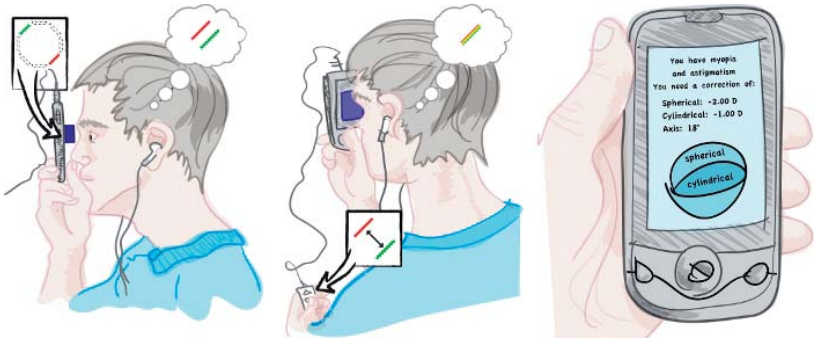
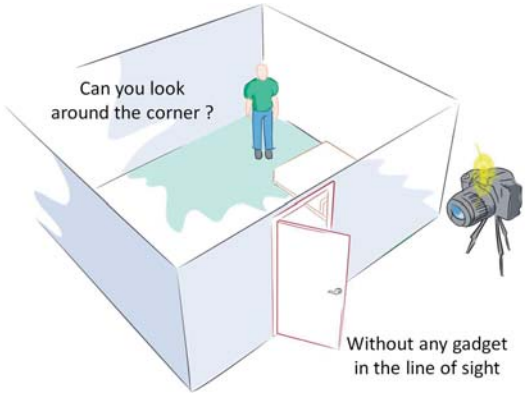
The Institute of OPTICS **Research Seminar** UNIVERSITY of ROCHESTER

Looking Around Corners and Cellphone Optometry:
New Imaging using Time and Angle Resolved Techniques





Ramesh Raskar
Associate Professor
MIT Media Lab
PhD UNC Chapel Hill, 2002

We will describe the theoretical foundation for sensing and reasoning using transient light transport, and scenarios in which transient reasoning exposes scene properties that are beyond the reach of traditional machine vision.

Special day, time and place
11:00 am, Wednesday, Dec 15, 2010
Goergen 109
Refreshments provided.

HAJIM SCHOOL OF ENGINEERING & APPLIED SCIENCES

Looking Around Corners and Cellphone Optometry: New Imaging using Time and Angle Resolved Techniques

Professor Ramesh Raskar
MIT Media Lab

Abstract
Can we look around corners beyond the line of sight? Our goal is to exploit the finite speed of light to improve image capture and scene understanding. New theoretical analysis coupled with emerging ultra-high-speed imaging techniques can lead to a new source of computational visual perception. We are developing the theoretical foundation for sensing and reasoning using transient light transport, and experimenting with scenarios in which transient reasoning exposes scene properties that are beyond the reach of traditional machine vision. (Joint work with a large team, see http://raskar.info/femto)

The ever increasing resolution of new LCDs and CMOS sensors in cellphones provides a new opportunity to build imaging and diagnostic platforms. These platforms will soon match the performance of today's high end scientific instruments. NETRA is a cell phone based solution for estimating refractive errors in the human eye. The NETRA autorefractor-like system uses the dual of a Shack-Hartmann sensor, and replaces the laser with simple user interaction. (Joint work with Pamplona, Mohan and Oliviera, http://eyenetra.com)

Biography
Ramesh Raskar joined the Media Lab from Mitsubishi Electric Research Laboratories in 2008 as head of the Lab's Camera Culture research group. His research interests span the fields of computational photography, inverse problems in imaging and human-computer interaction. Recent inventions include transient imaging to look around corners (Femto-photography), next generation CAT-Scan machine, imperceptible markers for motion capture (Prakash), long distance barcodes (Bokode), touch+hover 3D interaction displays (BiDi screen), low-cost eye care devices (Netra) and new theoretical models to augment light fields (ALF) to represent wave phenomena.

He is a recipient of TR100 award from Technology Review, 2004, Global Indus Technovator Award, top 20 Indian technology innovators worldwide, 2003, Alfred P. Sloan Research Fellowship award, 2009 and Darpa Young Faculty award, 2010. He holds 42 US patents and has received four Mitsubishi Electric Invention Awards. He is currently co-authoring a book on Computational Photography.