

Date: 26th February  
Time: 4 pm  
Venue: RM 101, RM Building, CSE Department

## ***"From Vision-Realistic Rendering to Vision Correcting Displays"***

*Professor Brian A. Barsky*

Computer Science Division  
School of Optometry  
Berkeley Center for New Media  
Berkeley Institute of Design  
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### **ABSTRACT**

Present research on simulating human vision and on vision correcting displays that compensate for the optical aberrations in the viewer's eyes will be discussed. The simulation is not an abstract model but incorporates real measurements of a particular individual's entire optical system. In its simplest form, these measurements can be the individual's eyeglasses prescription; beyond that, more detailed measurements can be obtained using an instrument that captures the individual's wavefront aberrations. Using these measurements, synthetic images are generated. This process modifies input images to simulate the appearance of the scene for the individual. Examples will be shown of simulations using data measured from individuals with high myopia (near-sightedness), astigmatism, and keratoconus, as well as simulations based on measurements obtained before and after corneal refractive (LASIK) surgery.

Recent work on vision-correcting displays will also be discussed. Given the measurements of the optical aberrations of a user's eye, a vision correcting display will present a transformed image that when viewed by this individual will appear in sharp focus. This could impact computer monitors, laptops, tablets, and mobile phones. Vision correction could be provided in some cases where spectacles are ineffective. One of the potential applications of possible interest is a heads-up display that would enable a driver or pilot to read the instruments and gauges with his or her lens still focused for the far distance.

### **Brief Biography of the Speaker:**

Brian A. Barsky is Professor of Computer Science and Vision Science, and Affiliate Professor of Optometry, at the University of California at Berkeley, USA. He is also a member of the Joint Graduate Group in Bioengineering, an interdisciplinary and inter-campus program, between UC Berkeley and UC San Francisco, and a Fellow of the American Academy of Optometry (F.A.A.O.).

Professor Barsky has co-authored technical articles in the broad areas of computer aided geometric design and modeling, interactive three-dimensional computer graphics, visualization in scientific computing, computer aided cornea modeling and visualization, medical imaging, and virtual environments for surgical simulation. He is also a co-author of the book *An Introduction to Splines for Use in Computer Graphics and Geometric Modeling*, co-editor of the book *Making Them Move: Mechanics, Control, and Animation of Articulated Figures*, and author of the book *Computer Graphics and Geometric Modeling Using Beta-splines*. Professor Barsky also held visiting positions in numerous universities of European and Asian countries. He is also a speaker at many international meetings, an editor for technical journal and book series in computer graphics and geometric modelling, and a recipient of an IBM Faculty Development Award and a National Science Foundation Presidential Young Investigator Award. Further information about Professor Barsky can be found at <http://www.cs.berkeley.edu/~barsky/biog.html>.