

University of Genoa, 2022/23  
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# Assignment 1

7. Lecture of Experimental robotics



# The Scenario

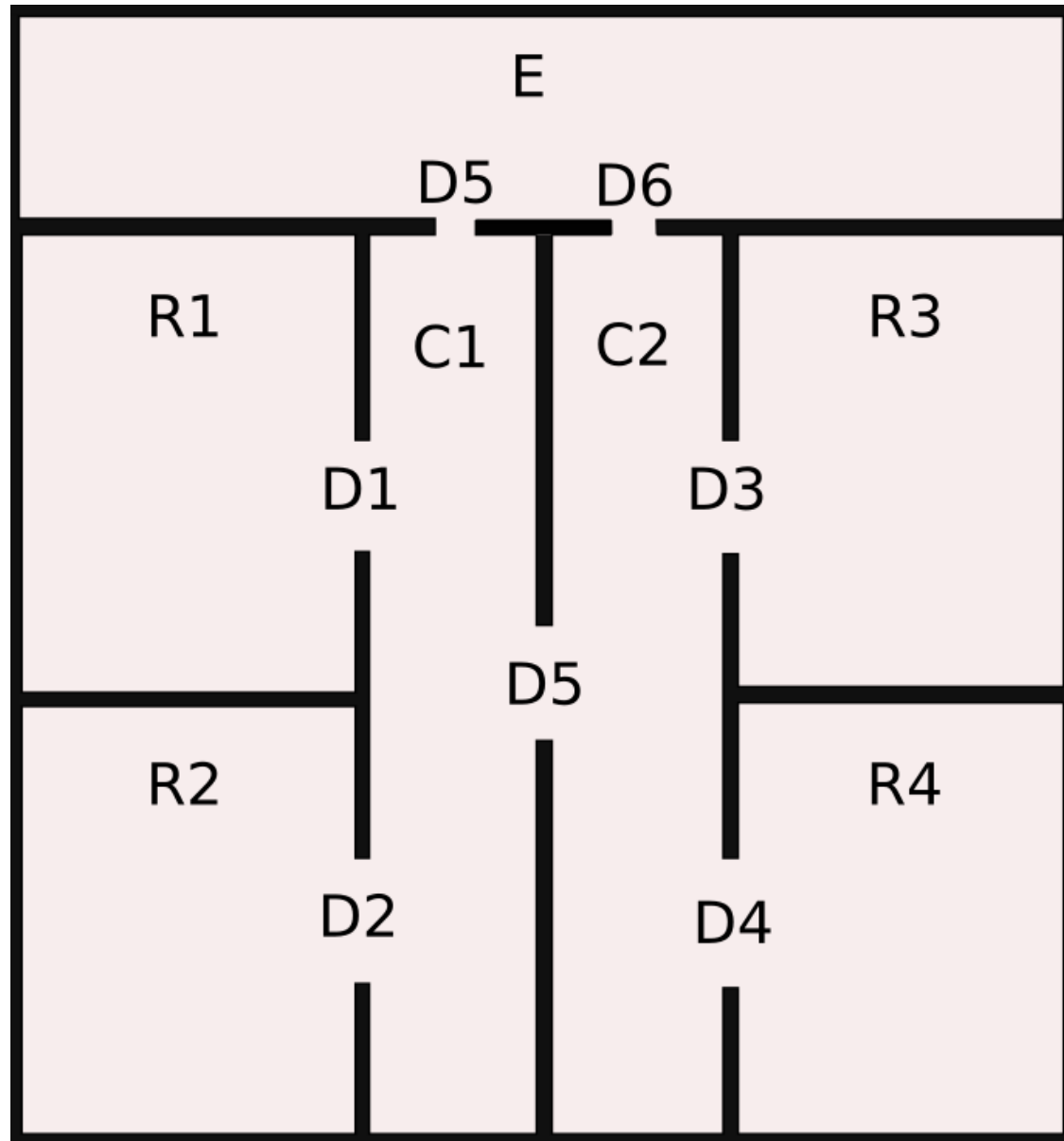
The scenario involves a robot deployed in a indoor environment for surveillance purposes.

The robot's objective is to visit the different locations and stay there for some times.

# The Environment

Consider a 2D environment made of 4 rooms and 3 corridors.

Which might not necessarily be as in the figure.





# The Phases (1)

The robot start in the E location and waits until it receives the information to build the topological map,  
i.e., the relations between C1, C2, R1, R2, R3 locations and the doors D1...D6.



# The Phases (2)

The robot moves in a new location, and waits for some times before to visit another location. This behavior is repeated in a infinite loop.

When the robot's battery is low, it goes in the E location, and wait for some times before to start again with the above behavior

*Hint:* Consider the waiting duration as parameters.



# The Surveillance Policy

When robot's battery is not low, it should move among locations with this policy:

- It should mainly stay on corridors,
- If a reachable room has not been visited for some times it should visit it.

*Hint:* see the ROOM, CORRIDOR and URGENCY concepts presented in the [https://github.com/buoncubi/topological\\_map\\_tutorial](https://github.com/buoncubi/topological_map_tutorial).



# Robot Control and Stimulus

Use the approach presented in the [https://github.com/buoncubi/arch\\_skeleton](https://github.com/buoncubi/arch_skeleton) example to simulate the movements of the robot and its stimulus (e.g., battery low).

Use a similar approach also to provide the robot with the information to build the topological map during Phase 1.



# Submission



# Submission

- Send the link of a github repository to `luca.buoncompagni.unige@gmail.com` and `carmine.recchiuto@dibris.unige.it`

The repository should contain:

- all the developed code
- documentation with Doxygen, docstring, or similar
- a README.md file with the report of your work

Deadline: the 13<sup>th</sup> of November.

# Readme Template

1. Brief introduction (couple of sentences).
2. Software architecture, temporal diagram and states diagrams (if applicable). Each diagram should be commented with a paragraph, plus a list describing ROS messages and parameters.
3. Installation and running procedure (including all the steps to display the robot's behavior).
4. A commented small video, a GIF, or screenshots showing the relevant parts of the running code.
5. Working hypothesis and environment (1 or 2 paragraph).
  1. System's features (1 or 2 paragraph).
  2. System's limitations (1 or 2 paragraph).
  3. Possible technical Improvements (1 or 2 paragraph).
6. Authors and contacts (at least the email).



# Evaluation

We mainly evaluate:

- the design of the software architecture included: interfaces, parameters and behaviors formalization,
- the quality of the developed code and its documentation,
- the ability to design and highlight working hypothesis and limitations,
- the ability to plan ahead and make an architecture that could be adapted for more complex scenarios.
- the ability to test (using randomness) the architecture and evaluate its outcomes,
- the quality of the repository and readme file.



**Questions?!**