Target Prosecution

Objective: Use computer vision to autonomously land a small fixed wing UAV on a visually distinct target.

Principle Investigators: Randy Beard, Tim McLain, Jim Archibald

Sample Publication: D. Blake Barber, Stephen Griffiths, Timothy W. McLain, Randal W. Beard, "Autonomous Landing of Miniature Aerial Vehicles," *AIAA Journal of Aerospace Computing, Information, and Communication,* vol. 4, no. 5 May, 2007, p. 770-784.

Funding Source: AFOSR.

Problem Summary

There are many applications that require precision landing for micro air vehicles. These include:
- Convoy support – landing in the back of a vehicle.
- Micro munitions.

A user is often tasked to assist the vehicle in landing.

Computer vision and missile guidance algorithms can be used to ensure very precise landings.

Approach

Adapted Proportional Navigation algorithm to bank-to-turn UAVs:

Step 1. User identifies location to land in video stream.
Step 2. Computer vision tracks the target in the video.
Step 3. Ego motion is estimated using IMU and removed from relative position vector.
Step 4. Desired acceleration is computed in the body frame.
Step 5. Acceleration is converted to commanded roll and pitch angles.

Results

First successful flight test in 2006.

Landed in the back of a moving truck in 2006.

Licensed to Procerus Technologies in 2007.

Currently a commercial product.