

ENJOY AI 2024
INTERSTELLAR JOURNEY

CLOSING CEREMONY OF SPORTS



Line Following Practice

Objectives:

1. Know how to follow the lines to reach task zones
2. Know how speeds affect line following
3. Find the optimal speed for stable line following

5+



Review



In the previous course, we learned about code blocks for line following.
Let's have a review!



Review

Code Blocks for Line Following

1. What detection is required before you run the line following program? What's the purpose of the detection?
2. If we want a robot to turn left at a crossroads, which block should we use?
3. Why do we need to set Motor B to a negative value during initialization?
4. What happens if we set the duration of passing crossroads?

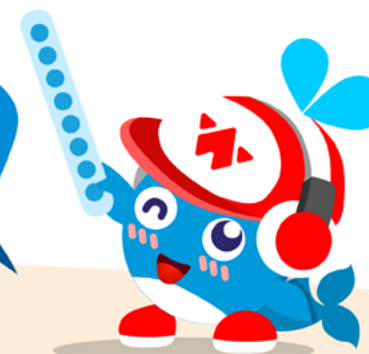
Challenges



Challenges



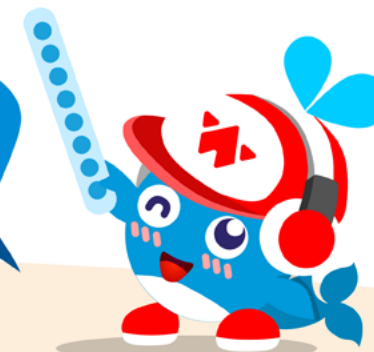
In the previous course, did you try different line following speeds?



Challenges



What happens when the speed is too high?



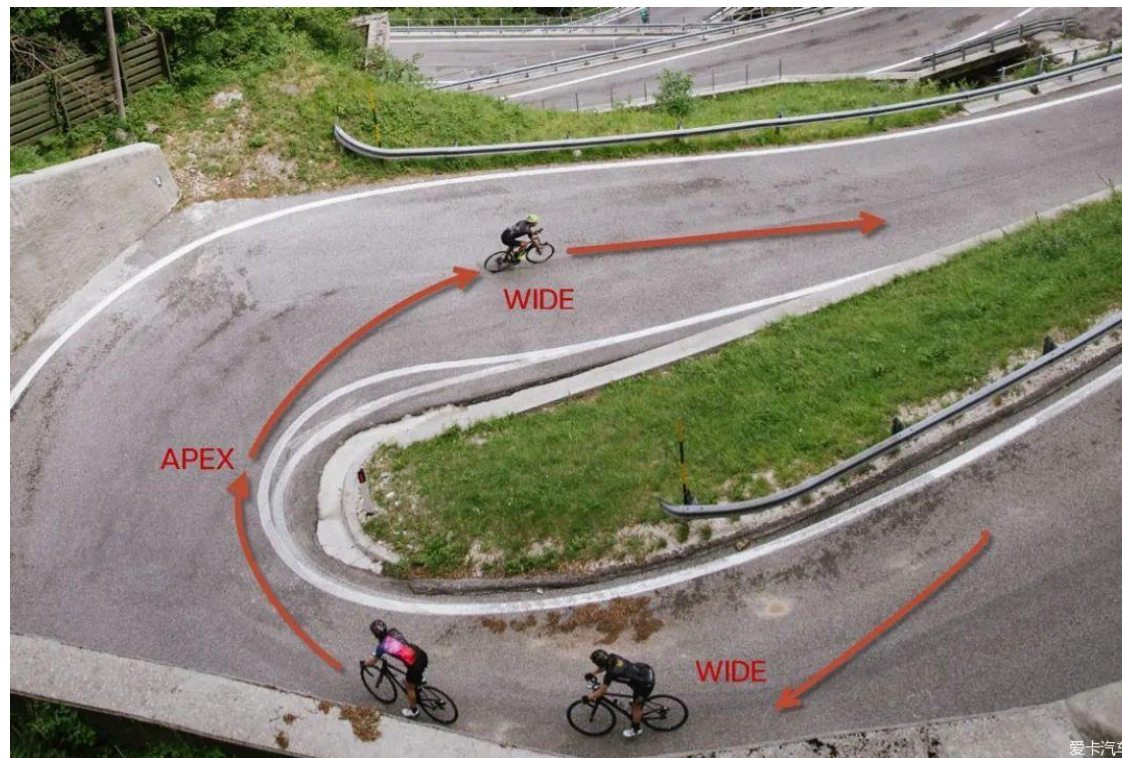
Challenges

Influence of Speed

The influence of speed is evident in all aspects of our lives.

For example, if we cycle around a corner at an extremely high speed, we may go off course or even fall from the bike.

In line following, excessive speed can lead to zigzags. This is because the robot sways to follow the black line. If the speed is too high, the line following data may suddenly get lost and errors may occur.

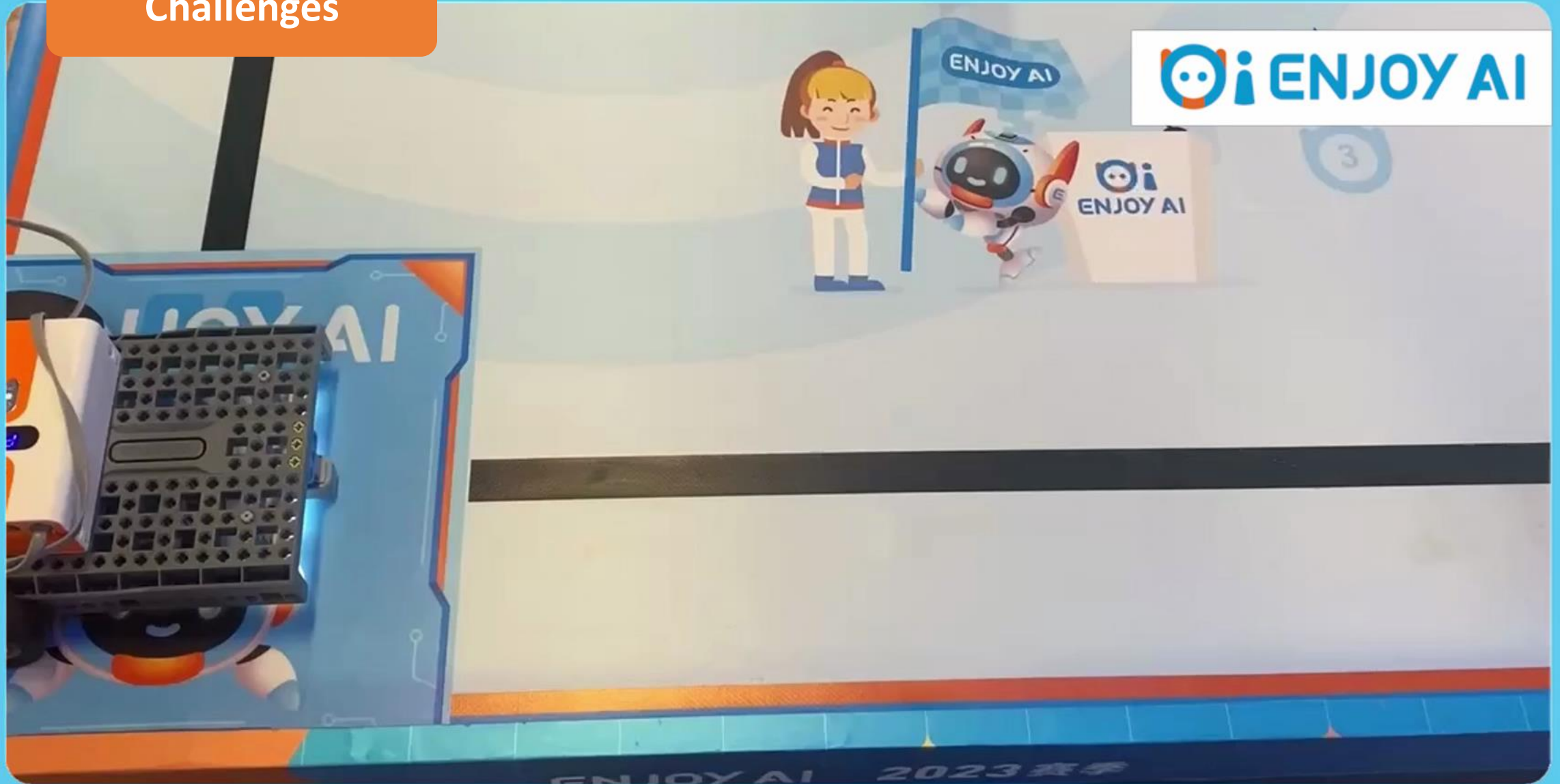


Challenges

What happens when the robot follows lines at the speed of 100? Let's watch a video.



Challenges



Challenges

What happens when the robot follows lines at the speed of 50? Let's watch a video.



Challenges

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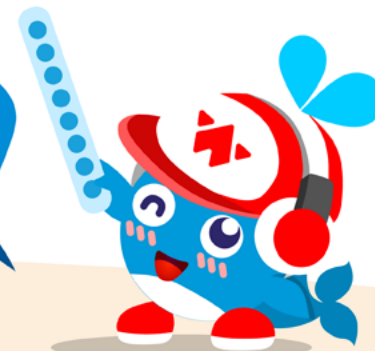


Challenges

Challenges accepted!

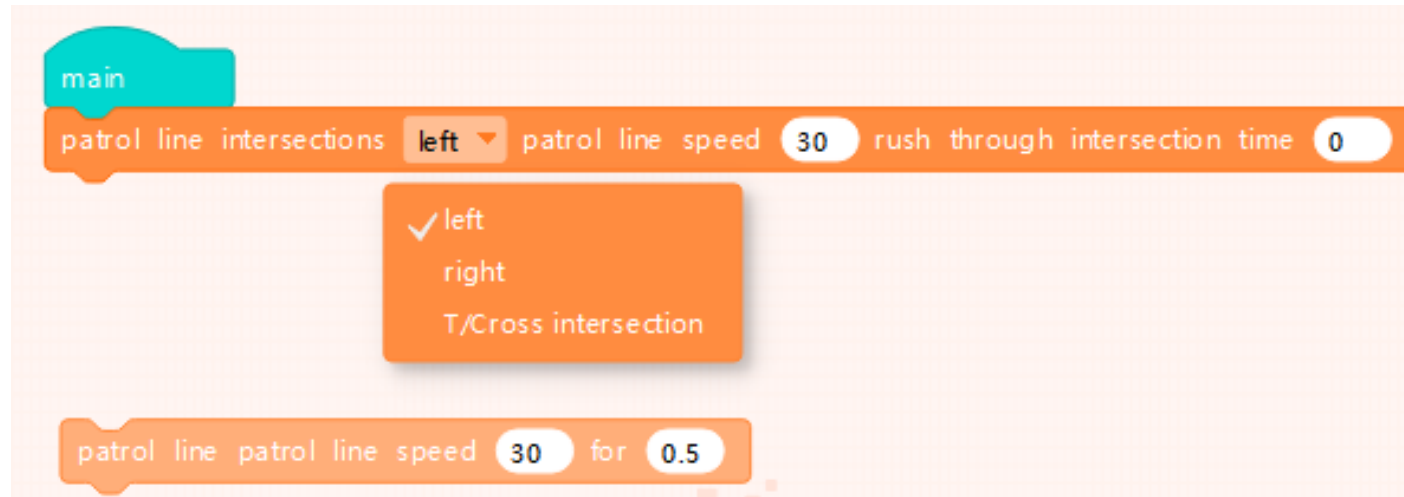


Let's find the optimal speed for fast and stable line following!



Challenges

Set Line Following Speed



You can configure the “patrol line speed” parameter to set the line following speed.

Valid values of the parameter: 0 to 100.

**Let's use the two code blocks to set
line following speeds!**



A blue cartoon character with a red and white striped hat, holding a blue and white striped stick. The character has large eyes and a smiling mouth, and is wearing red shoes. It is standing on a light brown surface.

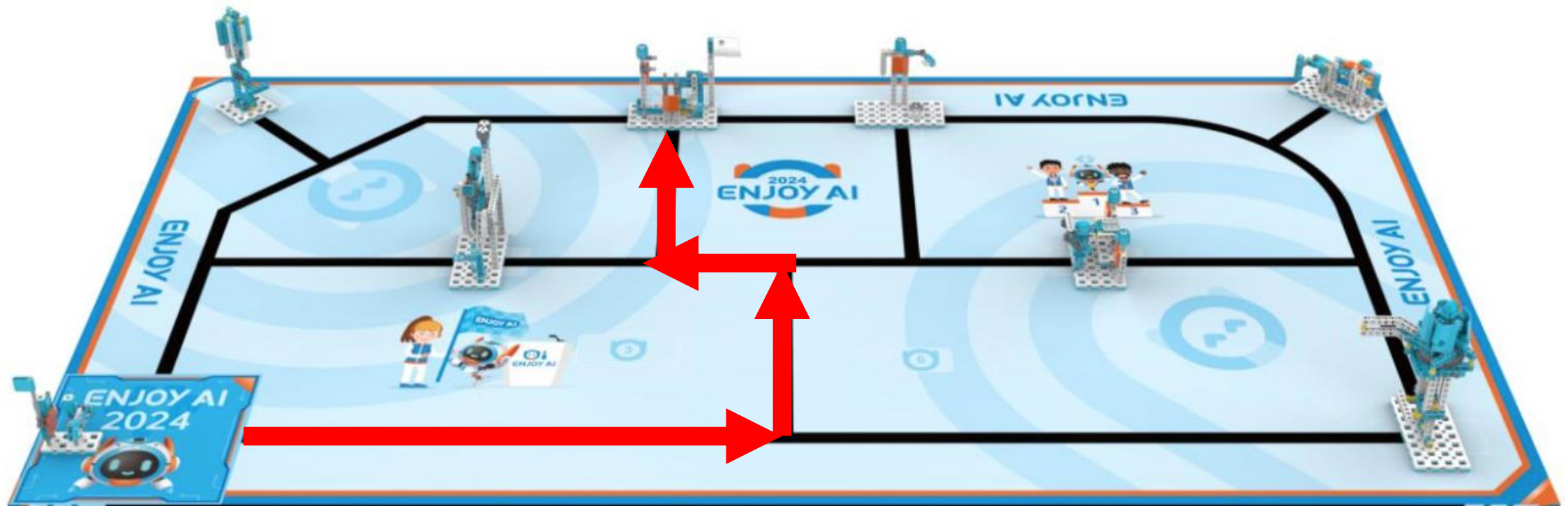
Tasks



Tasks

Task One

Line Following Blocks

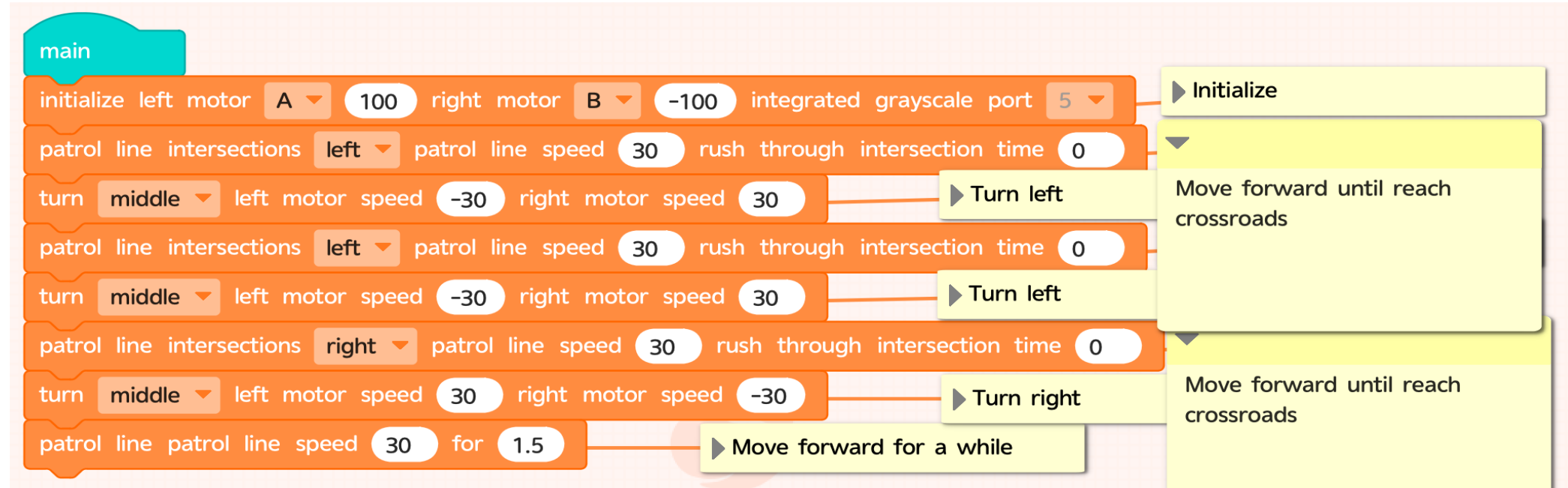


In this task, blocks that help identify roads at intersections are required.

Tasks

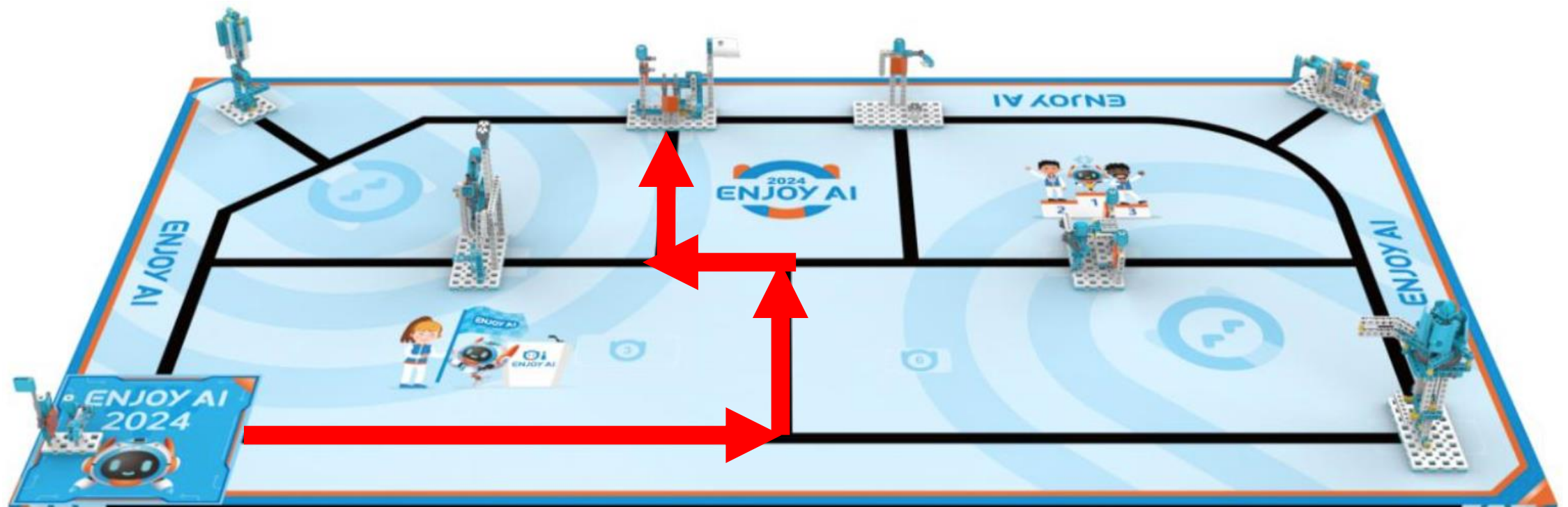
Task Analysis

Line Following Blocks



The previous slide shows that the robot must perform the following operations: Turn left at the first intersection. At the second intersection, stop for a while and then turn left. In this case, the “patrol line intersections” block must be repeatedly used.

Tasks



Let's try out!

Tasks

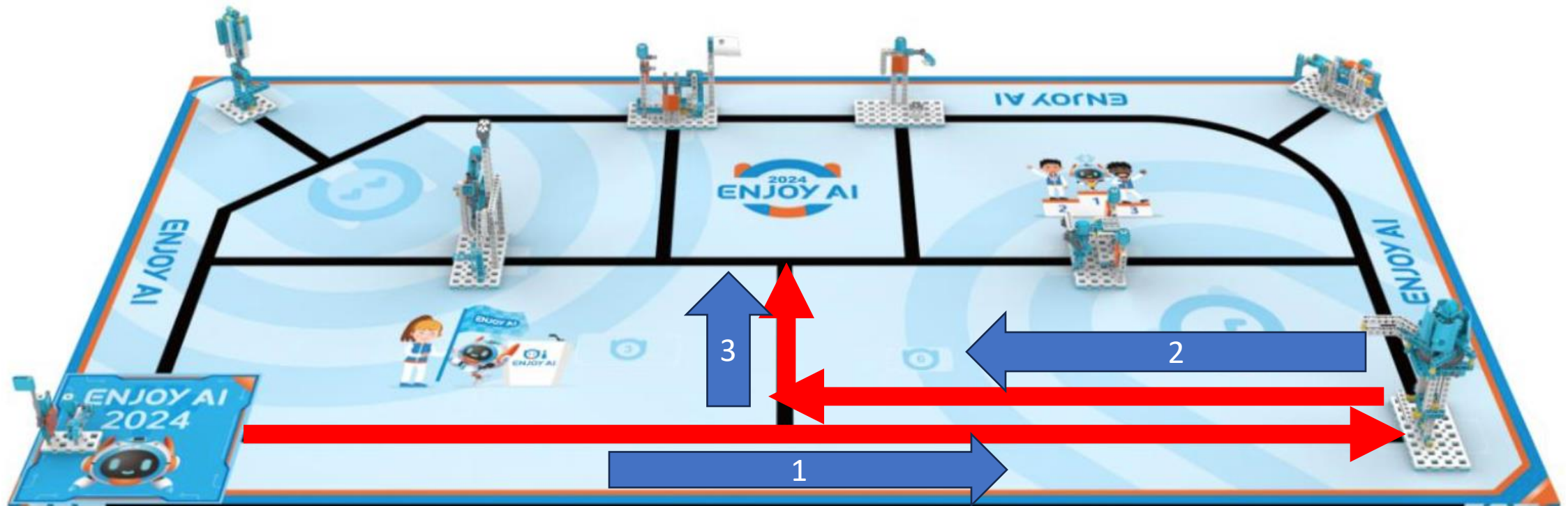
Run the program.



Tasks

Task Two

Line Following Blocks

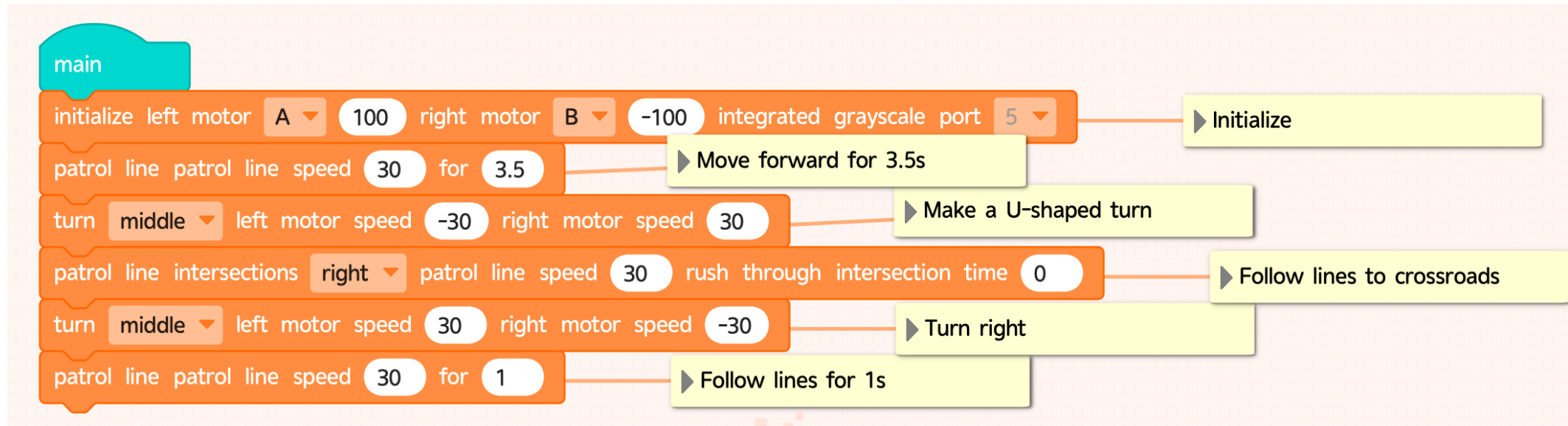


In this task, the robot must make a U-turn at the end of a road.

Tasks

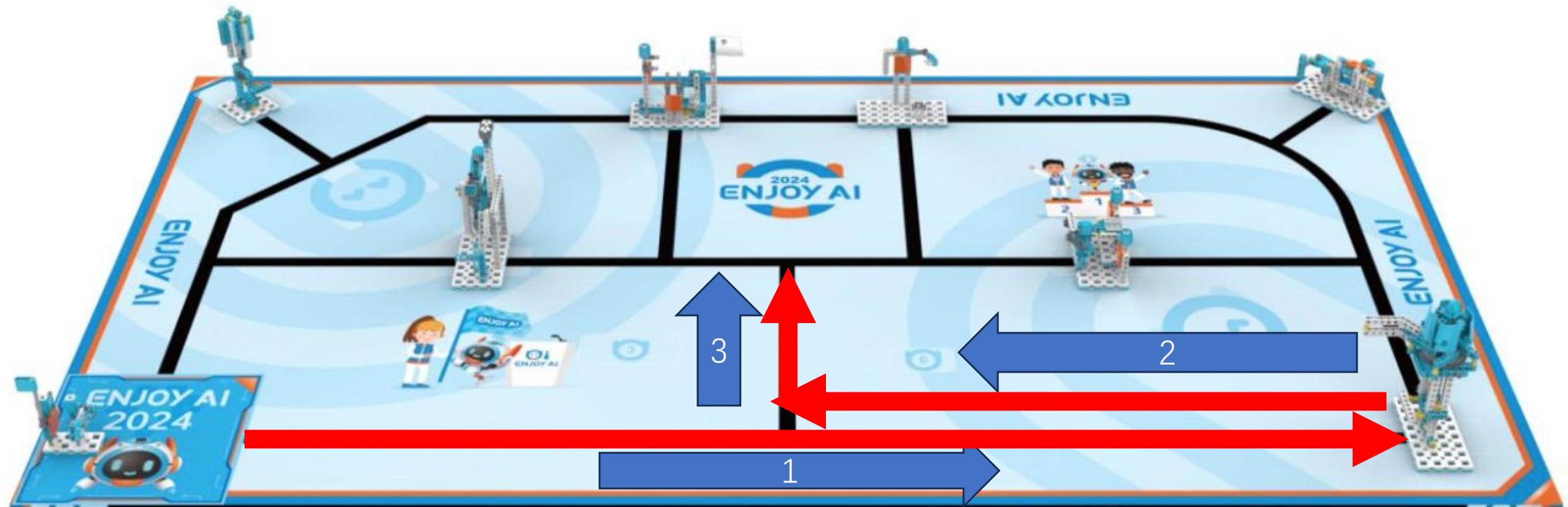
Task Analysis

Line Following Blocks



The previous slide shows that the robot must make a U-turn at the end of the first road. In this case, the “turn” block and the block for setting motor rotation angles can be used. The former block is preferred, because it avoids the need to calculate angles and automatically identifies the turns to make through a sensor.

Tasks



Let's try out!

Tasks

Run the program.



Tasks

Task Three

Line Following Blocks

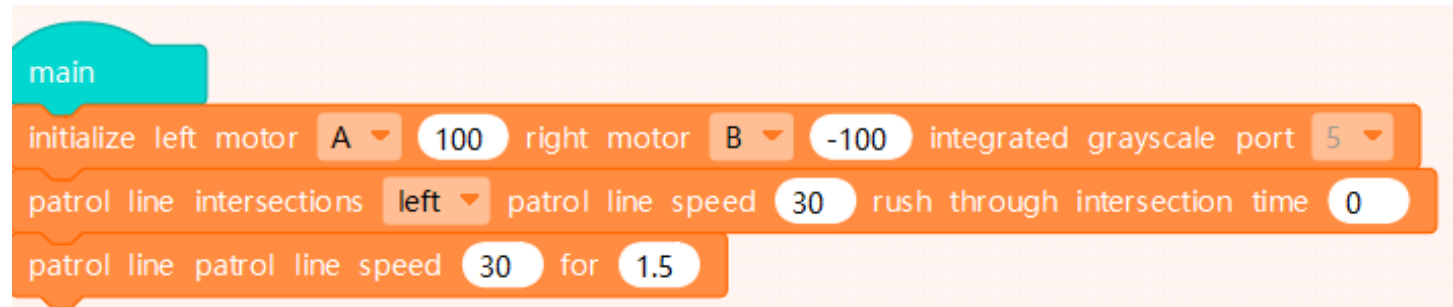
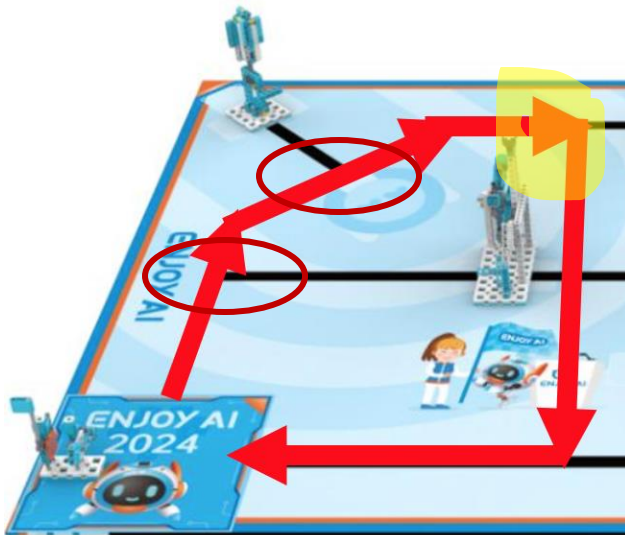


In this task, the robot must turn at only required intersections.

Tasks

Task Analysis

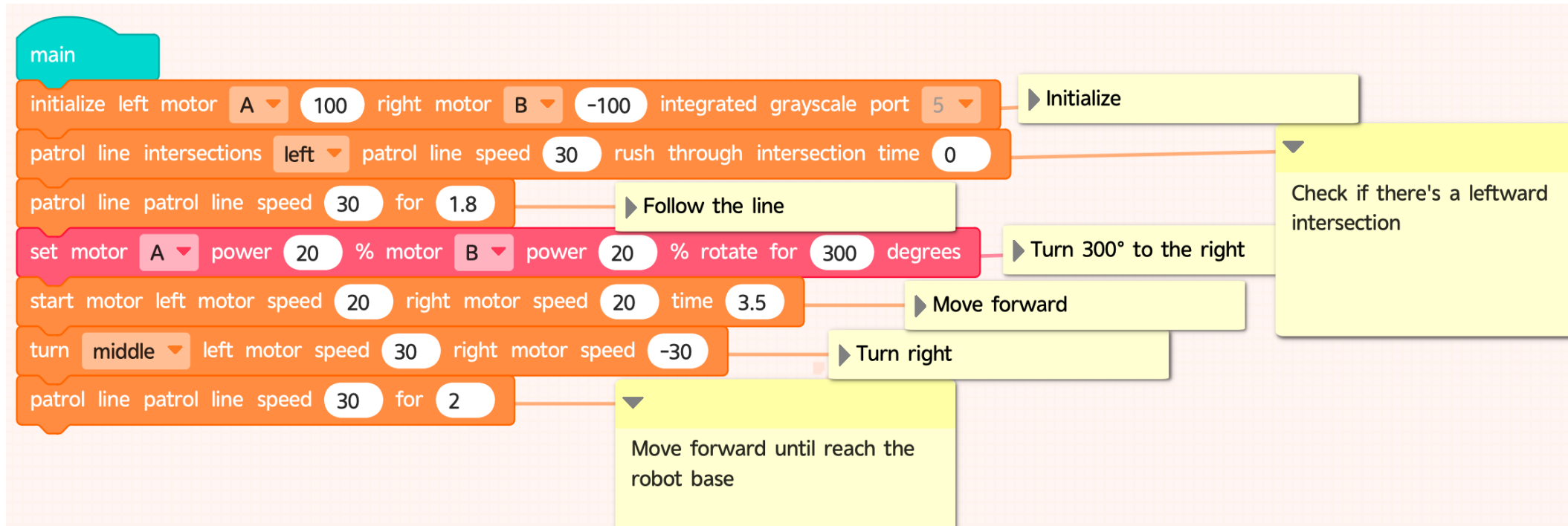
Line Following Blocks



The image shows that the robot must not turn at the circled intersections, so we cannot set the “patrol line intersections” parameter to right. Instead, we can set the parameter to left to let the robot pass the first intersection. Then, we can use the time-limited line following block to drive the robot forward to the yellow area.

Tasks

Task Analysis



Tasks



Let's try out!

Tasks

Run the program.



Further Study



Further Study



Design the program to drive your robot in the trajectory shown in the next slide. The robot must stay in the task zone for two seconds.

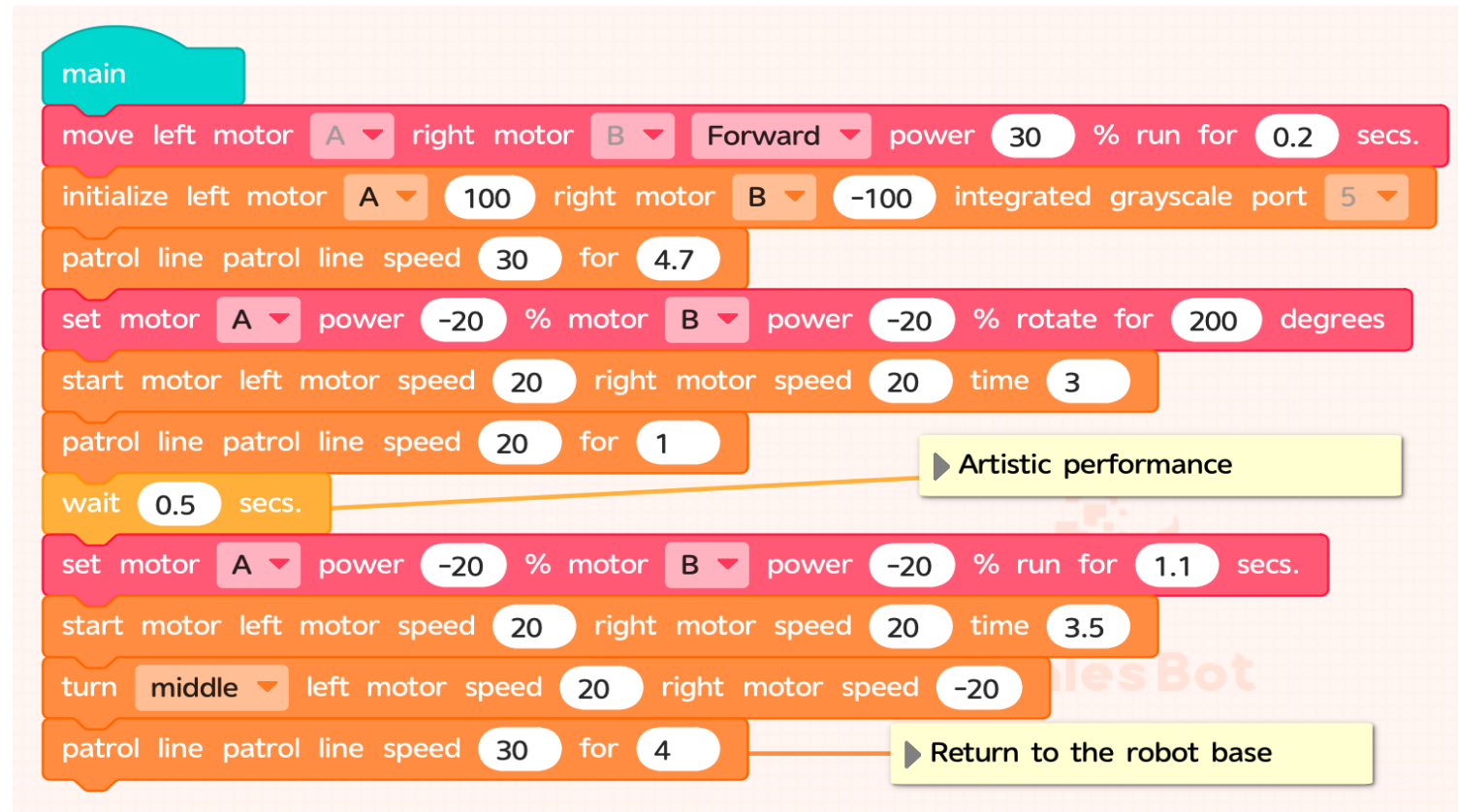


Further Study

Try to build the program.



Further Study



The robot is driven forward by using the “move” blocks in the “Motion” library rather than the “patrol line” blocks in the “Patrol line” library. This is because the latter ones make the robot move only before a black line is detected.

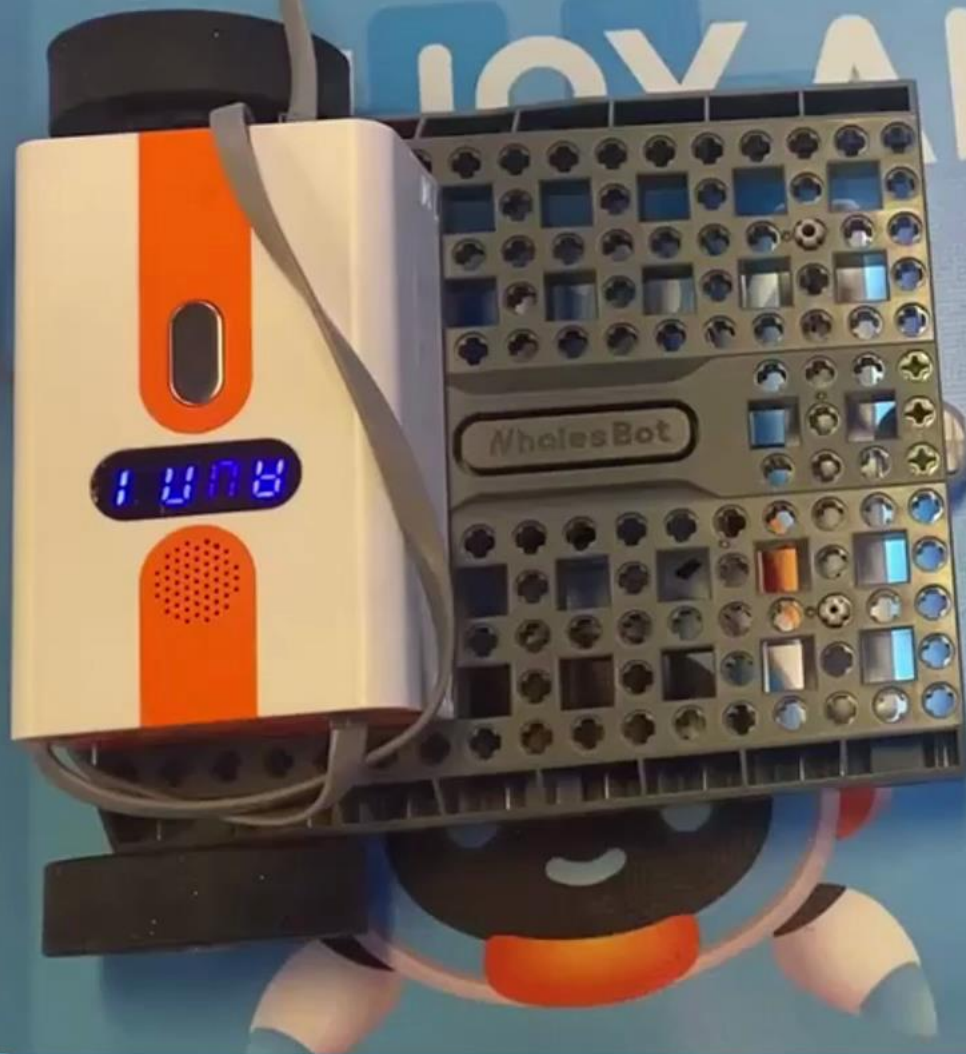
Further Study

**What happens when we start the program?
Let's watch a video.**



Further Study

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See you next time!

