Where Industry and Academia Meet

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EI20: INTRODUCTION TO CMOS IMAGE SENSOR TECHNOLOGY

Instructor: Arnaud Darmont, APHESA SPRL (Belgium) | **Sunday January 28**, 8:00 AM – 10:00 AM | **Course Level:** Beginner/Intermediate

Fee: Member: $175 / Non-member: $200 / Student: $65 (*prices for all increase by $50 after January 8, 2018)

This short course is a good refresher for image sensor and camera design engineers but is primarily targeted for newcomers to the technology or to less technical people who need to have a better understanding of the CMOS imaging technology. The course starts from the light and light sources and follows the natural path through the imaging system until an image is available out of a camera. Lenses, microlenses, color filters, photodiodes, pixel circuits, pixel arrays, readout circuits, and analog-to-digital conversion are described in details. The description includes an analysis of the noise sources, signal-to-noise, dynamic range, and the most important formulas are provided.

Introduction to CMOS image sensors technology: silicon material properties; photodiode operation; basic and more advanced pixel designs including color filters, microlenses, back side illumination, global shutters; sensor level design; packaging; and wafer foundry processes. The course also includes a brief introduction to image sensor characterization based on the EMVA1288 and explanations of the main differences between mobile, industrial, and scientific sensors. The course also explains the differences between CMOS and CCD. The course is updated yearly with some most recent information.

Benefits:
- Understand the terminology used in the field of image sensors.
- Understand the design tradeoffs and the design trends.
- Understand the performance limitations of each sensor or technology type.
- Be able to select or specify the right sensor for an application.

Intended Audience: Engineers and technical managers involved with the design, use, or specification of CMOS image sensors. To some extent, less technical people involved with image sensors and cameras will be able to follow the course and gain valuable information.

Instructor: **Arnaud Darmont** is owner and CEO of Aphesa, a company founded in 2008 specializing in image sensor consulting, custom camera design, the EMVA1288 standard, and camera benchmarking. He holds a degree in electronic engineering from the University of Liège (Belgium). Prior to founding Aphesa, he worked for more than seven years in the field of CMOS image sensors and high dynamic range imaging. He is a member of the EMVA1288 working group since 2006.

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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