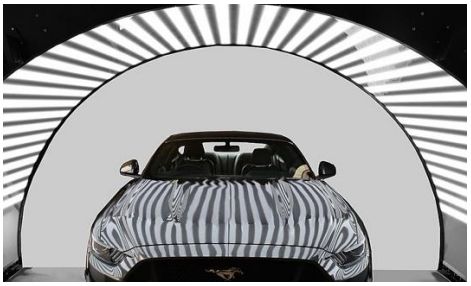
- **New course** offered for **grad students in Optics, ECE, CS**, or similar fields of study.
- Visit the course website for detailed information: https://wp.optics.arizona.edu/opti596/
- Live attendance (in-person or via zoom) required for student presentation sessions. See attendance policy for details.

Computational Imaging and Machine Vision Seminar

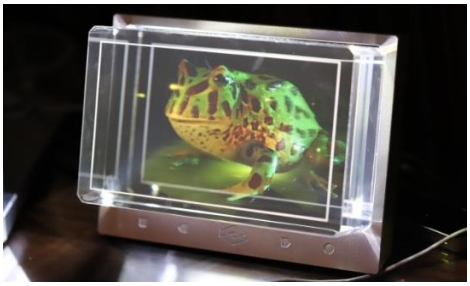
OPTI-596-002 | OPTI-596-202 (distance students)

Fall 2024, Tuesdays and Thursdays 2pm – 3:15pm in Meinel 422 | (3 Credits)

Computational illumination is used in the movie industry to render live actors into digital environments [1]



So-called "structured light" systems are critical in industrial inspection, e.g., to detect defects in car bodies [2]



Holographic and light field 3D displays have a wide range of applications in Augmented and Virtual Reality [3]

Course website: https://wp.optics.arizona.edu/opti596/

Instructor: Prof. Florian Willomitzer
Lab website: https://www.optics.arizona.edu/3dim

Target group:

This course is designed for graduate students in Optics, Electrical Engineering, Computer Science, or similar fields of study. The students should have a strong interest in computational imaging and its associated disciplines, including computer vision, image science, graphics, optical metrology, information theory, and more. Besides being motivated to understand the basic principles, students should be excited about the practical applications in various domains such as industrial inspection, VR/AR/MR, robotics, medical imaging, remote sensing, automotive sensing, metrology, forensics, or cultural heritage preservation.

Course Description:

This course explores the emerging new fields of computational imaging and machine vision, which combine ideas from technical optics, Fourier optics, information theory, image processing, imaging, graphics, and vision. The course will introduce state-of-the-art topics in computational imaging and machine vision in a "part-lecture, part-seminar" -style that gives the students the opportunity to contribute actively and to sharpen their presentation skills. The instructor introduces the students to the core topics in course "lecture sessions". At the end of each lecture session, important shortcomings or open questions of the introduced methods are formulated. The students will find the answers by reading and presenting related papers. The "pool" of technical topics includes:

- Active and passive triangulation, structured light 3D imaging
- Appearance capturing and photometric stereo
- Time-of-flight imaging, imaging around corners and through scatterers
- Light field imaging, plenoptic representations, aperture synthesis
- 3D imaging of specular objects, Deflectometry
- Event cameras, motion processing
- Interferometry, holography, lensless imaging, wavefront sensing
- Light transport, direct and global separation
- Light field displays and holographic displays
- Neural radiance fields
- Differentiable imaging methods
- … and many more

Number of allowed students for this course is limited. Please contact the instructor in case you have been placed on the wait list.
See course website for more details.