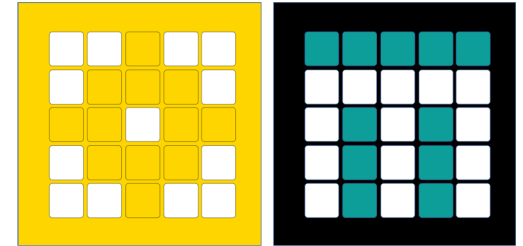


PRIME LESSONS

By the Makers of EV3Lessons



INTRODUCTION TO DISTANCE SENSOR

BY SANJAY AND ARVIND SESHAN

This lesson uses SPIKE 3 software

LESSON OBJECTIVES

Learn how to use the Distance Sensor



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; however, the SP3 API does not provide a way to set it as of version 3.4.0



HOW DO YOU PROGRAM WITH A DISTANCE SENSOR

The Distance Sensor can measure the distance to an object or surface using ultrasonic waves

You can also program the lights around the sensor. This is covered in a different lesson.

The distance returned by Blocks is in CM/INCH but the Python API returns it in mm.

If it cannot sense anything, the Python API returns -1. Note this is different from the value shown in the app sensor reading and in Blocks, which will be 200cm.

```
distance_sensor.distance(port.F)
```



Port

You can find all the available methods in the Knowledge Base

CHALLENGE: STOP AT OBSTACLE

Move your robot forward until it is 5cm from an obstacle.

Basic steps:

Write an `obstacle_found` function that returns true if it senses an object closer than 5cm

Set the **movement motors** for your robot

Start **moving straight**

Await the `obstacle_found` function

Stop moving

CHALLENGE I: SOLUTION

```
from hub import port
import runloop, motor_pair, sys, distance_sensor

# Function that returns true if an obstacle is found within 5cm
def obstacle_found():
    distance = distance_sensor.distance(port.F)
    # distance must be valid and less than 5cm (50mm)
    return distance > 0 and distance < 50

async def main():
    # Set up the pair and start moving
    motor_pair.pair(motor_pair.PAIR_1, port.C, port.D)
    motor_pair.move(motor_pair.PAIR_1, 0)
    # wait until obstacle found
    await runloop.until(obstacle_found)
    # stop and exit
    motor_pair.stop(motor_pair.PAIR_1)
    sys.exit("Done")

runloop.run(main())
```

CHALLENGE II (ADVANCED)

Place your robot 20 cm from a wall with an opening. It should have a distance sensor mounted on the side of the robot like Droid Bot IV

You want to find the opening in the wall. Move forward until you locate the opening

Once you find the wall, turn the robot and go through the opening



CHALLENGE II (ADVANCED) HINTS

An opening is a gap where nothing is present. So, you need to move forward until your sensor senses either:

Distance **greater** than 20 cm. it is not looking for the wall, it is looking for the opening.

OR No distance reading (i.e. API call returns -1)

Once you find the opening, turn the robot and go through it.

You may have to make some adjustments based on where your sensor is located on the robot, i.e.

Decide between spin and pivot turns.

Move forward/backward by a fixed amount before turning.

CREDITS

This lesson was created by Sanjay and Arvind Seshan for Prime Lessons

Additional contributions by FLL Share & Learn community members

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