

# Road Sign Recognition

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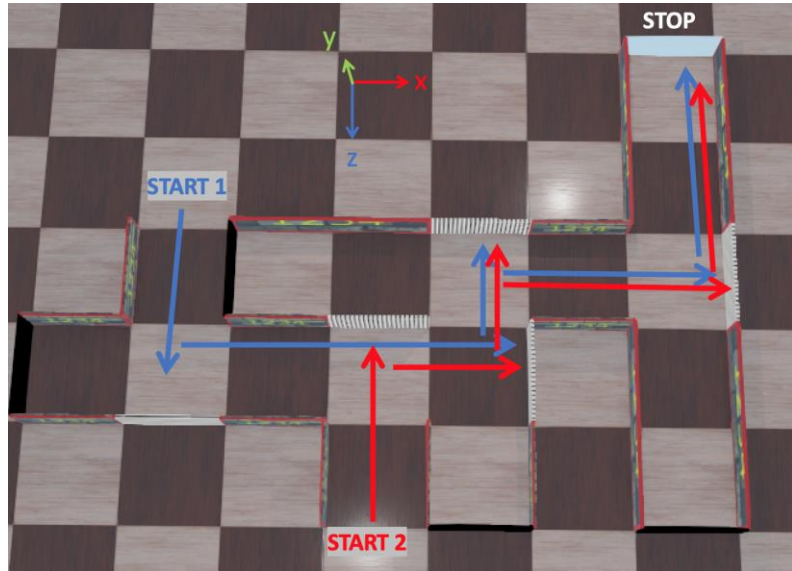
*Signals, Instruments & Systems* - BA6 EPFL



# Plan

- I. Project Goal
- II. Recognition Strategy
- III. Implementation in Webots
- IV. Results
- V. Performance strategy
- VI. Odometry
- VII. Conclusion

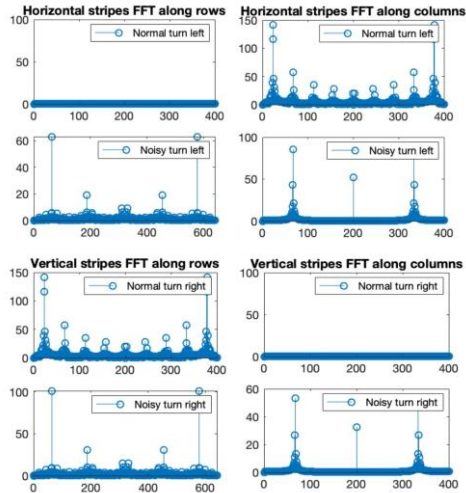
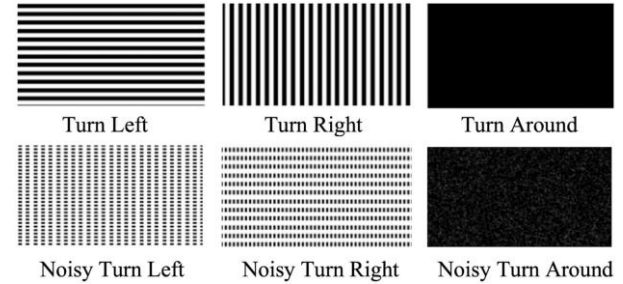
# I. Project Goal



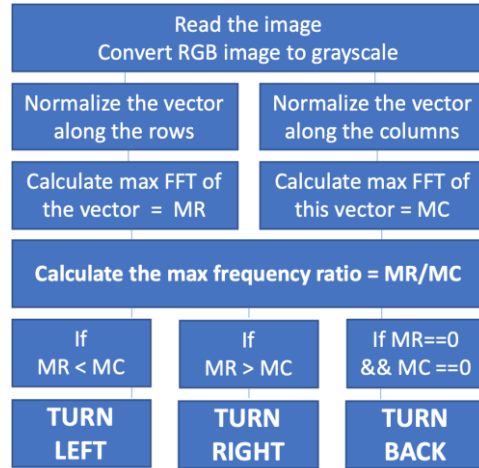
Absolute Frame of the maze and exit trajectories

- ❖ Get out of the maze
- ❖ As fast as possible
- ❖ Reading Road Signs
- ❖ Using supervisor
- ❖ Processing odometry

# II. Recognition strategy



Pictures analysing with FFT algorithm on MATLAB



Recognition Strategy to implement

- ❖ FFT on Matlab
- ❖ Understanding of peak frequencies along rows and columns

# III. Implementation in Webots

## A. Controller

- ❖ `run_braitenberg()`
- ❖ `process_image()`
- ❖ `run()`

## A. Supervisor

- ❖ Display exit time
- ❖ Display absolute positions

### *Main*

- *while (1)*
- *switch (operation\_mode)*
  - case AVOIDANCE*
    - *move forward, sensor control, Braitenberg*
    - *check distance* → *if > m, operation\_mode = STOP*
  - case STOP*
    - *take n pictures, compute n times FFT & mean*
    - *interpretation with FFT* → *return "action"*
    - *call the "direction" function with "action"*
    - *back to case AVOIDANCE*

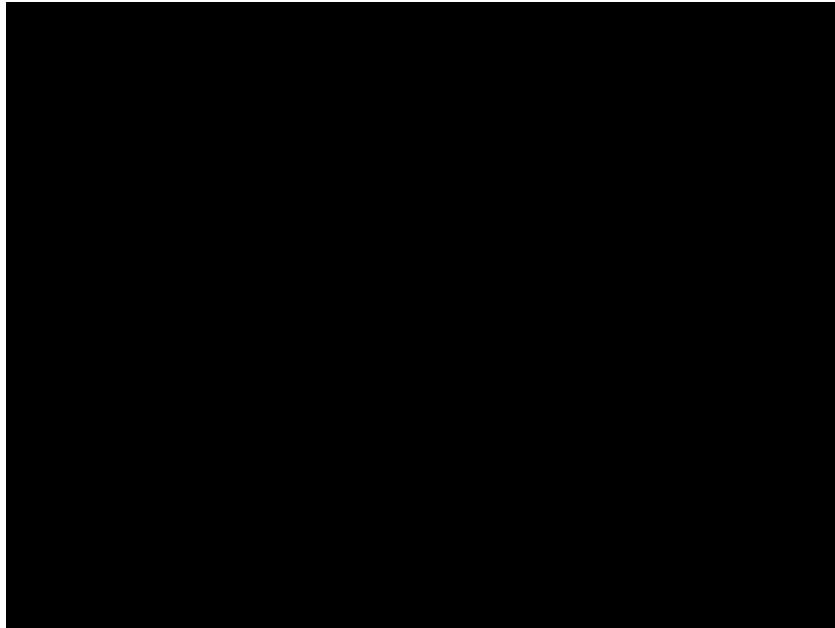
### *Direction*

- *switch (action)*
  - case 1*
    - *turn left*
  - case 0*
    - *turn right*
  - case -1*
    - *turn back*

Pseudocode of the strategy

# IV. Results

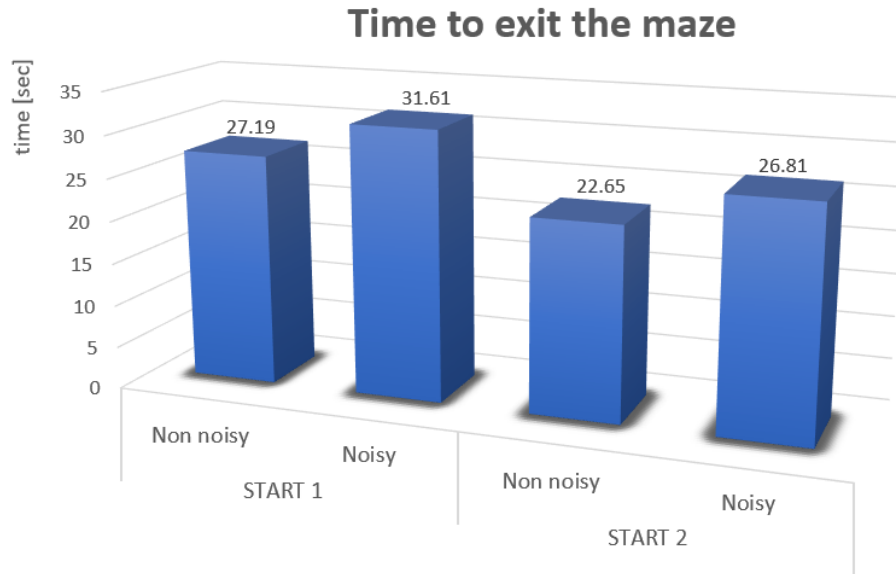
```
[supervisor] Robot has escaped in 22.527937 seconds  
INFO: 'supervisor' controller exited successfully.
```



E-puck escaping the maze from Start

2

# IV. Performance Strategy

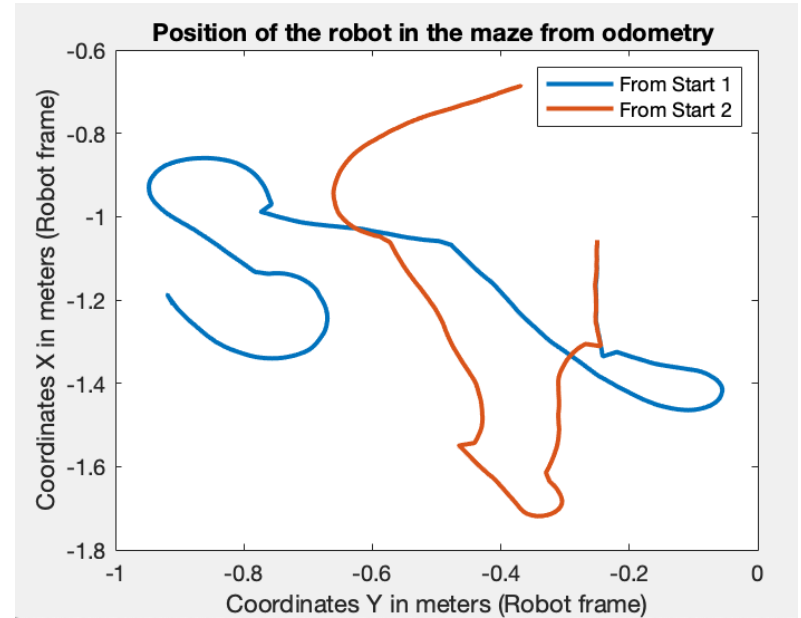
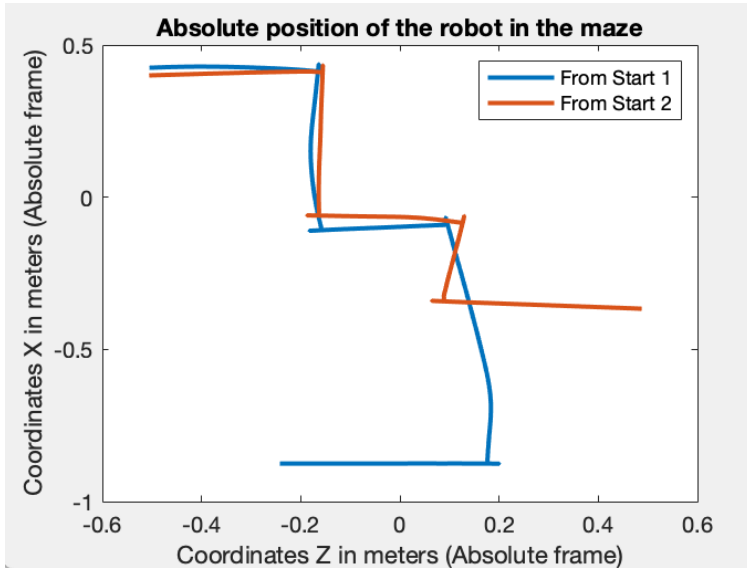


Performance strategy according to exit time

- ❖ Distance tests
- ❖ Lighting conditions
- ❖ Size of the picture
- ❖ 100% success for non-noisy and noisy experiments

# V. Odometry

- ❖ Motion sensors
- ❖ Rotation Matrix / Dead Reckoning
- ❖ Errors





# VI. Conclusion

## ❖ Goals reached

- Functional e-puck
- Get out of a maze
- As fast as possible
- High rate of success

## ❖ Strategy can be improved

- Filter Window average
- Higher speed ?
- Correct problems

- ❖ Develop our skills with Webots & C-programming
- ❖ Face intensive work
- ❖ Raise autonomy & teamwork



Growbothub - Project IGLUNA - Swiss space Center

# Thanks for listening !

Mathilde Boross & Mélodie Rey

