

Unconventional Vision Sensors

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What can be perceived by a human or computed by a machine from an image is fundamentally restricted by the captured data. Current imaging systems are limited in spatial resolution, field of view, and dynamic range. In this talk, we present new vision sensors that provide unconventional forms of visual information. The first part of the talk focuses on the use of catadioptrics (lenses and mirrors) for capturing unusually large fields of view. We describe several methods for obtaining single viewpoint and multi-viewpoint images. The second part of the talk addresses the problem of acquiring high dynamic range images using a low dynamic range detector. We present two approaches for extracting the desired extra bits at each pixel; the first one uses multiple images while the second uses just a single image. Several interactive demonstrations of our results will be shown. These results have implications for digital imaging, immersive imaging, image based rendering, 3D scene modeling, and advanced interfaces.