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

**Project Name:** Development of V-Lab Module: Virtual 3D Optical Ray Aberration Visualizer (Ver.2)

**Project Description:** For development of emerging AR/VR products such as MS-holoLens device, literacy in optics and understanding how optical system works now have become one of the core skills, thus are inevitable knowledge sets for students in computer sciences and electrical engineering. Such skill and knowledge sets can be obtained by taking graduate level classes, such as OPTI502, 516 offered at College of Optical Sciences, the University of Arizona. Alternatively, we offer a research opportunity to motivated undergraduate students in computer sciences and electrical engineering major to acquire knowledge and skill sets of optics while developing operating module such as controlling lasers, motorized stages, cameras and broadcasting 3D images over the Internet. During the 10 weeks of research period, student refines the “3D Ray Visualizer” which consists of a smartphone and 3D viewers. The 3D Ray Visualizer is a VR system which displays 3D image captures by the “3D Ray Aberration Generator (Figs, a.k.a RAG 2.0, developed in the 2016 RiO program)” 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, a 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 broadcasted to the 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 Arduino, Programming knowledge to access to sensors of smartphones such as cameras, gyro sensors. Advanced knowledge for LabView.

**Ideal Skills:** Time management skills