Speaker: Jean-François Lalonde

Jean-François Lalonde is an assistant professor in ECE at Laval University, Quebec City. Previously, he was a Post-Doctoral Associate at Disney Research, Pittsburgh. He received a B.Eng. degree in Computer Engineering with honors from Laval University, Canada, in 2004. He earned his M.S at the Robotics Institute at Carnegie Mellon University in 2006 and received his Ph.D., also from Carnegie Mellon, in 2011. After graduation, he became a Computer Vision Scientist at Tandent, where he helped develop LightBrush™, the first commercial intrinsic imaging application. His work focuses on lighting-aware image understanding and synthesis by leveraging large amounts of data.

More information: http://www.jflalonde.ca
Mohit Gupta is an assistant professor in the CS department at the University of Wisconsin-Madison. Earlier, he was a research scientist in the CAVE lab at Columbia University. He received a B.Tech. in computer science from Indian Institute of Technology Delhi, and a Ph.D. from the Robotics Institute, Carnegie Mellon University. His research interests are broadly in computer vision and computational imaging. His focus is on designing computational cameras that enable computer vision systems to perform robustly in extreme real-world scenarios, as well as capture novel kinds of information about the physical world that is not possible with conventional cameras.

More information: http://pages.cs.wisc.edu/~mohitg/
All materials
(including slides & list of references)
available at
jflalonde.ca/icnip16
From camera obscura
to the computational camera

With inspiration from Brian Barsky's talk, “Computational photography: going forward from an historical perspective”, presented at ICCP 2015
Camera obscura

Unknown, 17th century, public domain
Camera obscura (18th century)
Vermeer and realism

Johannes Vermeer, La leçon de musique (1662–1665)
Short detour: Tim’s Vermeer

Preview available here: https://www.youtube.com/watch?v=CS_HUWs9c8c

Movie available on Netflix
Earliest surviving photograph (c.1826)

Joseph Nicéphore Niépce. "Le point de vue de la fenêtre" c.1826.
Enhanced by Helmut Gersheim, c. 1952

Photo by J. Paul Getty Museum, from petapixel

Public domain
First photograph (c.1826)

Joseph Nicéphore Niépce. Source: public domain

Photo courtesy Musée Niécephore Niépce/Chalon-sur-Saône, from petapixel
First daguerrotype
First photo of a human being (1838)

Louis Daguerre, “Le boulevard du Temple”, 1838, from petapixel
First selfie (1839)
“The 1821 derby at Epsom”, Jean Louis Théodore Géricault, 1821, public domain.
"The horse in motion", Eadweard Muybridge, 1878, public domain.
What is photography?

5 separate negatives combined

Single shot, no retouching

Henry Peach Robinson, “Fading away”, 1858, public domain

Peter Henry Emerson, “At Plough, The End of the Furrow”, 1887, public domain
Eastman Kodak (1888)

U.S. patent no. 388,850, issued to George Eastman, September 4, 1888
Street photography

“Knowing when to shoot... the decisive moment”
Henri Cartier-Bresson
First digital photograph (1957)

Russell Kirsch, “Walden”, 1957, from petapixel

Resolution: 176x176
First digital camera (1975)

Steve Sasson, Eastman Kodak. Photo credit: Eastman Kodak
Modern digital cameras
Traditional, “film-like” photography

Mimics human eye for a single snapshot
single view, single instant, fixed dynamic range and depth of field for given illumination in a static world
Computational photography

Detector

Pixels

Programmable optics

Scene

Light source

Image
Computational photography

- Scene
- Light source
- Programmable optics
- Detector
- Computation
- Image
Computational photography

Diagram:
- **Detector**
- **Scene**
- **Programmable optics**
- **Programmable illumination**
- **Computation**
- **Image**
Computational photography

Detector

Programmable optics

Scene

Programmable illumination
Computational photography

“Coded” photography [M. Gupta]
Novel camera designs for improved functionalities

“Augmented” photography [J-F Lalonde]
Algorithmic tools to augment regular cameras
Schedule

14:00-14:20  Opening remarks & brief history of photography  [J.-F. Lalonde]
14:20-15:30  Coded photography  [M. Gupta]
15:30-15:40  Break
15:40-16:50  Augmented photography  [J.-F. Lalonde]
16:50-17:10  Future and impact of photography  [M. Gupta]
17:10-17:30  Q&A