

Monday, July 27th, 2020 10:00 AM

Defense held online via Zoom

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Ph.D. Dissertation Defense

Advisor: Dr. Gino J. Lim



“System Resilience Assessment and Improvement with Applications of Unmanned Aerial Vehicles”

Abstract

Natural and human-caused events often disrupt physical networks such as transportation networks, supply chain networks, and power networks. It is necessary to increase and maintain the resiliency of networks to enhance their endurance and keep the network's performance at a high level. Drones or Unmanned Aerial Vehicles (UAVs) are aircrafts without a human pilot aboard. Accommodating cameras, sensors, and other information gathering equipment allows them to provide high-quality information about the surveilled areas. The proposed research first provides a quantitative approach for measuring the resiliency of network components and the network itself and enhancing the network resiliency through reinforcing the weakest components in the network. Considering the U.S. border as an example of a physical network under threat, providing continuous surveillance over the border can enhance its security. Therefore, we propose a risk-based surveillance model using drones for border patrol. Using drones can help patrol areas that are typically inaccessible by field agents, reduce response time, and enhance the safety of the dangerous regions. Moreover, we provide a drone routing framework to enable the systematic and automatic assessment of power networks considering wireless charging of the drone during the scanning. We incorporate a resilience-oriented line priority index to periodically prioritize the power lines based on their specifications and conditions and improve the assessment's efficiency.

Zoom link: <https://uofh.zoom.us/j/93753152052>

Meeting ID: 937 5315 2052