

Where Industry and Academia Meet

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EI12: OPTICS AND HARDWARE CALIBRATION OF COMPACT CAMERA MODULES**Instructors:** Uwe Artmann, Image Engineering GmbH & Co KG (Germany), and Kevin Matherson, Microsoft Corporation (US)**Sunday January 28, 1:30 – 5:45 PM | Course Level:** Introductory/Intermediate | **Fee:** Member: \$275/ Non-member: \$300 / Student: \$95

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

Digital and mobile imaging camera and system performance is determined by a combination of sensor characteristics, lens characteristics, and image processing algorithms. Smaller pixels, smaller optics, smaller modules, and lower cost result in more part-to-part variation driving the need for calibration to maintain good image quality. This short course provides an overview of issues associated with compact imaging modules used in mobile and digital imaging. The course covers optics, sensors, actuators, camera modules and the camera calibrations typically performed to mitigate issues associated with production variation of lenses, sensor, and autofocus actuators.

Benefits:

- Describe illumination, photons, sensor, and camera radiometry.
- Select optics and sensor for a given application.
- Understand the optics of compact camera modules used for mobile imaging.
- Understand the difficulties in minimizing sensor and camera modules.
- Assess the need for per unit camera calibrations in compact camera modules.
- Determine camera spectral sensitivities.
- Understand autofocus actuators and why per unit calibrations are required.
- How to perform the various calibrations typically done in compact camera modules (relative illumination, color shading, spectral calibrations, gain, actuator variability, etc.).
- Equipment required for performing calibrations.
- Compare hardware tradeoffs such as temperature variation, its impact on calibration, and overall influence on final quality.

Intended Audience: People involved in the design and image quality of digital cameras, mobile cameras, and scanners will 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 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

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

