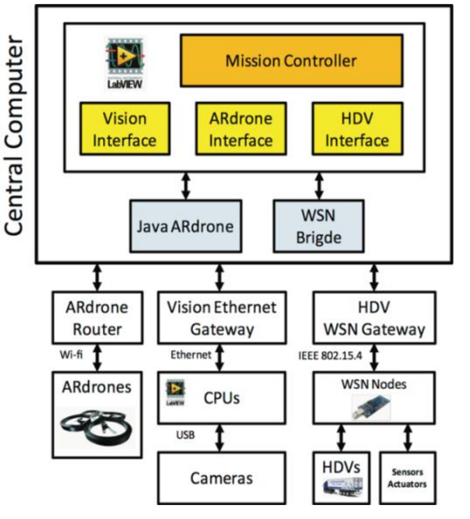
ROYAL INSTITUTE OF TECHNOLOGY

Master Thesis / Semester Project / Summer Project

Simulation and Implementation of Navigation Function based Control for Multi-agent systems

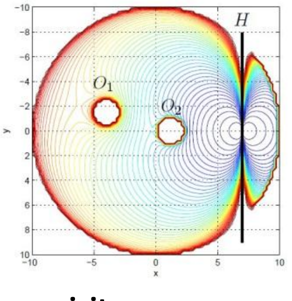
Description:

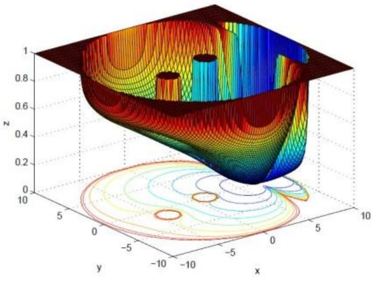
Navigation function proposed in [1] is one of the popular tools used to navigate a single robot through dynamic environment. Now navigation function based control techniques have been extensively applied to multi-agent systems where a group of agents need to cooperate with each other using locally available information and inter-agent communications. Some examples can be found in decentralized navigation [2], formation control [3] and air traffic management.

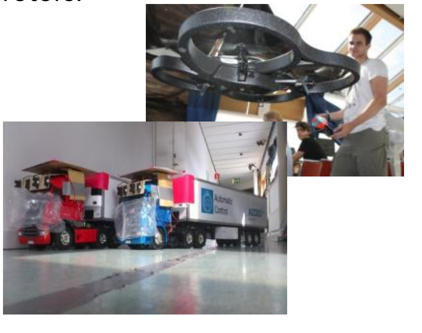


The main objective of this project can be classified into two parts: Firstly, several illustrative simulations in MatLab/Simulink should be performed to understand the control algorithms within different applications.

Then, an experimental testbed for mobile robots has been built at **Automatic Control Lab, KTH.** The primary architecture of the testbed is shown in the figure above, with a vision-based localization system, distributed wireless sensor networks, and several quadrotors and small scale trucks. This testbed could be an excellent practical system to implement and evaluate the Navigation Function based controllers for cooperative driving of the trucks, and autonomous navigation of quadrotors.







Prerequisites:

Courses in Automatic Control, Matlab/Simulink and general programming skills

Contact:

Meng Guo, KTH EES Automatic Control mengg@kth.se
Dimos Dimarogonas, KTH EES Automatic Control dimos@ee.kth.se

Reference:

[1] E. Rimon and D. E. Koditschek. Exact robot navigation using artificial potential functions. *IEEE Trans. on Robotics and Automation*, 1992.

[2] D. V. Dimarogonas, S. G. Loizou, K.J. Kyriakopoulos, and M. M. Zavlanos. A feedback stabilization and collision avoidance scheme for multiple independent non-point agents. *Automatica*, 2006.

[3] D. V. Dimarogonas and Kostas J. Kyriakopoulos, An application of Rantzer's Dual Lyapunov Theorem to Decentralized Formation Stabilization, *European Control Conference, 2007.*