

Where Industry and Academia Meet

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EI08: INTRODUCTION TO DIGITAL COLOR IMAGING**Instructor:** Gaurav Sharma, University of Rochester (US) | **Sunday January 28, 1:30 – 5:45 PM****Course Level:** Introductory | **Fee:** Member: \$275/ Non-member: \$300 / Student: \$95 (*prices for all increase by \$50 after January 8, 2018)

This short course provides an introduction to color science and digital color imaging systems. Foundational knowledge is introduced first via an overview of the basics of color science and perception, color representation, and the physical mechanisms for displaying and printing colors. Building upon this base, an end-to-end systems view of color imaging is presented that covers color management and color image processing for display, capture, and print. A key objective of the course is to highlight the interactions between the different modules in a color imaging system and to illustrate via examples how co-design has played an important role in the development of current digital color imaging devices and algorithms.

Benefits:

- Explain how color is perceived starting from a physical stimulus and proceeding through the successive stages of the visual system by using the concepts of tristimulus values, opponent channel representation, and simultaneous contrast.
- Describe the common representations for color and spatial content in images and their interrelations with the characteristics of the human visual system.
- List basic processing functions in a digital color imaging system and schematically represent a system from input to output for common devices such as a digital cameras, displays, and color printers.
- Describe why color management is required and how it is performed.
- Explain the role of color appearance transforms in image color manipulations for gamut mapping and enhancement.
- Explain how interactions between color and spatial dimensions are commonly utilized in designing color imaging systems and algorithms.
- Cite examples of algorithms and systems that break traditional cost, performance, and functionality tradeoffs through system-wide optimization.

Intended Audience: Engineers, scientists, students, and managers interested in acquiring a broad-system wide view of digital color imaging systems. Prior familiarity with basics of signal and image processing, in particular Fourier representations, is helpful although not essential for an intuitive understanding.

Instructor: **Gaurav Sharma** has more than two decades of experience in the design and optimization of color imaging systems and algorithms that spans employment at the Xerox Innovation Group and his current position as a professor at the University of Rochester in the departments of electrical and computer engineering and computer science. Additionally, he has consulted for several companies on the development of new imaging systems and algorithms. He holds 51 issued patents and has authored more than a 190 peer-reviewed publications. He is the editor of the *Digital Color Imaging Handbook* (CRC Press) and served as Editor-in-chief for the *Journal of Electronic Imaging* (2011-2015). Sharma is a fellow of IS&T, IEEE, and SPIE.

SYMPOSIUM PLENARY TALKS

Monday: Overview of Modern Machine Learning and Deep Neural Networks – Impact on Imaging and the Field of Computer Vision, **Greg Corrado, co-founder of Google Brain and Principal Scientist at Google**

Tuesday: Fast, Automated 3D Modeling of Buildings and Other GPS Denied Environments, **Avideh Zahkor, Qualcomm Chair & Professor at UC Berkeley**

Wednesday: Ubiquitous, Consumer AR Systems to Supplant Smartphones, **Ronald T. Azuma, Intel Labs Researcher and Augmented Reality Pioneer**

SYMPOSIUM HIGHLIGHTS

- 18 conferences featuring 30 keynote talks by world reknown experts
- 3D Theatre
- Tours of Stanford University Labs
- Industry Exhibition
- Meet the Future: Showcase of Student and Young Professional Research
- Demonstration Session
- Poster Session
- Welcome Reception
- Women in Electronic Imaging Breakfast
- Human Vision in Electronic Imaging 30th Year Banquet

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