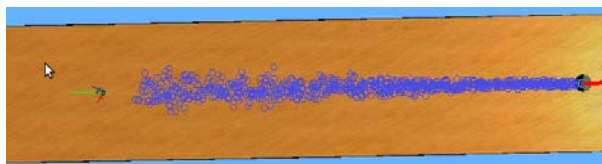


Evaluating Probabilistic Algorithms for Finding Odor Sources using Khepera IV Robots

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Nowadays, finding odor sources is usually performed by animals such as dogs or rats. However, using mobile robotic platform equipped with a chemical sensor, such sources could also be tracked down by robots. To do that, an odor source localization algorithm, which represents the brain of the device, is needed. DISAL laboratory performs experiments with several algorithms for example bio-inspired algorithm and for this project algorithm based on Probabilistics Inference. This algorithm, called Infotaxis, use a probability distribution to evaluate the position of the source.

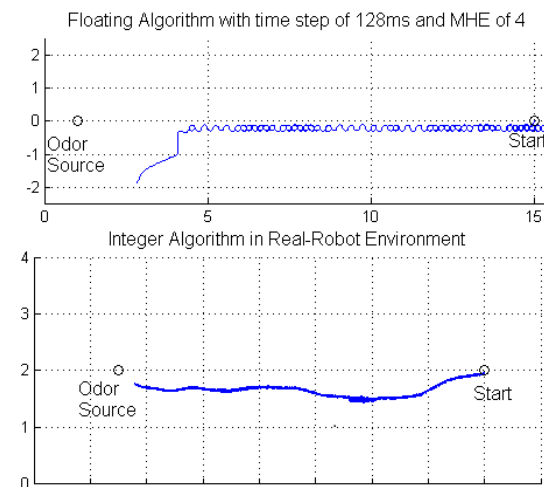


Picture of Webots simulation.

A previous work made by Thomas Lochmatter with a Khepera III robot use only integer computation. The goal of this project was to implemented a floating infotaxis algorithm and test it with both Webots simulator and real-robot. As we change of robot using now Khepera IV, another goal was to verify the functionality of the old algorithm on this new robot.

To perform real robot experiment, DISAL can use a wind tunnel that allows creating a homogeneous wind at a selected speed.

This device defined also the environment used in simulations.



Picture of two experiments: up there is the result of a run performs on the Webots simulator and down a run with real robot in the wind tunnel

The integer implementation and testing achieve good results on simulation and real-robot with slightly worse results than previous work. Maybe changes of device and location measurement cause it. For the floating implementation, the computation time appears to be critical. Therefore the goal was to create an algorithm combining integer and floating advantages. This new algorithm performs efficient results in simulation even if it seems less robust and stable than the integer implementation. Unfortunately in real robot experiments the robot does not success to reach the source position even if it has an efficient belief of its position.