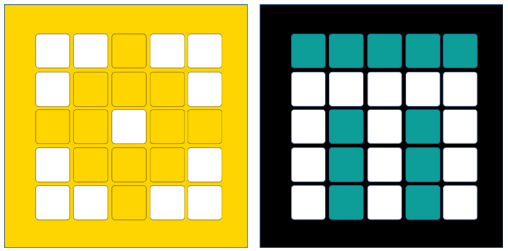
PRIME LESSONS

By the Makers of EV3Lessons



INTRODUCTION TO DISTANCE SENSOR

BY SANJAY AND ARVIND SESHAN

LESSON OBJECTIVES

- Learn how to use the Distance Sensor
- Learn how to use the Wait methods
- Note: Although images in this lessons may show a SPIKE Prime, the code blocks are the same for Robot Inventor

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WHAT IS A DISTANCE SENSOR?

- Measures the distance to an object or surface using ultrasonic technology
- There are also lights around the ultrasonic sensor (4 segments) that can be programmed individually (see Lights Lesson)
- The sensor can sense distances from 50-2000mm
- There is a fast sensing capability from 50-300mm

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HOW DO YOU PROGRAM WITH A DISTANCE SENSOR

- The Distance Sensor must be initialized before use

```
distance = DistanceSensor('C')
```

Name for the sensor object

Port

- The Distance Sensor can measure the distance to an object or surface using ultrasonic
- You can also program the lights around the sensor. This is covered in a different lesson.
- Units can be measured in Percent, Centimeters or Inches

```
distance.wait_for_distance_closer_than(20, unit='cm', short_range=False)
distance.get_distance_cm(short_range=False)
```

Extra feature in Python that allows you to set the mode to short_range – increases accuracy, but decreases range

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DISTANCE SENSOR METHODS

- **get_distance_cm**(short_range=False)
- **get_distance_inches**(short_range=False)
- **get_distance_percentage**(short_range=False)
- **light_up**(right_top=100, left_top=100, right_bottom=100, left_bottom=100)
  - Turn on lights on sensor
- **light_up_all**(brightness=100)
- **wait_for_distance_closer_than**(distance, unit='cm', short_range=False)
- **wait_for_distance_farther_than**(distance, unit='cm', short_range=False)

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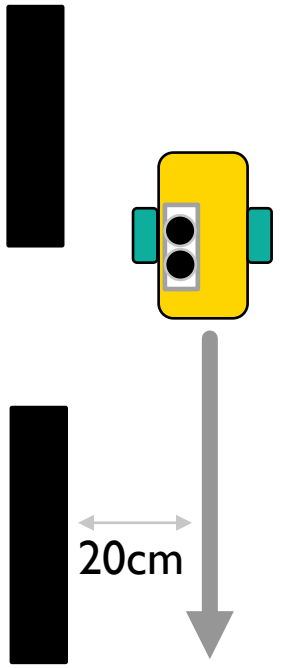
CHALLENGE: AWAY FROM THE WALL

- You want to find the opening. Use your Distance Sensor (mounted on the side of the robot like Droid Bot IV) to locate the gap
- Program your robot to move straight until it is less than 20cm from the wall
- You will need to use the `distance.wait_for_distance_closer_than(20)` method.
  Or
  `while distance.get_distance_cm() > 20: pass`



- **Pseudocode:**
  - Set the **movement motors** for your robot (A and E for ADB robot)
  - Set the **stop action** to brake
  - Set the **% speed** for your robot
  - **Initialize** the distance sensor
  - Start **moving straight**
  - Use the **wait for or a while loop** to detect that it is less than 20cm from the wall
  - **Stop moving**

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CHALLENGE 1: SOLUTION

In previous lessons, you learnt how to configure your robot. (See Configuring Your Robot Lesson)

```
motor_pair = MotorPair('A', 'E')
motor_pair.set_stop_action('brake')
motor_pair.set_default_speed(30)
distance = DistanceSensor('C')
motor_pair.start()
distance.wait_for_distance_closer_than(20, 'cm')
motor_pair.stop()
```

Configure robot

Start moving

Wait until the Distance sensor is less than 20cm

Stop moving

Line 6 can be replaced with a while loop:

```
while distance.get_distance_cm() > 20: pass
```

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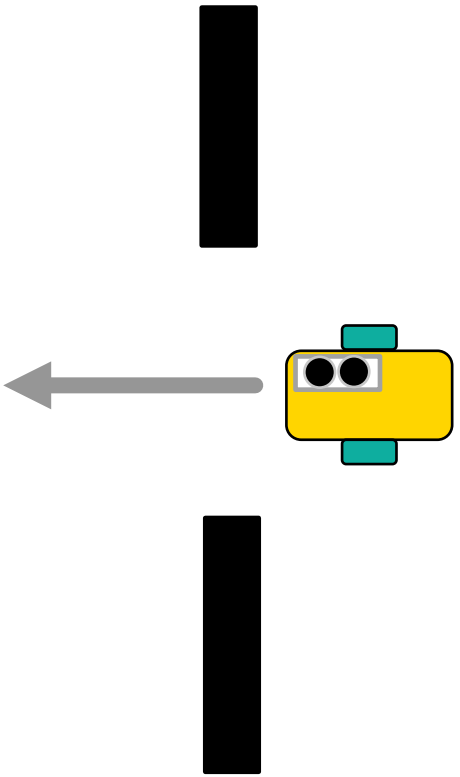
EXTENSION

- Once you find the wall, turn the robot and go through the hole



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