

Seminar

Thursday, Nov. 9th, 3-4:30 pm, Room 4164 Harold
Frank Hall (ECE Conference Room)

The Brave New Media: A Plenoptic Journey

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ABSTRACT

We are in the midst of a multimedia revolution made possible by the convergence of factors such as cheaper and better image acquisition and processing, increased computational power and storage capacity, and higher compression ratios and transmission bandwidth. Nevertheless, the images and videos we see today contain for the most part limited two-dimensional perspective views of the world. Thus, there has been a renewed impetus to take the next qualitative step and create new types of visual media. The research toward this goal can be seen as addressing two non-orthogonal requirements. The first is the desire to display to the human observer imagery of objects/scenes that can be viewed in the same way that we see the world, i.e., with depth perception, and preferably without visual aids (e.g., VR glasses). This can be exemplified by the 3D TV concept to replace the familiar TV in use today. The other requirement relates to the overcoming of limitations of the human visual system. For example, it should be possible for a user to visually “fly-around” an object or scene, or view a complete sphere of view at one or more points in a dynamic environment (e.g., “tele-presence”). These requirements rely solely on using input images captured from “real” scenes for which the modeling and texture mapping of computer graphics generally become very difficult. Thus, new research has emerged in a field commonly referred to as image-based rendering (IBR). In this context, I will review the concept of plenoptic function as a unifying representation in ray space, from which various visual representations can be extracted (e.g., light fields, cylindrical panoramas). A sampling of recent research and achievements in plenoptic image acquisition, processing, coding, and display will be presented, as well as some of the many remaining research challenges. Some novel image acquisition systems and the associated imagery will also be shown.

Dan Lelescu is currently a senior researcher with the Imaging Division Research Lab of Micron Technology, in San Jose, California. He was a researcher with NTT DoCoMo Communications Labs USA in San Jose and Palo Alto California from 2002 to 2006. He received the Ph.D. in Electrical Engineering and Computer Science from the University of Illinois at Chicago in May 2001, and the Diploma of Engineer (M.S. degree equivalent) in Electrical Engineering from Technical University “Politehnica” Timisoara, Romania in 1991. He has published in the areas of image and video signal processing and wireless communications, and has six pending patent applications. He has also made contributions to MPEG video standards, including MPEG 3DAV. He is a Guest Editor for EURASIP Journal on Wireless Communications and Networking (2006-2007) for a Special Issue on Multimedia over Wireless Networks. He is a member of IEEE. His areas of interest include image and video signal processing and coding, content-based visual information retrieval, computer vision, plenoptic signal acquisition and processing, and wireless communications.

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