MOBILE ROBOTS Case Studies 4

Prof. Francesco Mondada

Session ID: 455406

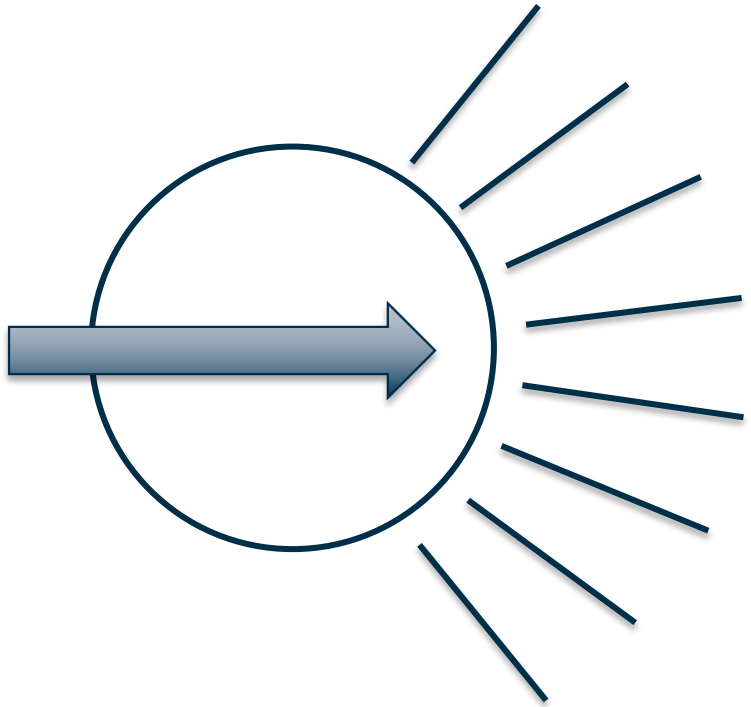
https://student.turningtechnologies.eu/#/respond

EPFL

2024-2025

Which sensors

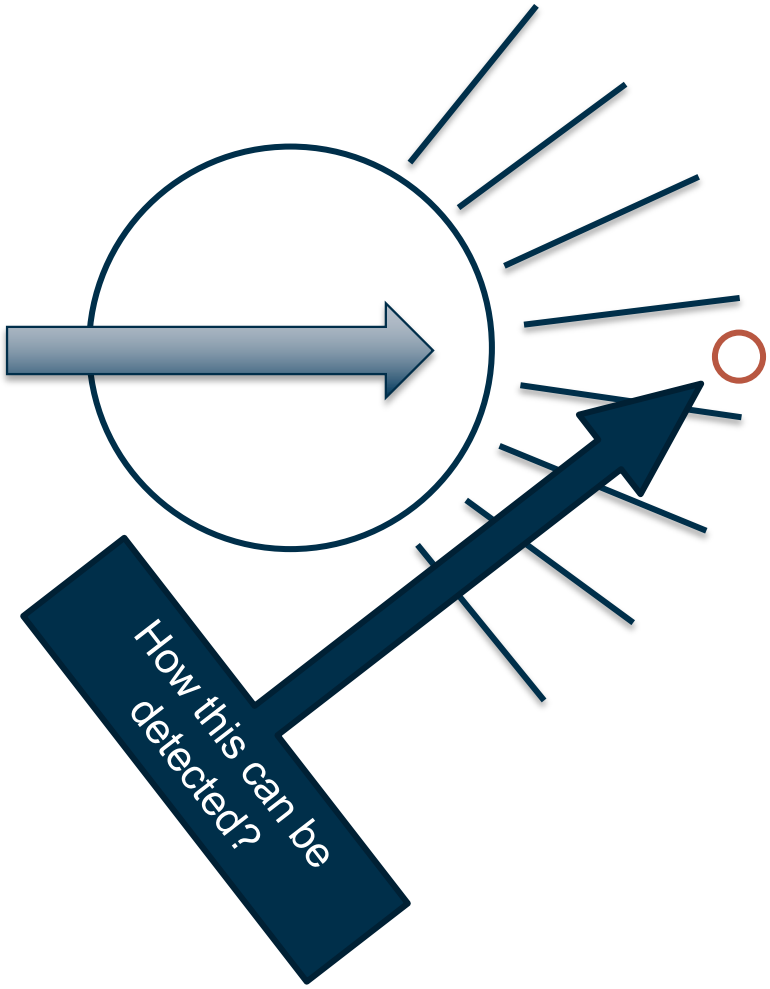
You have to design a cheap sensor system (sensor + computation) of a circular robot (1m Ø) that moves indoors. The look of the robot allows only detection of obstacles from 8 holes in the body. Which sensors do you place there?



A – Ultrasound
B – Laser TOF
C – Cameras

Which sensors

You have to design a cheap sensor system (sensor + computation) of a circular robot (1m Ø) that moves indoors. The look of the robot allows only detection of obstacles from 8 holes in the body. Which sensors do you place there?



A – Ultrasound

B – Laser TOF

C – Cameras (computational intensive)

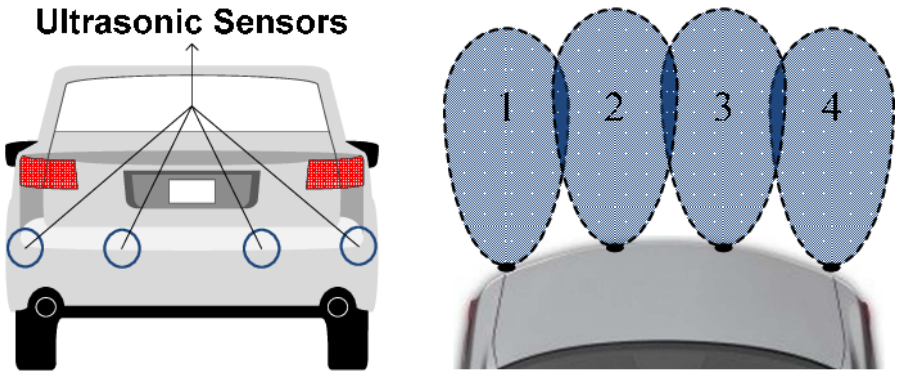
Which sensors

You have to design a cheap sensor system (sensor + computation) of a circular robot (1m Ø) that moves indoors. The look of the robot allows only detection of obstacles from 8 holes in the body. Which sensors do you place there?

A – Ultrasound

B – Laser TOF

C – Cameras **(computational intensive)**

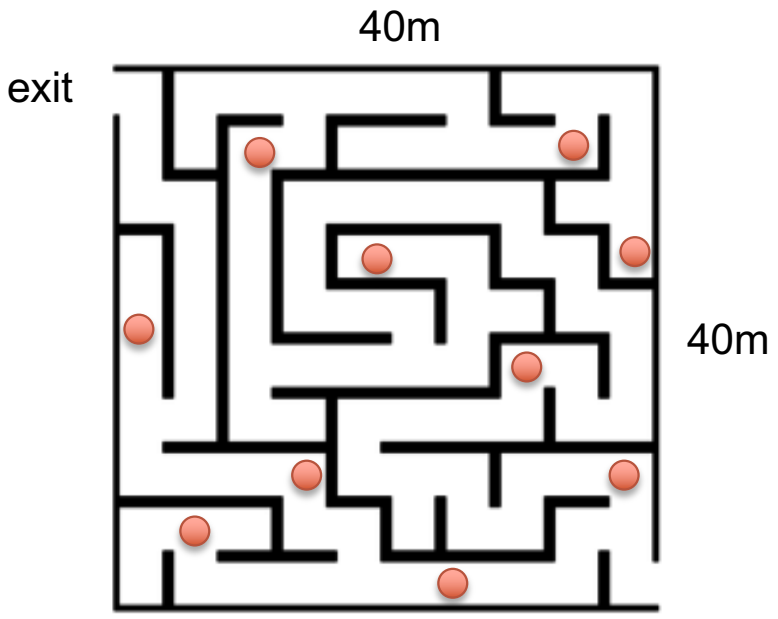


Han, D., Choi, H.B., & Kim, Y.S. (2018). Design of Road Surface Lighting System for Rear Lamp using Automotive Ultrasonic Sensor. 2018 International SoC Design Conference (ISOCC), 249-250.

Labyrinth

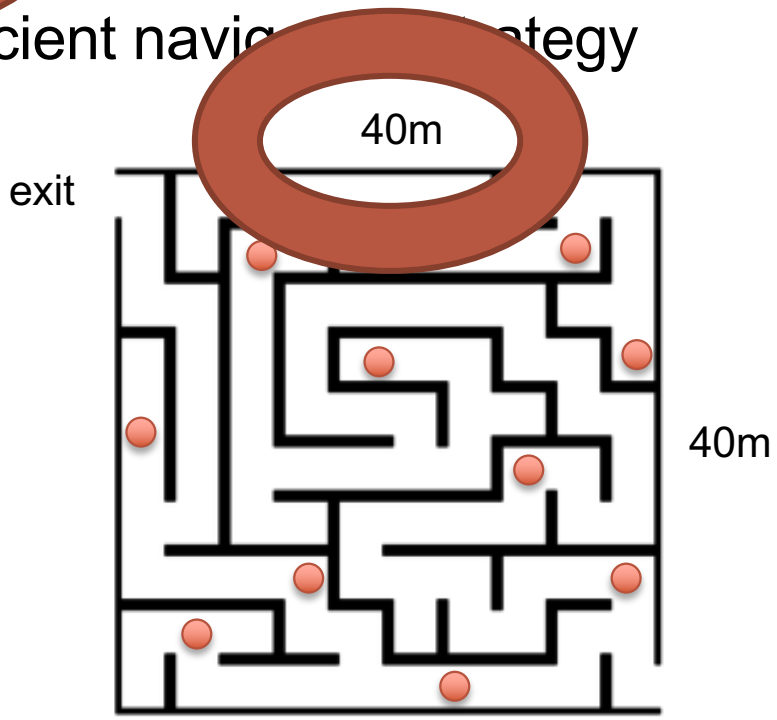
You have 10 small cylindrical robots (ø50cm) that need to escape at the same time from a labyrinth. They can perceive the direction of the exit. Which is the simplest, complete and more efficient navigation strategy you can use?

A – Left wall following
B – Left wall following + potential field when meeting another robot
C – Potential field (repulsion of walls and robot + attraction exit)
D – Wall following in the direction of exit (when starting)



Labyrinth

You have 10 small cylindrical robo (ø50cm) t need to escape at the same time from a labyrinth. They ca he direction of the exit. Which is the simplest, complete and more efficient navig tegy you can use?



A – Left wall following

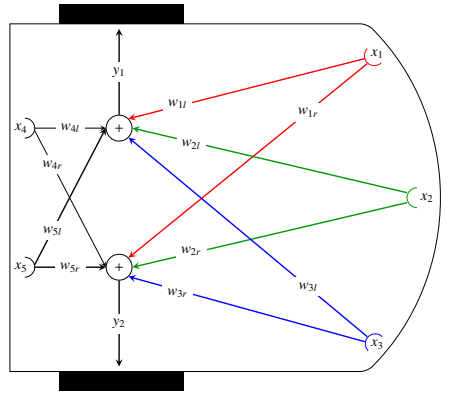
B – Left wall following + potential field when meeting another robot

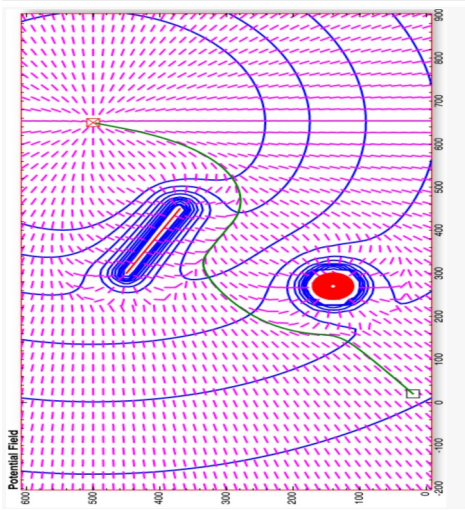
C – Potential field (repulsion of walls and robot + attraction exit)

D – Wall following in the direction of exit (when starting)

Which obstacle avoidance approach

Using a robot equipped with a set of 8 ultrasound sensors for obstacle detection, you need to choose a smooth behavior for obstacle avoidance and you hesitate between two approaches, Artificial Neural Networks (on layer ANN) and potential field (PF). Which one is easier to implement and smoother?

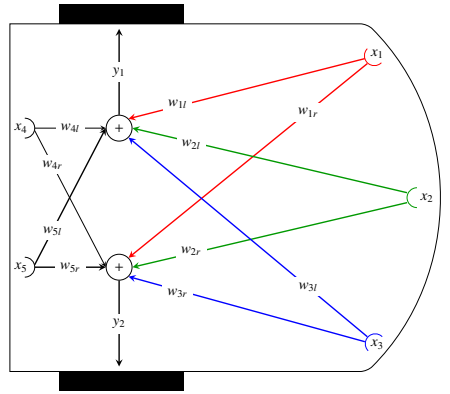


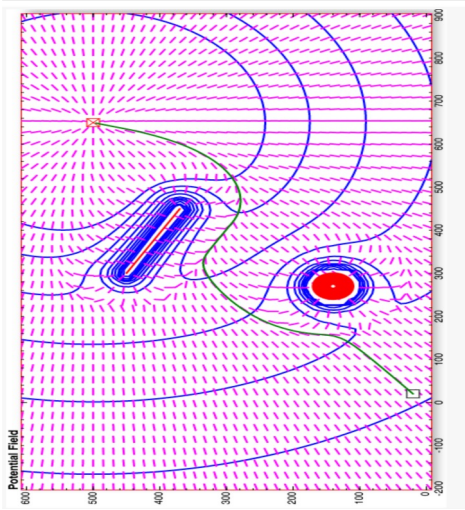


A – ANN, is not subject to local minima
B – PF has less parameters to configure
C – Both appraoches are nearly identical

Which obstacle avoidance approach

Using a robot equipped with a set of 8 ultrasound sensors for obstacle detection, you need to choose a smooth behavior for obstacle avoidance and you hesitate between two approaches, Artificial Neural Networks (on layer ANN) and potential field (PF). Which one is easier to implement and smoother?





A – ANN, is not subject to local minima

B – PF has less parameters to configure

C – Both appraoches are nearly identical

Which obstacle avoidance approach

Weights of neuron
w_l [7] = [40 ,20 ,−20 ,−40 ,−40 ,30 ,−10] # connection to l e f t motorvar
w_r [7] = [−40 ,−40 ,−20 ,20 ,40 ,−10 ,30] # connection to right motor