Department of Computer Science, The University of Hong Kong

CS Seminar

Computer Vision of Refractive Media

Professor Herb Yang
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University of Alberta

Date:
Nov 11, 2019
Monday
11:00 am

Venue:
Room 308
Chow Yei Ching Building
The University of Hong Kong

Abstract:
Computer vision of opaque objects has been extensively studied. However, there is signicantly less attention on refractive media. In this talk, I will give an overview of my recent research in the area of computer vision of refractive media, which includes solids and uids. My interest in this topic began several years ago when my group was asked to develop an undersea 3D vision system for Neptune Canada, which had been merged with Venus Canada to form Ocean Networks Canada. During our research, we discovered that simply applying land-based computer vision techniques to undersea appears trival but is, unfortunately, incorrect. Surprisingly, most photogrammetry methods at the time incorrectly adapted land-based methods to undersea applications with minor tweaking of parameters. By accommodating refraction in our methods, we have developed several physics based algorithms that outperform the accuracy of existing algorithms. Rather than a hindrance, we also discovered that refraction can be leveraged in underwater imaging. For example, we take advantage of dispersion to calibrate an underwater camera with improved accuracy. As well, dispersion can also be used to reconstruct an object in 3D with only one single view, i.e. one single camera, which is not possible for a typical land-based camera. More recently, motivated by our underwater results, we further explore developing new physics based methods to reconstruct shapes of transparent objects, which include transparent solids and dynamic water surfaces and underwater scenes.

About the Speaker:
Herb Yang (SM IEEE) received his B.Sc. (first honours) from the University of Hong Kong, his M.Sc. from Simon Fraser University, and his M.S.E.E. and Ph.D. from the University of Pittsburgh. He was a faculty member in the Department of Computer Science at the University of Saskatchewan from 1983 to 2001 and served as Graduate Chair from 1999 to 2001. Since July, 2001, he has been a Professor in the Department of Computing Science at the University of Alberta. He served as Associate Chair (Graduate Studies) in the same department from 2003 to 2005 and as Science Internship Director from 2016 to 2019. His research interests cover a wide range of topics from computer graphics to computer vision, which include physically based animation of Newtonian and non-Newtonian fluids, texture analysis and synthesis, human body motion analysis and synthesis, computational photography, stereo and multiple view computer vision, underwater imaging and medical imaging. He has published over 150 papers in international journals and conference proceedings in the areas of computer vision, computer graphics and medical imaging. He is a Senior Member of the IEEE and serves on the Editorial Board of the journal Pattern Recognition and IET-Computer Vision. In addition, he has served as reviewer and program committee member to many international conferences and reviewer to many international journals, and funding agencies. In 2007, he was invited to serve on the expert review panel to evaluate computer science research in Finland.

All are welcome!
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