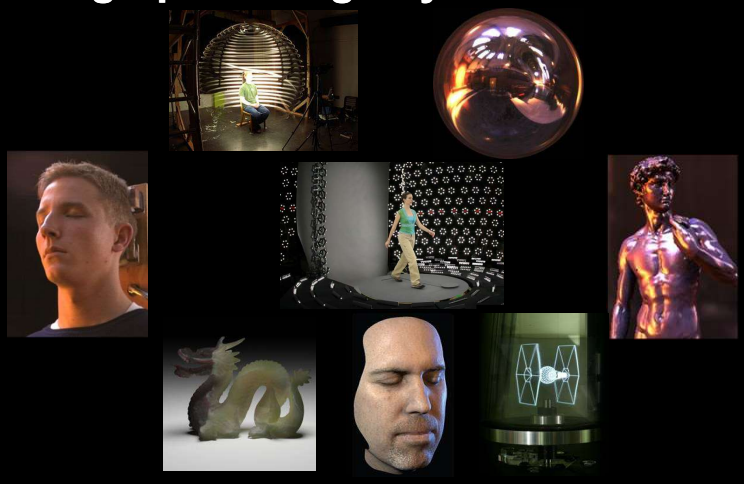
CO417 – Advanced Computer Graphics: Photographic Image Synthesis



Spring 2019

Abhijeet Ghosh

1

Instructor

Abhijeet Ghosh

abhijeet.ghosh@imperial.ac.uk

ghosh@imperial.ac.uk

http://www.doc.ic.ac.uk/~ghosh

Senior Lecturer in Computing

Imperial College London 2012 – present

Realistic Graphics and Imaging group

Research Assistant Professor, Graphics Lab

USC Institute for Creative Technologies 2007 – 2012

Ph.D. University of British Columbia 2007

"Realistic Materials and Illumination Environments"

2

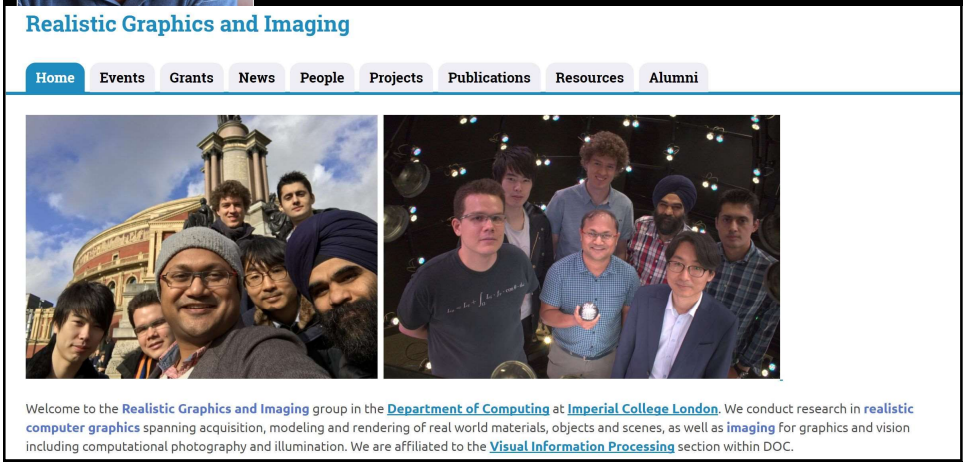
Avatar film credit (2009)

USC ICT Light Stage

3

Realistic Graphics and Imaging

https://wp.doc.ic.ac.uk/rgi/



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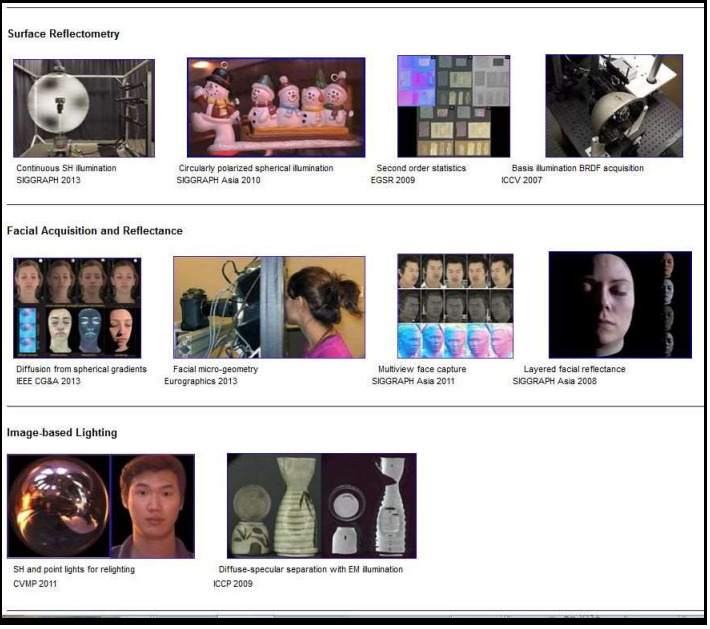
Research in Graphics and Imaging



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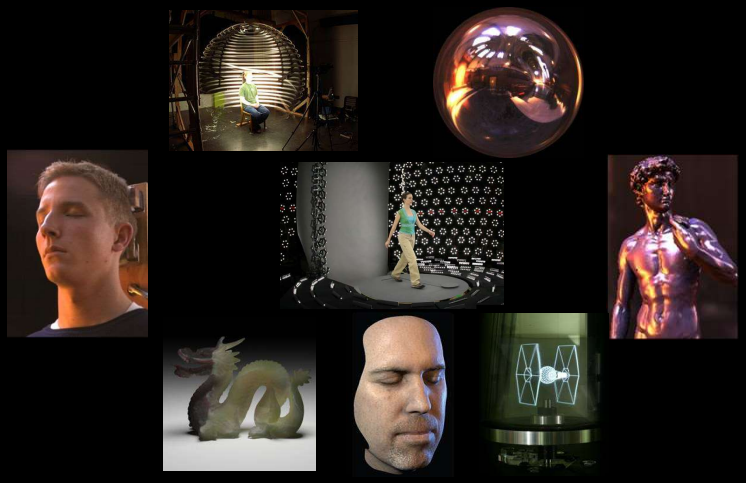
Photographic Image Synthesis



Past offerings: Spring 2009 & 2010 at USC

with Paul Debevec and Pieter Peers

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Phorealistic Computer Graphics

Special Effects / Movies

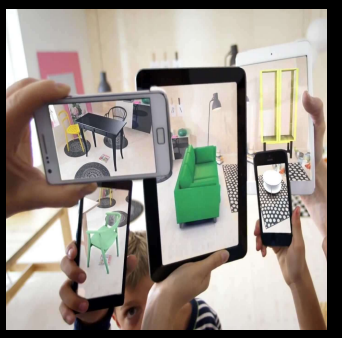
7

Phorealistic Computer Graphics

Games

8

Phorealistic Computer Graphics



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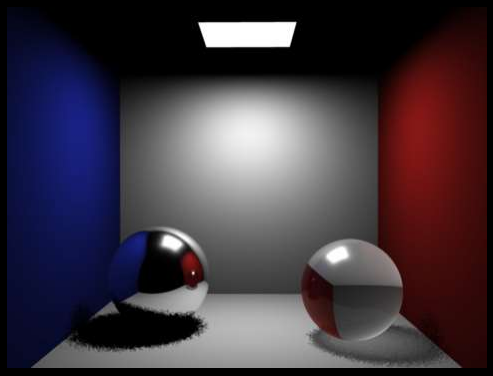
Light transport simulation



Cornell box with direct illumination

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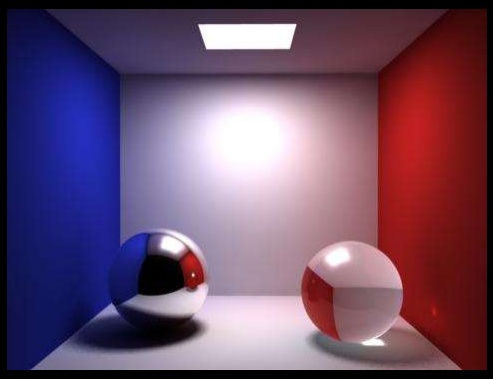
Light transport simulation



How real does this scene really look?

Cornell box with global illumination

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Light transport simulation

Measured data!

Peers et al. 06

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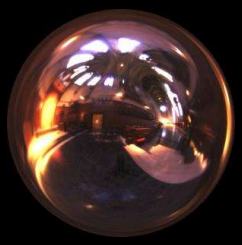
Image-based rendering

Canon EOS -1D Mark III

Point Grey Grasshopper



Grace Cathedral

Debevec et al. 00

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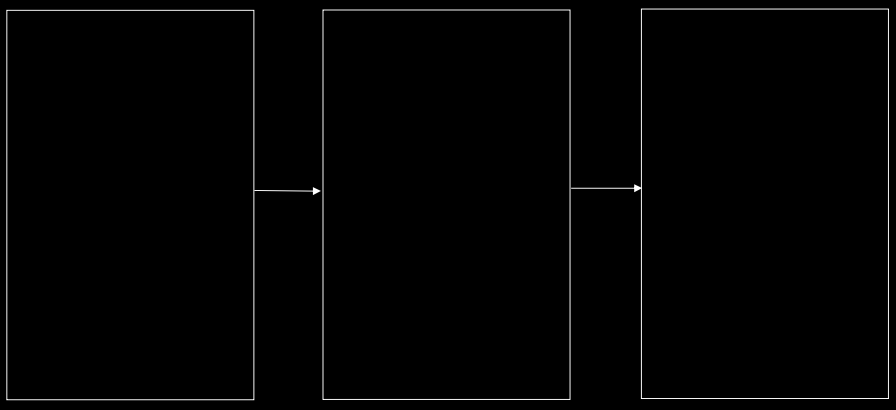
Modern Image Synthesis



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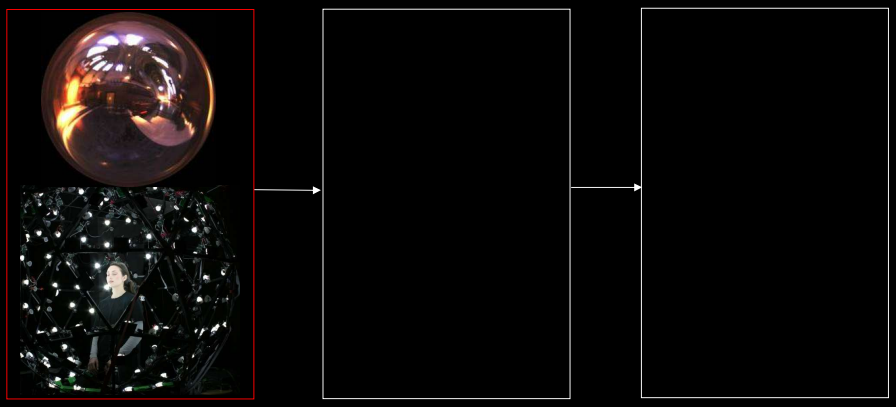
Modern Image Synthesis



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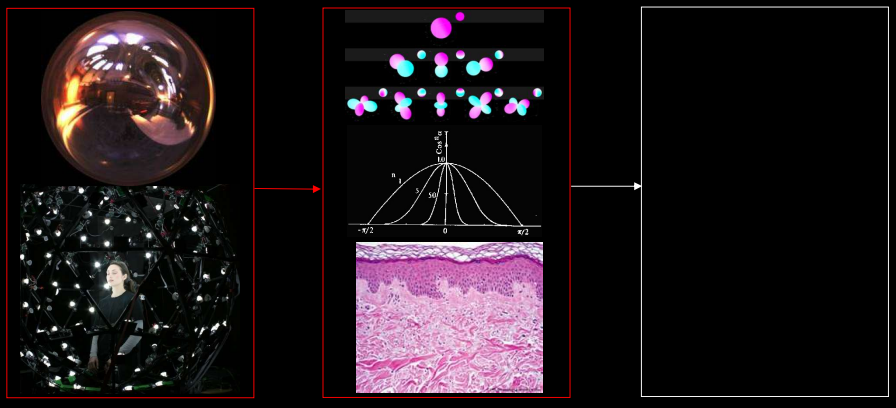
Modern Image Synthesis



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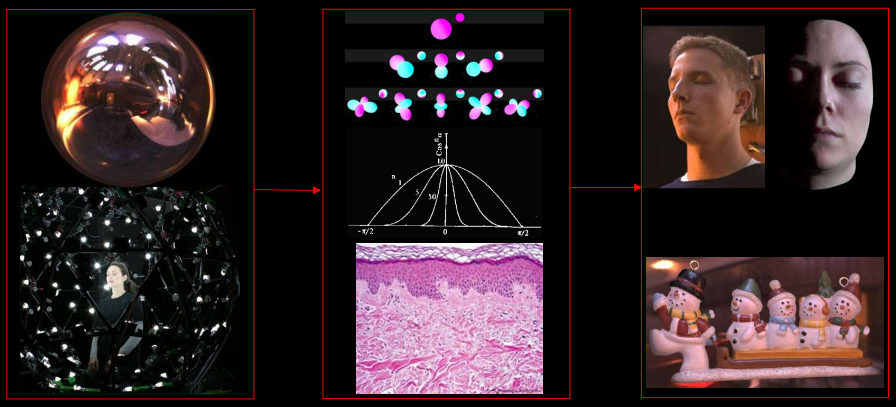
Modern Image Synthesis



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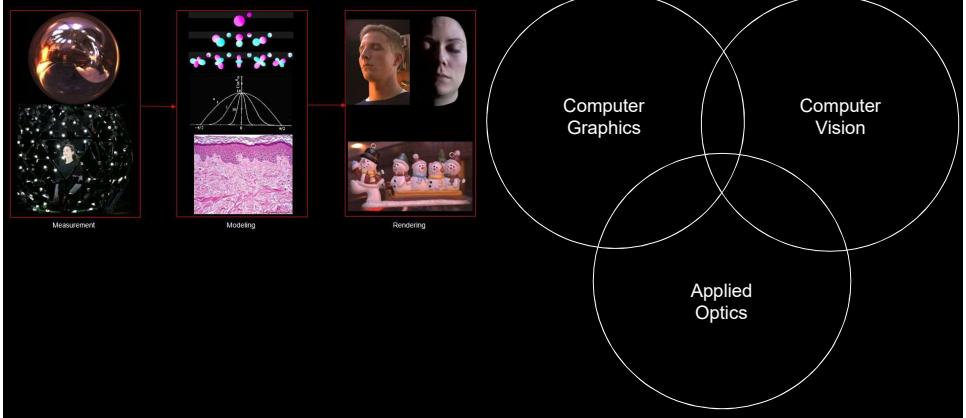
Modern Image Synthesis



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Administrativa

- **Day and Time** — Monday 9:00 am – 11:00 am
  Friday 2:00 0m – 4:00 pm
  (Weeks 2 – 9, Week 10 revision)
- **First class** — January 14, 2019 (Week 2)
- **Location** — Hux 140 (Mon), 145 (Fri)
- **Prerequisites** — CO317, or equivalent
  Familiarity with linear algebra, calculus

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Grading scheme

- **Assignments (implementation)** — total 2 (2 weeks each)
  33% of grade
- **Final examination** — 2 out of 3 questions
  67% of grade

TAs: Yuliya Gitlina yuliya.gitlina13@imperial.ac.uk (Primary)
Yiming Lin yiming.lin11@imperial.ac.uk (Marking)
(TA Office hours, Wednesdays 2:00pm – 3:00pm, Hux 304)

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Assignments

- Teams of two (joint submissions but with individual subparts)
  - Email TAs your teams by Friday, Jan. 25th (Week 3)
- Assignment 1: High Dynamic Range Imaging
  - Goes out on Monday, Week 3
  - Due on Monday, Week 5
- Assignment 2: Sampling and Rendering
  - Goes out on Monday, Week 6
  - Due on Monday, Week 8

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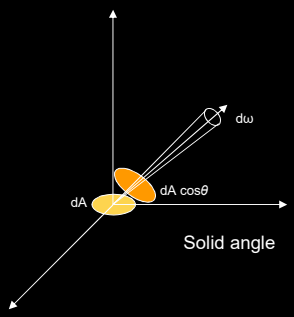
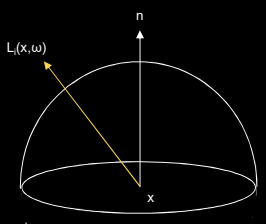
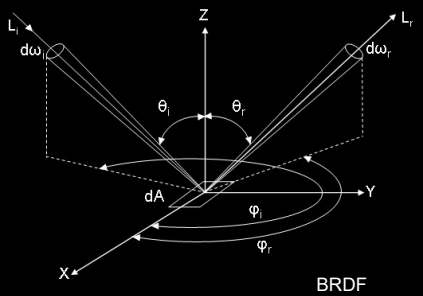
Radiometry



Solid angle



Spherical integral



BRDF

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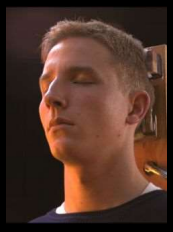
HDRI and Image-Based Lighting



Light probes | Rendering | Relighting

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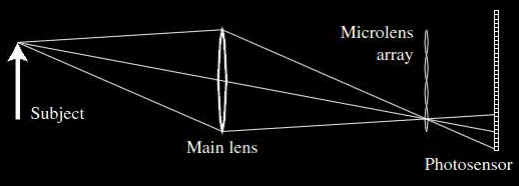
Light Fields



Synthetic refocusing

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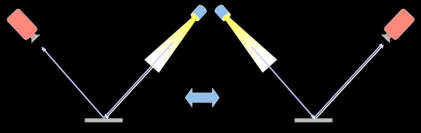
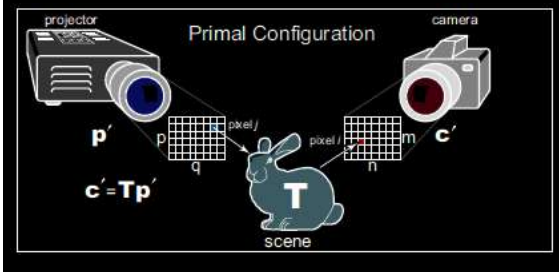
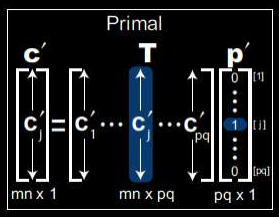
Light Transport



Reciprocity

Virtual relighting





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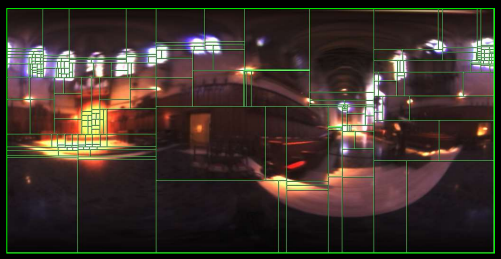
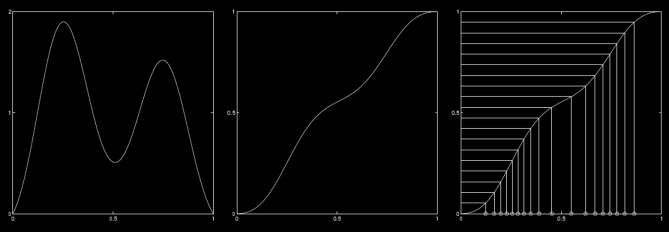
Environmental Illumination





Monte Carlo Sampling

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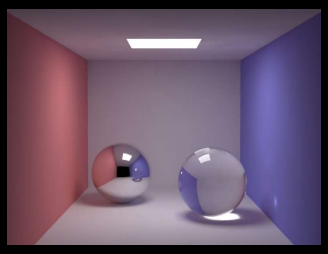
Global Illumination

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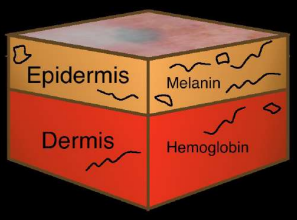
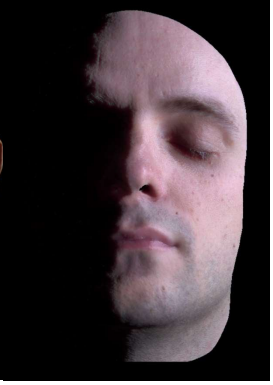
Facial Modeling and Rendering





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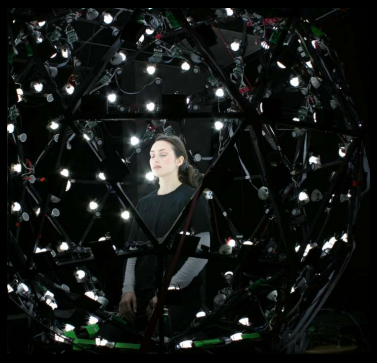
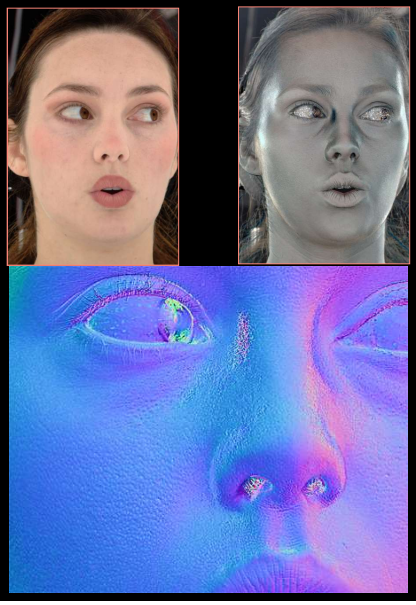
Facial capture techniques



Polarized illumination



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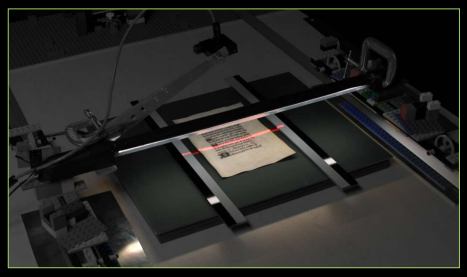
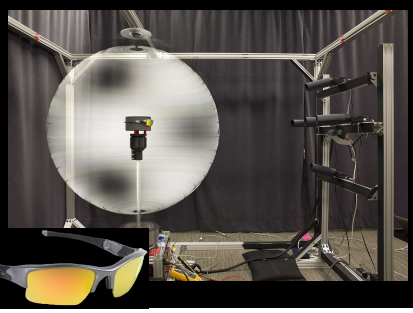
Reflectance capture techniques





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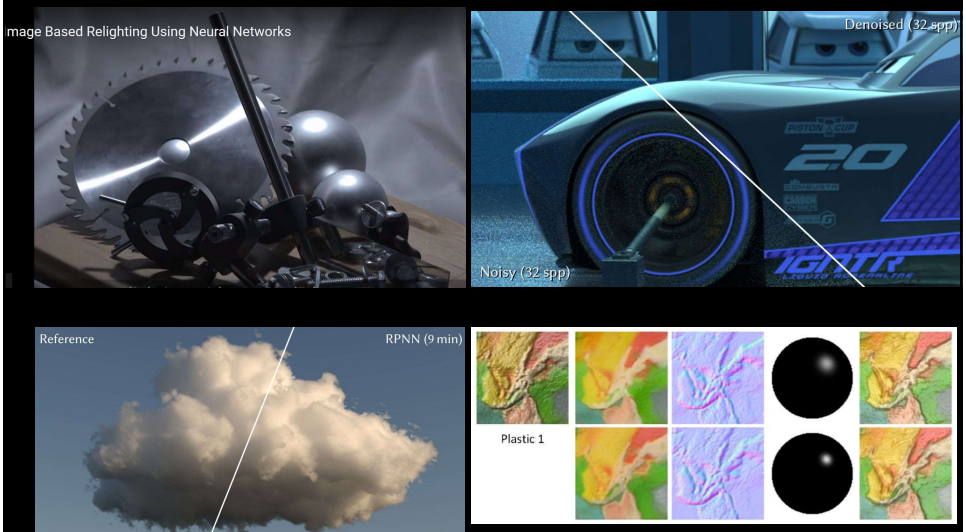
Machine learning techniques



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Course material

- **Lecture slides on CATE**
  - **additional notes will be made available periodically**
- "***Physically Based Rendering : From Theory to Implementation***", Morgan Kaufmann, ISBN-13: 978-0125531801
- "***High Dynamic Range Imaging: Acquisition, Display, and Image-Based Lighting***", Morgan Kaufmann, ISBN-13: 978-0125852630

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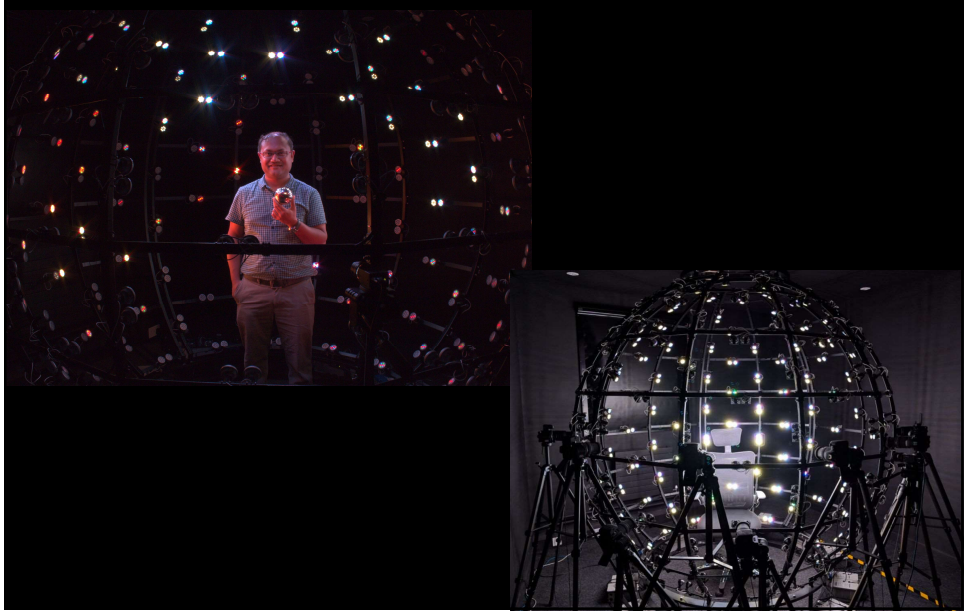
Multispectral lightstage demo – Hux 221



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