



Universidade
de Aveiro

Path executor

USING THE CIBERRATO SIMULATION ENVIRONMENT



Perception and Control
Assignment 1
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INTRODUCTION

- **Intro:** Develop a mobile robot agent to follow a path on a known environment.
- **Rules:** Path is a list of successive coordinates relative to the robot initial position.
- **Goal:** Predict position using a movement model and correct localization with obstacle sensors.



LOCALIZATION & CONTROL

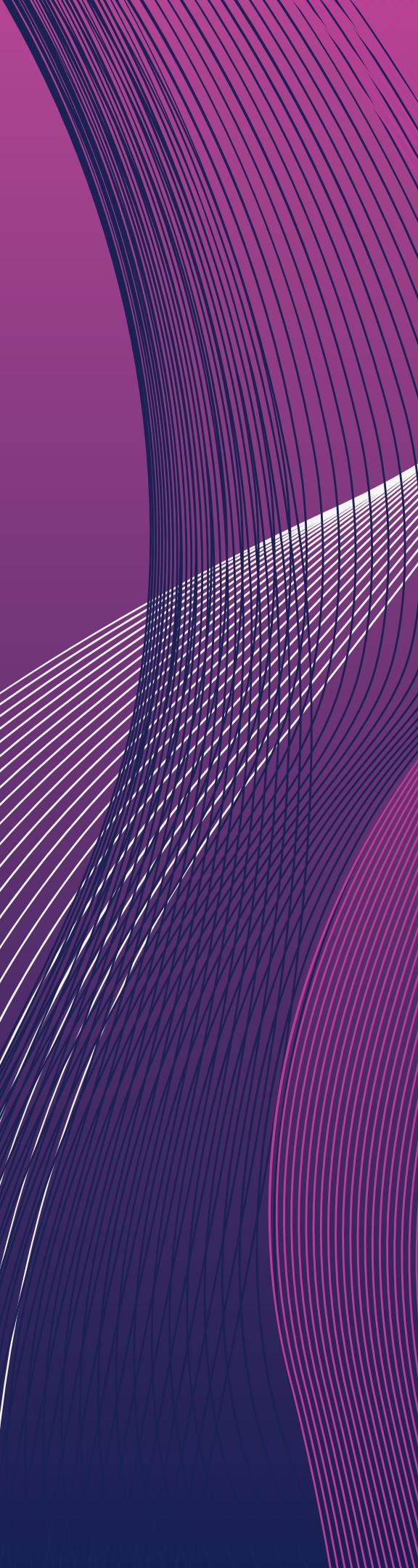
- Check each coordinate missing from list of coordinates from path & store agent positions.
- Calculate angle between agent position and next coordinate.
- Compare angle difference between next coordinate & compass orientation.
- Return state according to angle difference.



NAVIGATION

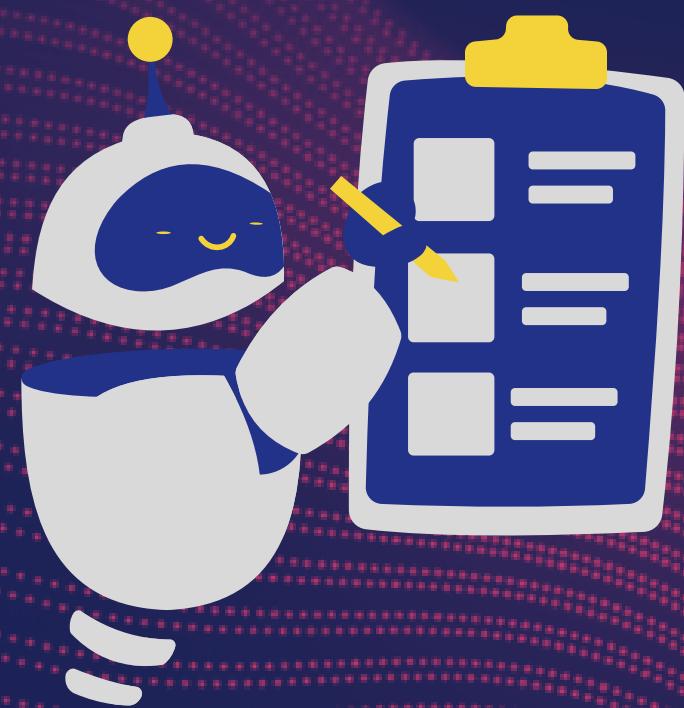


- States: rotate right, rotate left, move, finish
- Rotate function calculates target orientation based on vector from both coordinates
- Agent rotates to target angle until compass reaches desired orientation and updates flag
- With no rotation, agent keeps moving while checking distance to walls.



NAVIGATION TESTS

- Distance from robot to wall used:
 - 1/sensor measure - half wall size.
- Fixes trajectory based on right and left sensor distance to wall (<0.15), by slowly moving to opposite side.
- In case agent hits wall it rotates back to trajectory (Did not happen on tests).



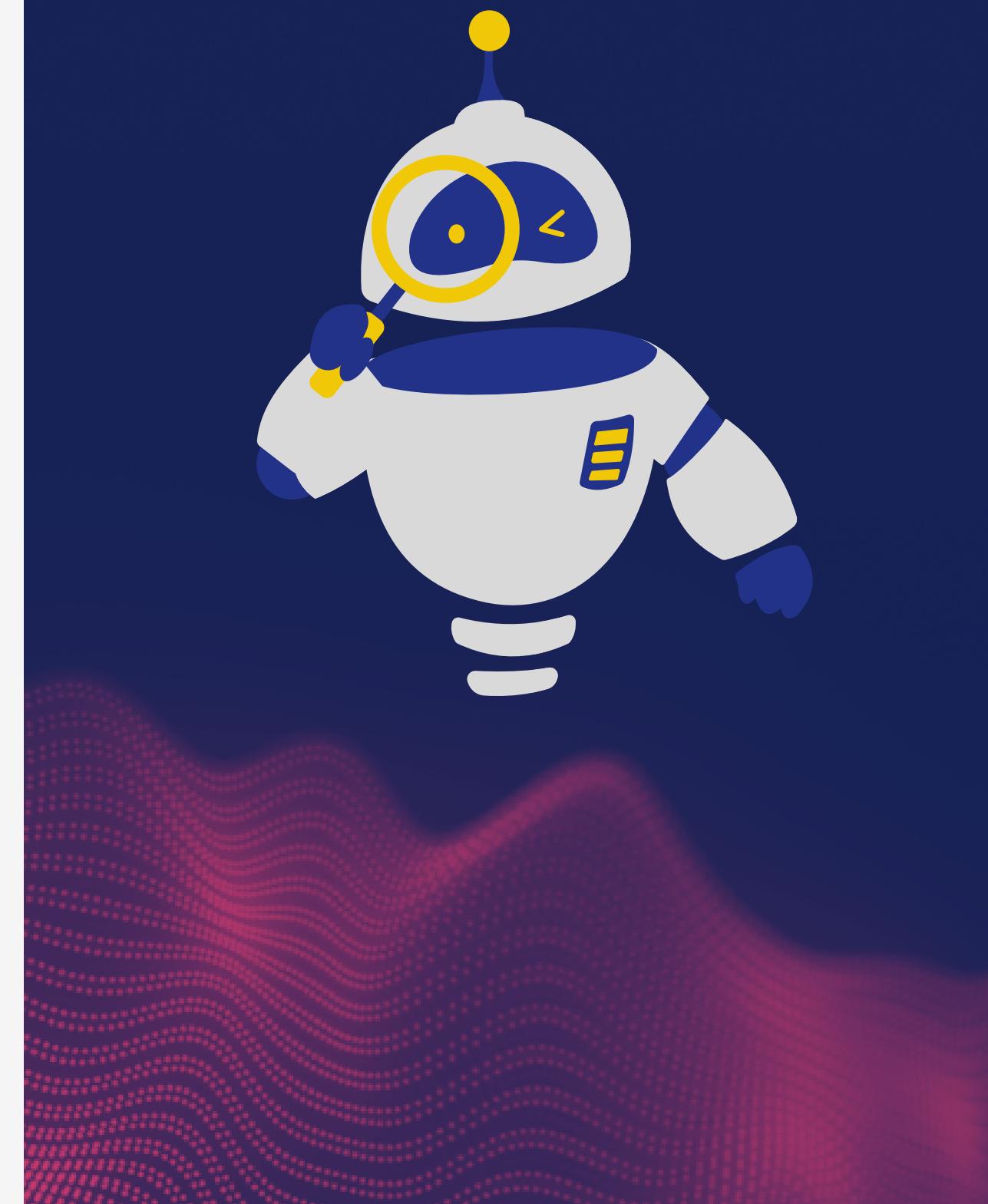
MOVEMENT MODEL

- Movement model adapted from the given equations.
- Rotation component was not considered on the movement model.
- Use of compass to check orientation.
- Based on estimated pose calculate distance from previous coordinate.
- Retrieve new coordinate when a distance > 1.9 is reached and round (x,y) values.

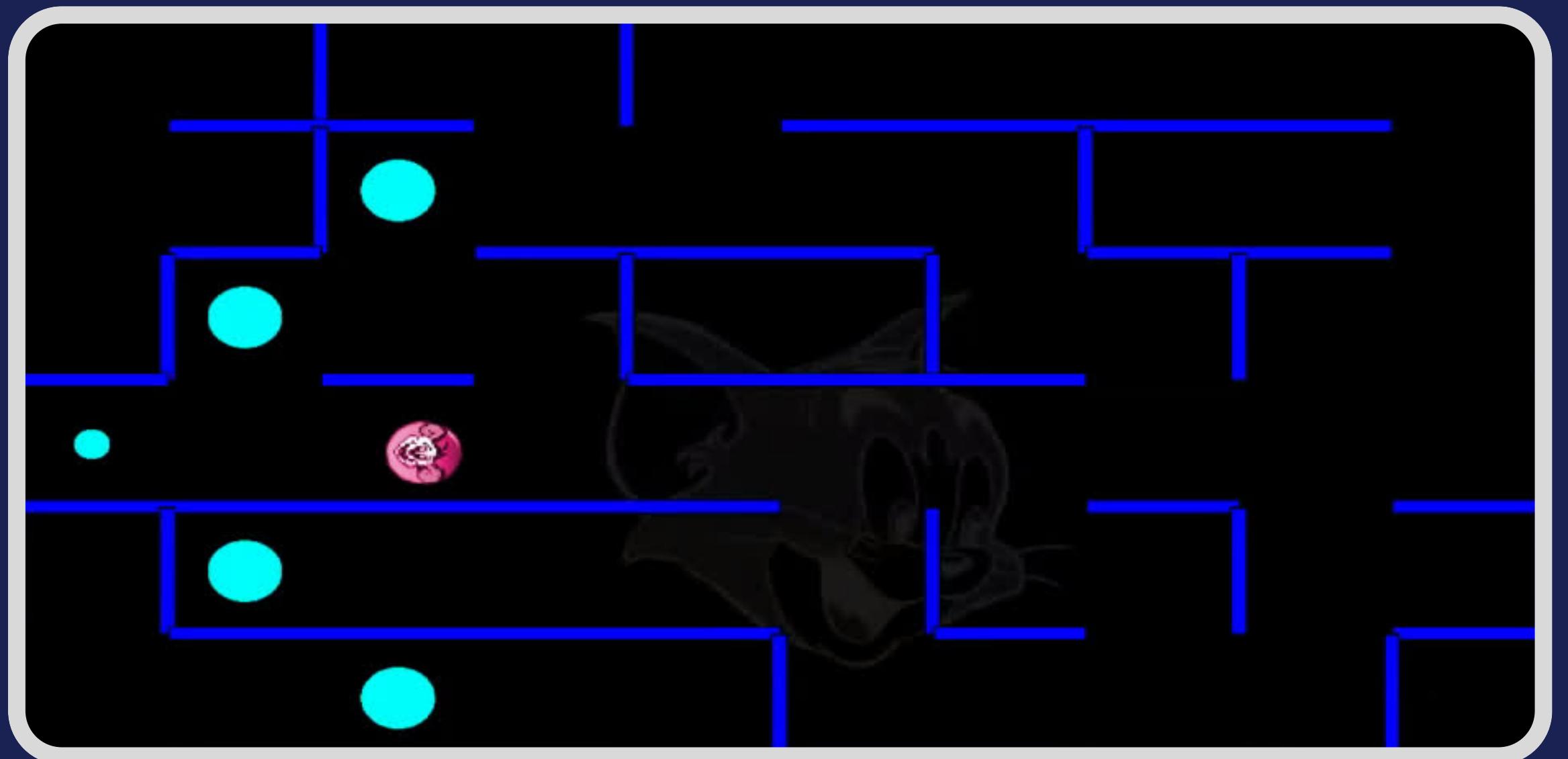


CONCLUSIONS

- Agent successfully performs the given path.
- Key improvements:
 - Implement a noise filter method to improve movement model position estimate.
-> Refine agent position on rotation states.
 - Optimize trajectory correction to achieve a smooth deviation.
-> Fine-tuning the small rotation.



DEMO





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THANK YOU !
QUESTIONS?

