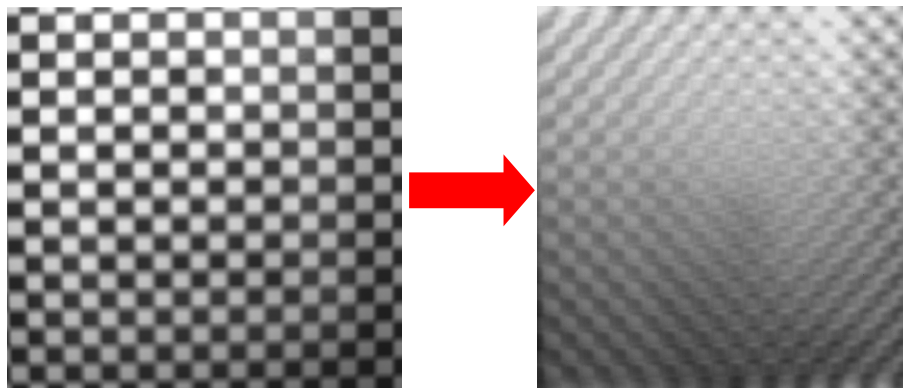


Coded Aperture Augmented Vision Aided Inertial Navigation System

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Sponsor: Air Force Research Laboratory (AFRL)



A challenge to navigating micro air vehicles autonomously through indoor environments is unreliable access to navigation satellite signals. The Advanced Navigation Technology (ANT) Center at the Air Force Institute of Technology (AFIT) seeks to overcome this challenge by augmenting the camera of a vision aided inertial navigation system with a coded aperture. Replacing the typically rounded camera aperture with a coded aperture allows a single camera to both capture images and measure the range to features in the environment. The range information is used to solve for scale ambiguity without requiring comparison of multiple images from either additional cameras or the same camera at different times. Solving for scale ambiguity permits the navigation system to predict where features should appear in subsequent images as the vehicle moves, and the comparison of new images with those predictions are used to correct the navigation solution. Augmenting the camera of a vision aided inertial navigation system with the coded aperture then allows a micro air vehicle to use a single camera to navigate through environments with unreliable satellite access.

For more information, see “Morrison, J., J. Raquet, and M. Veth, "Performance Evaluation of Vision Aided Inertial Navigation System Augmented with a Coded Aperture," *Proceedings of the Institute of Navigation International Technical Meeting*, Anaheim, CA, January 2009”.

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