

THE MAZE RUNNER

SAN DIEGO COMIC-CON EXCLUSIVE COMIC BOOK



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Project 2: Road Sign Recognition

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EPFL

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INTRODUCTION

Project goals: Program an E-puck able to get out of a maze.

❖ **Data : 3 differents road sign :**



Turn left



Turn right



Turn around

❖ **How ?**

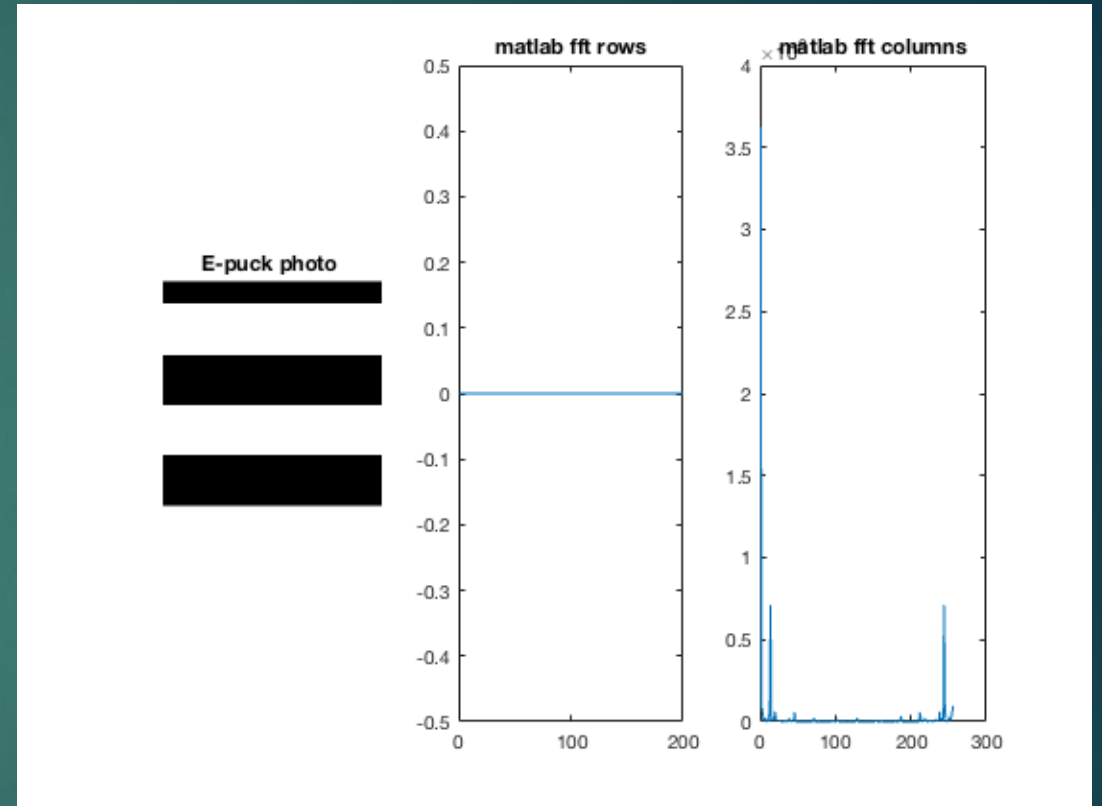
- Taking a picture of the road sign with the camera
- Analyze it with an FFT method
- Take the right decision

❖ **Instruments :**

- *MATLAB : To see the resultant picture.*
- *Webots : To elaborate a strategy*

STRATEGY ON MATLAB

- Strategy based on the ratio of the magnitudes for the road sign 1 & 2
- For the black panel, it consist on calculating the average of the image



Webots (1)

Obstacle avoiding

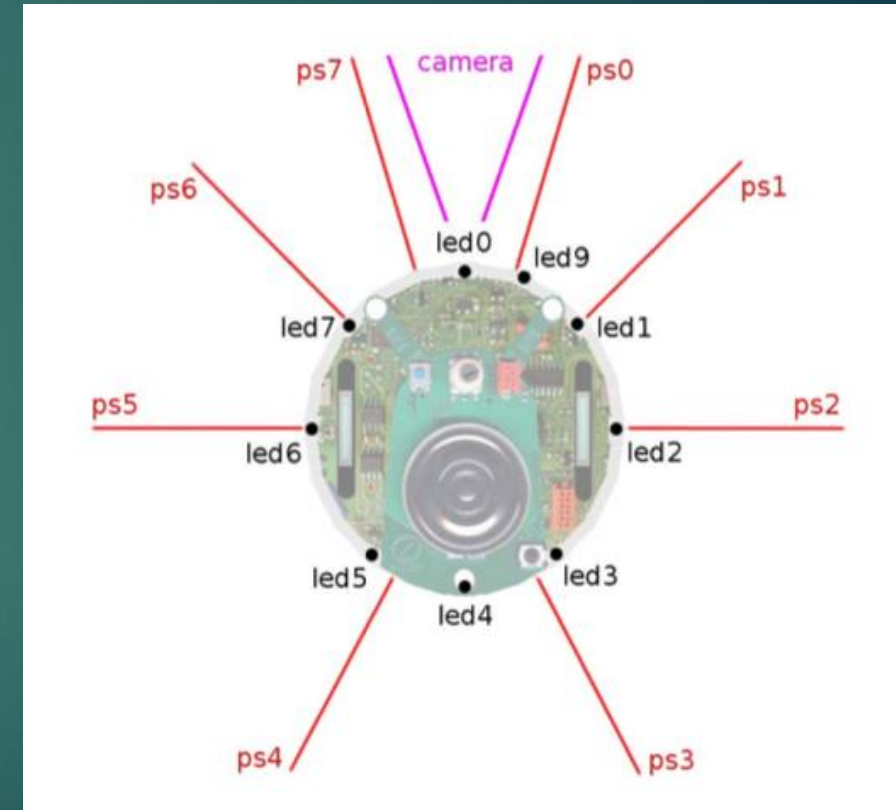
→ Use braitenberg's coefficient

Main

```
while {1}
  switch ( mode )

  case = RUNAWAY
    - move forward,
    - get sensors value,
    - compute threshold and if threshold > 500
      mode = STOP

  case = STOP
    - Set motors to zero
    - take picture
    - compute FFT and mean of greyscale
    - take a decision:
      Turn left
      Turn right
      Turn 180°
      mode = RUNAWAY
```



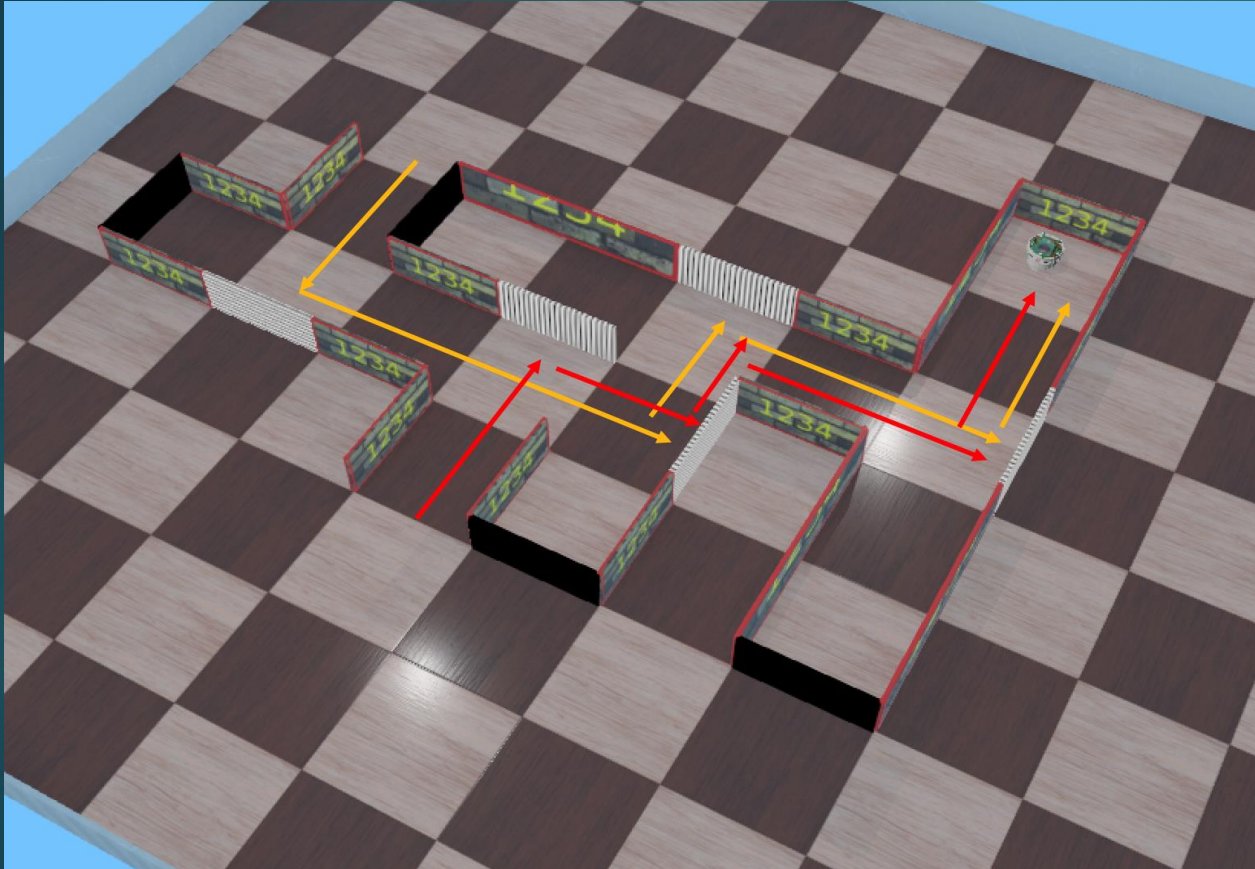
Webots (2)

- Implementation of our matlab strategy
- Simple recognition strategy based on if-else conditions
- Problem of blockage
 - If black : turn 180
 - Else : call the `random` function
- Modification of condition based on mean computation to determine whether it is black or not

If – else conditions based on the processing

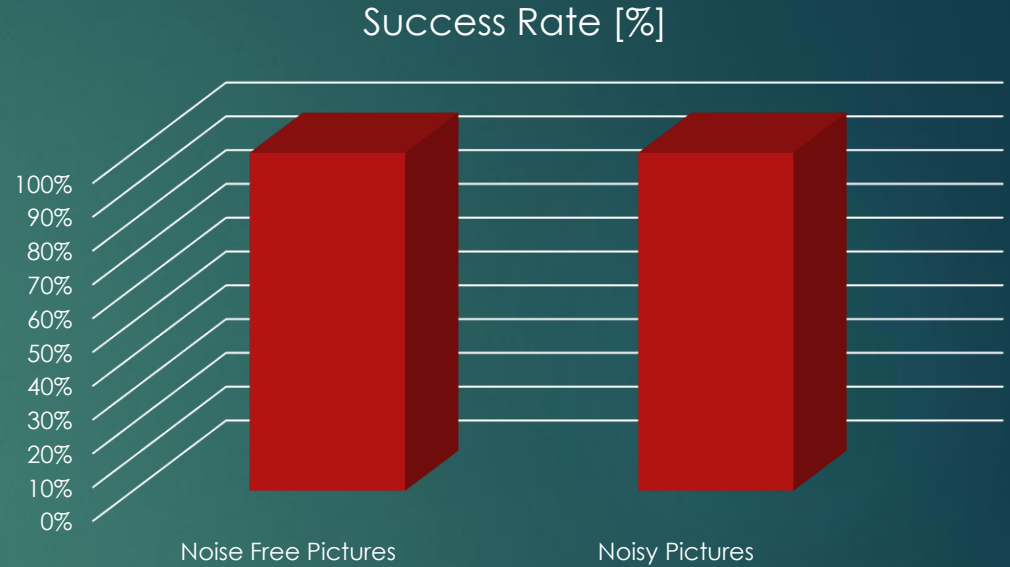
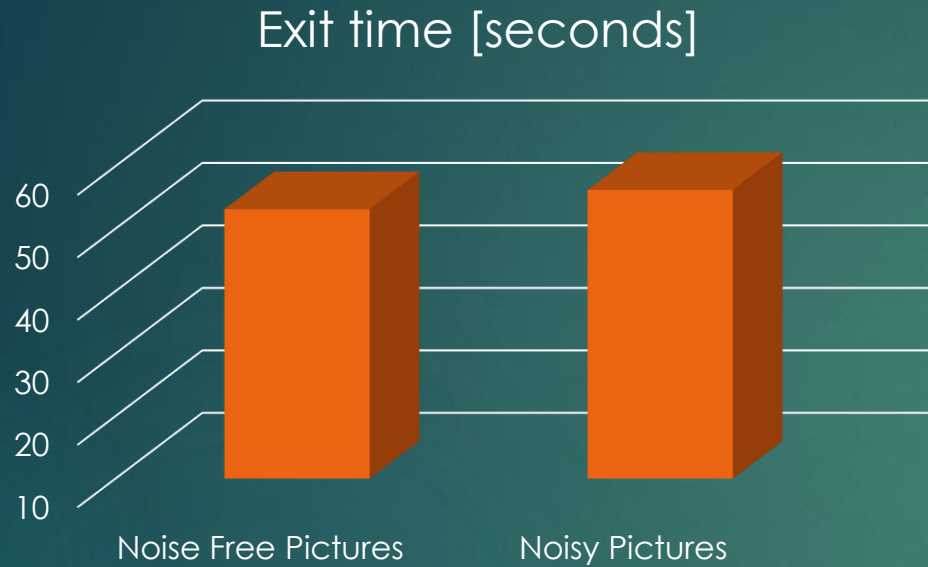
```
if maxcol < 20 && maxrow < 20
    turn 180 °
else if maxrow/maxcol > 10
    turn right
else if maxcol/maxrow > 10
    turn left
else
    if random > 0.5
        turn right
    else
        turn left
```

Experiments



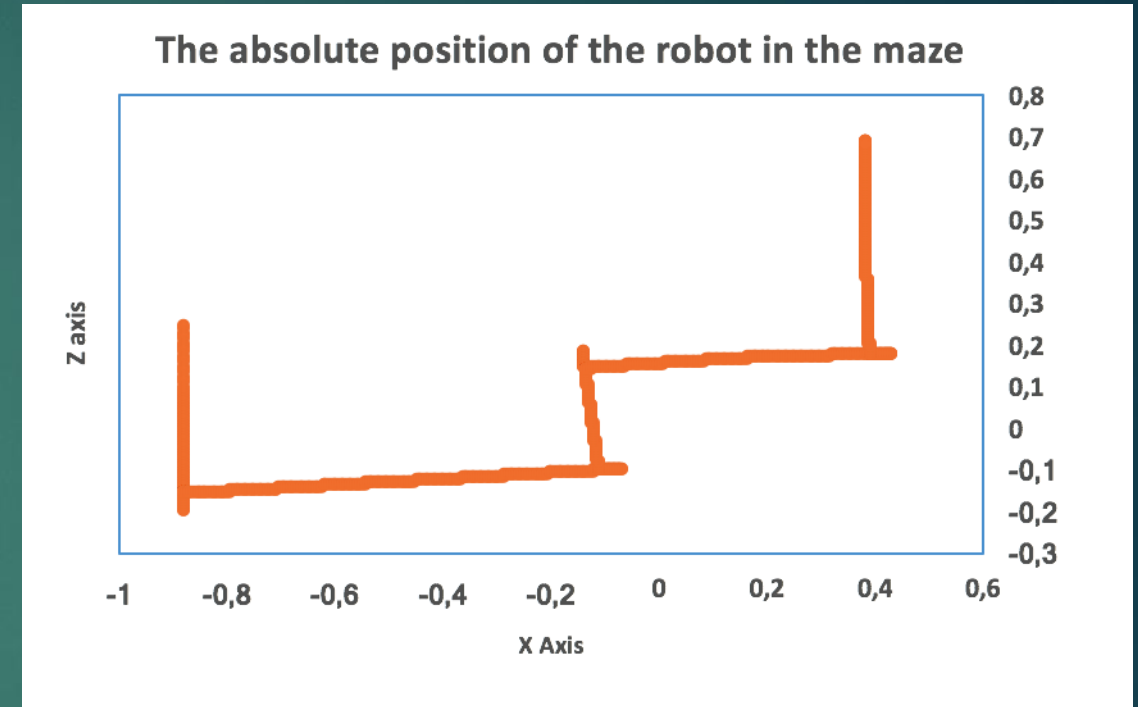
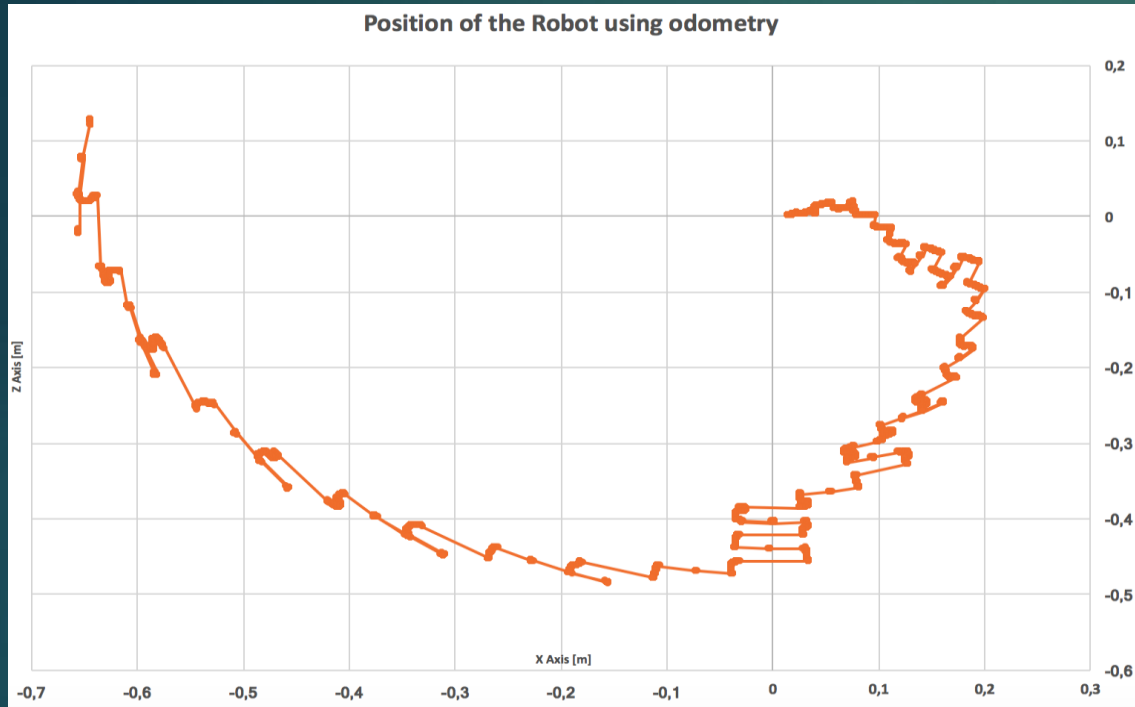
- Exit the maze
- Varying pictures, noise and noise free
- Odometry

Results (1)



- Success recognition rate of 100%.
- The robot makes more time to exit the maze in the case of noisy pictures.

Results (2)



- Trajectory of the robot in the maze from odometry and from the robots onboard sensors
- Error accumulation in the odometry case

Conclusion

- It is a success! The e-puck is able to get out of the maze with good accuracy
- Great immersion in C programming
- An opportunity to improve our autonomy, rigorousness and the most important of all : the teamwork skills



**THANKS FOR
WATCHING**

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