MAV Motion Tracking and Dynamic Behavior Analysis
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Motivation
Research into Micro Air Vehicles (MAVs) and other small, dynamic robots often involves quantification of their dynamic behavior. Video analysis is common for many of the same reasons it is commonly used in biological research applications—low disturbance to the system, potentially high spatial resolution, and easy adaptation to laboratory scales [1].

We propose to create an image processing system which is tailored specifically to the needs of small robotic platforms predominantly moving in directions parallel to the plane of the camera. The system will identify moving objects in a video, characterize these objects by consistently discovered fiducials, and output velocity and trajectory information.

Related Work

Future Work
• GUI implementation of fiducial selection for dynamic analysis
• Additional fiducial identification and tracking
• Within-plane angular velocity output upon multiple fiducial identification

Experimental Results

Trajectory Identification
Median image of video
Median difference of each frame after small region removal
Centroid tracking for anchor points of MAV-centered mask

Stitching of consistent feature matches for best fiducial selection

SIFT feature detection between adjacent masked frames
Matched fiducials
SIFT fiducials
Masked frames

Chief fiducial identified
Trajectory Generation
Computed velocity components
Manually generated velocity components