First experiments with robot simulator ARGoS: Programming simple behaviours

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1 Play with the example file

The files `beginning.argos` and `beginning.lua` provide an example of the experimental setting (.argos file) and controller programming in Lua (.lua file).

2 Exercises

The following exercises concern the coding of a given robot behaviour. Use a scientific approach to design your controller: once you have written the code, and **before** running the robot, make a hypothesis on the expected behaviour. Then, check your hypothesis against the actual behaviour. If the outcome is as expected, do more tests by changing the initial and environmental conditions. Conversely, if the behaviour is not as expected, this means that your "theory" has to be corrected and so the robot program.

1. Program the robot such that it is able to perform phototaxis (i.e., it goes towards the light). Arena: only perimetral walls and one light bulb.
   - Variant 1: add an extra light
   - Variant 2: what happens if you add actuator/sensor noise?

2. Program the robot such that it is able to perform obstacle avoidance. Arena: perimetral walls and some boxes. Test the robot in arenas with different number of boxes.

Food for thought

- What does exactly mean to "Program the robot such that it is able to perform phototaxis" ? Is the task correctly, properly and completely defined?
- About obstacle avoidance: the task, as it is presented in Exercise 2, is not sufficiently detailed, as a standing robot achieves the goal. One should define the task as something like "random walk with obstacle avoidance" or "collision-free navigation".
- What are the main difficulties in each of the robot programming exercises?
- Which of the two tasks between phototaxis and obstacle avoidance is harder to program? Why?
- Do the controller need memory to let the robot achieve the desired task? If yes, why? If not, would it help?
- How would you assess the *performance* of the robot?