Robotics and Autonomous Systems Thesis Defense

Dynamic Modeling and Control of AerialManipulator for Phytobiopsy

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Abstract

The ability for aerial manipulators to stay aloft while interacting with dynamic environments is critical for successfully insitu data acquisition methods in arboreal environments. One widely used platform utilizes a six degree of freedom manipulator attached to quadcoper or octocopter, to sample a tree leaf by maintaining the system in a hover while the arm pulls the leaf for a sample. Other system are comprised of simpler quadcopter with a fixed mechanical device to physically cut the leaf while the system is manually piloted. Neither of these common methods account or compensate for the variation of inherit dynamics occurring in the arboreal-aerial manipulator interaction effects. This research proposes force and velocity feedback methods to control an aerial manipulation platform while allowing waypoint navigation within the workspace to take place. Using these methods requires minimal knowledge of the system and the dynamic parameters. This thesis outlines the Robot Operating System (ROS) based Open Autonomous Air Vehicle (OpenUAV) simulations performed on the purposed three degree of freedom redundant aerial manipulation platform.

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Zoom Link: https://asu.zoom.us/j/5404714698