

乱流中スカラー源探索に関する実験的研究

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<http://www.ysklab.iis.u-tokyo.ac.jp>

Assessment of Olfactory Search Algorithm with Mobile Robots in Wind Tunnel Experiment

Applications of Olfactory Search

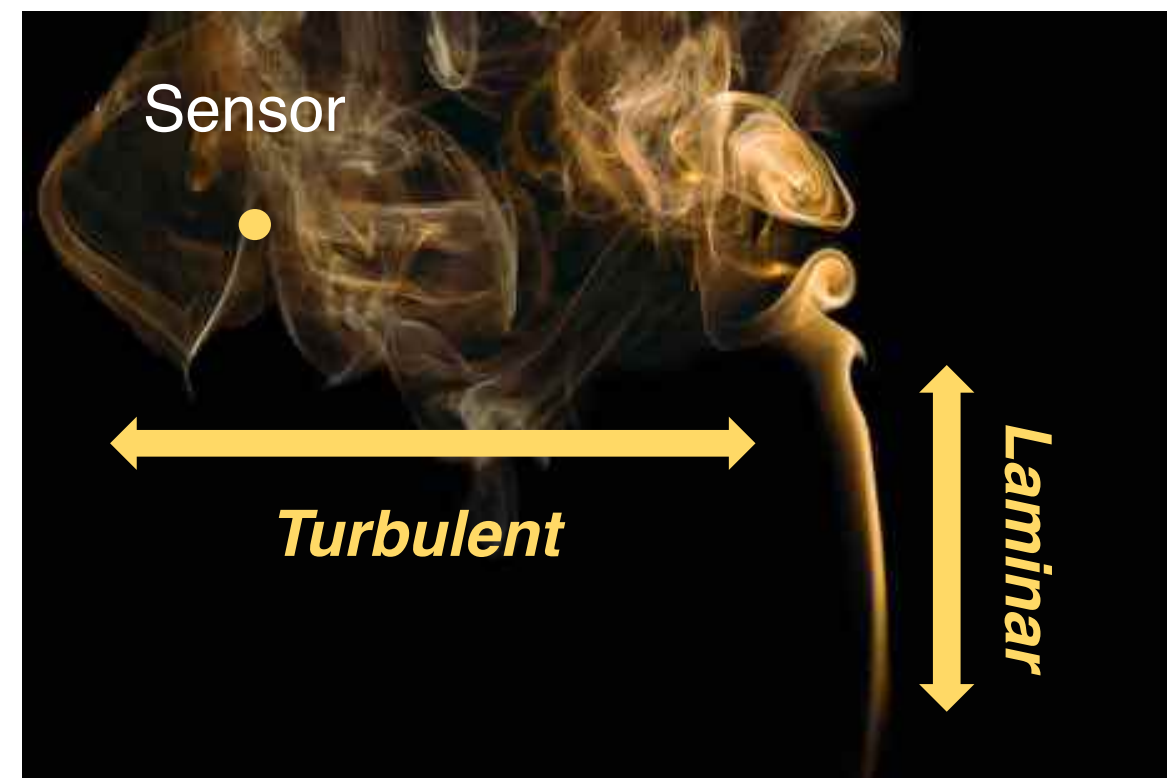


http://www.sohu.com/a/167403250_260616
Rescue and recovery operations

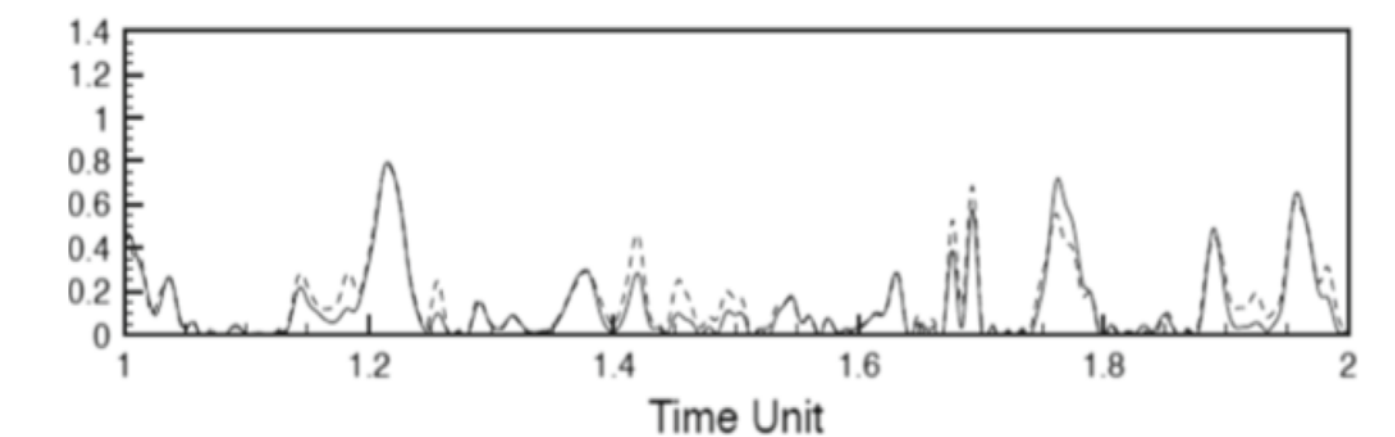


<http://makilab.iis.u-tokyo.ac.jp/equipment/>
Seabed mineral exploration

Complexity of Turbulent Scalar Diffusion

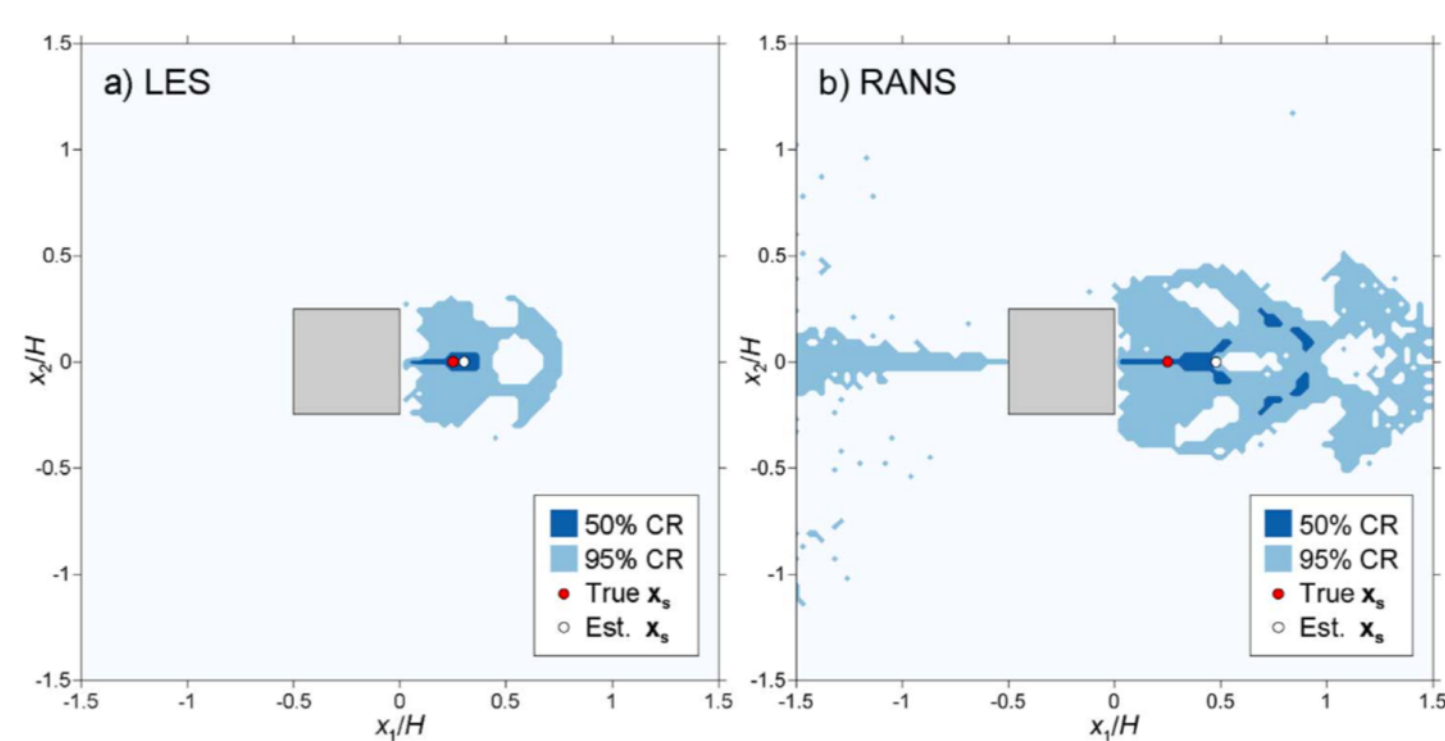


The structure of plumes in the air is intermittent in both time and space. If we put a sensor in the plume, the signal will be like the continuous line:

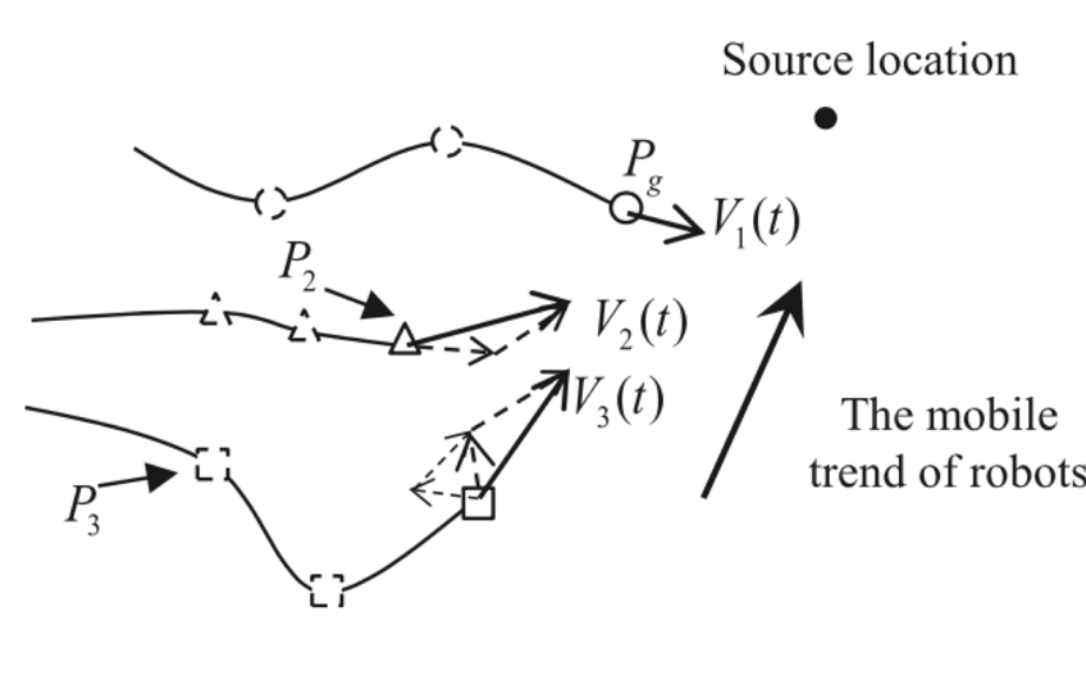


Cerizza, D., et al. "Reconstruction of Scalar Source Intensity Based on Sensor Signal in Turbulent Channel Flow." *Flow, Turbulence and Combustion* 97.4 (2016): 1211-1233.

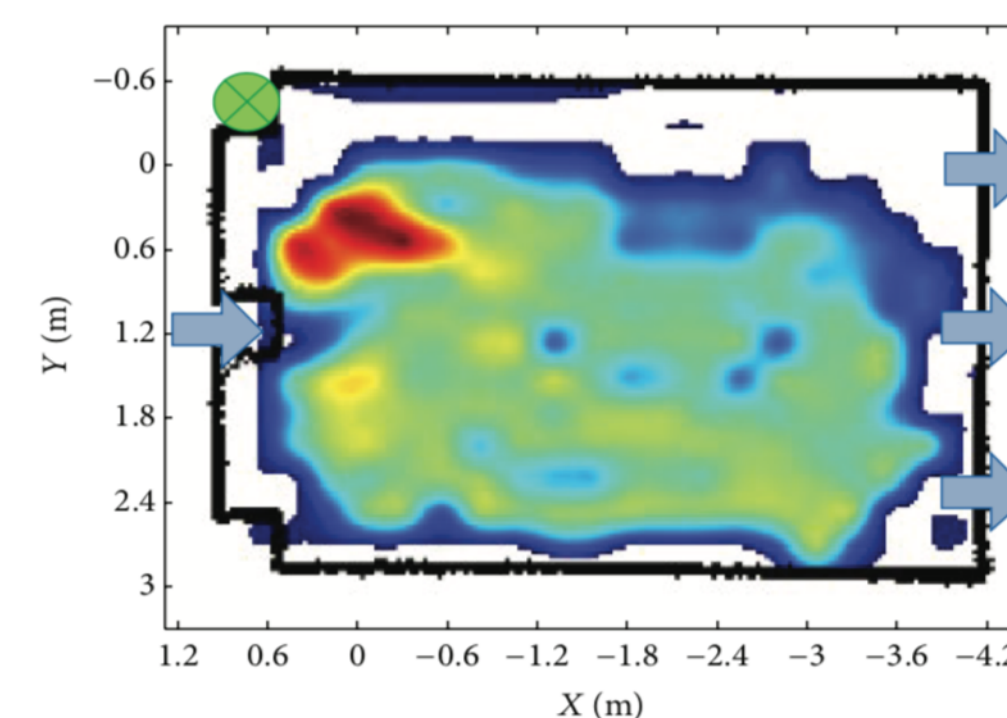
Category of Olfactory Search Algorithms



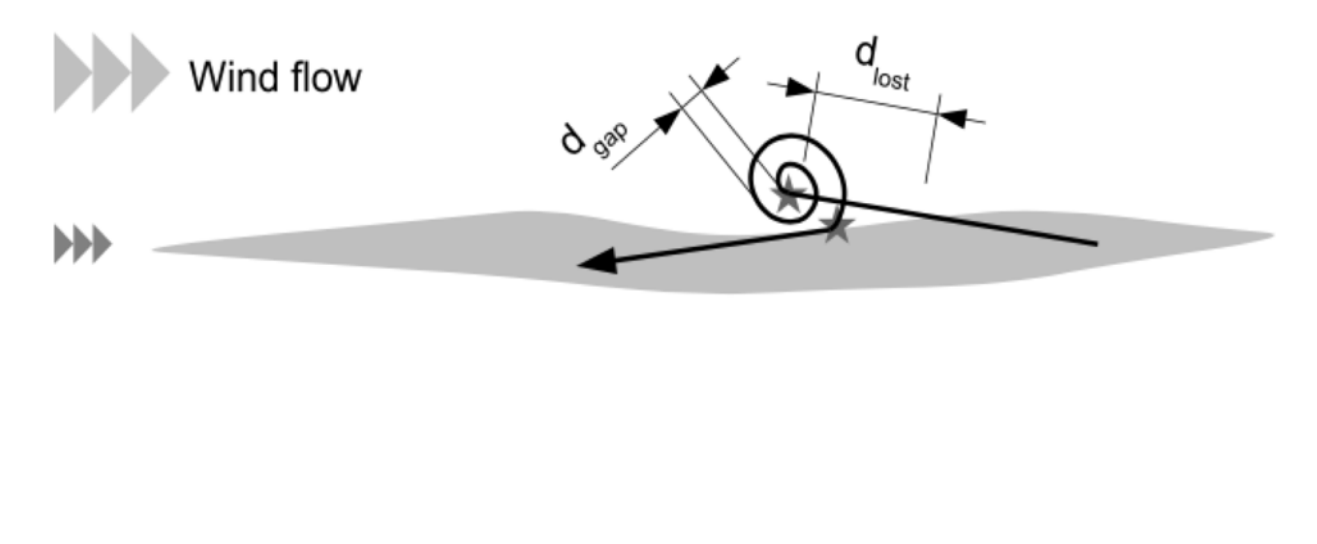
Xue, Fei, et al. (2018)
Probabilistic algorithm



Chen, Yicun, et al. (2017)
Formation-based algorithm



Martínez, Dani, et al. (2016)
Map-based algorithm



Lochmatter, et al. (2009)
Bio-inspired algorithm

Experiment System Developed in Our Lab

Objective:

Developing an experiment system for assessing different algorithms under controlled flow conditions

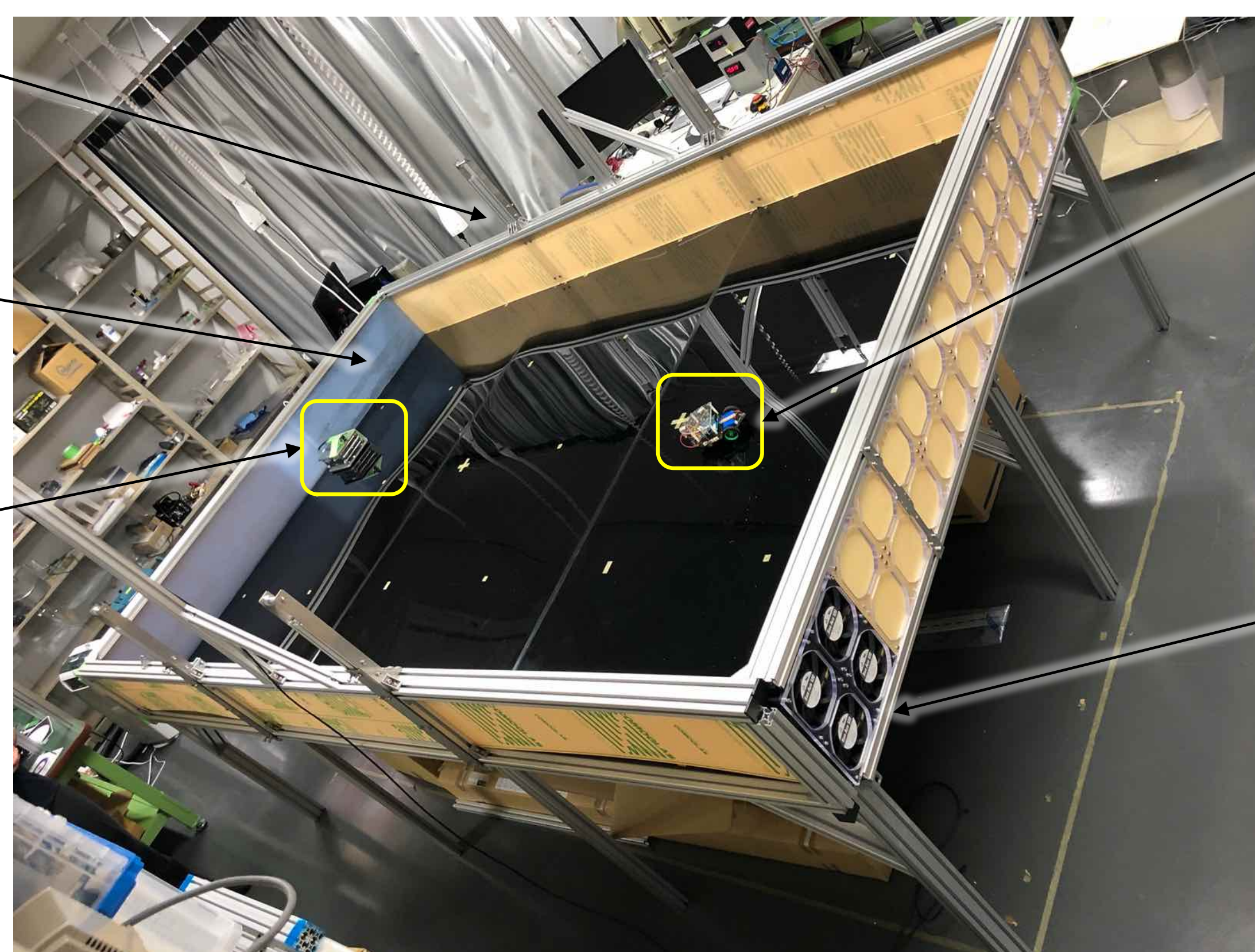


USB Camera
(Set above wind tunnel. Get image of the whole field to get the coordinate of robot)

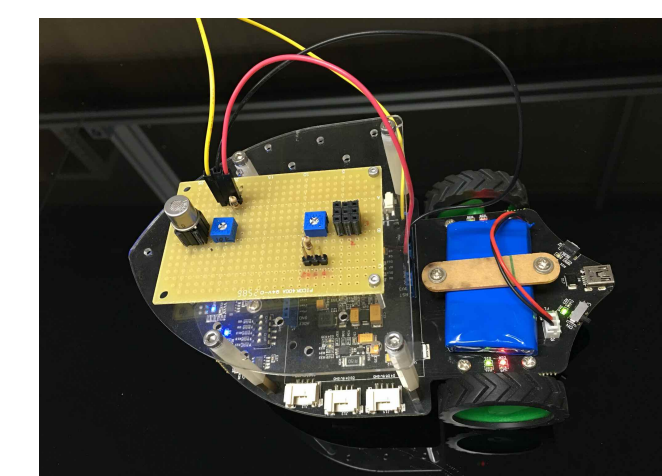
Wind Tunnel

Honeycomb Core

Scalar Source (Ethanol)



Mobile Robot (with sensor on it)



Fans



Scalar Source



Pump

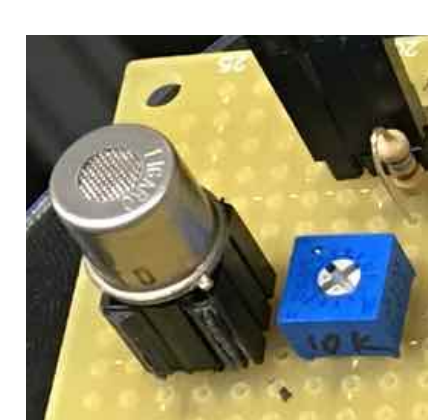


Ethanol container

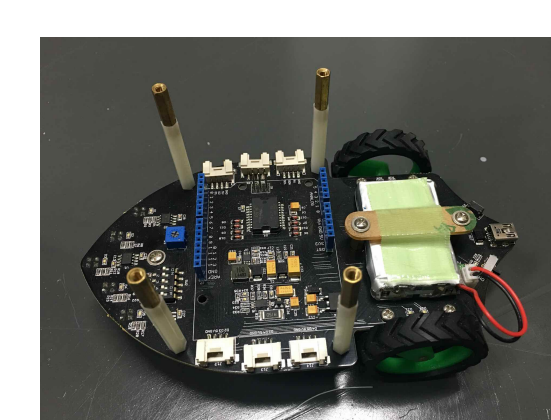


Flow switch

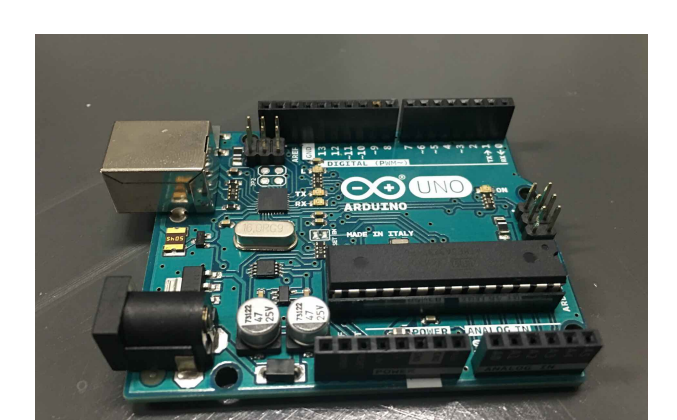
Mobile Robot



Sensor (TGS2620)



Shieldbot



Arduino Board