Motivation: Event cameras promise to revolutionize computer vision by unlocking scenarios currently inaccessible to standard cameras: HDR, high speed, low latency.

Goal: First unifying framework that allows to address multiple computer vision tasks with event cameras.

What is an event camera?

- Only transmits brightness changes (“events”).
- Advantages: low latency, no motion blur, HDR.

Optical Flow Estimation

- Low contrast and blurred
- High contrast and sharp (best point trajectories)

Rotational Motion Estimation

- Curved point trajectories, parametrized by angular velocity
- High-speed motions (~1000 º/s).
- Accuracy: 2% error σ-deviation.
- Does not need optical flow or image intensity reconstruction.

Homography Estimation

- Curved point trajectories, parametrized by 8-DOF homography.
- Recover camera motion and plane.
- Motion-corrected event images are useful for Visual-Inertial Odometry.
  (Rebecq et al. BMVC’17)

Semi-dense 3D reconstruction

3D Reconstruction

Patches Warped events:

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