



# ARTIFICIALY INTERVIEW – ASSIGNMENT

## Introduction

The purpose of this assignment is to test your familiarity with best practices in software design and development. Your project will be discussed and eventually expanded during the technical interview.

## General Rules

- Implement the exercise using Python
- You can use the free tools and libraries you prefer, but try to use popular ones and explain your choice (professionals do not use niche libraries if not required)
- Spend at most 6 hours of work on the assignment
- Develop the solution as you are delivering a professional application
  - Even though simple solutions are acceptable, avoid quick and dirty implementations
  - Follow design and development best practices
  - The final solution should be easily readable and extendable
- Try to fill the doubts you may have regarding the requirements with reasonable implementations and functionalities

## Deliverables

- The code must run. You have to provide proper instructions about how to do it.
- The developed project should be sent via mail as a zipped file by the 17:00 of the day before your technical interview.
  - The zipped file should NOT contain binary files.
  - Please ask confirmation in a separate mail for the correct delivery of the mail, to avoid problems with the antispam filter.

## Assignment - Cleaning Robot

The company ArtiCleaning produces household cleaning robot, and it wants to develop a REST application in Python that allows the user to remotely control a robot. The environment in which the robot will move is defined by a map. A map is a rectangular grid made of tiles. Each pair of (x, y) coordinates identifies a tile. A tile can be either walkable or non-walkable (e.g. they can be occupied by obstacles, or they implicitly form a wall).



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## set-map endpoint

The current environment can be selected by the user through the set-map endpoint. It accepts a file of a map as input and sets the current environment into the robot. The file can be either a json or a txt file (two examples are attached to these instructions).

The **txt file format** is a rectangular grid where o and x identify walkable and non-walkable tiles respectively:

```
xxxxx00000xxxxx
000000000000000
000000000000000
000000000000000
00000xxxxx00000
```

The **JSON file format** instead contains the number of rows and columns of the rectangular grid, and a list of tiles. Each tile contains the x, y coordinates and a walkable flag:

```
{
  "rows": 10,
  "cols": 10,
  "tiles": [
    { "x": 0, "y": 0, "walkable": true },
    ...
  ]
}
```

## clean endpoint

The main endpoint that the robot exposes is the clean one: it takes as input a starting location (a pair of coordinates x,y) and a sequence of actions that form the path that the robot will follow.

Each action is described by the direction of the movement (north, east, south, west) and the steps to take in that direction.

The robot has collision sensors: if the sequence of actions guides the robot towards a non-walkable tile, an error should be thrown and the cleaning session should stop with an error.

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Once the robot has finished his routine will send back a JSON report as a response to the API call. The report will contain the list of tiles cleaned by the robot, and the final state of the session (completed or error).

The application should also store in a local database the information of the cleaning session (session start time, session final state, number of actions, number of cleaned tiles, and duration).

## history endpoint

The user can download a dump of the previous cleaning sessions in CSV format. This will be the history functionality.

## Extended functionality

As a last constraint, consider that ArtiCleaning produces different models of robots. The base one has been already described above. The premium model has sensors that recognize if the current tile is dirty or cleaned. If it's cleaned, the robot just skip that tile to save power and water: tiles that were already clean before the session should not increment the counter of cleaned tiles.