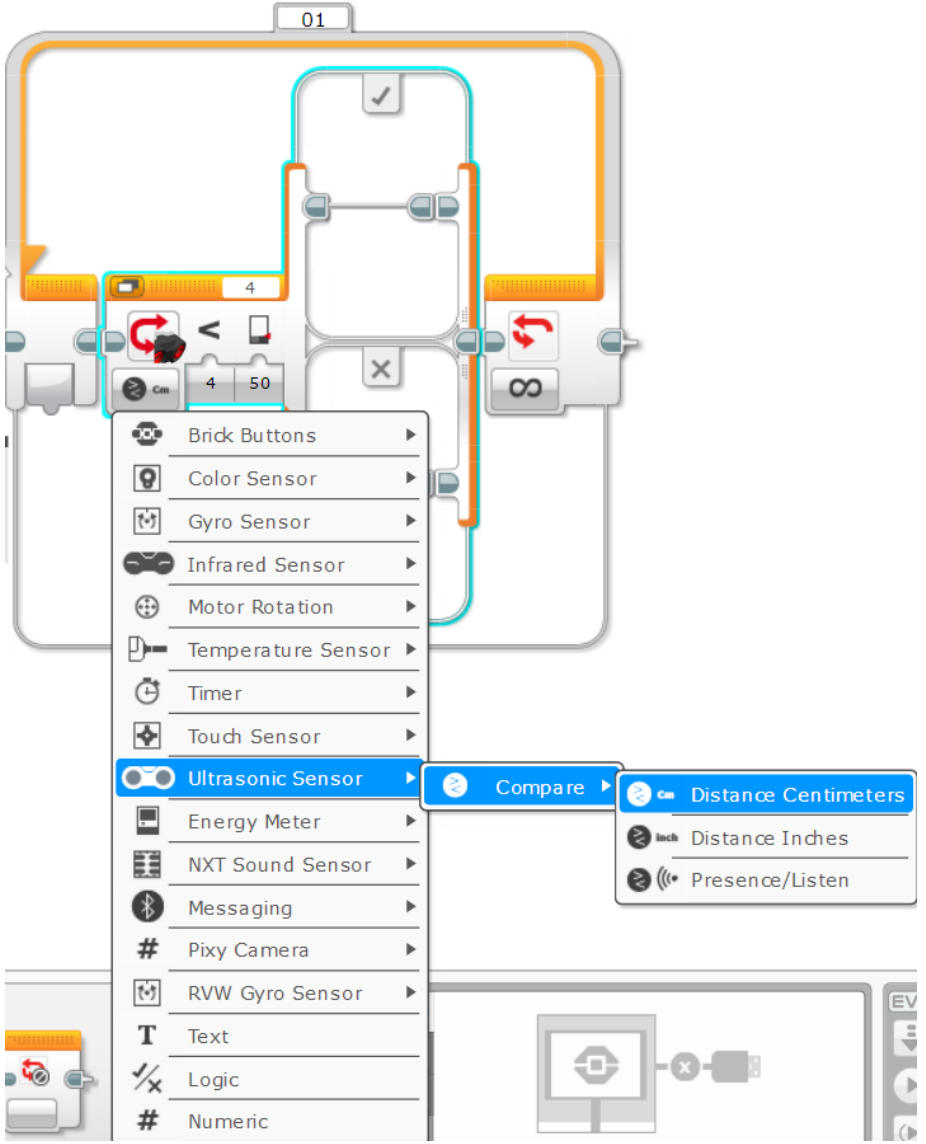
Step 1: Drag a loop from the orange tab

Step 2: Drag a switch inside loop

Step 3: Set switch to Ultrasonic

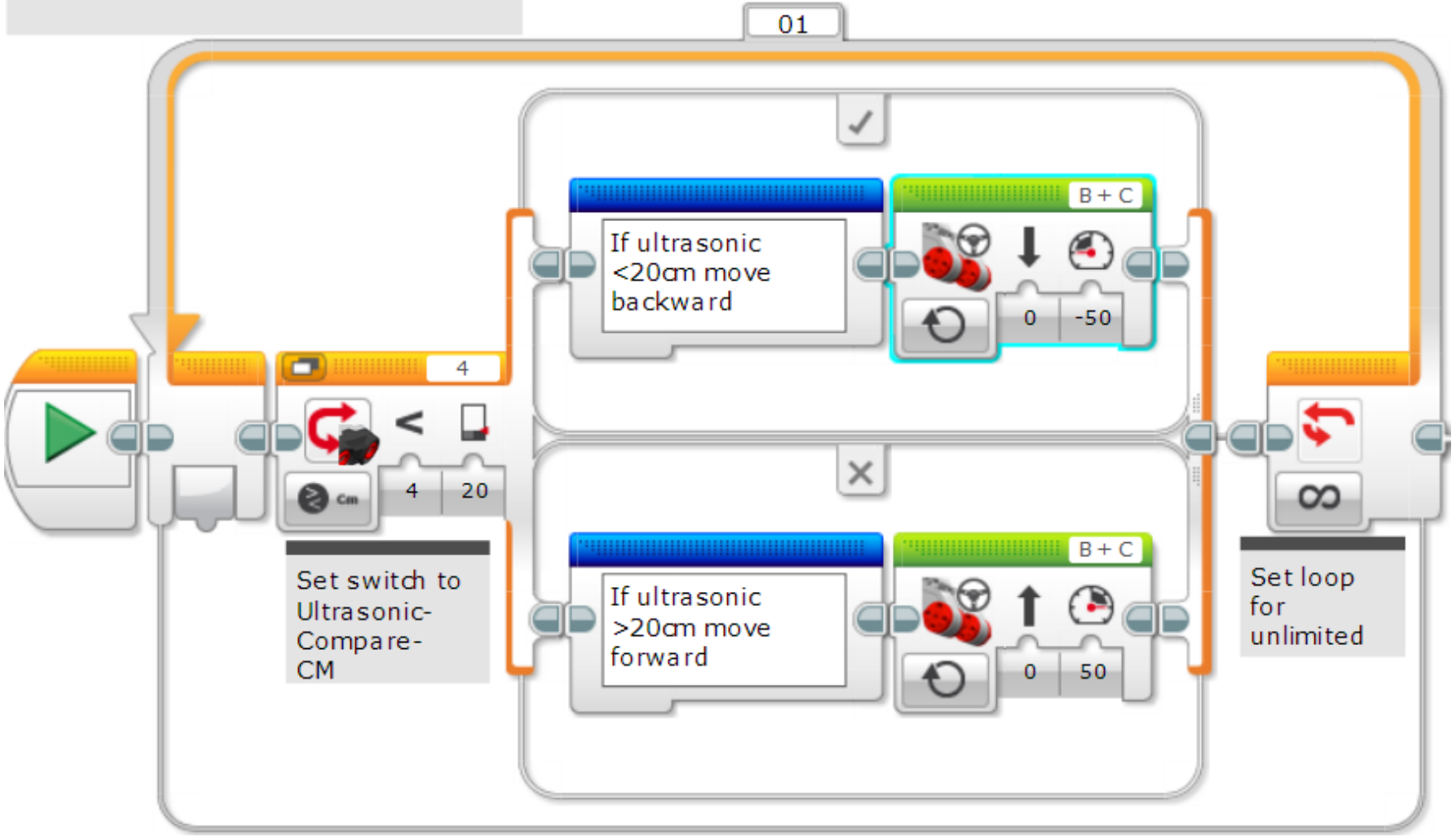
Step 4: Set move steering block to ON with negative power and place in TRUE

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



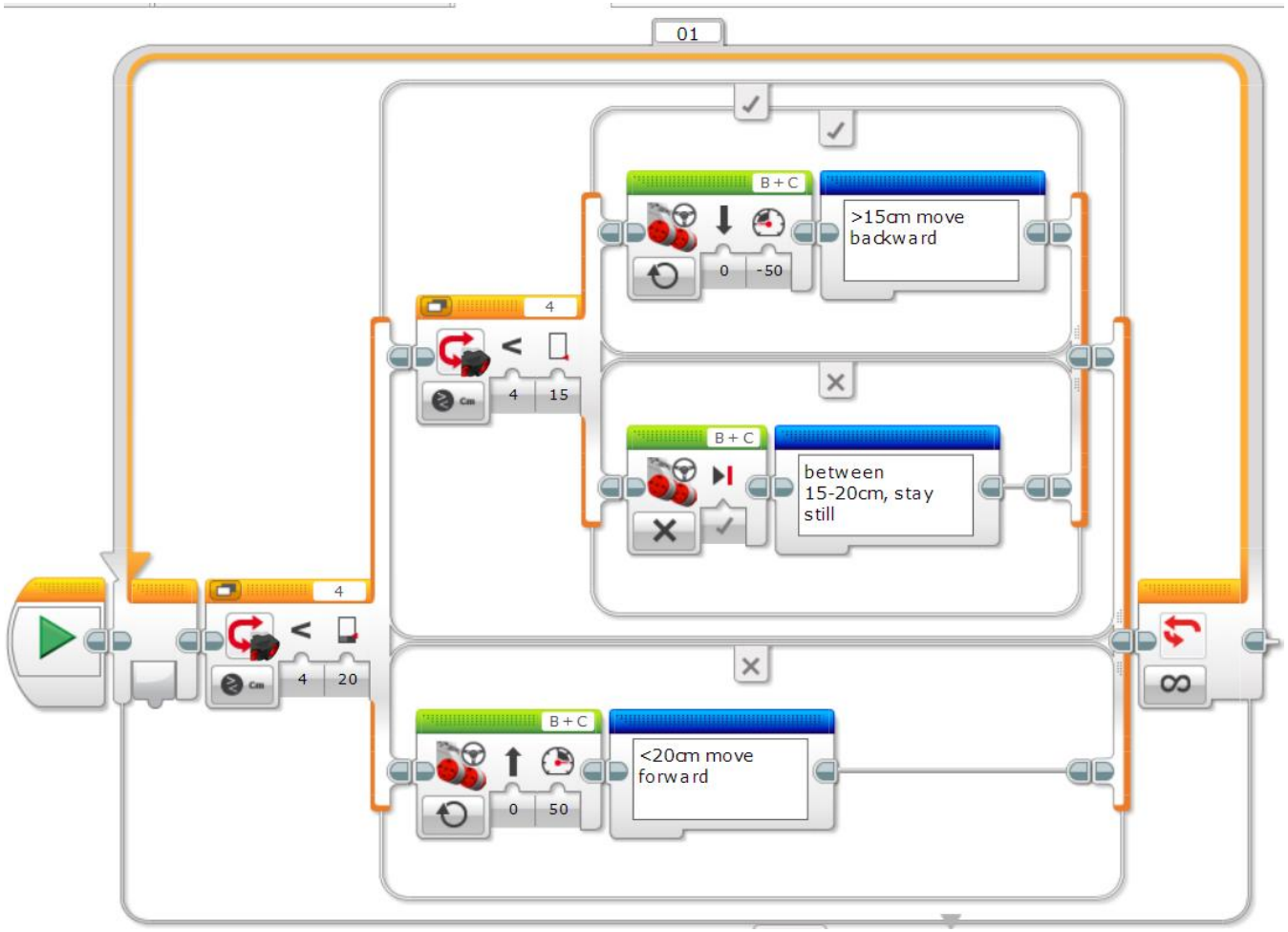
Challenge 2 Solution

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.



References

Benedettelli, D. (2014), *THE LEGO® MINDSTORMS® EV3 LABORATORY build, program, and experiment with wicked cool robots*. William Pollock, USA.
Griffin, T. (2014), *THE ART OF LEGO® MINDSTORMS® EV3 PROGRAMMING*. No Starch Press, USA.
Valk, L. (2014), *THE LEGO® MINDSTORMS® EV3 DISCOVERY BOOK*. William Pollock, USA.
Filipov, S.A. (2013), *Robotics for children and parents*, Fradkova, A.L., St. Petersburg.