Autonomous Multirotor Infrastructure

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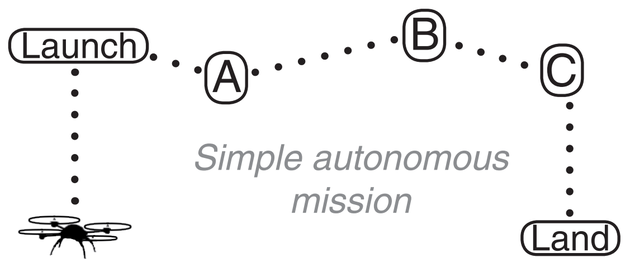
THE MISSION: Multicopter Control, Navigation, and Landing

Autonomously gathering aerial data has many potential applications, from co-scouting with ground robots to providing live field information to dismounted units. The ARL team developed a number of autonomous multirotor capabilities, creating an infrastructure for further work at ARL and at Olin.

Autonomous Navigation

GPS waypoints can be sent to the quadcopter using open-source protocols. The team can command its quadcopters to autonomously launch, fly to a set of GPS points, and land.

Great Lawn waypoints for team testing



Simple autonomous mission

Live video stream from the quadcopter while landing

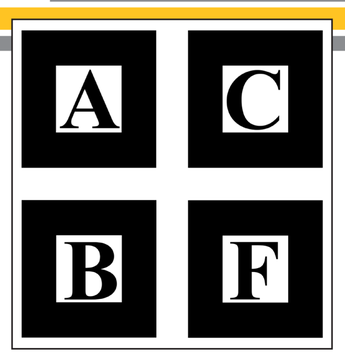
Lightbridge video radio

Live Video Streaming

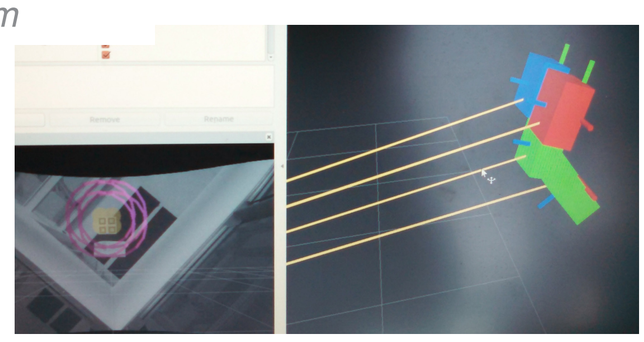
The system can stream HD video from the quadcopter to the base station computer using a Lightbridge radio (shown left). The base station computer calculates landing paths using targets in the video stream.

Marker Identification

Using open source libraries, the position of a fiducial, pictured right, can be calculated from the video stream. Using fiducials as targets, the quadcopters can land autonomously.



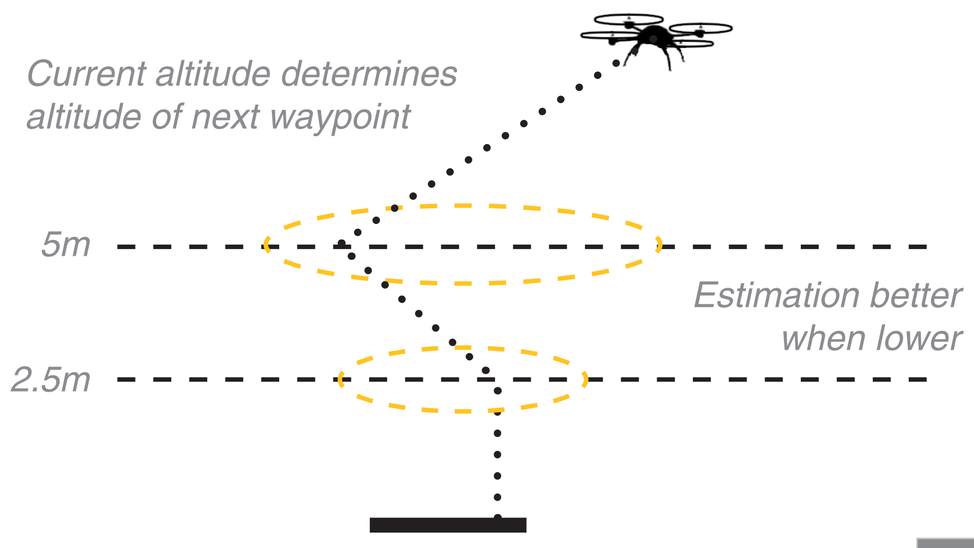
Fiducial used by the team



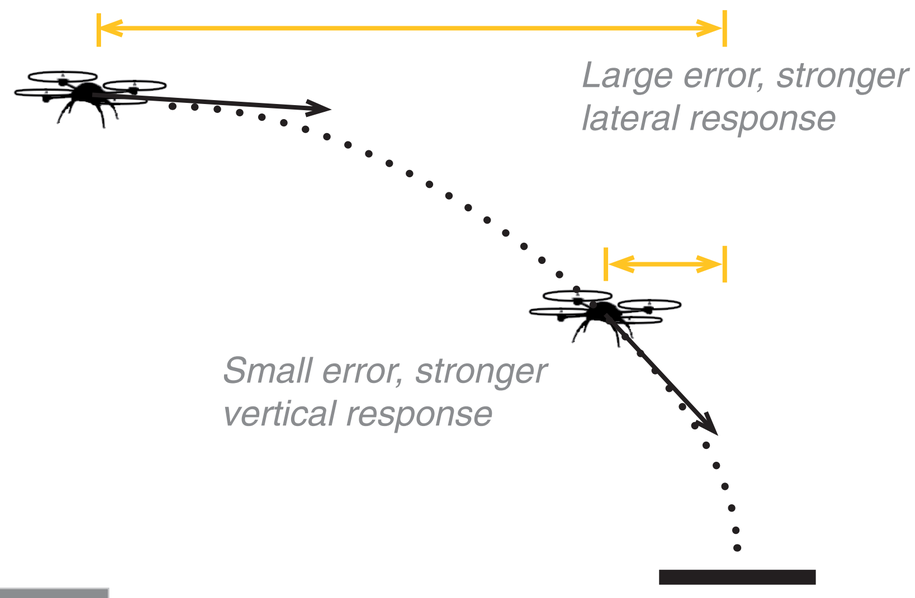
Video stream as seen on computer, fiducials identified

Precision Landing Strategies

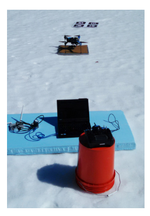
GPS Landing calculates the GPS position of the target fiducial at a series of descending waypoints, homing in on the target in several **discrete** steps. This landing method is inherently limited by GPS accuracy.



With **Computer-Generated RC Landing**, ground control mimics RC controller signals. It transmits **continuous** commands proportional to the lateral error, steering the quadcopter onto the target.



pixhawk



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