Docket #: S26-031

Single-Camera Rolling Shutter Correction Using Strabismic Imaging

Researchers at Stanford have developed a novel method to correct motion-induced image distortion in rolling shutter cameras using a single camera sensor.

Rolling shutter cameras are widely used across consumer electronics, medical imaging, and autonomous systems. Rather than capturing an entire frame simultaneously, they read out image data sequentially, row by row, which introduces motion artifacts whenever the camera or subject moves. Existing solutions each carry meaningful limitations: motion-sensing hardware only compensates for camera movement, not a moving subject; software-based correction using machine learning can fail unpredictably on unfamiliar scenes; and upgrading to an alternative sensor architecture is often impractical at scale.

This technology applies strabismic imaging, a technique that uses two slightly offset, synchronized image captures, to enable motion correction from a single camera sensor. No machine learning is required. The correction is performed by deterministic mathematical algorithms that are broadly applicable across scene types and content, making the approach well-suited for integration into a wide range of imaging products.

Stage of Development: Proof of concept.

Applications

- Smartphones and consumer cameras for distortion-free photos and video
- Medical imaging devices such as endoscopes and surgical microscopes
- Autonomous vehicles and unmanned drones for reliable visual sensing

Advantages

- More reliable than AI-based correction; no scene-specific training or tuning required
- Broader coverage than motion-sensing hardware; corrects moving subjects even with a stationary camera
- Compatible with existing rolling shutter hardware; no sensor replacement needed

Publications

- Gastón Ayubi, Karteek Kunala, Bartlomiej Kowalski, Aubrey Hargrave, Alfredo Dubra (2026). Strabismic imaging for correcting in-plane motion distortion in scanning imaging instruments and rolling shutter cameras. Adv Photonics. 2026 Apr 8;8(2):026016.

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