Multi-robot/Multi-agent Reading Group (12.10.2004)
Biologically Inspired and Emergent Behavior Systems

Readings

- Richard T. Vaughan, Kasper Stoy, Gaurav S. Sukhatme and Maja J. Mataric. "Whistling in the dark: cooperative trail following in uncertain localization space." Proceedings of the International Conference on Autonomous Agents. 2000.

- Lee Spector, Jon Klein, Chris Perry, and Mark Feinstein. "Emergence of Collective Behavior in Evolving Populations of Flying Agents." Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2003). 2003.

Optional related readings

- Koza, John R. "Genetic evolution and co-evolution of computer programs." Artificial Life II. 1991.

- Koza, John R. "Evolution of emergent cooperative behavior using genetic programming." In Paton, Ray (editor). Computing with Biological Metaphors. London: Chapman and Hall. Pages 280-297. 1994.

- Yann Semet, Una-May O'Reilly, and Fredo Durand. "Artificial Ant Colonies for Non-Photorealistic Rendering." Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2004). 2004.

Questions

- While 'ant-inspired' systems are probably the most common, what are other ways we can draw from biology in designing systems?

- Must biologically inspired systems be reactive? How would one incorporate biological inspiration into a larger system?

- What are some ways biologically inspired systems can be applied to real multi-robot systems?

- How can one design emergent behavior systems?

- Can one effectively design emergent behavior systems for some arbitrary task, or is some prior biological inspiration necessary?

- What can we learn about the altruism of communication from emergent behavior systems? How can this knowledge be applied to systems on real robots?

- What are some applications of emergent behavior and biologically inspired systems?

- Are these type of systems only good for agents with low processing capabilities?

- In (Vaughan et al. 2000) the use of an ant-inspired system helped the system to be robust against localization error. In what other ways can biological inspiration and emergent behavior help create robust systems?