

Hands-on Robotics with Programming

Project 1

CCR and DSS Application

Due Date: 04/12

Project Goal

This project is to develop a virtual robot which can navigate in a randomly-generated maze. Your robot has four sensors: one SickLRF (laser range finder), two Bumping sensors and a WebCam. Sensors' locations are shown on Figure 1. The SickLRF's scan range is up to 20m and scan angle range is up to 180 degrees. The Bumper sensors are located at front and back sides of the robot. The WebCam is on top of the robot. The example of randomly-generated maze and robot initial location are shown on Figure 2. You need to modify the C# code to finish the Service, and then code a VPL program to demonstrate the result.

Grading

Both hardware and software designs will be evaluated in terms of effectiveness, performance and creativity. The grading will be separated into two parts. One is demonstration. Students need to demo the program and show the strategy of the robot. The other is a report, in which we will review system designs in both hardware and software components. The report should include the program code and detail descriptions.

Detailed grading items and weights are listed as follows:

1. **Demonstration (50%):** You need to demonstrate the robot for 5 times. Each time you have 2 minutes, and the grades are given by the degree of the maze navigation.
 - 10 points - finish
 - 7 points - almost finish
 - 5 points – possibly finish eventually
 - 3 points - may not finish eventually
 - 0 points - system fail
2. **Report (50%):** 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 port and portset, arbiter and handler.

Basic C# code (environment and basic robot setting):

<http://robot2010.caece.net/filecabinet/project1.zip>

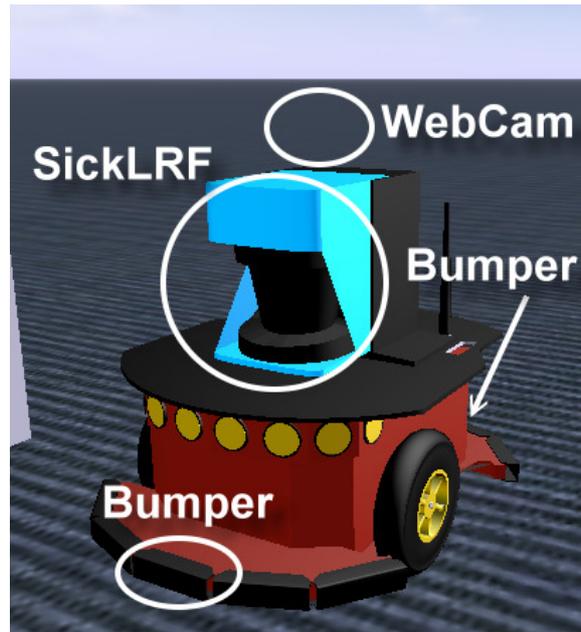


Figure 1. Sensors' locations

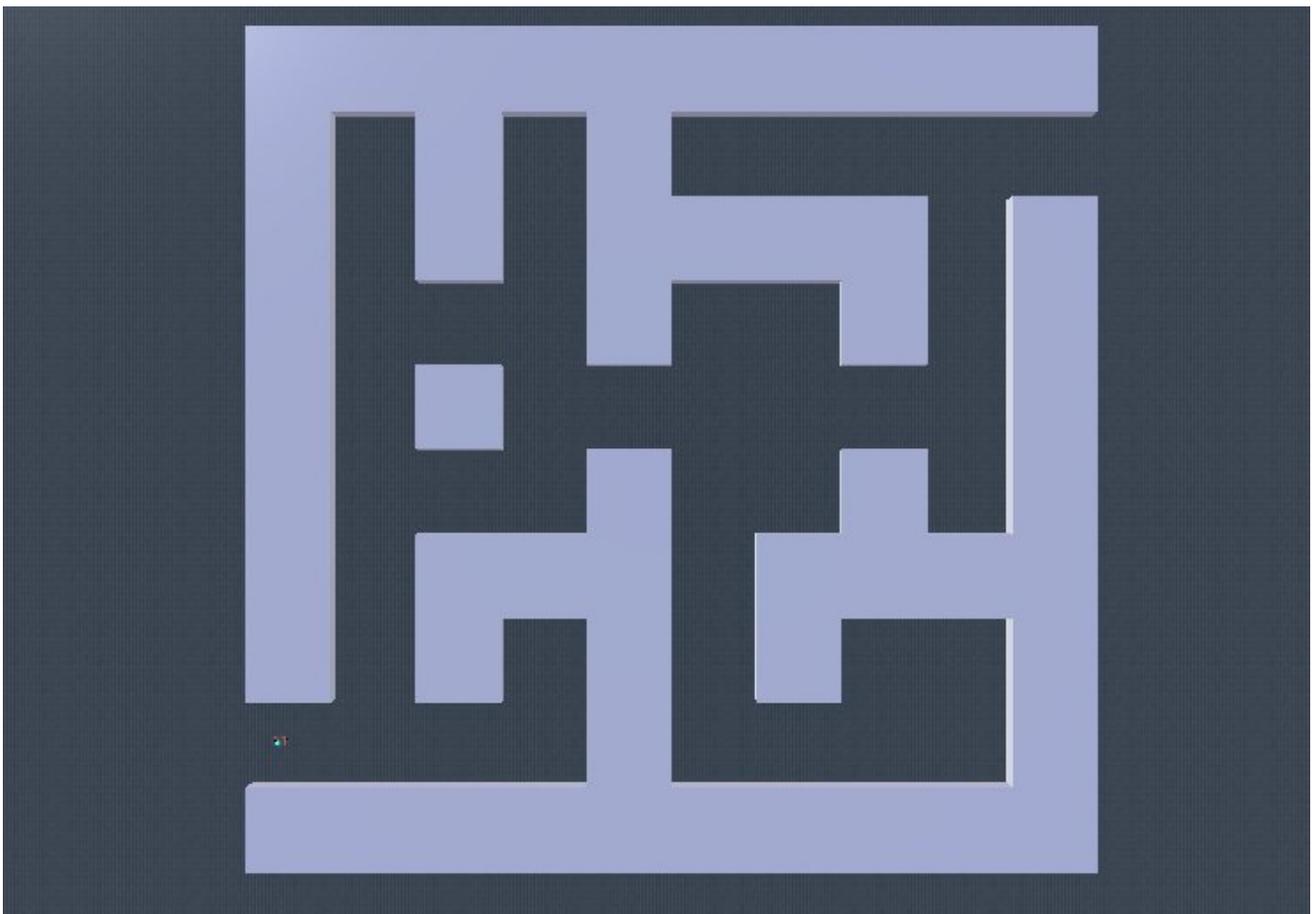


Figure 2. Example of randomly-generated maze