Autonomous Aircraft Landing System

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Project Goal:
Land an unmanned aerial vehicle autonomously into a designated zone accurately. The system shall be operable under various environmental conditions.

Project Summary:
By the year 2014 the world market for unmanned aerial vehicles (UAVs) is expected to top $13.6 billion. The US military alone utilizes more than 20 different types of UAVs to perform varying tasks from real time surveillance to actual weapons deployment. This number is very quickly rising as strategic planners and commanders come to grasp with the vast potential that UAVs provide. The fastest growing segment of the UAV market is small UAVs These are typically UAVs that are between 5 to 20 lbs. Unfortunately, there is no effective way to land these airplanes. Most of these small UAVs, such as the Desert Hawk, are designed to withstand crash landings by utilizing strong composite materials such as Kevlar and Expanded Polypropylene (EPP) foam to absorb harsh landings. Despite this, almost 33 % of these small UAVs are damaged beyond field repair capabilities. We developed an autonomous approach and landing system that will guide a UAV from its final waypoint to a predetermined landing zone. This project is unique in that it utilizes ground-based optical sensor to detect the airplane and its position. We also developed a novel control algorithm to guide the airplane to a safe landing. The cost of UAV systems, although high, is considerably less than a piloted aircraft counterpart. The greatest savings are the lives that are saved by keeping operators from harms reach.

The benefit of our precision auto landing system is many:

1. Weight savings to the delicate payloads can be reduced since they will no longer need to be engineered to withstand harsh crashes.
2. Cost savings of having to purchase new parts that break.
3. Less missed missions due to lack of airworthy planes.
4. Opportunity to deploy UAVs in much more versatile locations and roles.
5. Mitigation of human error.

Our system has many advantages to current systems, being:

1. Less costly.
2. Scalable to any size aircraft.
3. Less of a payload on the UAV.
4. Easier to integrate with current UAVs.
5. Portable. Our system can be carried by one person.
6. Deployable almost anywhere.
7. Less susceptible to conventional jamming and tapping techniques.
8. More secure than DGPS beacons which can give away your location.

Our system has undergone real-world testing and has successfully guided an aerial vehicle to a landing zone with precision and consistency. We are in the process of obtaining patents for our technology.