

# Hands-on Robotics with Programming

## Project 3: Robot Controlling and Monitoring System

Team Project (Max 2 members) Due Date: 05/31

### Project Goal

In this project, you and your team members will design and implement a wheel robot on Microsoft Robotics Developer Studio (MSRDS). The robot is to simulate an automatic-controllable railroad system such as 文湖線 as of Taipei MRT.

This robot should be able to follow a line track (Figure 1) and simultaneously send the information to a remote computer to enable a centralized control. The robot should be able to perform a cyclic task with the following three steps: Step 1: The robot initiates from the "Starting Line," and follows the track counterclockwise. Step 2: The robot makes a U turn (180° turn) when reaching the initiate point. Step 3: The robot moves clockwise.

Please notice that we designed two "accidents" in the track system, a box and a gap. The robot should obtain the reading from light sensors (TCRT5000) and distance sensor (sonar sensor) to overcome the problems.

You need to design a control panel to display the status of the robot. An example of the panel is shown in Figure 2. You are free to design a better user interface. The users should be able tell the location and status of the robot from the panel.

### Grading

This project will be graded basically from the outcome of the project. The grading will be separated into three parts. One is live demonstration. You and your team member need to demo to the class to show at least a cycle of the three-step task. Another is a video demo in which you can show the best performance of your design. The other one is a written report. The report should include the program codes and detailed explanation of your design. Detailed grading items and weights are listed as follows:

1. Demonstration (50%): You need to demonstrate the robot in the class. We will run through several tests to see the performance and reliability of your work. Creativity and system design (including user interface) will also be graded.
2. Video demo (20%): You need to submit one or multiple video demos by using screen capture software or digital camera. The video demo should upload to Youtube. The link should be included in written report.
3. Report (30%): You need to develop a detailed report to describe your design. You are encouraged to include many figures, flowchart diagrams, sketches, photos and snapshots from computer screen to help you explain the designs. You have to describe the main mechanism of the robot and controlling method.

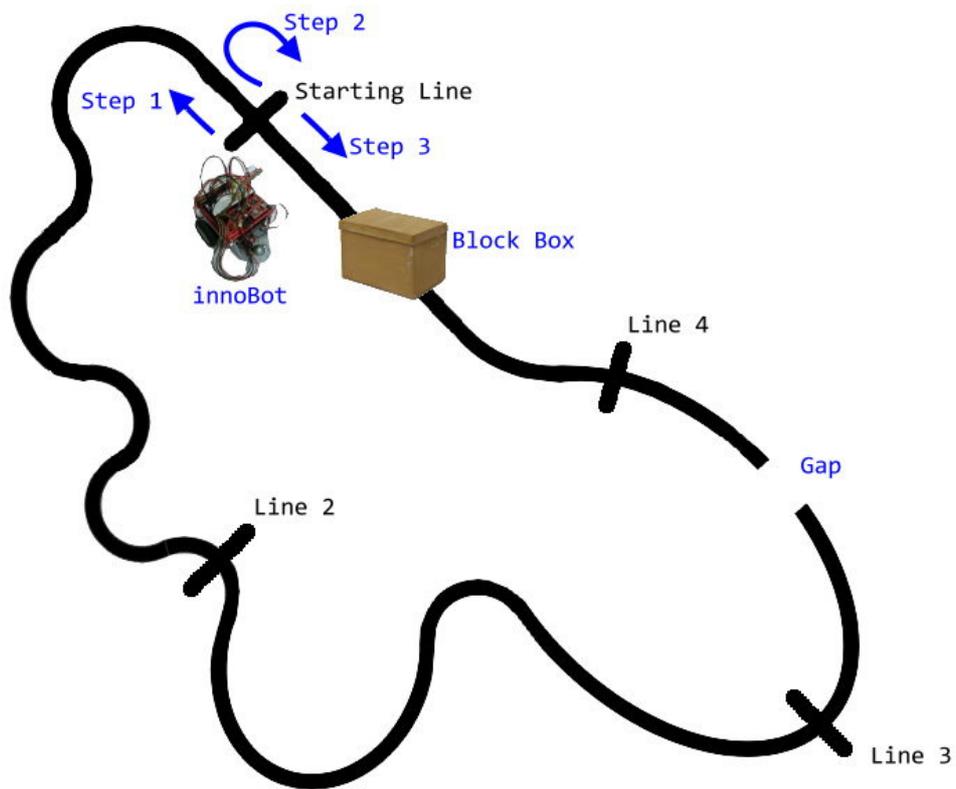


Figure 1: Test map

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Robot Status Panel

innoBot status : Clockwise
Left wheel power : 0.4
Right wheel power: 0.4
TCRT5000 status : 0 1 0
Sonar distance : 38 cm

innoBot location:

- - Starting Line < Block Box - -
|
- Line 2 - Line 3 - Gap - Line 4 -

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Figure 2: Robot status panel