USF Available Technologies

Technology Transfer Office

Adaptive Optics Ophthalmic Imager Without Wavefront Sensor or Wavefront Corrector

Researchers at the University of South Florida have developed an enhanced ophthalmic imaging device for viewing and capturing photos inside the human eye.

Imaging of the eye is important for studying vision as well as for diagnosing and repairing any defects in the vision system. The imaging process, however, is challenging for a number of reasons. For example, the relatively small aperture of the pupil and low reflectivity of the retina limit the amount of light available for imaging inside the eye. A technology known as adaptive optics (AO) addresses this problem by employing a method that reduces distortion in the image generation process. However, the components used in AO require a high degree of delicate alignment and maintenance. They also constrain imaging resolution, dynamic range, and speed, and they are very expensive.

Seeking to improve ophthalmic imaging systems, USF inventors developed a method of adaptive ophthalmic imaging. The new system is able to work without some of the more expensive optical components required for conventional AO imaging. The function of these hardware components is replaced with a newly developed numerical processing method. The numerical processing approach achieves the same results of enhancing images by lowering distortion and affords resolution near that of a CCD camera. Furthermore, it substantially reduces complexity and cost of the imaging system. The system can generate profiles of retinal vasculature and measurement of blood flow, provide real time profiles of ocular aberration during Lasik surgery, and generate a 3D map of intraocular debris.

ADVANTAGES:

- **Faster & higher resolution imaging**
- **Eliminates need for complex hardware**
- **Lower purchase, manufacturing & maintenance costs**
- **Easily incorporated into fundus camera**

Simplified Ophthalmic Imaging System that Replaces Expensive Hardware

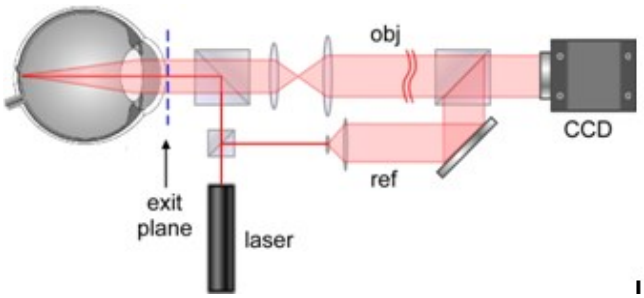

Illustration of the Ophthalmic Imaging System — Digital Holographic Adaptive Optics (DHAO)

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