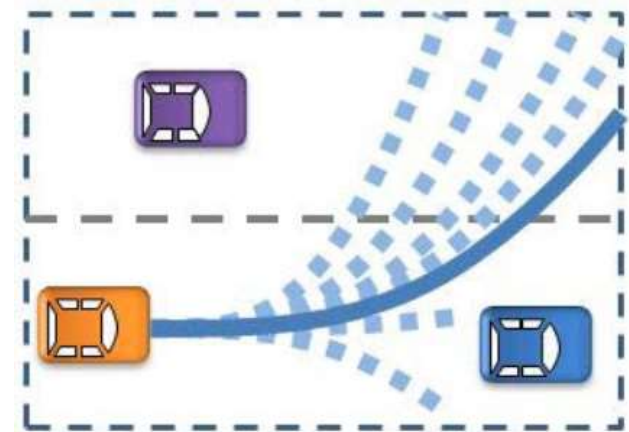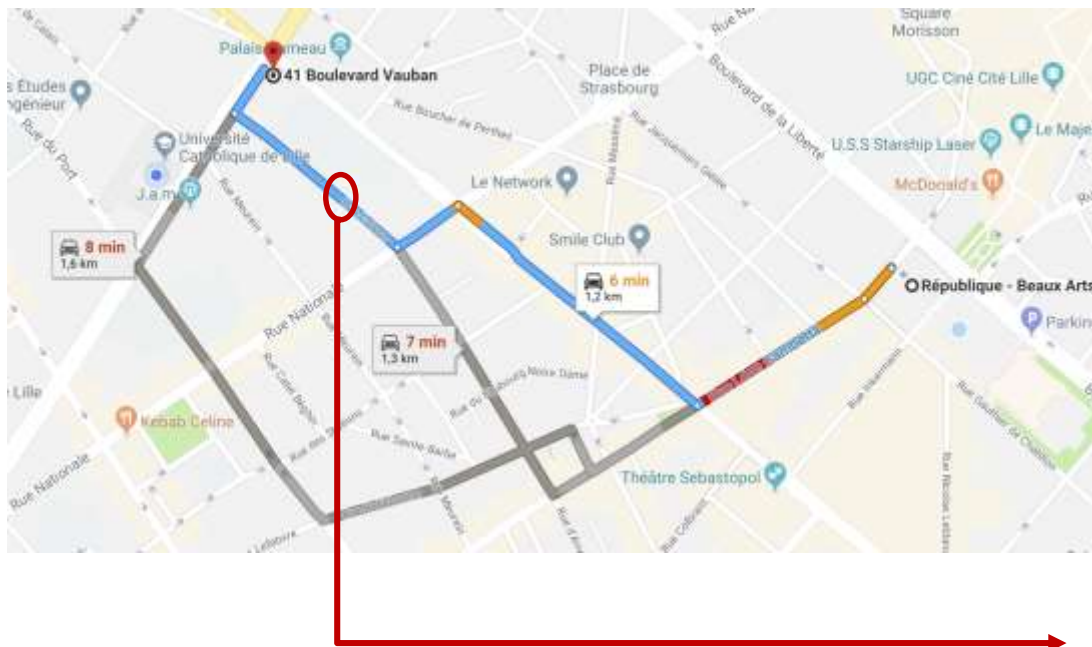# Systèmes robotisés intelligents
# Smart Robotic Systems

# Trajectory planning

## Gilles TAGNE

# Mobile robots trajectory planning

Global planning → Overall itinerary (Trajectory planning)

Local planning → Path planning
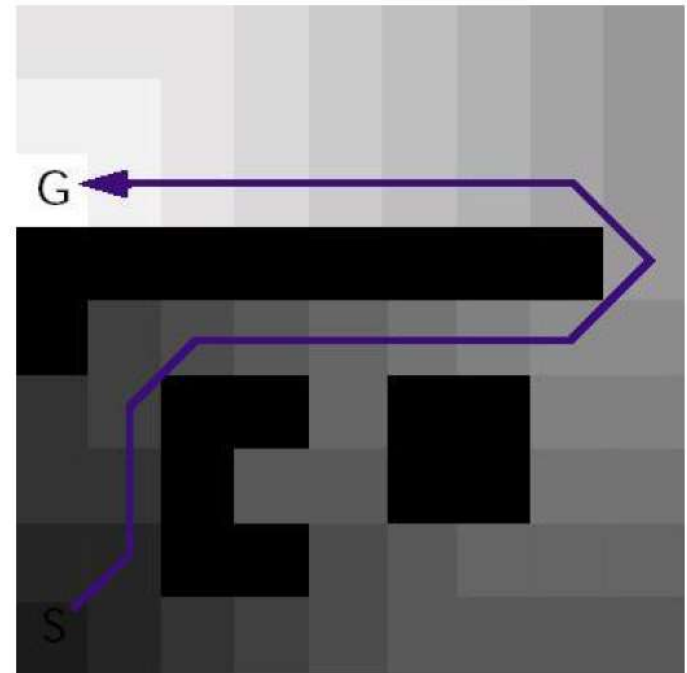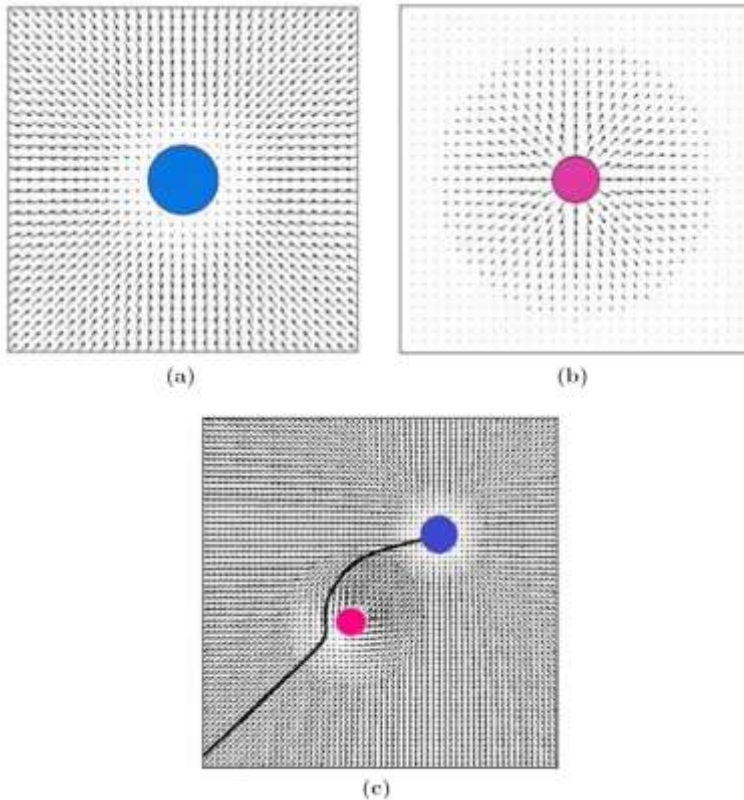
# Mobile robots trajectory planning

Path planning methods:

- Potential fields method
- Methods based on the connectivity of the navigable space of the road and the cellular decomposition
- Constant turning field method
- Dynamic window
- Model Predictive based Methods
- Tentacles method
- Fuzzy logic planning

# Mobile robots trajectory planning

## Potential fields method

Attractive fields (a)
Repellents fieds (b)



(a)

(b)

(c)

# Mobile robots trajectory planning

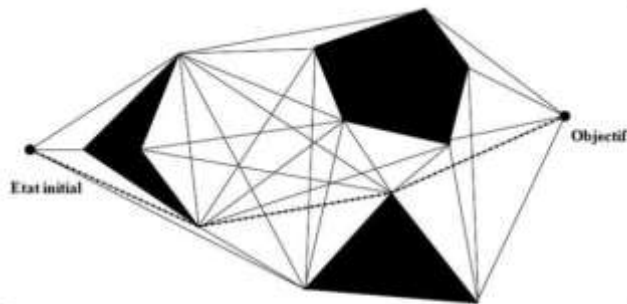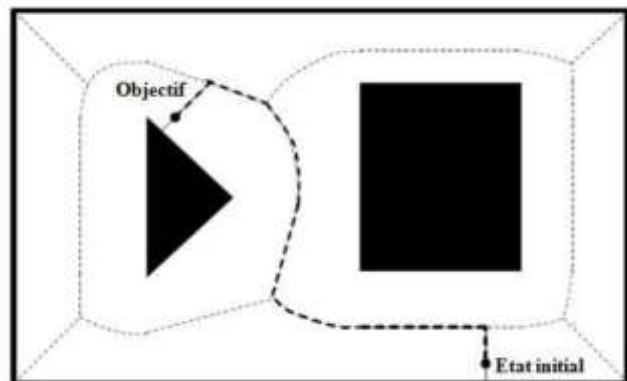**Methods based on the connectivity of the navigable space of the road and the cellular decomposition**

Visibility graphs (a)
Voronoï diagrams (b)
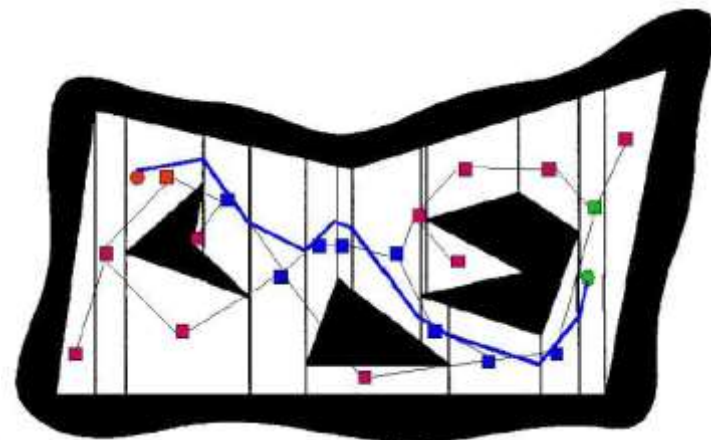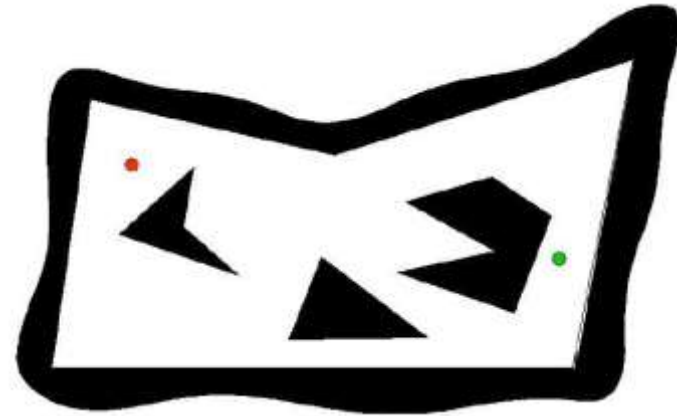


(a)
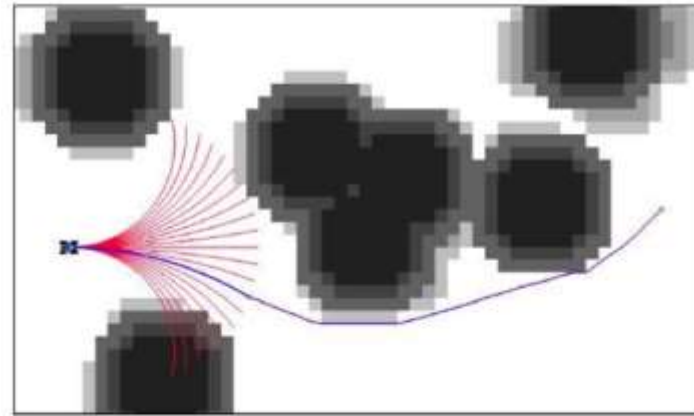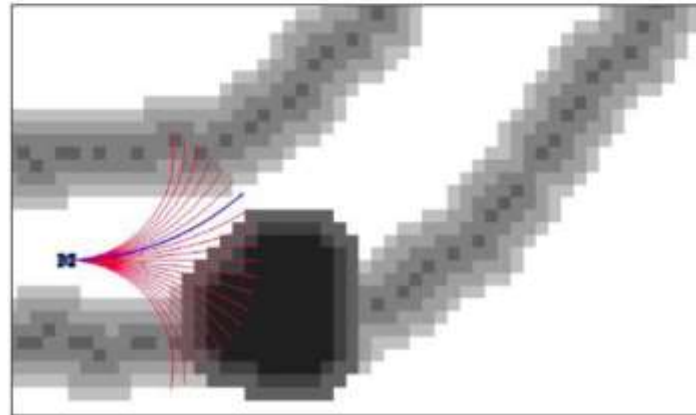
(b)

# Mobile robots trajectory planning

## Constant turning field method

Unstructured environment (a)
Structured environment (b)



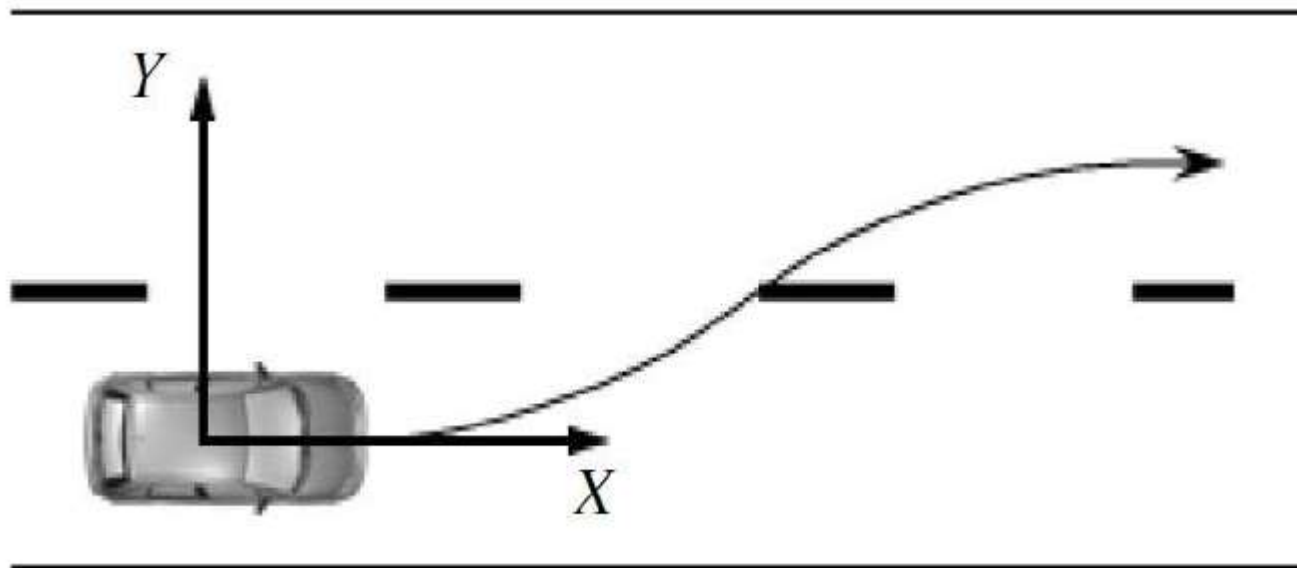(a)

(b)

# Mobile robots trajectory planning
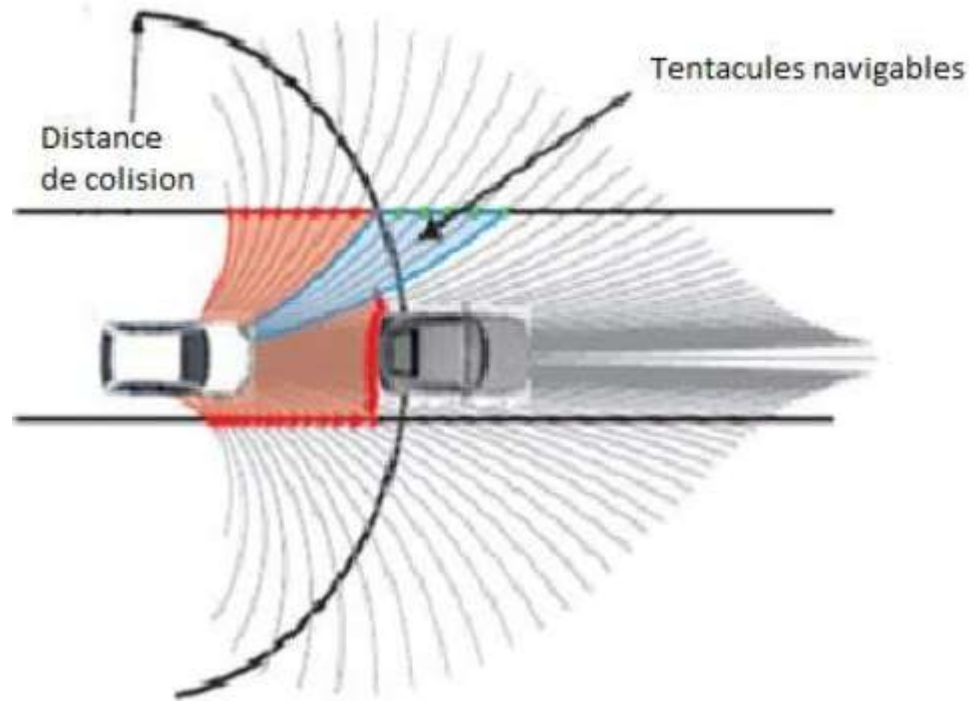
## Dynamic window

Find the navigable space
Choose the command entries that maximize the objective function (optimization)
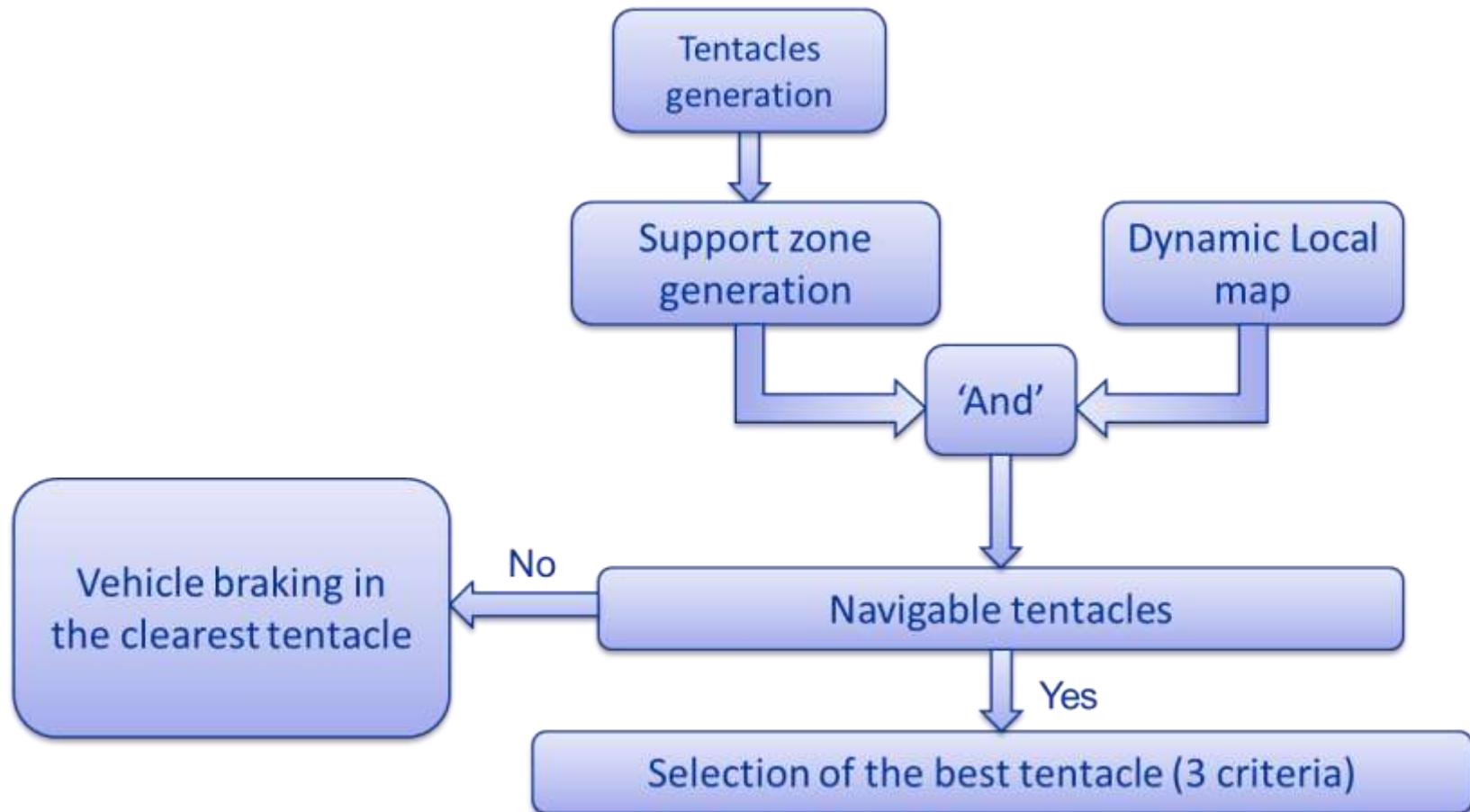Apply the command to the robot

## Model Predictive based Methods

# Mobile robots trajectory planning

## Tentacles method



Distance de colision

Tentacules navigables

# Mobile robots trajectory planning

**Tentacles method**



- Clearing of the tentacle - Change of steering - proximity to the overall trajectory

# Mobile robots trajectory planning

**In conclusion:**
It can be beneficial to use and merge different planning techniques to achieve better results