

ME 101 Assignment 6 Winter 2022

This assignment will be completed in partnership for both questions. The robot station files are available on LEARN under the Assignment 6 folder.

Deliverables

- **In this assignment, you will:**
 - Practice using RobotC to control an EV3 robot in its standard lab configuration
- **There are two deliverables for this assignment:**
 - **Question 1: RobotC**
 - **Question 2: RobotC**

Before you start programming


1. Sign out a robot with your partner
2. You may use your laptop with RobotC installed or the lab computer
3. Check the contents of robot kit to ensure all the parts are present. If not, please inform one of the teaching team members in the lab to record the missing part(s) and get replacement part(s) if the part(s) is needed for that assignment. Otherwise, when the teaching team members collect the robot kits at the end of the lab, the missing part(s) will be your responsibility to replace.
4. You are NOT allowed to take the robot apart. If you have questions about how the robot works, please consult the teaching team who is helping in the lab.

At the end of your Lab Session:

- Pack all the parts of the robot and store them in the robot kit.
- Bring the robot kit to the front for a teaching team member to check if all the parts are present and the robot is still in its proper standard lab configuration.

Experiment with Portview

The EV3 brick provides a Portview feature that shows the readings of the sensors and motors connected to the appropriate ports on the brick. You may get familiar with this feature by following the steps listed below.

1. Mount the ultrasonic sensor to the robot and connect its cable to sensor port 2 on the EV3 brick.
2. Make sure that the cables of the touch, ultrasonic, color, and gyro sensors are connected to the sensor ports 1, 2, 3, and 4 on the EV3 brick respectively.
3. Place the robot on a level / flat surface before turning on the brick. This should calibrate the gyro sensor rate to a reading of 0 degree per second.
4. Turn on the brick by holding down the center (enter) button for a couple of seconds.
5. Navigate by using the RIGHT button to the third EV3 Brick Interface with LOGO 
6. Select the top item "Portview" by pressing the CENTER button
7. The values of the sensors and motors that are connected to the EV3 brick are displayed on the LCD screen one at a time
8. Cycle through each sensor or motor port by using the LEFT / RIGHT button to see the displayed value. The color and gyro sensors have more than one mode. You can access the mode selection menu by hitting the center (enter) button while that sensor is selected in port view.
9. You may check the values of the sensors shown in Portview against those you measure when in doubt

Question 1: Drive carefully

What you need to do

The robot is placed so that the front bumper is somewhere between 20 cm and 60 cm from a wall. You will use the ultrasonic sensor to measure distance for this question.

Write a program that:

- Configures sensors (you should always do this even if not specified in the question)
- Displays your group members' initials on line 5 of the display, e.g. **CH RC**
- Waits for the enter (centre) button to be pushed and released
- Moves slowly forward until the robot hits the wall, as indicated by the touch sensor, and then stops
- After waiting for 0.5 seconds, the robot should slowly back away from the wall until the front bumper is 15 cm away from the wall and then stops.
- After waiting 1 second, the robot then moves back to twice the original distance between the wall and the front of the robot
- Then stops and displays the original distance between the front of the robot and the wall for 10 seconds

Useful information: It is approximately 20 cm from the front bumper to the ultrasonic sensor.

Demonstrating your program

You are required to demonstrate your working program to a member of the teaching staff. Once you have successfully downloaded and tested your program on a Lego robot, bring your robot to the front of the room. A TA will be available for you to demonstrate your robot's functionality.

What you need to submit

Submit your code to crowdmark. As the demonstration to the TA serves as output for your submission, you are only required to hand in your code for RobotC questions. No printed "output" section is required for RobotC questions in the assignment package.

Question 2: Drive a line

What you need to do

You will use the motor encoders to measure distance in this question.

Write a program that:

- Configures sensors (you should always do this even if not specified in the question)
- Displays your group members' initials on line 5 of the display, e.g. **CH RC**
- Waits for the user to press and release either the up or the down button; You can assume the user does not press a button other than these two
- Drives 60 cm in the specified direction (backward for the up button, and forward for the down button.)
- Waits for the user to press and release either the left or the right button
- Turns for 1.25 seconds at 25% power: one motor power at -25 and the other at 25, clockwise for the right button and counterclockwise for the left button
- Waits for 0.5 seconds
- Returns approximately to the starting point by reversing its movements.

Demonstrating your program

You are required to demonstrate your working program to a member of the teaching staff. Once you have successfully downloaded and tested your program on a Lego robot, bring your robot to the front of the room. A TA will be available for you to demonstrate your robot's functionality.

What you need to submit

Submit your code to Crowdmark. As the demonstration to the TA serves as output for your submission, you are only required to hand in your code for RobotC questions. No printed "output" section is required for RobotC questions in the assignment package.