Optical Flow Based Velocity Control for Miniature Rotorcrafts

Short Description

In order to implement a standard velocity controller for miniature indoor rotorcrafts a velocity reference must be available to compute the corresponding control error. Using a downward pointing camera and an altitude sensor a rotorcraft’s velocity may be estimated from optical flow extracted from onboard camera images. Image feature dynamics (velocities of image features) may be related to a rotorcraft’s velocity if measurements of the distance to the observed ground plane are available.

Possible tasks during the project could be:

- Choice of appropriate real-time optical flow algorithm
- Filtering of optical flow response to remove noise
- Synchronization of altitude measurements and optical flow data (just a necessary part of the project)
- Fusion of IMU data with optical flow velocity measurements
- Calculation of a reliable velocity measurement based on available data
- Build a test bench (camera, camera carrier, visual pattern on the ground)
- Evaluation of the velocity measurements on the test bench

All computations will be executed offboard. A quadrotor platform with an onboard camera and altitude sensor and corresponding software to send camera images to a laptop in “real-time” is already available at ASL. First steps could be undertaken using this platform. In later stage of the project a miniature coaxial helicopter will be available featuring a similar but optimized sensor suite.

Typ / type Semester project
Partner -
Zeitdauer / period 16.02.2009 to 29.05.2009
Student(en) / student(s) -
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