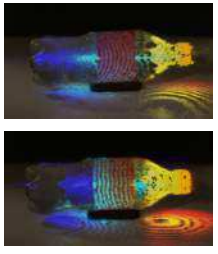
Camera Culture

Creating new ways to capture and share visual information

MIT Media Lab
Professor Ramesh Raskar
http://raskar.info

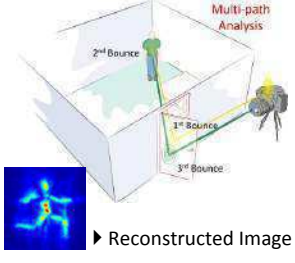
Limitless Photons: Energy Propagation, Imaging, and Inverse Problems

Trillion Frames per Second Imaging



A camera fast enough to create movies of light in flight. We use 'light in motion' to understand reflectance, absorption and scattering properties of materials.

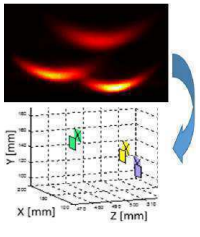
Looking Around Corners



Using short laser pulses and a fast detector, the device can look around corners with no imaging device in the line of sight using scattered light and time resolved imaging.

▸ Reconstructed Image

Time-of-Flight Fluorescence



We repurpose a time-of-flight camera to record nanosecond dynamics of fluorescent materials, and perform fluorescence imaging through turbid layers.

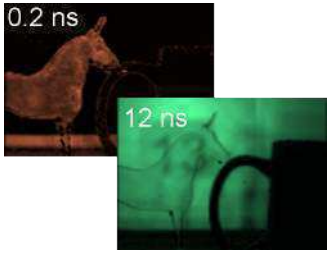
Eyeglass-Free Tablets

A display that frees the viewer from using glasses and optical corrections.

Compressive Light Field Camera

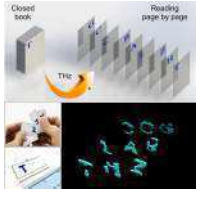
A frugal camera design exploiting the fundamental dictionary of light fields for single-shot capture of light fields at full sensor resolution.

Multi-Depth Time-of-Flight Cameras



We repurpose a time-of-flight camera using coded illumination to recover time profiles of large-scale scenes to acquire multiple depths per pixel.

Reading Through a Book



The combination of pulse-echo detection and Terahertz waves (between infrared and microwaves) enables the location of the pages of a book and the extraction of the content of each page.

Tensor Display: Glasses-Free 3D HDTV

Compressive light field displays employing a stack of time-multiplexed, light-attenuating layers with uniform or directional backlighting. They exhibit incr-eased brightness and refresh rate.

Unbound HDR

A framework to extend the dynamic range of image capturing called Unbounded High Dynamic Range (UHDR) with our novel modulo imaging sensor.

Flutter-Shutter

A camera that codes exposure time with a binary pseudo-sequence to deconvolve and remove motion blur in textured backgrounds and partial occluders.

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Health & Wellness

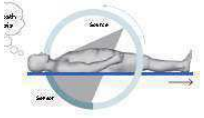
Retinal Imaging and Electroretinography

A device with simplified optics, clever illumination, and electrophysiology that visualizes images of the retina in a standalone device easily operated by the end user, enabling disease diagnosis.

NETRA/CATRA

A low-cost cell-phone attachment that measures eye-glass prescription and cataract information from the eye.

High-speed Tomography

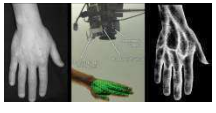


A compact, fast CAT scan machine using no mechanical moving parts or synchronization.

Cellphone Microscopy

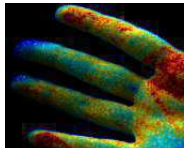
A platform for computational microscopy and remote healthcare

Imaging Through Skin



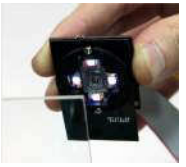
A device that utilizes high spatio-frequency patterns with state of the art dictionary learning algorithms to enhance vein structures under the skin.

Skin Perfusion Photography



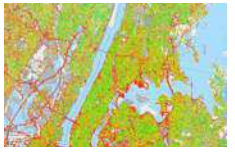
Using computational photography to recover in-vivo blood flow speed in skin tissue.

Spec Trans



A new surface classification technology of exotic materials such as glass, transparent plastic, and metal. It extracts the materials optical property by employing laser and multi-directional, multi-spectral LED illumination.

Streetscore

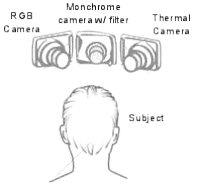


A computer vision algorithm, trained using crowdsourced data, that can predict the perceived safety of streetscapes.

Statistics of Non-Rigid Observations

Statistics of non-rigid stretchable structures (Heart, Kidney, Brain etc) for high level inference.

Mental Health from Visual Cues



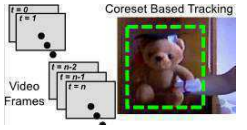
A device that uses remote physiological measurement to detect a persons emotional state using machine learning and compressive sensing.

Dental Imaging

Portable low-cost imaging tools for oral diagnostics by monitoring and tracking the health of teeth, gum, tongue and more.

Theory of Light Propagation

Real Time / Big Data Visual Learning



A method to compress big data for learning using real-time object detection and tracking

People:

Head: Professor Ramesh Raskar
Administrative Staff: Margaret Church

Head of Innovation and New Ventures:
John Werner

Research Staff
Pratik Shah, Albert Redo Sanchez, Karin Roesch, Rohan Puri, Jamie Schiel

Post-Doctoral Researchers
Micha Feigin, Dan Raviv, Barmak Heshmat, Munehiko Sato, Anshuman Das, Hyunsung Park, George Leifman

Research Assistants
Nikhil Naik, Ayush Bhandari, Achuta Kadambi, Guy Satat, Hang Zhao, Tristan Swedish Shantanu Sinha, Otkrist Gupta, Mrinal Mohit

Visiting Researchers & Students
Devesh Jain, Pushyami Rachapudi

[+] http://cameraculture.info