IS&T International Symposium on
Electronic Imaging 2018
SCIENCE AND TECHNOLOGY

28 January – 2 February 2018
Hyatt San Francisco Airport, CA

Where Industry and Academia Meet

Join us

EI04: 3D POINT CLOUD PROCESSING

Instructor: Gady Agam, Illinois Institute of Technology (US) | **Sunday January 28**, 8:00 AM – 12:15 PM

Course Level: Introductory | **Fee:** Member: $275/ Non-member: $300 / Student: $95 (*prices for all increase by $50 after January 8, 2018)

Point clouds are an increasingly important modality for imaging with applications ranging from user interfaces to street modeling for GIS. Range sensors such as the Intel RealSense camera are becoming increasingly small and cost effective thus opening a wide range of applications. The purpose of this course is to review the necessary steps in point cloud processing and introduce fundamental algorithms in this area.

Point cloud processing is similar to traditional image processing in some sense yet different due to the 3D and unstructured nature of the data. In contrast to a traditional camera sensor which produces a 2D array of samples representing an image, a range sensor produces 3D point samples representing a 3D surface. The points are generally unorganized and so are termed "cloud". Once the points are acquired there is a need to store them in a data structure that facilitates finding neighbors of a given point in an efficient way.

The point cloud often contains noise and holes which can be treated using noise filtering and hole filling algorithms. For computational efficiency purposes the point cloud may be down sampled. In an attempt to further organize the points and obtain a higher level representation of the points, planar or quadratic surface patches can be extracted and segmentation can be performed. For higher level analysis key points can be extracted and features can be computed at their locations. These can then be used to facilitate registration and recognition algorithms. Finally, for visualization and analysis purposes the point cloud may be triangulated. The course discusses and explains the steps described above and introduces the increasingly popular PCL (Point Cloud Library) open source framework for processing point clouds.

Benefits:
- Describe fundamental concepts for point cloud processing.
- Develop algorithms for point cloud processing.
- Incorporate point cloud processing in your applications.
- Understand the limitations of point cloud processing.
- Use industry standard tools for developing point cloud processing applications.

Intended Audience: Engineers, researchers, and software developers who develop imaging applications and/or use camera sensors for inspection, control, and analysis.

Instructor: Gady Agam is an associate professor of computer science at the Illinois Institute of Technology. He is the director of the Visual Computing Lab at IIT which focuses on imaging, geometric modeling, and graphics applications. He received his PhD from Ben-Gurion University (1999).

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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