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Planar Fourier Capture Arrays: Tiny Optical Sensors Built Entirely in Unmodified CMOS

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In 2008 at Cornell, we developed a new class of optical sensor made in standard CMOS: the angle sensitive pixel (ASP). ASPs have allowed us to develop several optical innovations including the Planar Fourier Capture Array (PFCA) in 2011: the first camera without lenses, mirrors or moving parts. PFCAs capture the Fourier transform of the far-away scene directly without external optics. The first prototype PFCA is 100 000 times smaller by volume than the smallest focusing cameras and can image with an effective resolution of 400 pixels, making it an interesting intermediate between single photodiodes and miniaturized focusing cameras.

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