Navigation of a mobile wheeled robot

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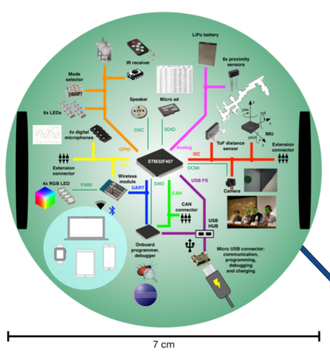
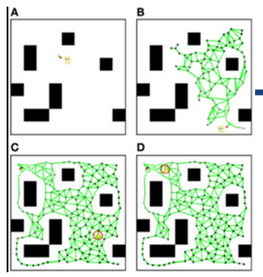
Pioneer 3dx

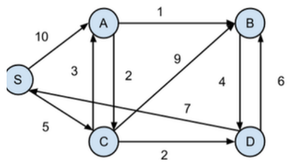
The Pioneer 3dx robot is a small model of mobile robot with 2 wheels which is usually used for studies and research .

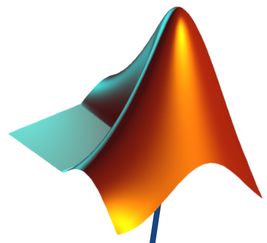
Robots navigation

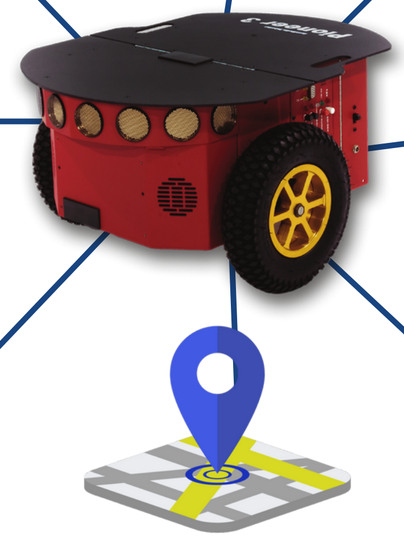
- Exploring its environnement.
- Determining the shortest path.
- Localizing itself in the same time.

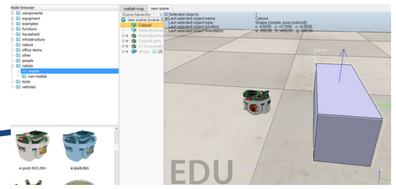


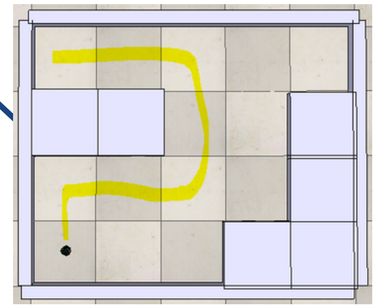












Steps and tools

1- Making the algorithm.
2- Implementing the algorithm in Matlab.
3- Simulation in CoppeliaSim

Results

Once Matlab got connected to CoppeliaSim, the simulation could start, and the robot could follow the path that has been planned to get to the goal.

Project's goals

In this project, the map is already given with obstacles, the robot has to find the shortest path and to go to the goal point.

Dijkstra's Algorithm

Dijkstra's algorithm gives the shortest path the robot can take from a start point to the arrival point.

```
while G is unmarked
    n ← n + 1
    for each unmarked cell c in grid
        next to a marked cell
        mark c with n
current ← G
append current to path
while S not in path
    append lowest marked neighbor c
        of current to path
    current ← c
```

Obstacles

The robot needs to localize itself constantly, and the sensors couldn't give the exact information.