

MOBILE ROBOTS Case Studies 5

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Mail delivering robot

You have to design the routing system of a mail delivery robot traveling on footpaths in a large city. You have a specific map with all existing footpaths at your disposal, but you do not know where there are obstructed footpaths (work in progress). How do you expect implementing the path planning?



- A. Planning several times at regular dist. + local avoidance**
- B. Planning + local avoidance + replanning if blocked**
- C. Like B + map edition before replanning**

Mail delivering robot

Replanning on the same map will give the same results! Therefore not useful if you find an obstacle that cannot be passed. Replanning after an avoidance can be fine if you passed the obstacle, not if the obstacle cannot be passed.



- A. Planning several times at regular dist. + local avoidance**
- B. Planning + local avoidance + replanning if blocked**
- C. Like B + temporary map edition before replanning**

Path planning in exhibition

In an exposition about planets, you need to implement a navigation of a Thymio robot (simulating a starship) initially placed by the visitors on a large surface ($4 \times 4 \text{m}^2$) navigating through a set of planets toward a planet base (big hot light, can be detected from far). How do you implement it:



- A. Visibility graph with expansion of robot size**
- B. Local potential field navigation attracted by base and repulsion by planets**
- C. Ant colony optimisation approach**

Path planning in exhibition

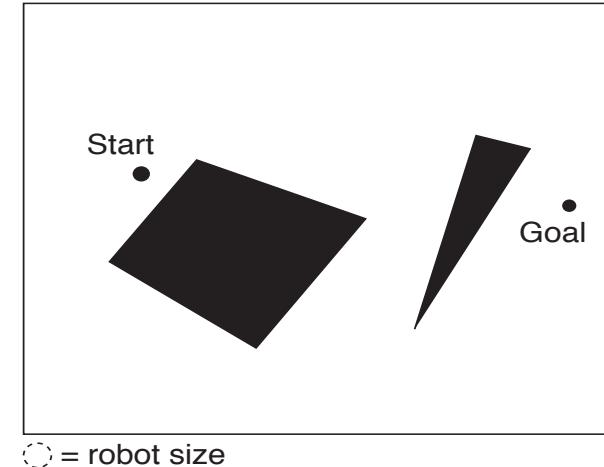
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- A. **Visibility graph with expansion of robot size**
- B. **Local potential field navigation attracted by base and repulsion by planets**
- C. **Ant colony optimisation approach**

Which algorithm?

You have an application where your robot need to navigate in a building with a strange architecture, close of this type of object and path shape, what approach of path planning would you choose to get an optimal path with the simplest algorithm?

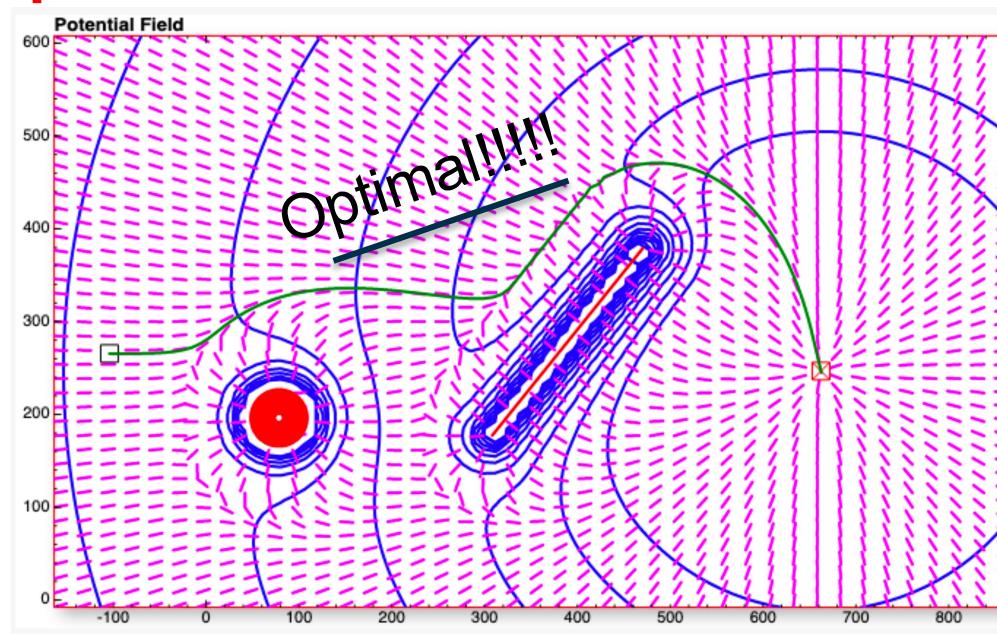


- A. Potential field, as there would be no local minima and the resulting trajectory is optimal.
- B. With vertical cell decomposition, these simple shapes are perfect, generate only few cells (10 here), are easy to compute and generating optimal path.
- C. This shape of object is perfect for visibility graphs, easy to compute and generating an optimal path.

Which algorithm?

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B – For vertical cell decomposition this simple shapes are perfect, generates only few cells (10 here), easy to compute and generating optimal path.

