

Universidade de Aveiro

DETI - Departamento de Eletrónica Telecomunicações e Informática

Robótica Móvel

2024/25

Assignment 2

Path Finder Robot

Objective

In this assignment you should develop robotic agents to command a real robot that should be able to follow a path, find the target and optimize its path to the target.

The robot is a small differential drive platform (Figure 1) developed at DETI that includes a ground sensor with 5 IR sensors. These sensors enable the robot to follow a path specified by black lines on a white floor. The robot processor is based on a PIC32 microcontroller that can be programmed in C/C++.



Figure 1: robot that will be used in this assignment.

The first objective is to build an agent that can follow a black line on a white floor. If there are several options, i.e. the black lines provide an intersection, the robot should turn left. The second objective is to build an agent that stops at the final position (marked as a wide black line). The third objective is to optimize the path to the final position.

Environment

The robot includes a differential drive that may be controlled by setting the speed of each wheel. Its sensors include encoders at the wheels and the ground sensor that has previously been mentioned.

An example of the environment that may be used to test the agents is presented in Figure 2.

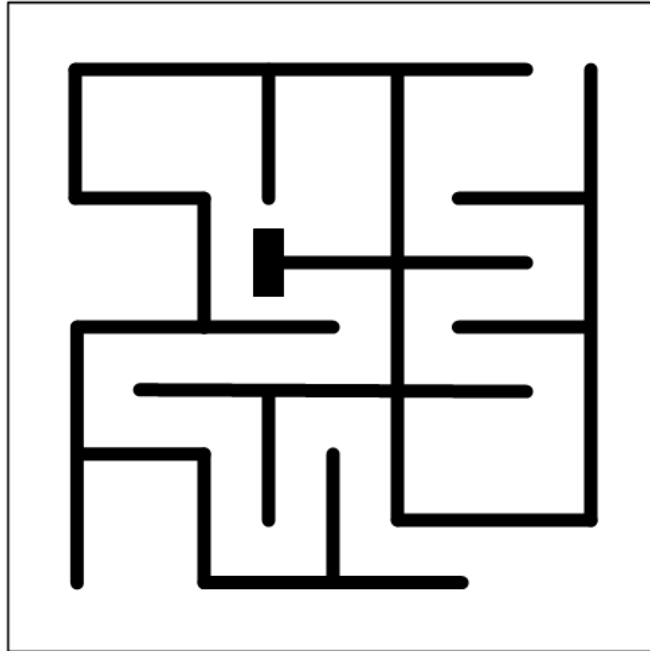


Figure 2: Example of a possible path map

Installation

Install the PIC32 compiler tools at /opt in your computer:

```
cd /opt
tar xvfz pic32-64-2017_09_15.tgz
export PATH=$PATH:/opt/pic32mx/bin
```

the last line may also be added to your ~/.bashrc script.

Install the example code in a working folder:

```
tar xvfz rm_deti_rob.tgz
```

Test Execution

To test if all tools are working correctly, execute (in the folder rm_deti_rob):

```
cd src
pcompile rm-example.c rm-mr32.c
```

Connect the robot to your PC USB port and execute:

```
ldpic32 -w rm-example.hex
pterm
```

Press the start and stop buttons of the robot. The robot should rotate and your terminal should display the values of the obstacle sensors (that are not used in this assignment).

Deliverables

- Source code of the developed agents
- Report (in PDF format; according to Springer LNCS paper template)