

A Vision for Computer Vision: Emerging Technologies

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Abstract

Computer vision is a rapidly evolving discipline. It includes methods for acquiring, processing, and understanding still images and video to model, replicate, and sometimes, exceed human vision and perform useful tasks.

Computer vision will be commonly used for a broad range of services in upcoming devices, and implemented in everything from movies, smartphones, cameras, drones and more. Demand for CV is driving the evolution of image sensors, mobile processors, operating systems, application software, and device form factors in order to meet the needs of upcoming applications and services that benefit from computer vision. The resulting impetus means rapid advancements in:

- visual computing performance
- object recognition effectiveness
- speed and responsiveness
- power efficiency
- video image quality improvement
- real-time 3D reconstruction
- pre-scanning for movie animation
- image stabilization
- immersive experiences
- and more...

Comprised of innovation leaders of computer vision, this panel will cover recent developments, as well as how CV will be enabled and used in 2016 and beyond.

Concepts: • Computing methodologies • Artificial intelligence → Computer vision • Computer graphics.

Keywords: Computer vision; computational camera; 3D scanning and reconstruction; mobile processing; video image quality

Topics of Discussion

The panel moderator will guide the discussion with questions directed to the panelists. Below are some potential topics for discussion. The moderator will include additional time-relevant topics or questions to address the current state of the industry.

- When and where to use different camera solutions, software- versus hardware-based 3D cameras?
- How to overcome obstacles, such as limited space availability for sensors in mobile and device power requirements?
- What are the current and near-term applications for computer vision in the film industry for modeling and animation?
- How can compute and processing speed impact the object recognition effectiveness, video quality, scanning and stabilization?
- Where are advancements being made in camera capabilities to support different approaches in capture (mono vs stereo, low- vs high-res)?
- Ways to use computer vision and virtual reality to get users more engaged and/or creating their own content for VR worlds?
- What immersive experiences do consumers not yet know they want or need?
- What companies and applications will drive the industry forward with new innovation, products and services?

Audience

This panel is designed to benefit others in the industry who want to learn about the latest advances and highly anticipated future directions. Ecosystem players, business thought leaders, and technology developers are working on new products and services that will make our lives more exciting and easier through CV. The panel will provide them valuable insight through industry experts from a variety of product category perspectives.

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Panelists

Moderator:
Jon Peddie
President, Jon Peddie Research (JPR)



Dr. Jon Peddie is one of the pioneers of the graphics industry, and formed Jon Peddie Research (JPR) to provide customer intimate consulting and market forecasting services. Peddie lectures at numerous conferences on topics pertaining to graphics and the emerging trends in digital media technology. Recently named one of the most influential analysts, regularly advises investors in the GLG network, and is frequently quoted in trade and business publications. He was the former president of SIGGRAPH Pioneers, and authored several books, his most recent, *The History of Visual Magic in Computers*. Dr. Jon Peddie was recently honored by the CAD Society with a lifetime achievement award.

Kurt Akeley
CTO, Lytro



Kurt Akeley is CTO at Lytro, where he applies his knowledge in computer science and optics to advance light-field rendering technology. A pioneer in the field of computer graphics and a founding member and former SVP and CTO of Silicon Graphics (SGI), Akeley has helped develop innovative products like SGI's RealityEngine and the OpenGL graphics system. Prior to Lytro, he served as Principal Researcher and GM at Microsoft Research. Akeley earned his Ph.D. in computer science from Stanford and B.E.E. from the University of Delaware. He is a member of the National Academy of Engineering, recipient of SIGGRAPH's Computer Graphics Achievement Award, and a Fellow of the Association for Computing Machinery.

Paul Debevec
Chief Visual Officer, USC Institute for Creative Technologies



Paul Debevec is a Research Professor at the University of Southern California and the Chief Visual Officer at USC's Institute for Creative Technologies. Since obtaining his Ph.D. at UC Berkeley, Debevec's publications and animations have focused on techniques for photogrammetry, image based rendering and lighting, high dynamic range imaging, facial animation, and 3D displays. Debevec is an IEEE Senior Member and Co-Chair of the Academy of Motion Picture (AMPAS) Science and Technology Council. He received a Scientific and Engineering Academy Award® in 2010 for his work on the Light Stage facial capture systems, used in movies including *Spider Man 2*, *Superman Returns*, *The Curious*

Case of Benjamin Button, *Avatar*, *Tron: Legacy*, *The Avengers*, and *Maleficent*.

Erik Fonseka
Co-Founder and VP Mobile 3D, Dacuda Inc.



Erik Fonseka co-founded Dacuda AG in 2008 and is heading the US office in Palo Alto. Fonseka is the lead software architect of Dacuda. He has gained consolidated knowledge in Computer Vision with focus on image processing and artificial intelligence/machine learning techniques. He successfully participated in the Nanogram RoboCup 2007, is a passionate programmer, and has a proven track record in solving complex image processing problems. Fonseka has several years of experience as software engineer. He serves as a Director of Dacuda Inc and is the VP for Mobile 3D. He holds an MSc in Computer Science from ETH Zurich.

Michael Mangan
Camera and CV Sr. Product Manager, Qualcomm Technologies Inc.



Michael is focused on bringing to market sophisticated mobile cameras and processors, capable of running advanced visual processing algorithms. He plays a significant part in Qualcomm enabling new mobile market segments like Virtual Reality and Augmented Reality, and delivering high quality Computer Vision experiences to end-customers. He creates improvements in image processing, mobile processing hardware, and Computer Vision software by making computationally demanding algorithms run effectively on mobile, such as multi-camera processing, computational photography, six degrees of focus, mobile 3D reconstruction, and more. Michael earned his Bachelor of Applied Science in Electrical Engineering at the University of Toronto and an MBA from the Rady School of Management at UCSD.

Michael Raphael
Founder and CEO, Direct Dimensions



Michael Raphael earned a BS degree in Engineering Science and Mechanics from Virginia Tech, followed by a Masters of Engineering Administration from George Washington University. During his 10 years at Lockheed Martin as an engineer responsible for solving aerospace manufacturing quality problems, Raphael co-developed the FaroArm portable CMM and became the first user on the planet! In 1995, he founded Direct Dimensions, Inc., now in its 15th year of providing rapid solutions to 3D problems.