Approaches to Designing and Coordinating Unmanned Aerial Vehicles Using Multiagent Systems

By Brandon Gigous

Candidate for Master of Science in Robotics

Major Professor: Dr. Kagan Tumer

Abstract

The rise in unmanned aerial vehicles (UAVs) over the last several years has brought significant contributions to 3D-mapping, aerial photography, even search and rescue, among an increasing number of applications. Alongside UAVs, the field of multiagent systems (MAS) is an emerging area of research in artificial intelligence (AI) and has the potential to address many challenges in engineering, including those that are pertinent to UAVs. One of these is UAV design, which continues to grow in complexity. In this report, a distributed multiagent system is introduced as a way of optimizing the design of a quadrotor, and this system can be suited to the design of other complex systems. It is shown that this approach is capable of finding designs comparable to those of centralized algorithms in about the same amount of computational time. Another likely challenge is congestion of urban airspaces as UAV regulations are loosened. A multiagent UAV traffic management system is presented, where agents control costs across different parts of an airspace in order to influence the paths of the UAVs in the environment to reduce total travel time. Investigated is the ability for agents to learn when given not only local traffic information, but also additional information about incoming traffic, which is shown to improve performance of the system in particular traffic scenarios.

Wednesday, June 7, 2017

1:00 PM, Robotics Conference Room (Graf 300)

Oregon State University OSU College of Engineering

School of Mechanical, Industrial, and Manufacturing Engineering