Growing demand for aerial surveillance and mapping in emergency response, agriculture, and military applications. Implications in vision-based robotic sensing.

Comparison of Methods:
- **Affine Transformation, No Blending**
  - Significant frame misalignment, distortion, obvious seams

- **Full Homography, No Blending**
  - Far less frame misalignment
  - Consistent perspective distortion corresponds to quadrotor pitch

- **Full Homography, Linear Blending**
  - Smooth transitions at seams
  - Some ghosting remains where homography model fails (e.g., benches)

- **Full Homography, Weighted Blending**
  - Allows for blending across 2D tiling
  - Weights decrease toward edge of frame

Final Results:
- Upper oval, 25 tiles, 1119x2811 pixels
- Lower oval, 17 tiles, 1239x2168 pixels

Related and Future Work:
- Integration of multi-band blending to eliminate ghosting
- Gain adjustment to eliminate color imbalance
- Model simplification (e.g., affine approximation) for fast computation and real-time sensing

Images acquired at 7m altitude, 480x640 tile res.

**Inputs**
- Correct fish-eye distortion
- Calibration Parameters

**Outputs**
- Feature matching within R*
- Error** minimization for all frames
- Mosaic Metadata

**Mosaicking Algorithm**
- SIFT
- Affine pairwise RANSAC
- Image overlay and blending

**Test Platform**
- 3D Robotics ArduCopter Quadrotor, GPS enabled
- Camera: GoPro HERO2

**Problem**
Develop an algorithm to mosaic and blend images gathered by a low-altitude UAV

**Motivation**
- Recent work in mosaicking targets
- Blending methods
- Integration of metadata for computational speedups

**Motivation**
- Growing demand for aerial surveillance and mapping in emergency response, agriculture, and military applications

**References**