

Adaptive Technologies Ideal For Small, Adjustable Camera Lenses

University of Central Florida



A scientist at the University of Central Florida’s Center for Research and Education in Optics and Lasers (CREOL) in Orlando has invented adaptive lenses that change their light focusing properties in response to stimulus such as electrical current and mechanical pressure. Adjusting the pressure in the lens changes the level of magnification without having to rely on moving, mechanical parts the way standard cameras do.

The first patent application for professor Shin-Tson Wu’s “Adaptive Liquid Crystal Lens” was submitted in 2002. Funding for the research, which has been ongoing for five years, is provided by the U.S. Air Force, the University of Central Florida, and the private sector. Wu’s portfolio of adaptive lens technologies have been licensed by Holochip Corp., in Albuquerque.

Unlike conventional cameras that use mechanical controls to adjust focus, the Adaptive Liquid Crystal Lens uses liquid crystal technology to provide the focus and zoom capability, without the need for moving mechanical parts.

The excitation of the liquid crystal through electrical current works like a LCD monitor in that the electrical current

decides the shape of the lens, thus producing the effect of zooming or focusing. As a second approach, Wu's fluidic lens uses a transparent fluid encapsulated by a transparent elastic membrane. Mechanical compression of the fluid causes the membrane surface to bulge, thereby changing its curvature and the focal length of the lens.

“ *These technologies make it possible to produce very small lenses, something that is prohibitively expensive for conventional mechanical lenses.*

The liquid crystal and fluidic lenses are ideal for cell phone cameras and other image-capturing systems, including surveillance equipment for the military. Medical applications are also of interest, such as implantable lenses for eyes, or replacement lenses, that are made from biocompatible materials.

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