

Where Industry and Academia Meet

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EI19: COLOR AND CALIBRATION IN MOBILE IMAGING DEVICES**Instructors:** Uwe Artmann, Image Engineering GmbH & Co KG (Germany), and Kevin Matherson, Microsoft Corporation (US)**Sunday January 28, 8:00 – 10:00 AM | Course Level:** Introductory/Intermediate | **Fee:** Member: \$175 / Non-member: \$200 / Student: \$65

(*prices for all increase by \$50 after January 8, 2018)

When an image is captured using a digital imaging device it needs to be rendered. For consumer cameras this processing is done within the camera and covers various steps like dark current subtraction, flare compensation, shading, color compensation, demosaicing, white balancing, tonal and color correction, sharpening, and compression. Each of these steps has a significant influence on image quality. In order to design and tune cameras, it is important to understand how color camera hardware varies as well as the methods that can be used to calibrate such variations. This course provides the basic methods describing the capture and processing of a color camera image. Participants get to examine the basic color image capture and how calibration can improve images using a typical color imaging pipeline. In the course, participants are shown how raw image data influences color transforms and white balance. The knowledge acquired in understanding the image capture and calibration process can be used to understand tradeoffs in improving overall image quality.

Benefits:

- Understand how hardware choices in compact cameras impact calibrations and the type of calibrations performed and how such choices can impact overall image quality.
- Describe basic image processing steps for compact color cameras.
- Understand calibration methods for mobile camera modules.
- Describe the differences between class calibration and individual module calibration.
- Understand how spectral sensitivities and color matrices are calculated.
- Understand how the calibration light source impacts calibration
- Describe required calibration methods based on the hardware chosen and the image processing used.
- Appreciate artifacts associated with color shading and incorrect calibrations.
- Learn about the impacts of pixel saturation and the importance of controlling it on color.
- Learn about the impact of tone reproduction on perceived color (skin tone, memory colors, etc.).

Intended Audience: People involved in the design and image quality of digital cameras, mobile cameras, and scanners would benefit from participation. Technical staff of manufacturers, managers of digital imaging projects, as well as journalists, and students studying image technology are among the intended audience.

Instructors: **Kevin J. Matherson** is a director of optical engineering at Microsoft Corporation working on advanced optical technologies for consumer products. Prior to Microsoft, he participated in the design and development of compact cameras at HP and has more than 15 years of experience developing miniature cameras for consumer products.

Uwe Artmann studied photo technology at the University of Applied Sciences in Cologne following an apprenticeship as a photographer and finished with the German 'Diploma Engineer'. He is now the CTO at Image Engineering, an independent test lab for imaging devices and manufacturer of all kinds of test equipment for these devices.

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 Zakhor, 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

To register or learn more, visit www.ElectronicImaging.org

