Project 2 (P2)
Deadline: 20/10/2019

1   Goals

The general objective of this work is to build, on the V-REP robotic simulator, a set of behaviors to control a Pioneer P3-DX robot.

2   Description

More specifically, the system must:

- Implement and evaluate at least 1 robot control behavior per group member (AvoidObstacle, WallFollow, Go-ToGoal) using models based on PID, Fuzzy, Neural Networks, etc;

- Validate the behavior and present the performance of each controller isolated (From path graphs, control signal, etc.), as in the example in Figure 1. To show the quality and robustness of the behavior, start the robot from different poses, use different scenarios and different controller parameters.

- Compare the behavior result when:

    - the robot uses as a source of its localization the ground truth
    - the robot uses as a source of its localization the odometry (simple or corrected)

- Propose a behavior coordination strategy (state machine, planner, AR, subsumption, etc.)

- Introduce the performance of the behavior coordination system, as in the example in Figure 2. To display system quality, start the robot from different poses and use different scenarios.
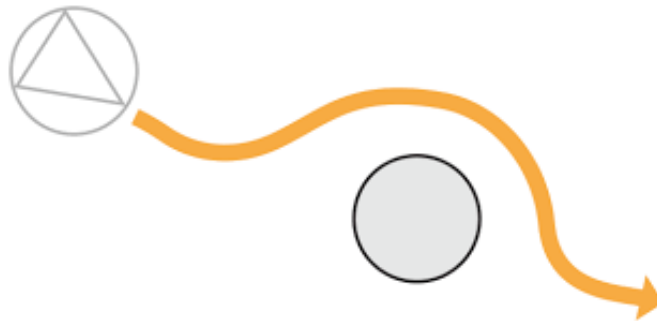

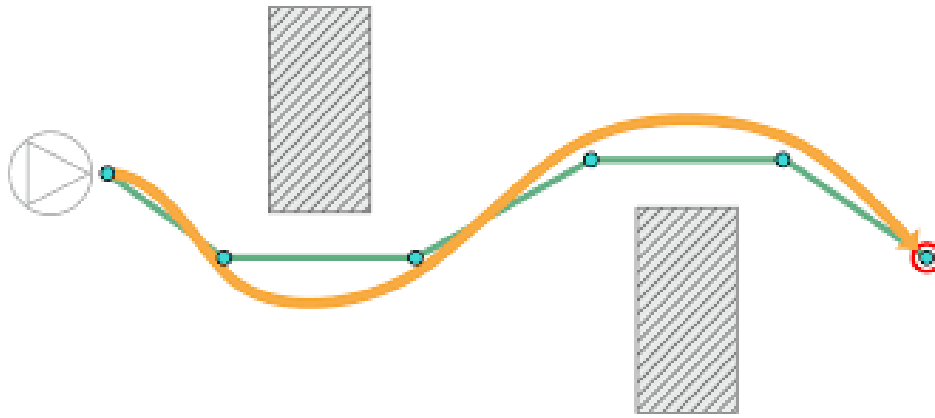Figura 1: Example of an avoid obstacle behavior.

Figura 2: Example of a trajectory performed by a set of coordinated behaviors.

3 Evaluation

The system should be evaluated according to the quality of the solutions found and a critical evaluation is expected on the relationship between adopted parameters x solution quality. Graphs, tables and images representing the results are expected. Further comparisons with the literature are welcome, although not mandatory. A link to a video of up to 2 minutes with recording of the behavior(s) running in the scene should be indicated in the report.

4 Simulator, Programming Language and Libraries

The simulator adopted in the discipline is the V-REP. The programming language used in the work is free and the use of libraries is allowed.

The work should be done in groups of up to 4 people.

5 Submission and Report

The report must be submitted by the Moodle system (https://www.ggte.unicamp.br/ea/) in the area corresponding to the course with the source code. Delivery consists of:

- **For groups that choose Python as their programming language**: The notebook with the implementation/execution of experiments and comments in code describing the implemented approach and discussing the results;

- **For groups that choose other languages**: A report, maximum 4 pages, with the definition of the problem, the solution and the results obtained. The report template is available on the course website.