universidade de aveiro

Intelligent Mobile Robotics

Assignment 1

Robotic challenge solver using the **CiberRato** simulation environment

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Challenge 1 - Control

Decision based on **four main states**:
(Descending priority)

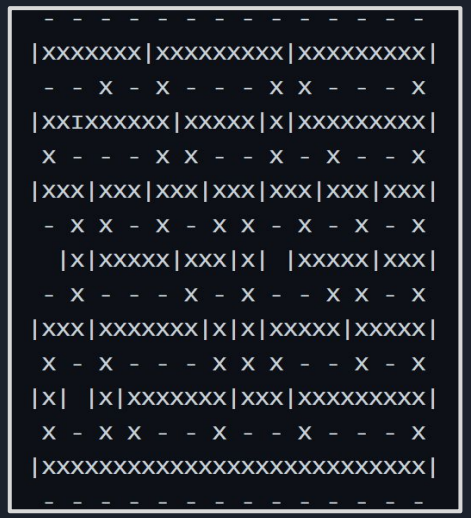
- High danger
  - (front sensor > 2.0) or (left sensor > 2.7) or (right sensor > 2.7)
- Medium danger
  - (front sensor >1.1) or (left sensor > 2.7) or (right sensor > 2.7)
- Low danger
  - (front sensor > 0.6) or (left sensor > 2.6) or (right sensor > 2.6)
- No danger
  - (front sensor > 0.5) or (left sensor > 2.1) or (right sensor > 2.1)

Challenge 1 - Control

According to the priority presented in the previous slide, the robot will make an **increasingly accentuated** curve the **greater** its **distance** from a **wall**

Challenge 2 - Mapping

- **Surroundings Evaluation**
  Manipulation of visited and unvisited cell lists
- **Map Output**
- **Movement** (next slide →)



Challenge 2 - Mapping

- Movement
  - Initial position and respective offset
  - Exploration strategy
    i. Unvisited cells (left, front, right, back)
    ii. Visited cells (left, front, right, back)
  - “Movement” itself
    i. Calculating the displacement to the next position
    ii. Movement/Deviation control
  - Rotation
    i. Progressive rotation speed
    ii. Deviation control

Challenge 3 - Planning

- Movement based on mapping challenge
- Beacon detection
- A* Search Algorithm
- Output path

  path(beacon 0, beacon 1) +
  path(beacon 1, beacon 2) +
  path(beacon 2, beacon 0)

Results achieved

- Control Challenge
  3000 points acquired with no collisions (approximately seven and a half laps)
- Mapping Challenge
  Exploration of the **entire map** and subsequent elaboration of the **output map** design
- Planning Challenge
  Best closed path between beacons is identified