Development of V-Lab Module: Virtual 3D Optical Ray Visualizer

Name/Contact of Project: Yuzuru Takashima, Ph.D.

Project Description: As many of emerging products such as Lytro’s after focusing Camera, and MS-hologram computing device indicate, literacy of optics and understanding how optical system now have become core skill and inevitable knowledge sets for students in computer sciences who have desire to conduct research in interdisciplinary manner. Such skill and knowledge sets can be obtained by taking graduate level classes, such as OPTIS02, 516 offered at the University of Arizona. Alternatively, we offer research opportunity to motivated undergraduate students in computer sciences to acquire knowledge and skill sets of optics while developing operating module such as controlling lasers, motorized stages and cameras by LabView.

During the 10 weeks of research period, student develops “3D Ray Visualizer” which consists of a smartphone and 3D viewers. The 3D Ray Visualizer is a software which displays 3D image captures by “3D Ray Generator (see separate description)” as well as control the camera gantry of it. The 3D Ray Generator consists of a laser light sources, computer generated holograms, acrylic lenses, motorized stages, smoke chamber and cameras. All the components are controlled by 3D Ray Visualizer such that viewpoint is controlled by gestures, for example, tilting the 3D Ray Visualizer device. The image of the ray captured by two cameras are transferred to Virtual 3D Ray Visualizer so that user can operate camera to see a 3D image of optical ray trajectory with simple gestures.

Required Skills: Programing skill for smartphones, Programming knowledge to access to sensors of smartphones such as cameras, gyro sensors. Advanced knowledge for LabView.