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Goal: Track VR/AR headset as fast as possible using sensors on the headgear.

Challenges:
1. Fastest human motion is 700°/s neck rotation; normal rotation is 70°/s; walking is ~1.4m/s. [Bishop, 84]
2. Motion-sickness is quickly induced if imagery does not match head motion.
3. Camera frame-rate, exposure time, and the number of cameras hinder high-frequency inside-out tracking.

Contributions:
• Tracking frequency = fps*height = 86.4kHz
• System uses commodity rolling shutter cameras.
• We convert rolling shutter and radial distortion artifacts into virtues for tracking.
• Supports 4- and 6-camera designs with arbitrary camera orientations.

Overview

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Results

Higher radial distortion increases system stability

4-camera cluster drifts faster than 6 cameras
The errors are smaller than RS-SLAM [Kim ICRA’16]

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