SEMINAR NOTICE

Preston M. Green Department of Electrical and Systems Engineering

Resource Distribution for Robots and Nexus between Water and Energy

PhD Preliminary Research Examination

Daniel McGibney
PhD Candidate

Department of Electrical and Systems Engineering
Washington University in St. Louis

Abstract: This proposal will present the overview of my planned thesis work in two parts:

We consider the sorting operation at a recycling center using robots. For example, the operation may sort bottles and cans based on their material: iron, aluminum, and plastic. Currently we have a vision-based system consisting of 3 robots that can effectively sort and navigate the objects using the color and shape of each object. However, the system cannot distinguish between similar looking objects, so we utilize audio features to get material type information. We propose adding the use of 2 audio robots so that objects can be sorted based on the sound emitted when the object is dropped into the sorting area. The combined multi-robot system will integrate a vision-based navigation system with an audio-based system and effectively sort objects based on material type.

Water and power requirements for large-scale systems have been researched and can be optimized using multi-objective formulations. We propose a nexus between water and electrical power that satisfies the water and power demands, ensures a sufficient quality of water, and minimizes the total cost. Here we consider multiple power sources such as thermal, hydro, wind, and solar. Also, the water source we consider is a multiple-reservoir system that supplies the water to the region of interest. In particular, we consider a system with pumping stations, hydro plants, treatment centers, and water users to model the water consumption. We model the power flow with hydro, coal, oil, wind, and solar power plants connected to the power grid, which charges batteries and provides power to multiple users. We then propose fast and efficient methods using state-of-the-art techniques such as convex optimization constrained with linear matrix inequalities to develop useful tools for decision-makers of the system.

DATE: Thursday, November 8, 2012
TIME: 10:00 a.m.
PLACE: Green Hall, Room 0120

Thesis Advisor:
Dr. Hiro Mukai

This seminar is in partial fulfillment
of the Doctor of Philosophy degree

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