Rappels

Module 1 : Présentation de la robotique mobile et des capteurs utilisés
Module 2 : Localisation par intégration odométrique
Module 3 : Localisation par télémétrie laser

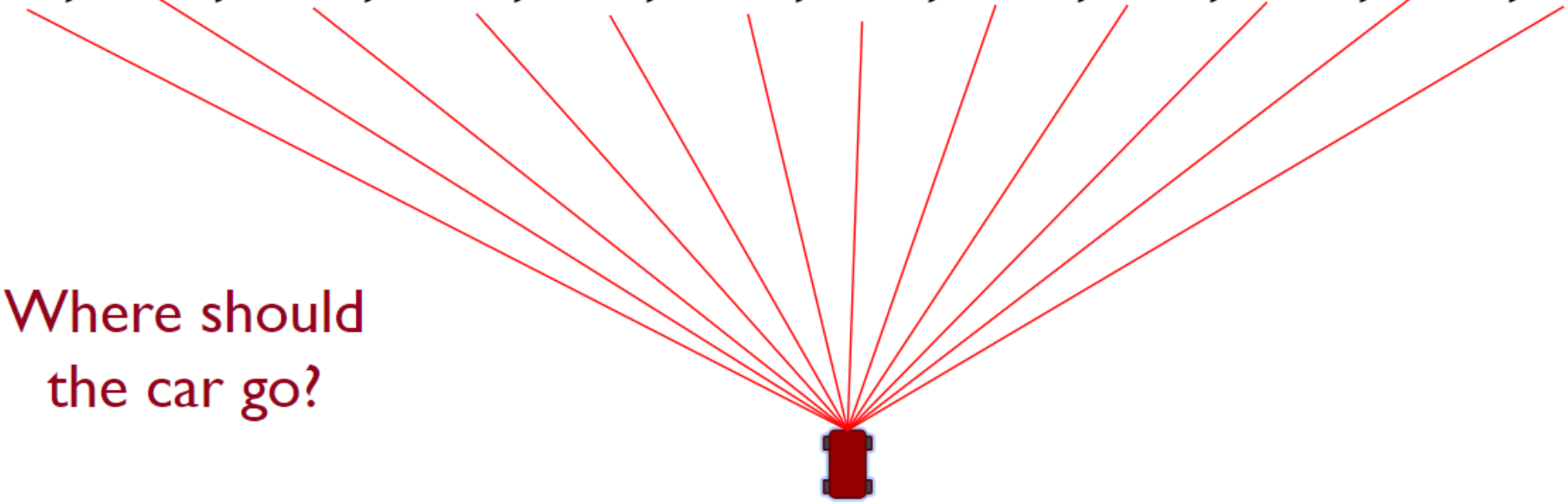
Module 4 : Navigation réactive

Objectifs : Navigation à l'aide des données du télémètre
Sans Carte, sans encodeur

Lien :
https://www.youtube.com/watch?v=3erOYWFrTcI&t=3s&ab_channel=DhruvKarthik

Follow the Gap

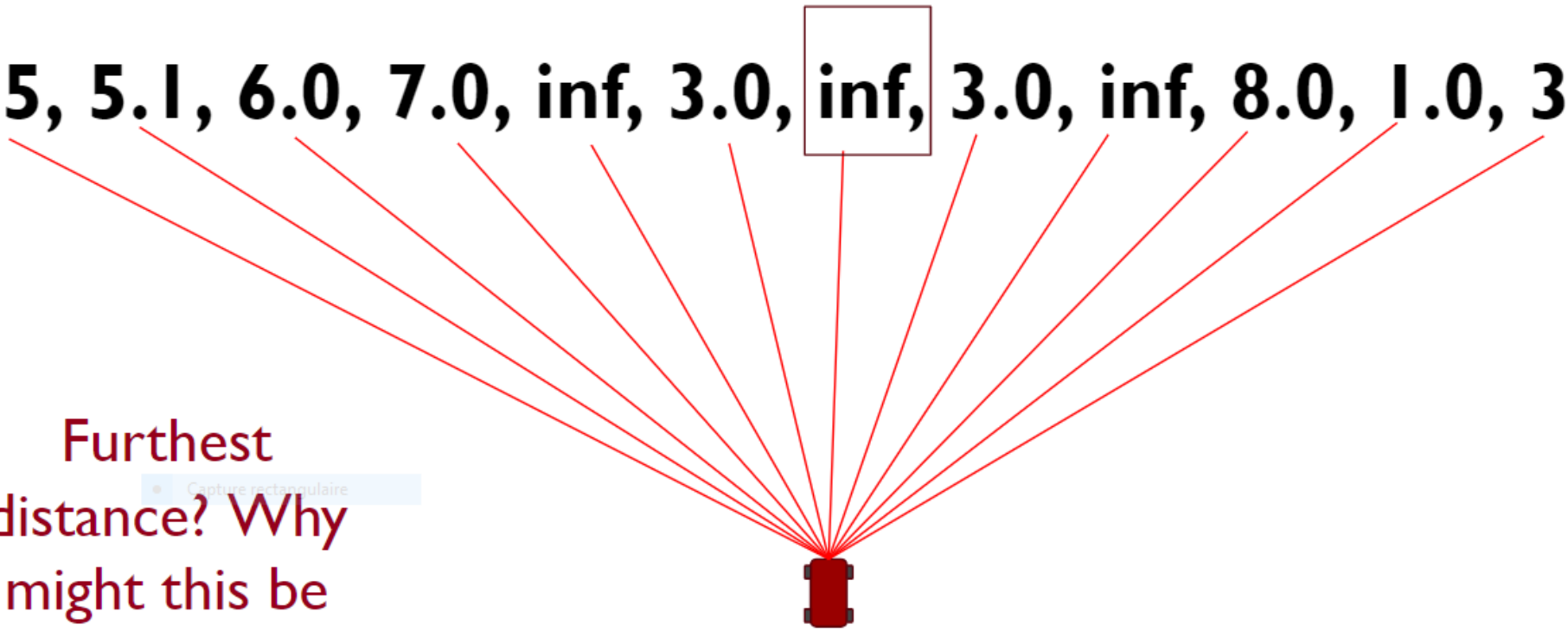
[0.5, 5.1, 6.0, 7.0, inf, 3.0, inf, 3.0, inf, 8.0, 1.0, 3.0]



Where should the car go?

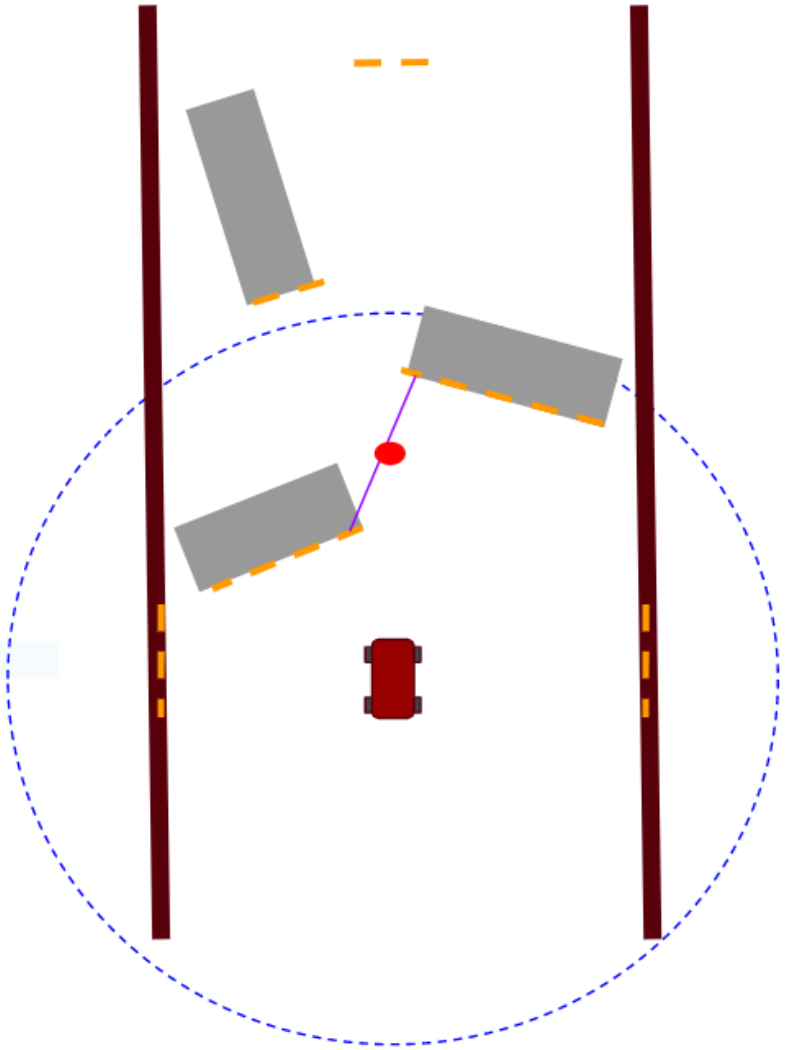
Follow the Gap

[0.5, 5.1, 6.0, 7.0, inf, 3.0, inf, 3.0, inf, 8.0, 1.0, 3.0]



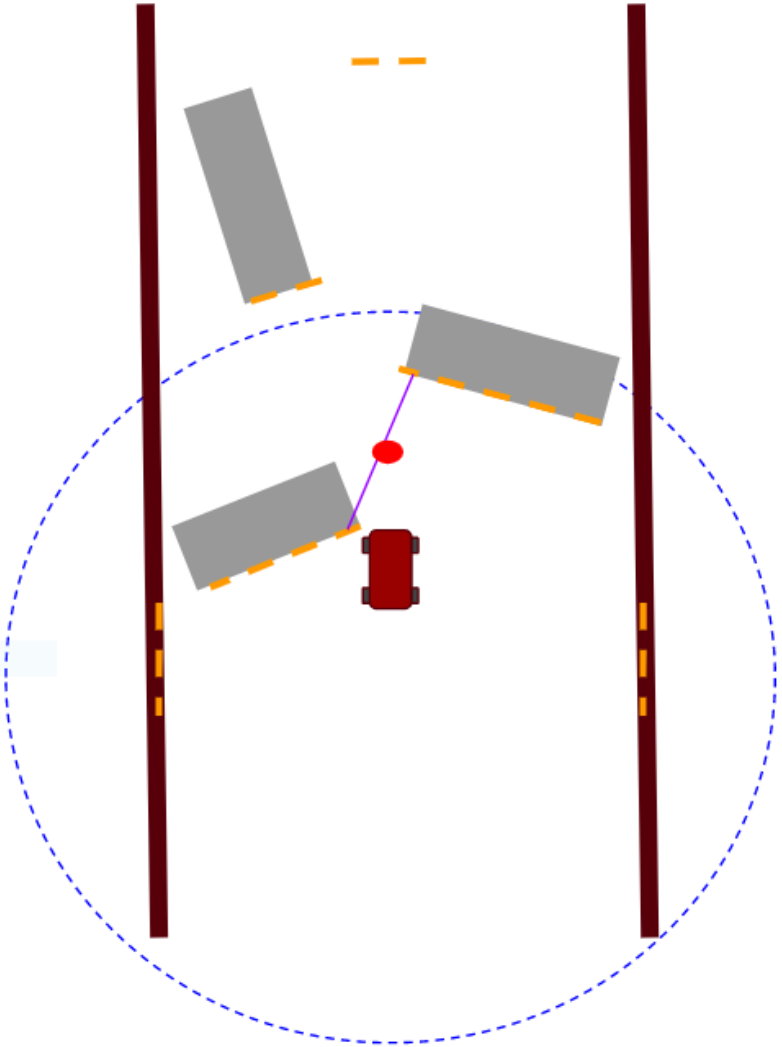
Furthest distance? Why might this be wrong?

Why Naive "Follow the Gap" doesn't work



Why "Find the Largest Gap" doesn't work

- Threshold



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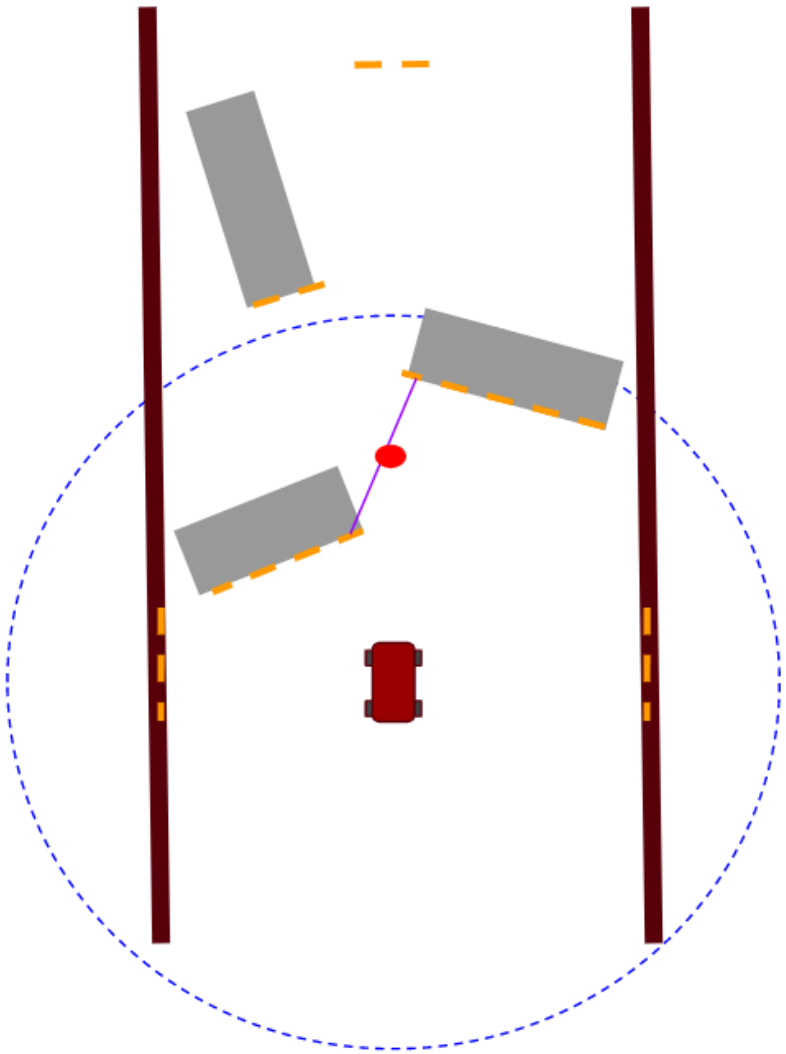


The Idea:

"Seek out the largest gap"

Works fine for holonomic robots (eg. turtlebots)

Works fine for non-holonomic robots in environments with sparse obstacles

Doesn't optimize for safety

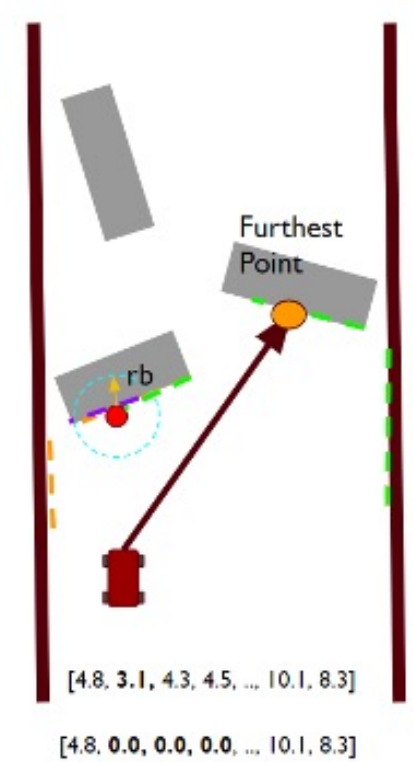
Doesn't consider car's dimensions

Hard to decide threshold *t*

Step 1
Find nearest LIDAR point and put a "safety bubble" around it of radius *rb*

Step 2
Set all points inside bubble to distance 0. All nonzero points are considered 'free space'

Step 3
Find maximum length sequence of consecutive non-zeros among the 'free space' points - The **max-gap**



Step 4
Find the 'best' point among this maximum length sequence

Naive: Choose the furthest point in free space, and set your steering angle towards it

Changing speed results in you losing velocity

Better Idea Intuition
If you're 3-4m away from your closest obstacle, should you immediately make a sharp turn to avoid it?

Webots – Simulateur (Thymio)

Sujet disponible sur Ecampus

- Implémenter une méthode « follow the gap - with bubble »
- Optimiser au maximum sa méthode
- Tester sa méthode en ajoutant des « obstacles »

-> Faire une vidéo de sa solution