GPS DEPRIVED DRONE LOCALIZATION

Problem

Unmanned aerial vehicles, such as drones and quadcopters, rely heavily on GPS for navigating an environment. Indoors, GPS is often diminish to the point of unusability, making indoor navigation difficult.

We seek to identify and implement various systems which enable an unmanned aerial vehicle to navigate autonomously in GPS-deprived environments, such as indoors.

Solution

We have investigated two main routes of localization; Wi-Fi RSSI Localization and Optical Localization. We determined that Wi-Fi RSSI localization is not precise enough for real time drone localization. Optical localization can be precise enough for a GPS deprived drone (indoors, tunnel, etc.) real time control.

Challenges

- Limited precision in Wi-Fi RSSI localization even with noise filter.
- Lack of existing systems to implement optical localization.
- No prior AI/ML experience
- No prior Computer Vision experience
- No prior drone development experience
- Environment influences optical localization (lighting, background colors, etc)

Achievements

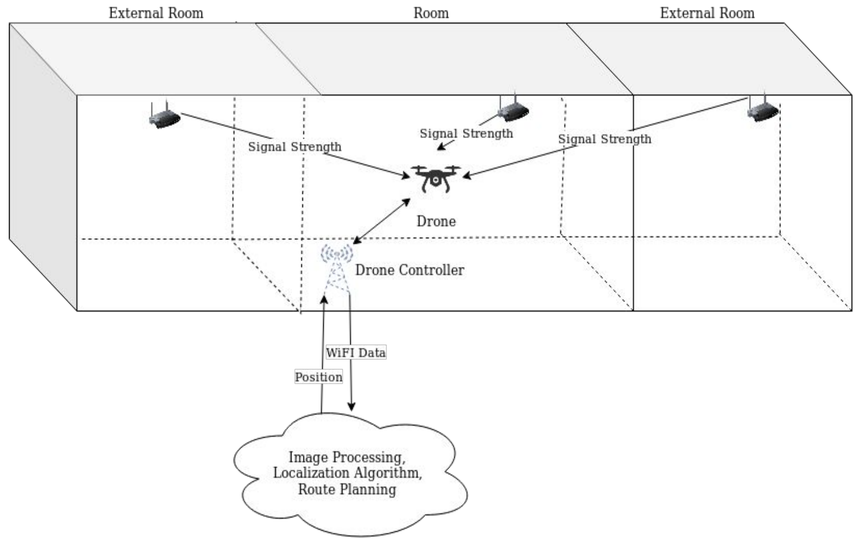
Successfully determined that Wi-Fi RSSI localization is not usable for real time drone localization.

Successfully implemented rudimentary optical localization system with drone control feedback in limited environments.

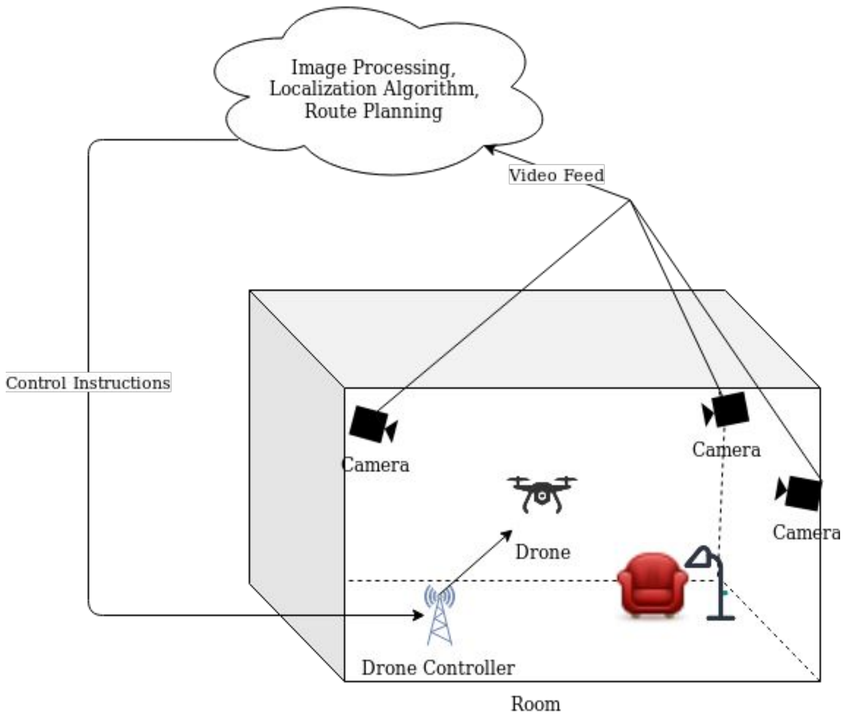
Future

We want to expand the environments optical localization works within and improve precision.

Wi-Fi Localization



Optical Localization



Tanner Bornemann

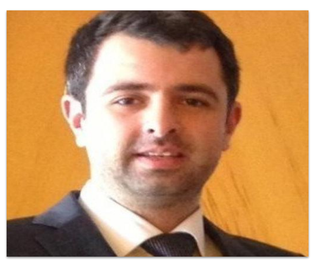
Computer Science

Joseph Krusling

Computer Science

Matt Manley

Computer Science



Mehdi Norouzi

Faculty Advisor