Advanced Programming
1st Assignment: Concurrent and Asynchronous Abstractions
Deadline: 18 November 2025, 23:59

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1 Assignment

This assignment is a continuation of the exercise about concurrency in Kotlin. You should start working from the solution to the exercise, available in the course website. The task is to complete the implementation of the `src/main/kotlin/assignment/Assignment.kt`. After you have completed the assignment, please submit your solution using the course website. You should modify and submit ONLY the `Assignment.kt` file.

1.1 Scenario

In this scenario (Figures 1 and 2), there are three colored robots (the **red robot**, the **green robot**, and the **blue robot**) and three colored lights (**red**, **green**, and **blue**). The main goal is for each robot to reach the light of the corresponding color: the red robot should reach the red light, the blue robot reach the blue light, and the green robot reach the green light.

Note that each robot start closest to a light of a different color: the red robot is closest to the blue light, the green closest to the red, and the blue closest to the green. Because the light sensor only detects the closest light, the robots don't know the position of their target light at the beginning. The robots will have to exchange information about the local environment to achieve their own goal.

The robots must also exchange information about the progress of their goal. In fact, only after **all** the robots have accomplished their goals, they start celebrating by blinking their leds.

1.2 Guidelines

Here follow some tasks to guide you through the assignment. Feel free to combine the different **asynchronous** programming techniques that we have seen for completing the assignment. The only restriction is that **each robot must be an actor**.

Task 1: Designing Actors

Actors are a combination of *local state* and *behavior* with respect to *incoming messages*. When designing actors, you should ask yourself what is their local state and what messages are exchanged between them.

Task 2: Coordination

The light sensors only detect the light closest to each robot. At the beginning, the robots don't know the position of their own target lights, but they know the position of the target light of another robot. The robots must share this information with the other robots to help them reach their goal.

Figure 1: The start of the scenario.

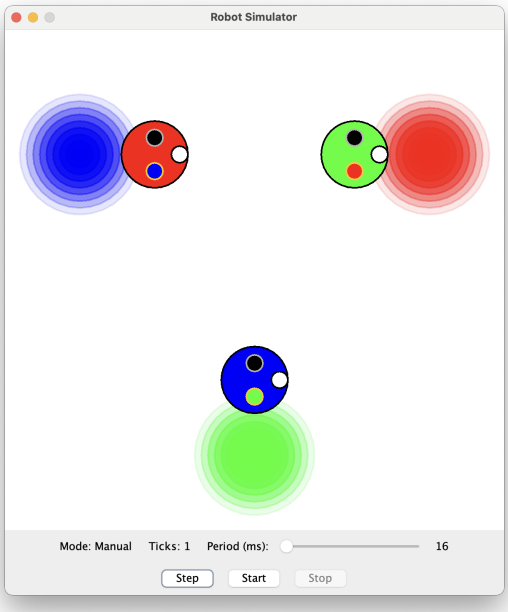
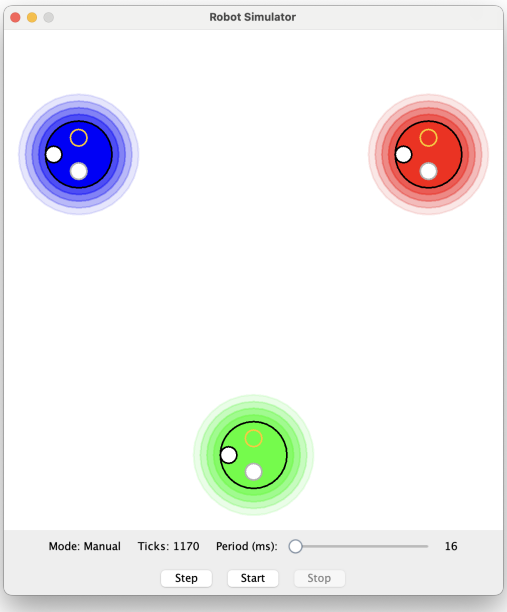


Figure 2: The end of the scenario.



Task 3: Reach The Light

After gathering enough information, each robot should know the position of its target light. Then, it can easily rotate towards it and move forward until the destination is reached. You can also take inspiration from the behaviors that we have seen during the exercise.

Task 4: Celebration

In order to celebrate at the end of the scenario, the robots must keep track of the state of every other robot. Only when all the robots have reached their respective target lights, then they should start blinking.