Project title: Task scheduling for a swarm of heterogeneous drones

Brief Description of Design Project Goals:

Overview: Swarms of IoT devices, specifically UAVs, can be used in many scenarios, including disaster recovery, weather monitoring, and space exploration. The actual edge devices have strict battery constraints, and limited compute and memory capabilities. Therefore, when the swarm of UAVs must execute a more demanding computation, it often leverages a backend cloud. The goal of this project is twofold. First, students will have to configure a local small swarm of programmable drones to move in a coordinated fashion, recognize images in their environment, and avoid obstacles. Second, once this application is set up, students will benchmark the difference in performance and battery-life for the following three setups: (i) when all computation and communication happens between the drones themselves with no centralized coordination system, (ii) when a local server at Cornell is used to coordinate the drones’ actions, and (iii) a hybrid scenario where part of the computation happens on the edge devices, and part on the backend cloud.

Specific MEng Contribution:
- Set up coordinated movement and image recognition service on the local drone swarm (an initial implementation of the application already exists)
- Benchmark the different execution environments (cloud, edge, hybrid) and design a simple scheduler that determines when to assign a compute task to an edge device and when to run it on the backend cloud.

ECE Field Advisor Name: Christina Delimitrou
- Email – cd434@cornell.edu
- Phone – 255-9316
- Office – 332 Rhodes
- Project Web Site: Contact Christina for more details.

Number of MEng Students Needed: 2 - 3

Required Skills: Experience in C++/Python, JS, Linux, networking, basic distributed systems principles.

Estimated Project Time Frame:
2017-18 Academic Year, Two (2) Semesters