

Solving the Maze and Sensors

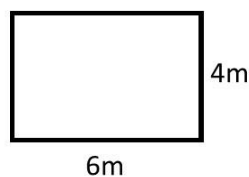
The aim of Lab Task 2 is for Working Groups to further develop their ability to program their robot by completing a series of movement-based tasks as well as creating a program which uses the Touch and Ultrasonic sensors.

Task: The Lego Mindstorms software does not come with all the required sensors installed. To complete this lab you are required to add additional sensors via a download. Follow these steps:

1. Visit - <https://www.lego.com/en-gb/mindstorms/downloads>
2. Scroll near the bottom to "EV3 SOFTWARE BLOCKS"
3. Download - Gyro Sensor Block and Ultrasonic Sensor Block
4. Open Lego Mindstorms software
 - 4.1. Select Tools
 - 4.2. Select Block Import
 - 4.3. Browse for block destination folder(usually Downloads folder)
 - 4.4. Select sensors to import and click Import
5. Restart Mindstorms software

You should now see the Gyro and Ultrasonic sensor blocks in the Sensor block tab &'%'\$

Exercise 1: Given the following information, design and outline a program using a flowchart which moves a robot in a rectangular shape of length 4 meters and width 6 meters.



Note the following:

- The wheels of the robots have a circumference (the length of its border) of 0.5 meters.
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Note: on Moodle; Using sensors section, you can find a guide on how to attach the sensors and a simple example on how to configure them.

Exercise 3: Mount the Ultrasonic and Touch sensor (respectively) to your robot. Ensure that the sensors are connected to their correct ports!

Exercise 4: Using first the Touch sensor and then the Ultrasonic sensor develop and implement a program that:

1. Moves the robot forward at power to 30.
2. If the robot touches or is within 15 cm of an object it stops, move backwards and then rotates 90°.
3. The robot continues to perform the actions above until the stop button is clicked.

Challenge (you do not have to attempt this): can you make it so the robot randomly chooses to turn either left or right?

References

[1] LEGO Mindstorms Education 45544 Instruction Booklet, LEGO Education