

Robotica: veicoli autonomi e algoritmi di navigazione

Emanuele Micheli

Agenda

- Veicoli autonomi: breve introduzione
- Esempi applicativi: partiamo da una cosa semplice.
- I 4 passi della navigazione autonoma
- Navigazione Globale e Locale
- Flow Chart di Navigazione
- Algoritmo A*: dal Travelling salesman problem alla navigazione autonoma
- Algoritmi Classici: go to goal, follow wall, obstacle avoidance, risoluzione labirinti
- SLAM e sensori

Primi passi



La prima vera automobile autonoma



<https://www.youtube.com/watch?v=LZ3bbHTsOL4>

Come Stanley Vede:

<https://www.youtube.com/watch?v=DEuWL9OawWk>

Le automobili autonome oggi

Driverless car: Tesla

<https://www.youtube.com/watch?v=KHvLFujWBeg>



Non solo automobili ovviamente



Scuola di
Robotica

develer



Scuola di
Robotica

develer



Scuola di
Robotica

develer



Scuola di
Robotica

develer



Scuola di
Robotica

develer



Scuola di
Robotica

develer

Sviluppare tecnologia, nuovi software, nuovi algoritmi ha un impatto sulla società.

L'impatto della Navigazione autonoma sulla nostra società

Cambio di Paradigma



Blockbuster 
@blockbuster



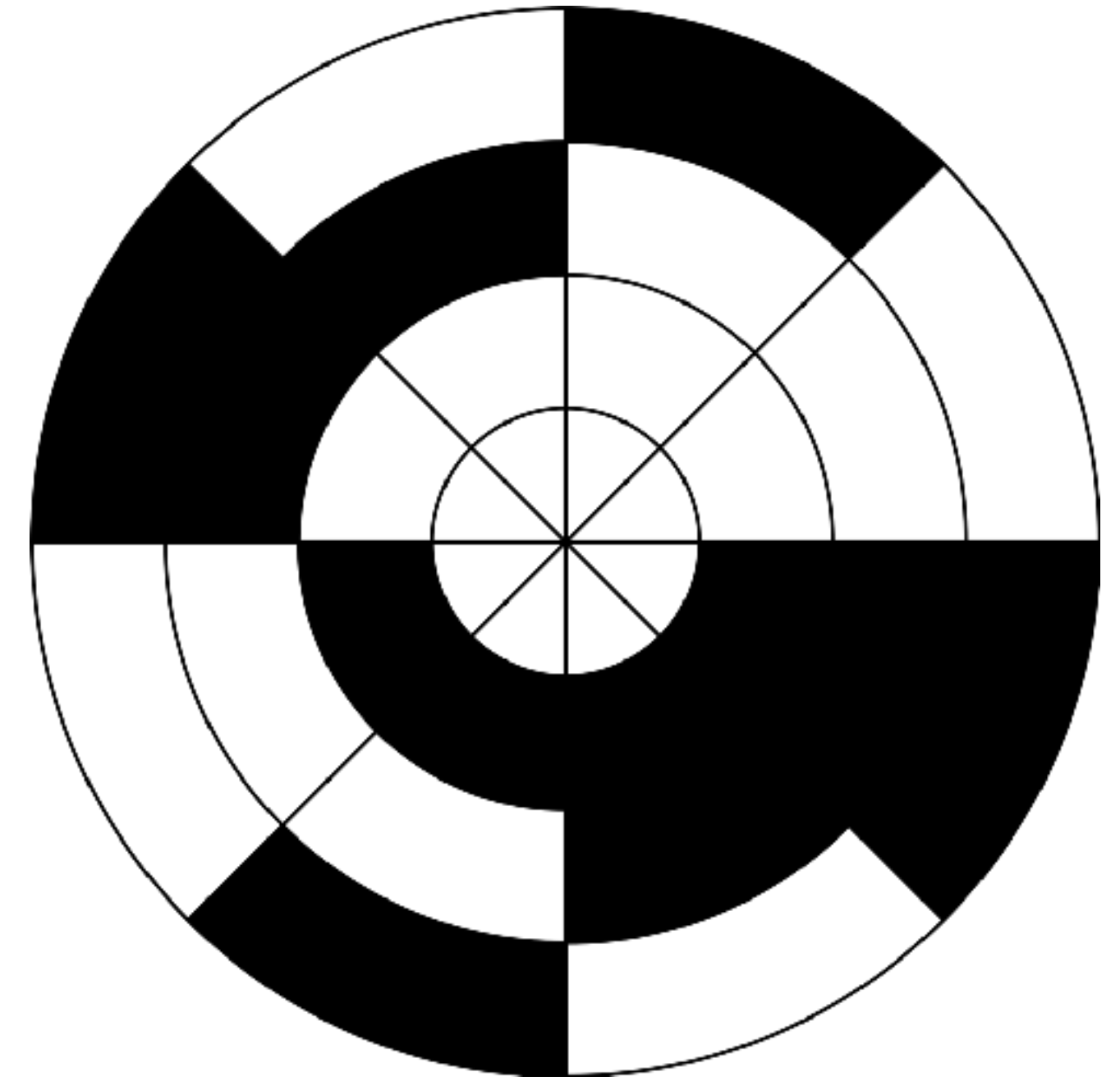
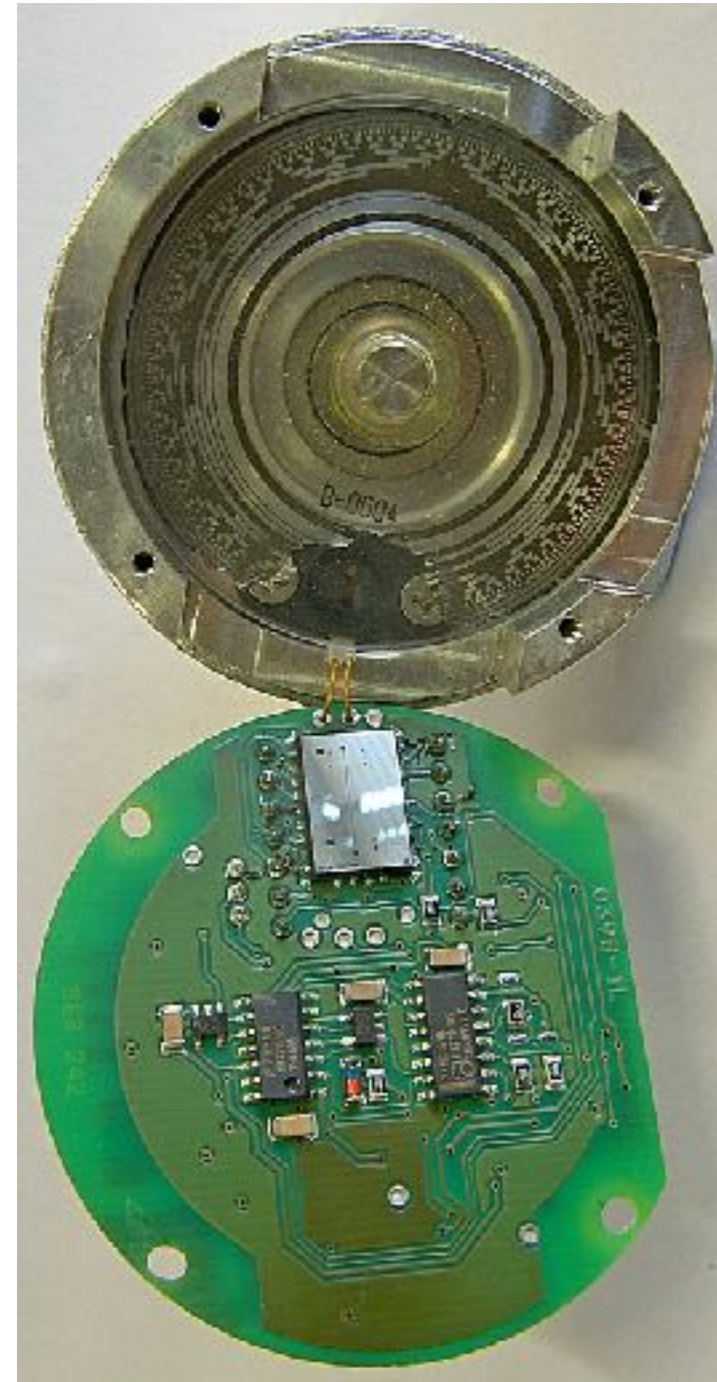
Tweet why you're leaving Netflix. The top three most creative tweets using [#GoodbyeNetflix](#) will win a 1-year subscription to Blockbuster!

3:55 PM · Sep 21, 2011 · [Twitter Web Client](#)

28.8K Retweets **31.4K** Likes

Partiamo da una cosa semplice

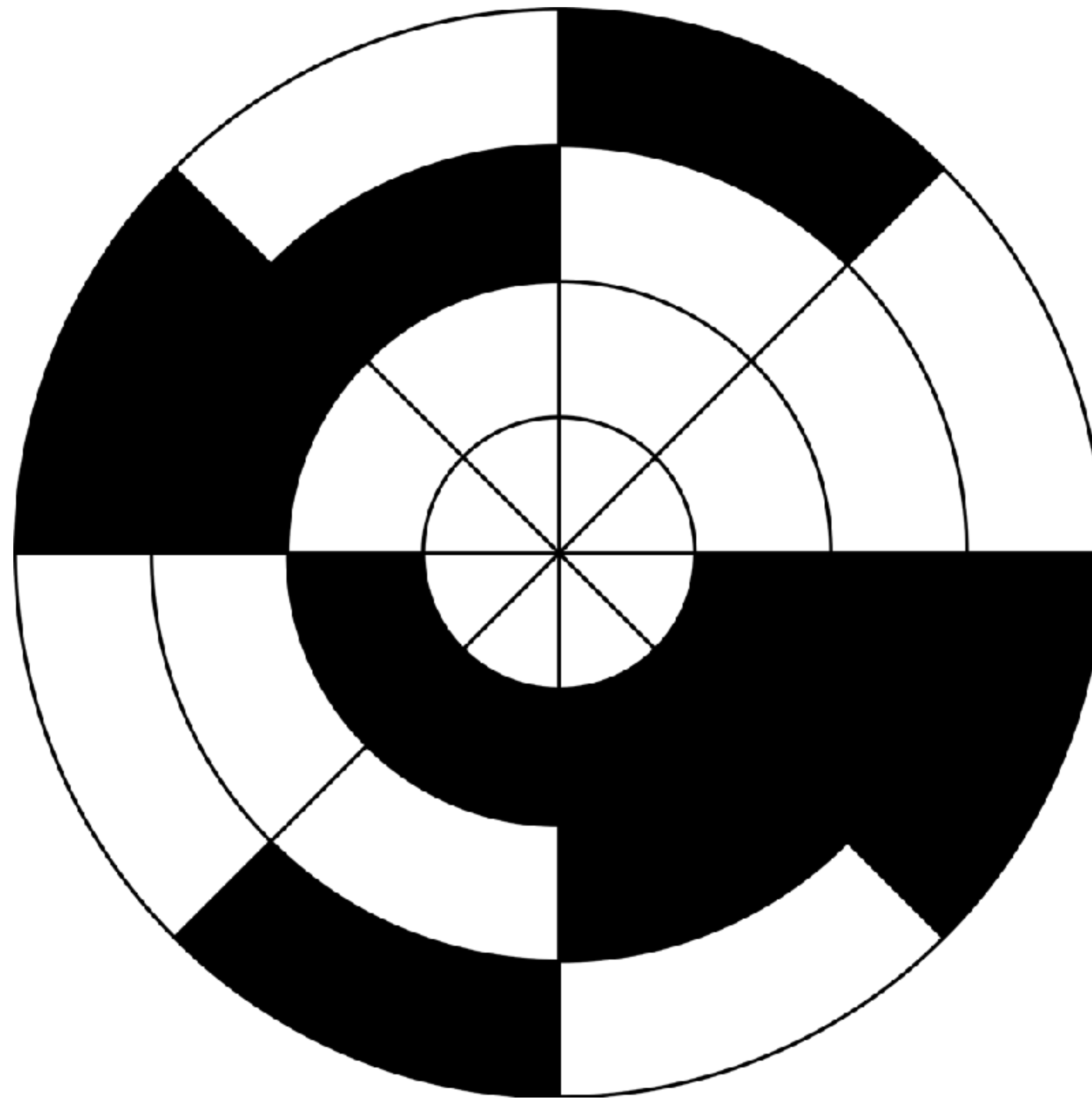
Conosco la mappa dove mi trovo e ho un semplice odometro





Scuola di
Robotica

develer

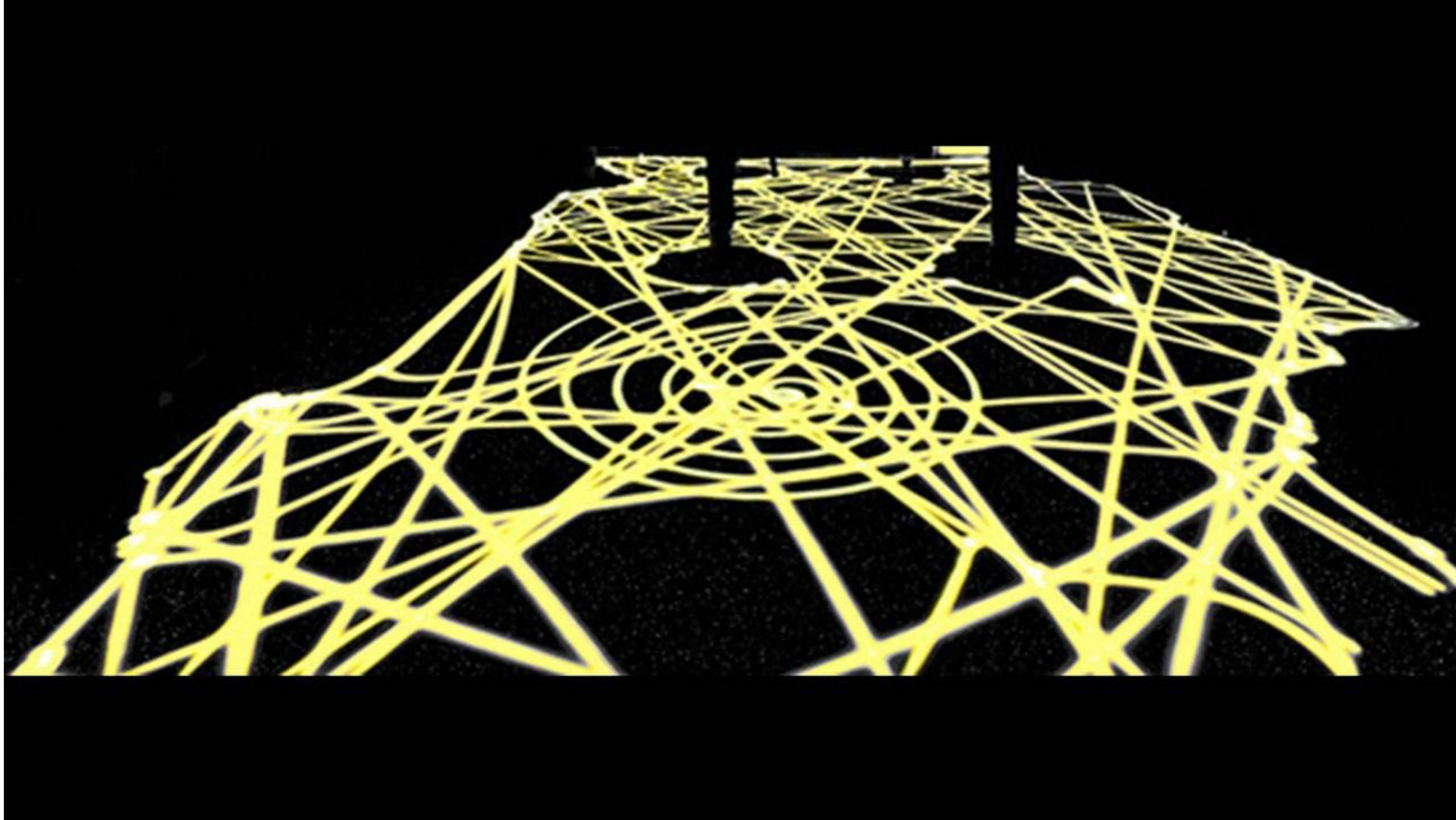


Scuola di
Robotica

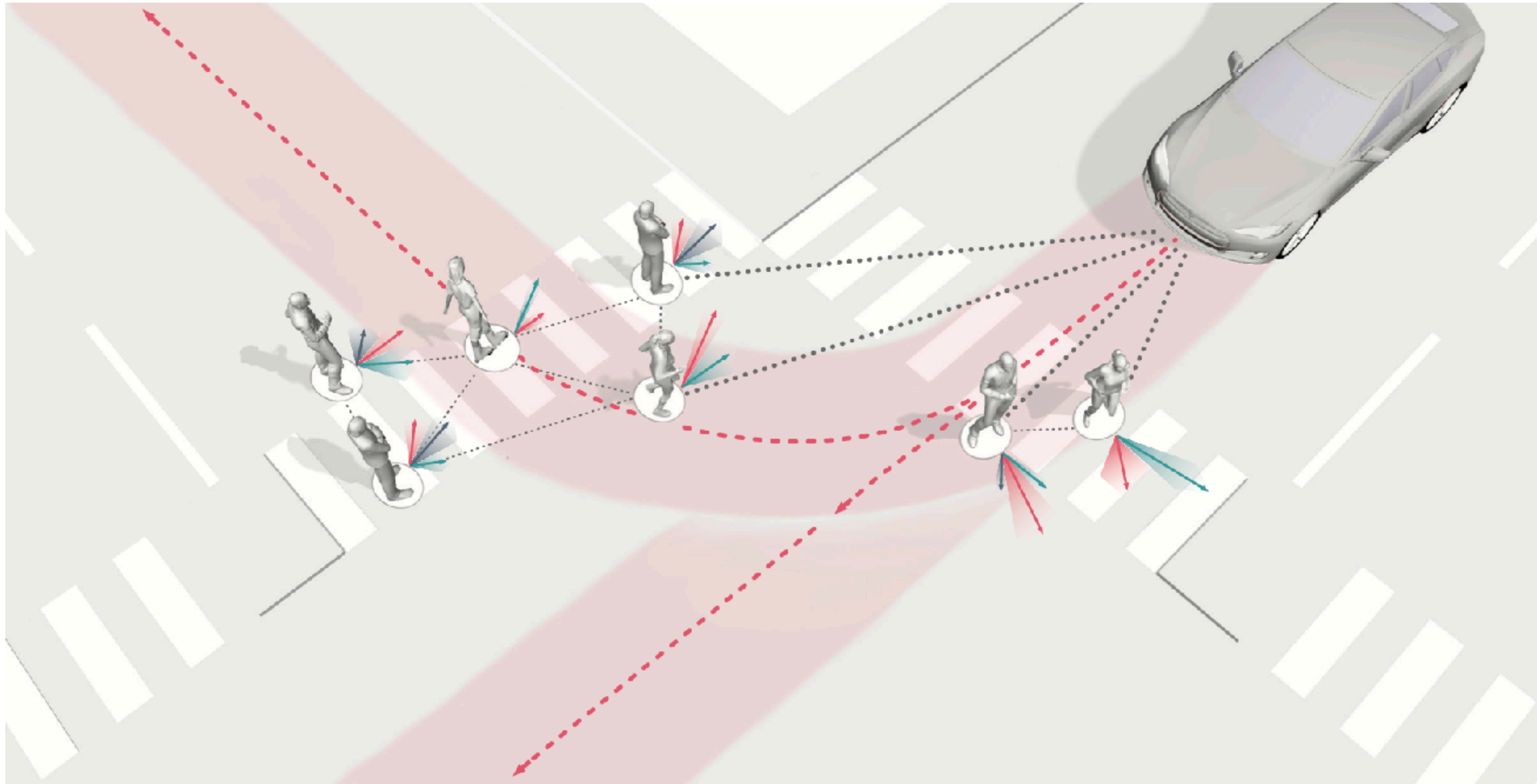
develer

**4 Passi nella navigazione autonoma:
environment mapping, trajectory design,
motion control, and obstacle avoidance**

Environment mapping

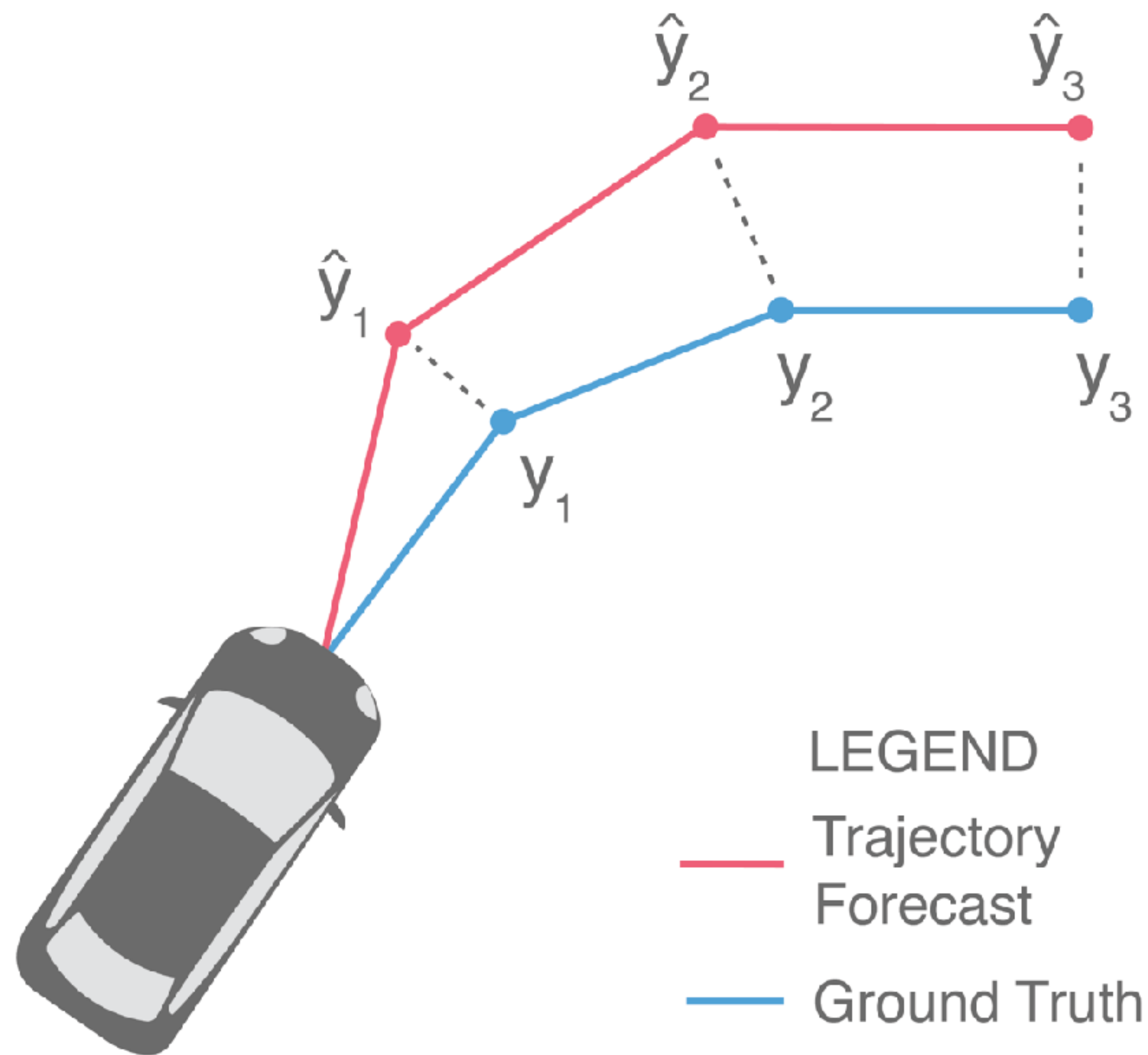


Trajectory design

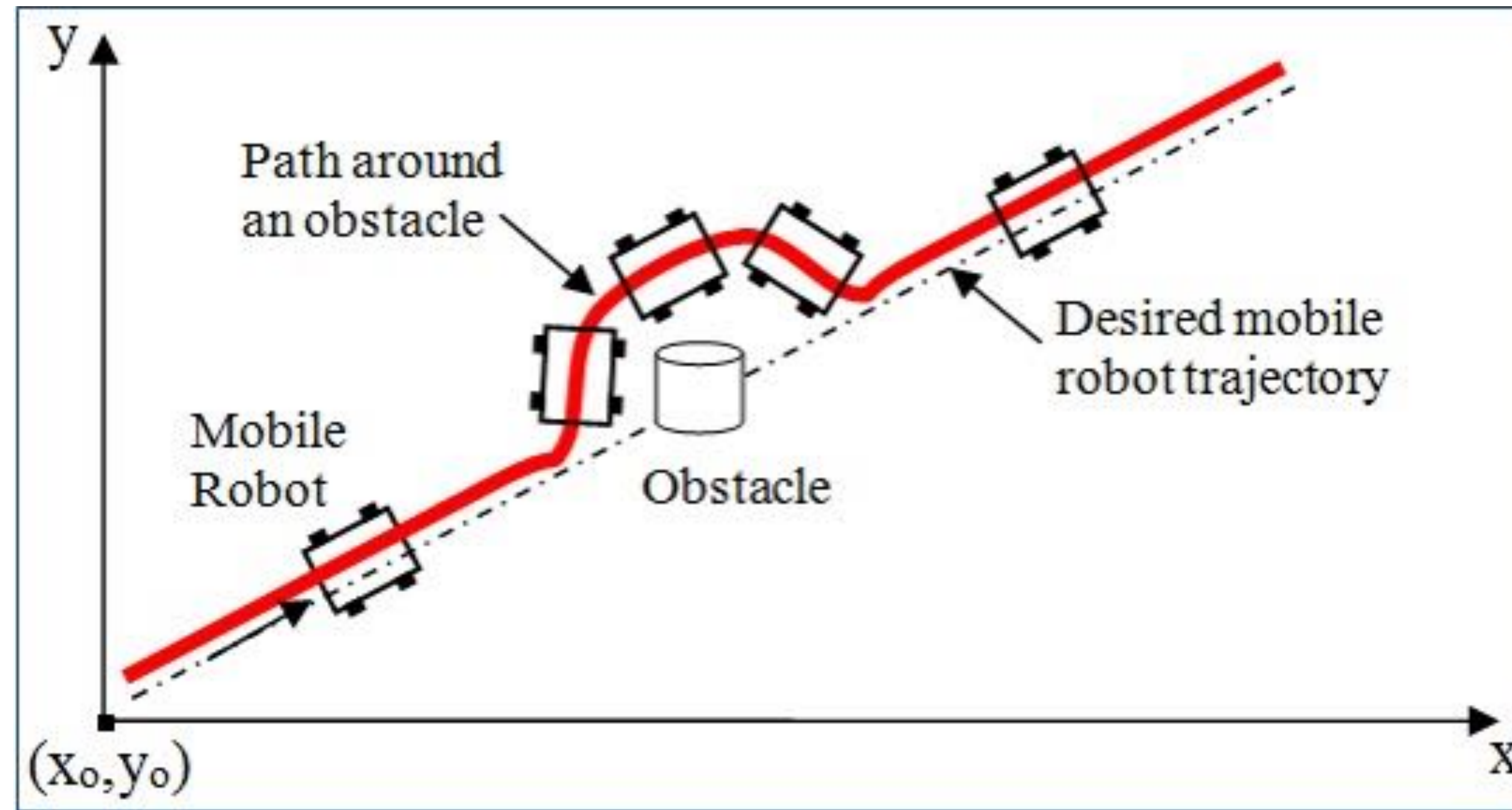


Scuola di
Robotica

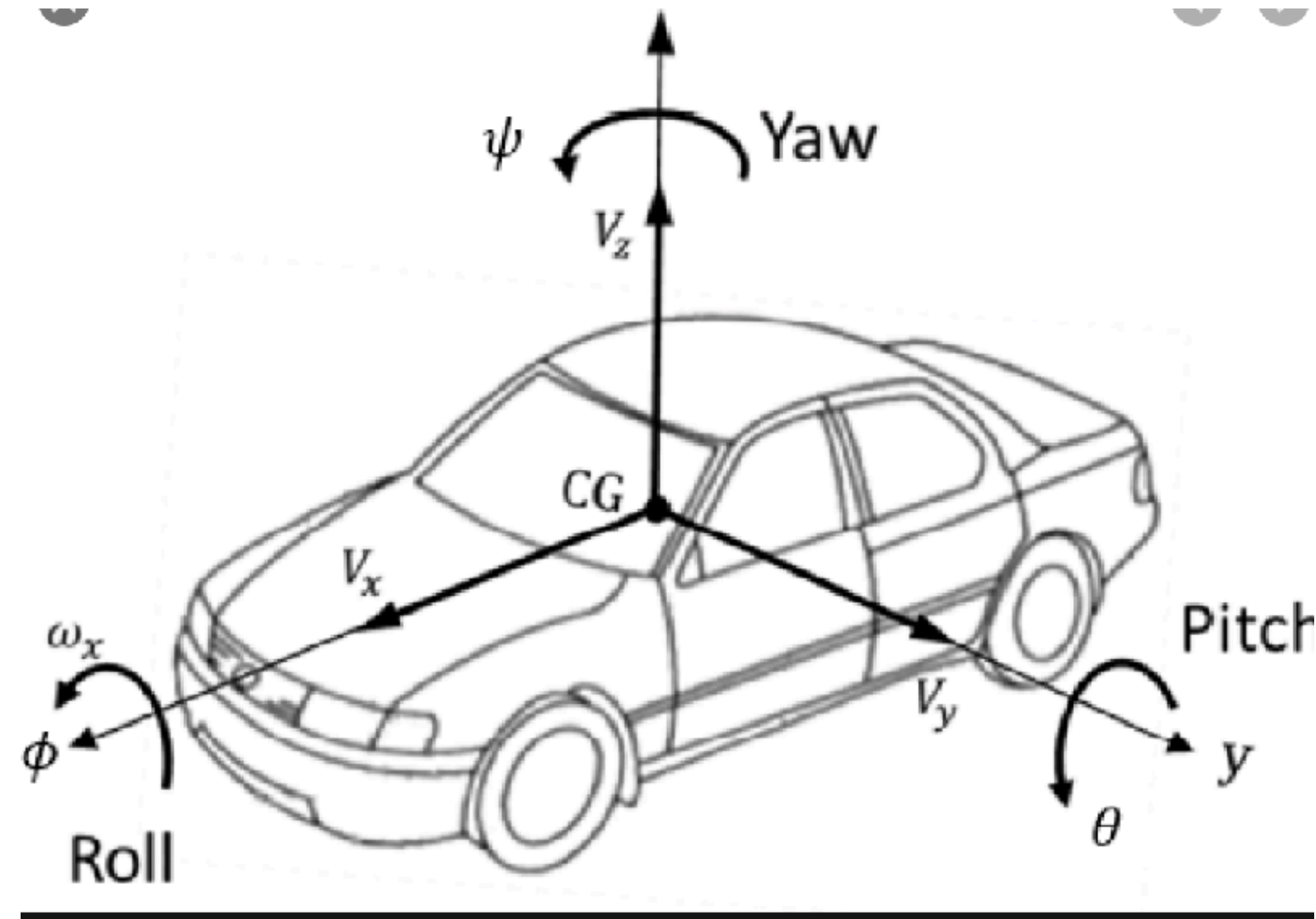
develer



Obstacle avoidance



Motion control

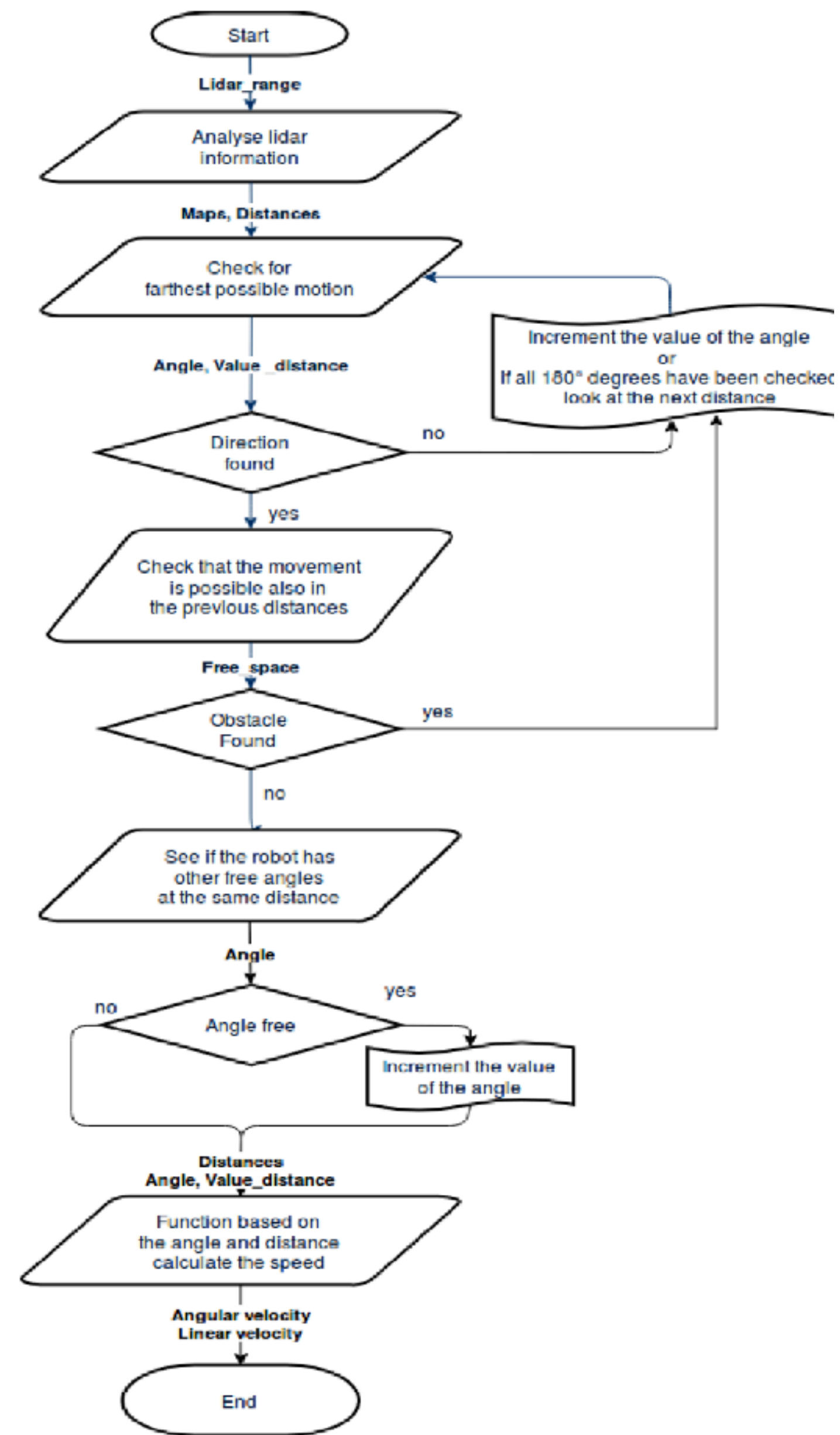


Navigazione Globale e Locale



Scuola di
Robotica

develer

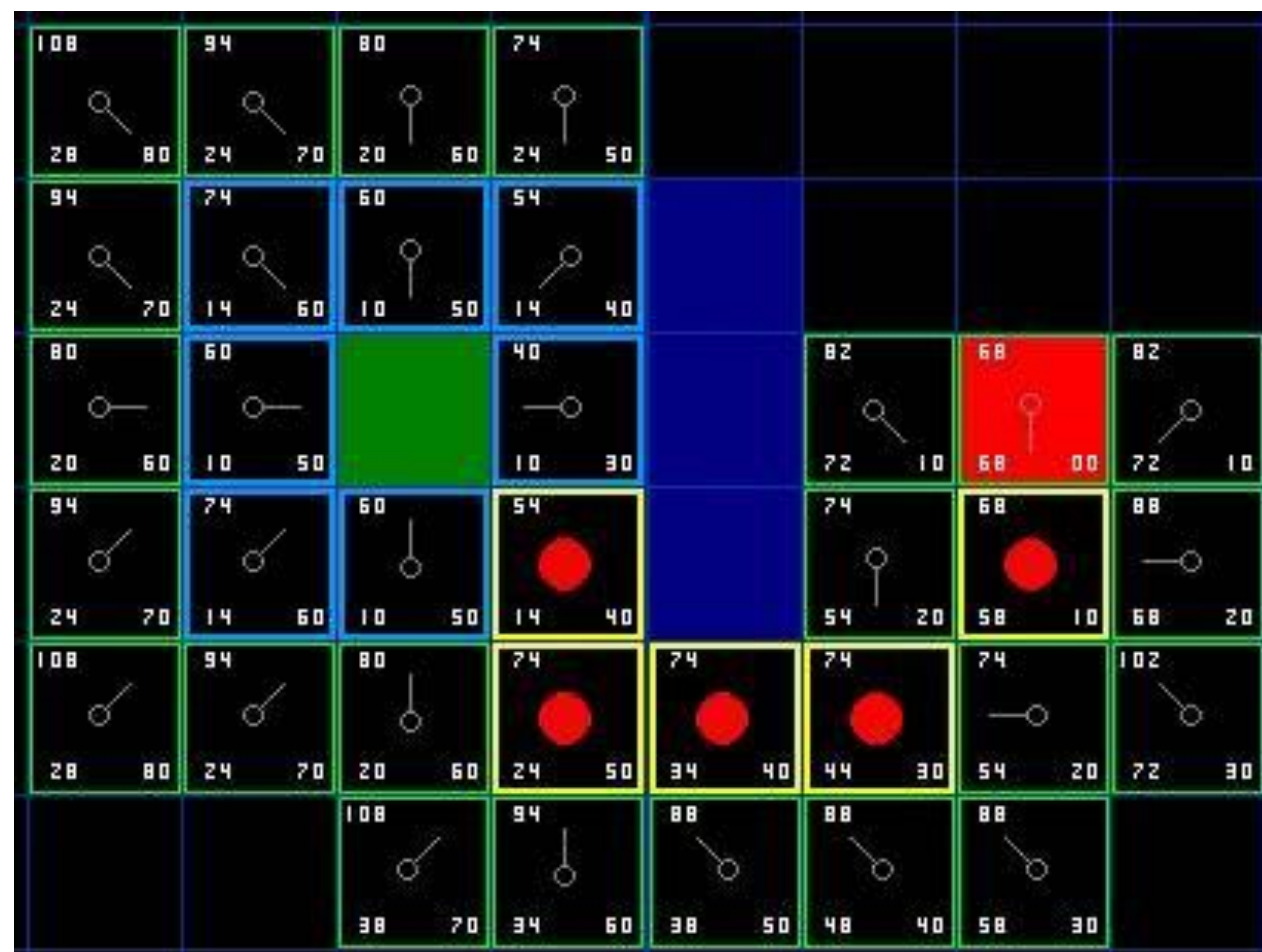
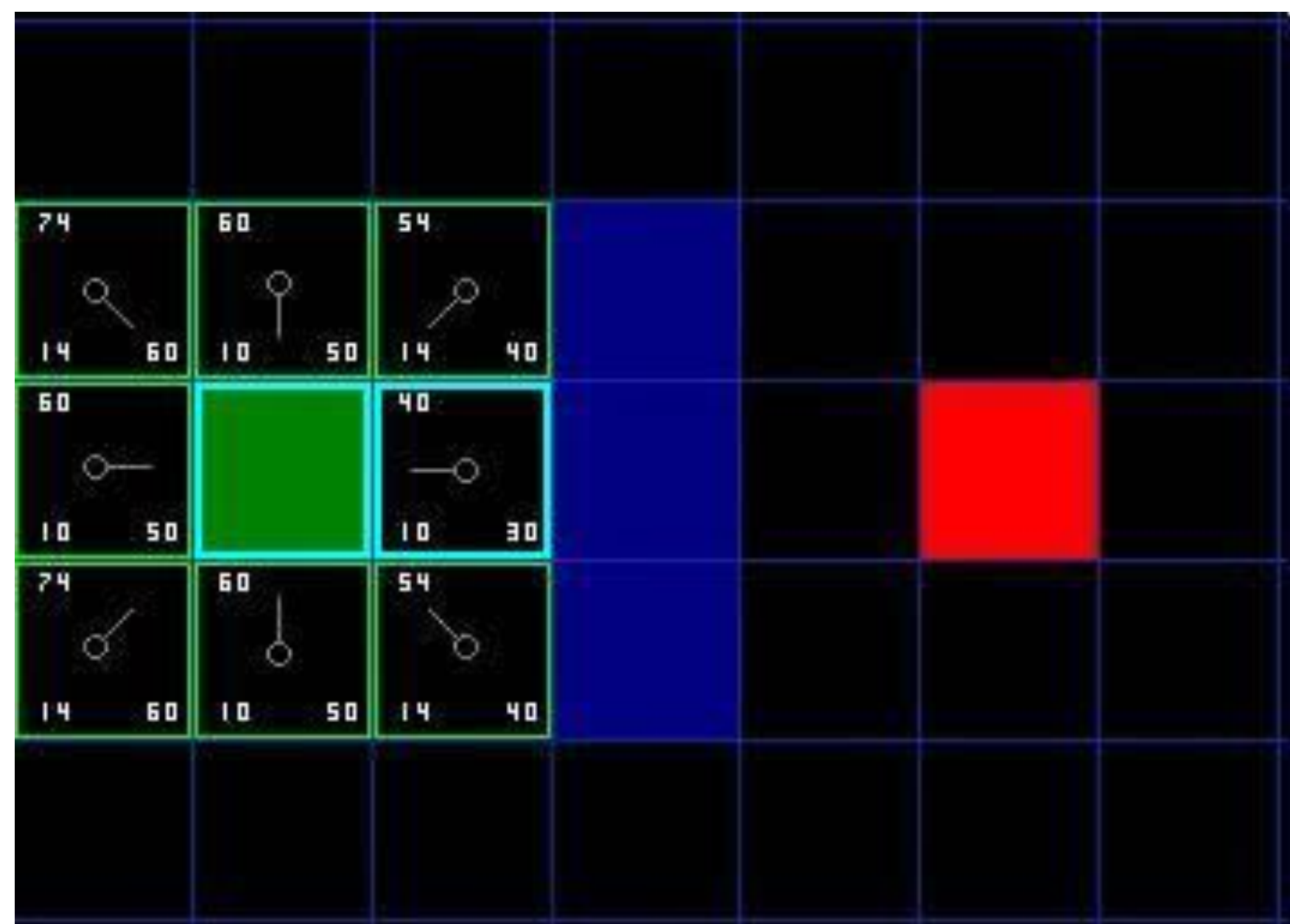


**Algoritmo A^* : cambio percorsi via
via che acquisisco informazioni**

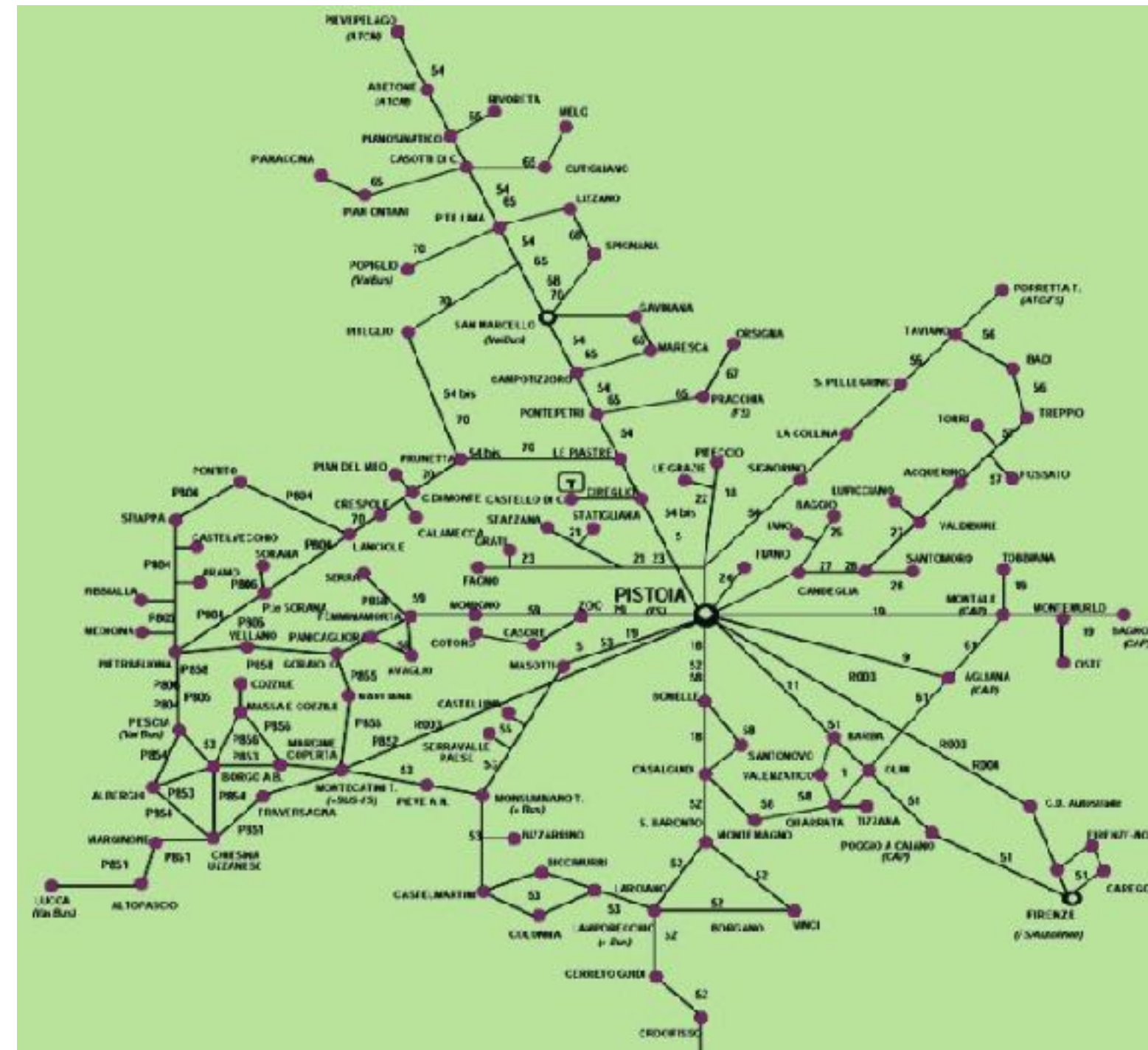


Scuola di
Robotica

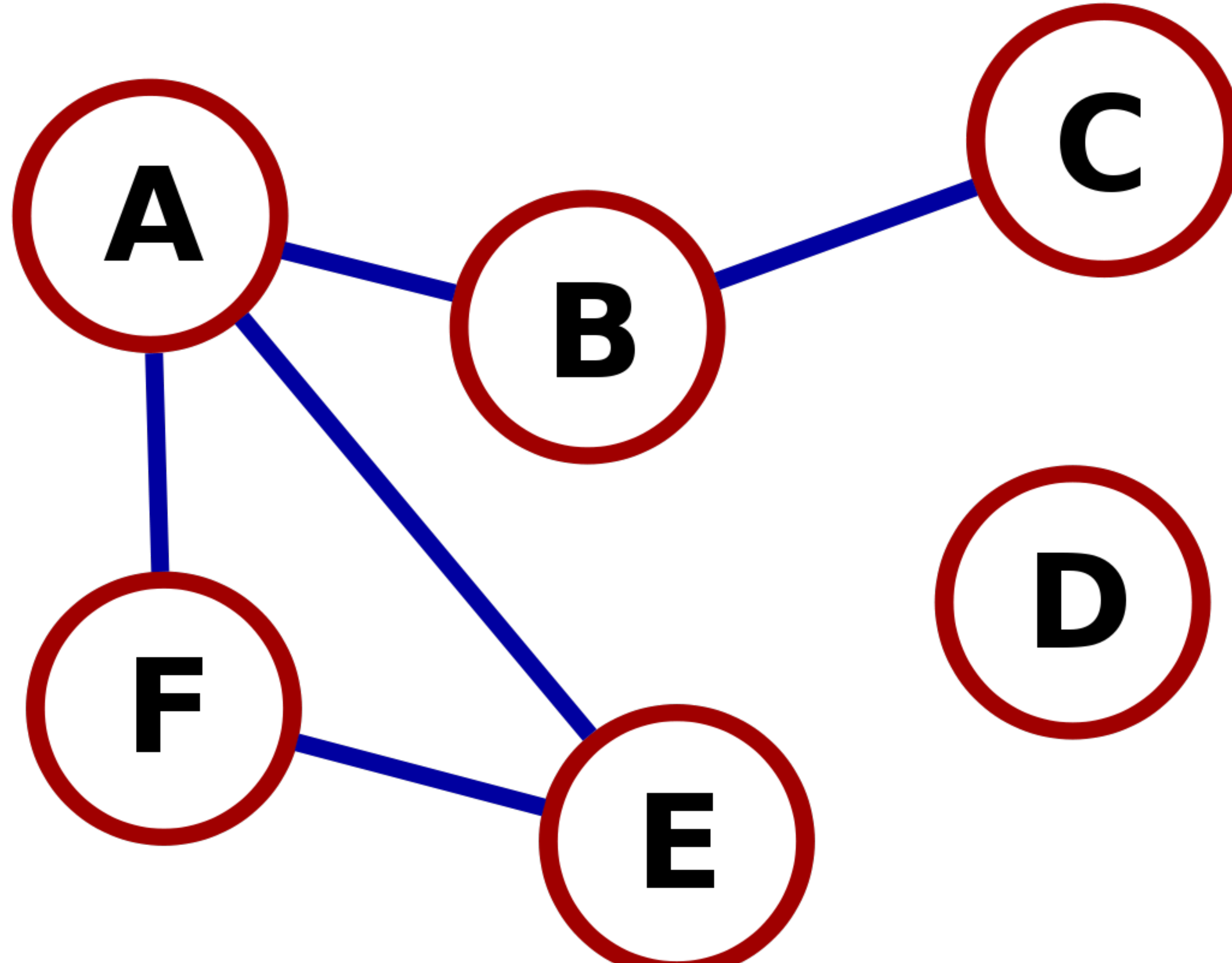
develer



Travelling Salesman Problem



Nodi da cui passo: go to goal

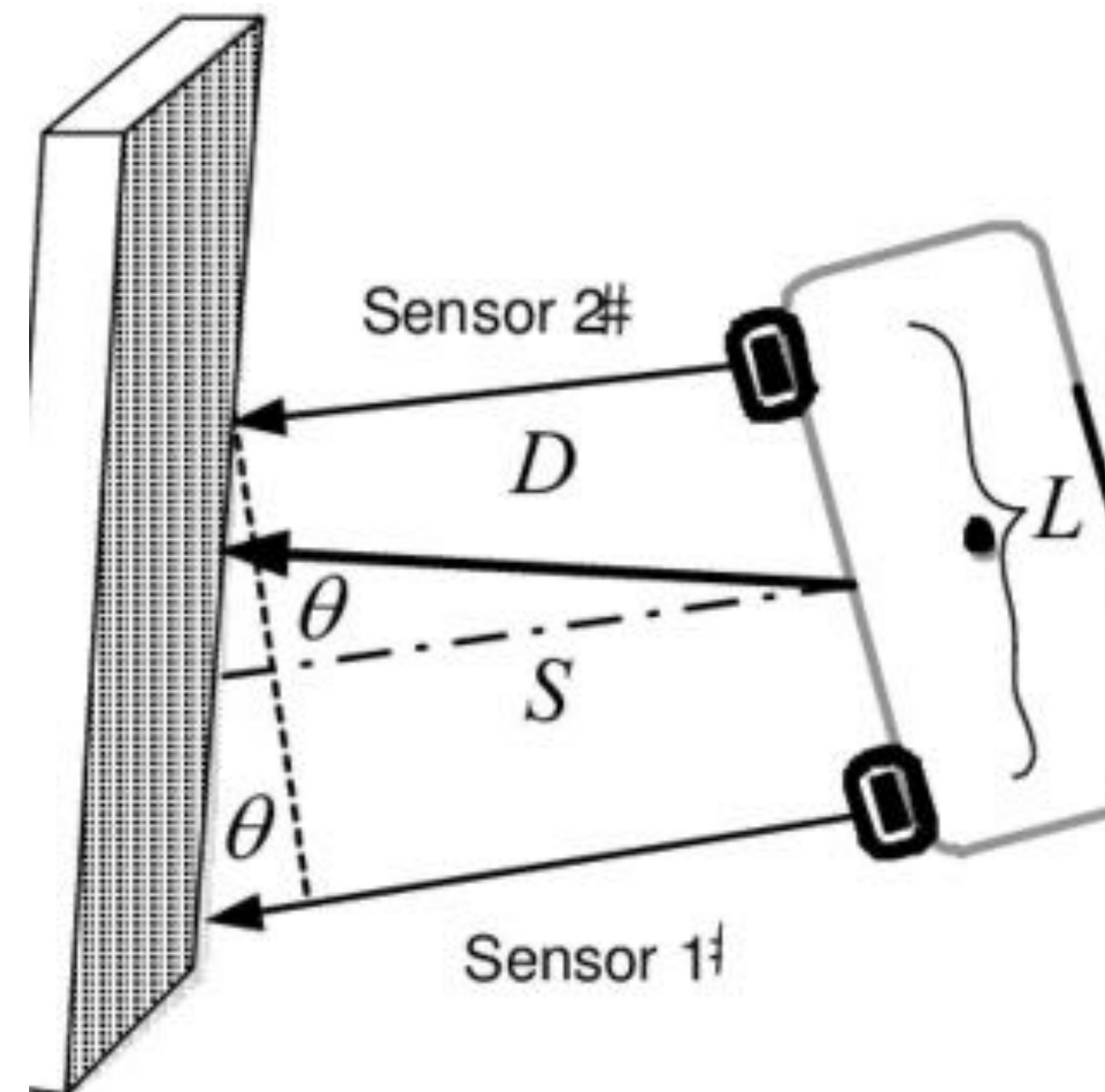
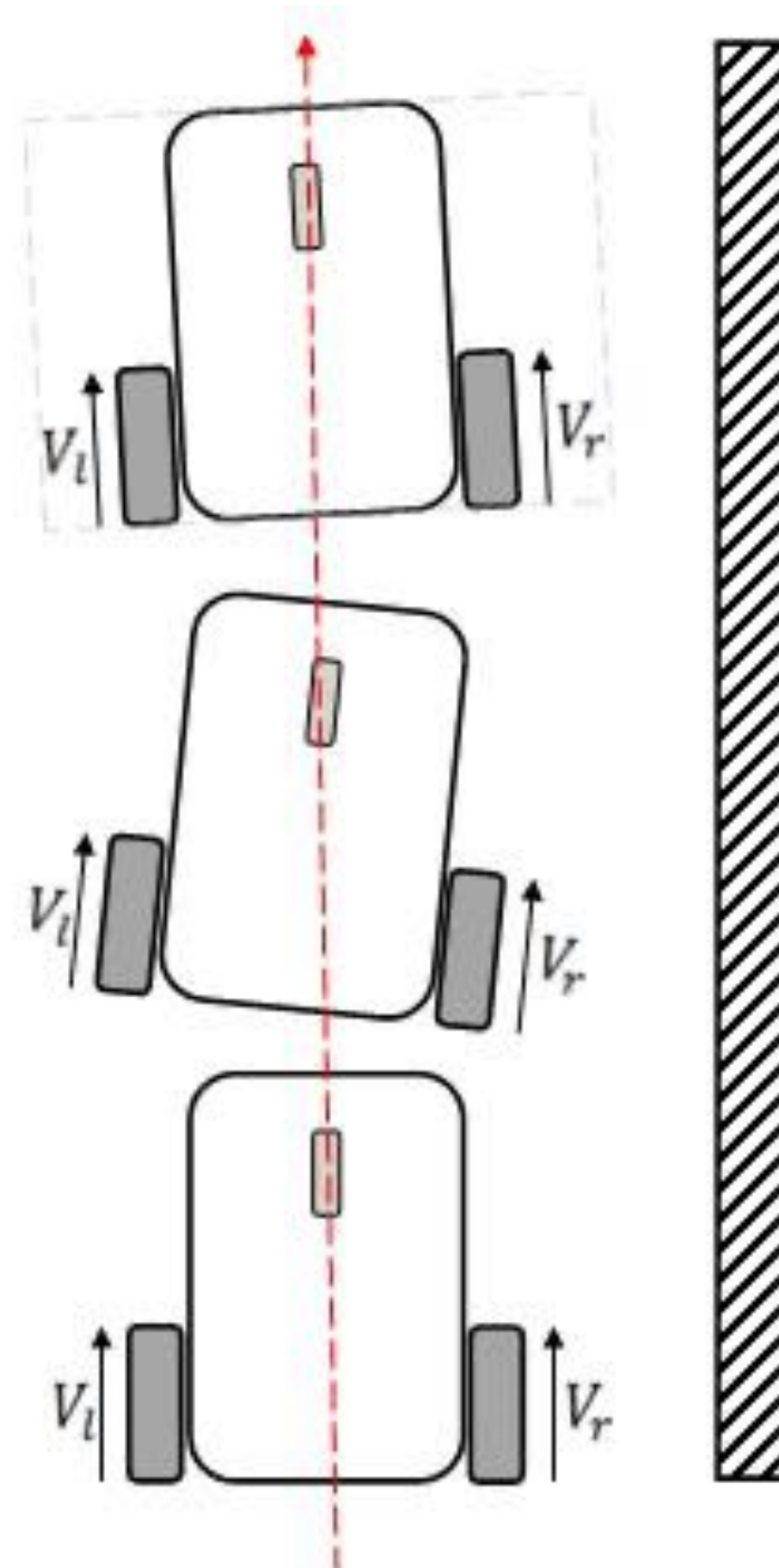


Trovare il percorso a minor costo

Follow Wall

Andiamo alla Lavagna:

<https://jamboard.google.com/d/17zt8xbJI7P0J-AY3hIH0xdkkASaXm59P20E8Dr3qiG0/edit?usp=sharing>



Labirinti

SLAM: Simultaneous Localization and Mapping