

Computational Photography



Dr. Irfan Essa

Professor

School of Interactive Computing

Study the basics of computation and its impact on the entire workflow of photography, from capturing, manipulating and collaborating on, and sharing photographs.



"It's a Wrap!"

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Where we started and
where we are now!



Course Goals

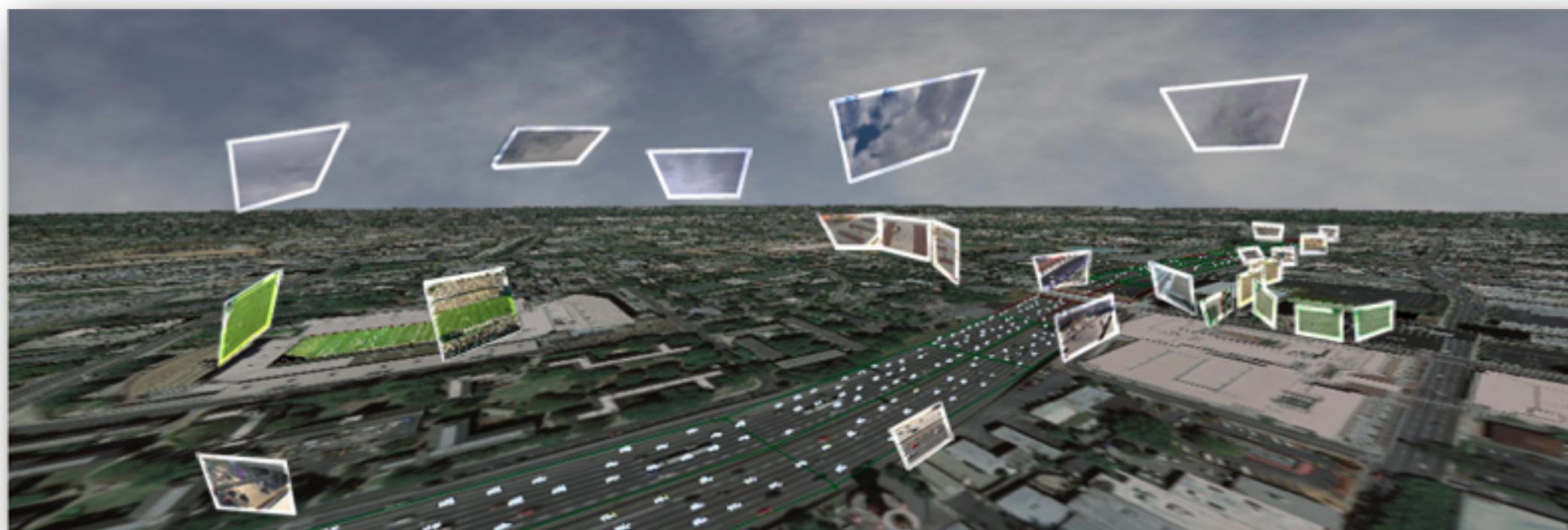


Course Goals

- ★ Study the basics of computation and its impact on the entire workflow of photography.
 - Introduce the Discipline of Computational Photography.
 - Provide foundations to Computational Photography.
 - Explore hands-on how to do Computational Photography.

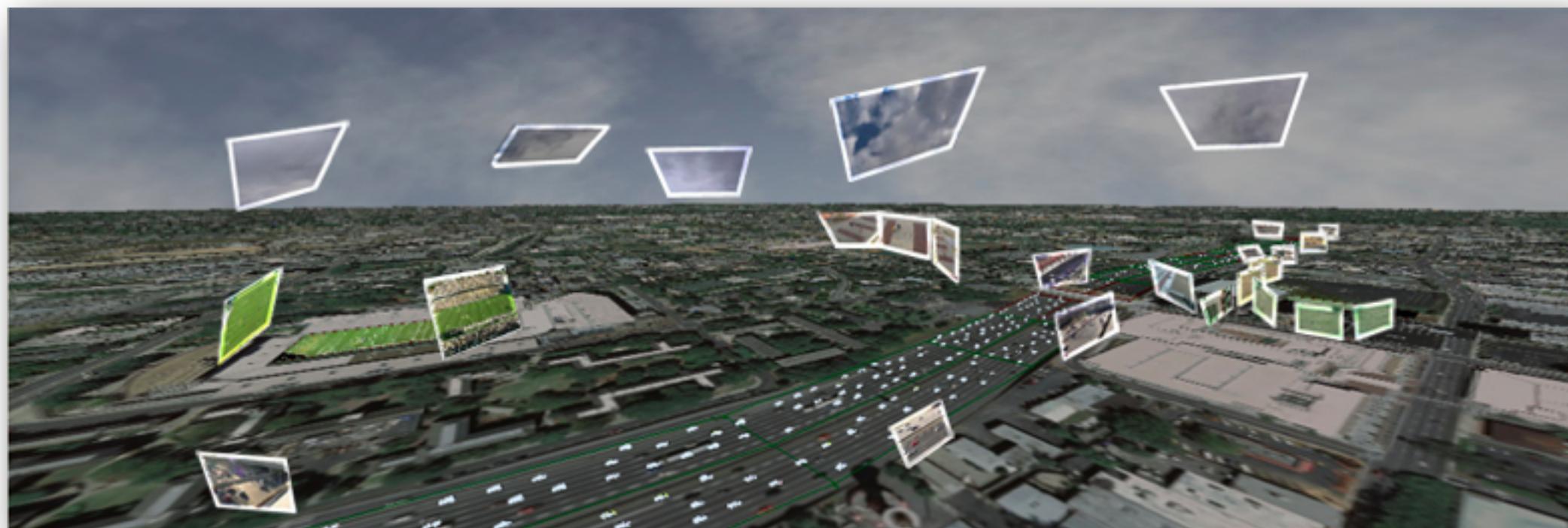


In Five weeks ...



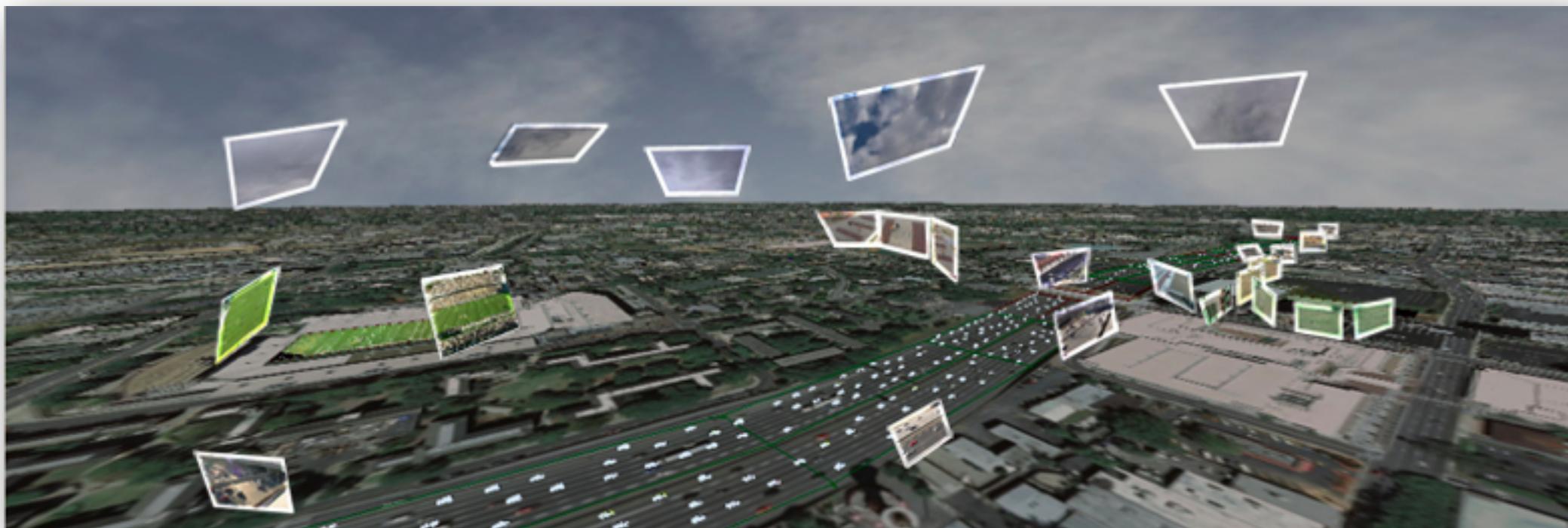
In Five weeks ...

1. What is Computational Photography?



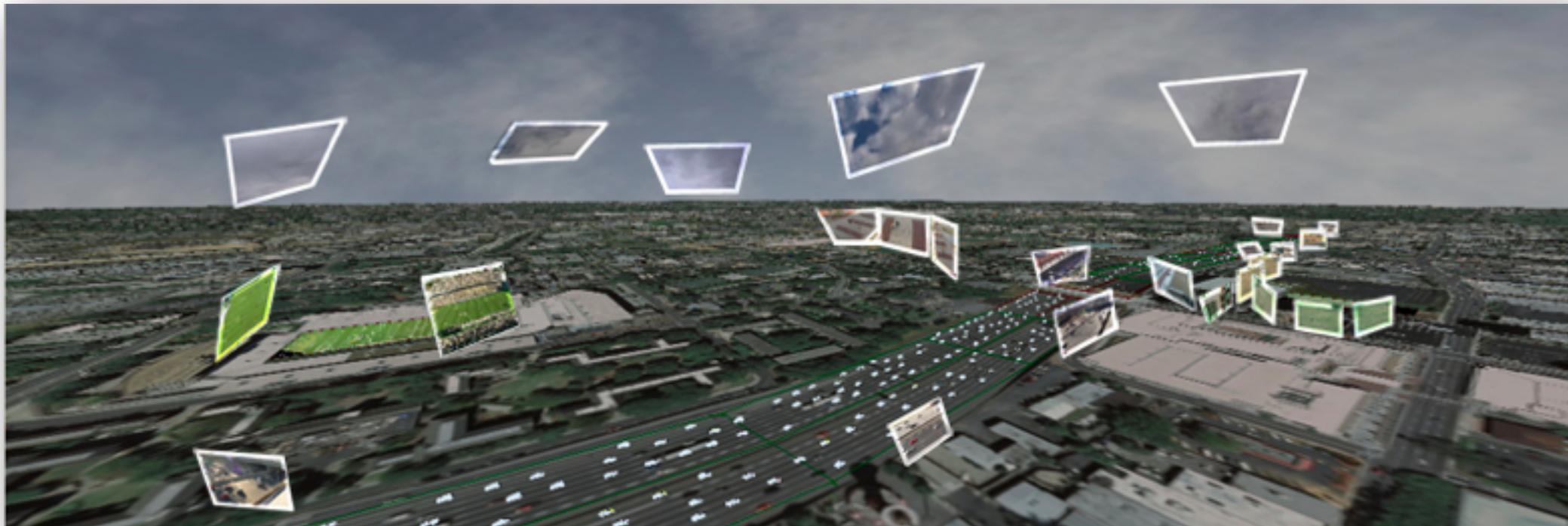
In Five weeks ...

1. What is Computational Photography?
2. How to Process Images?



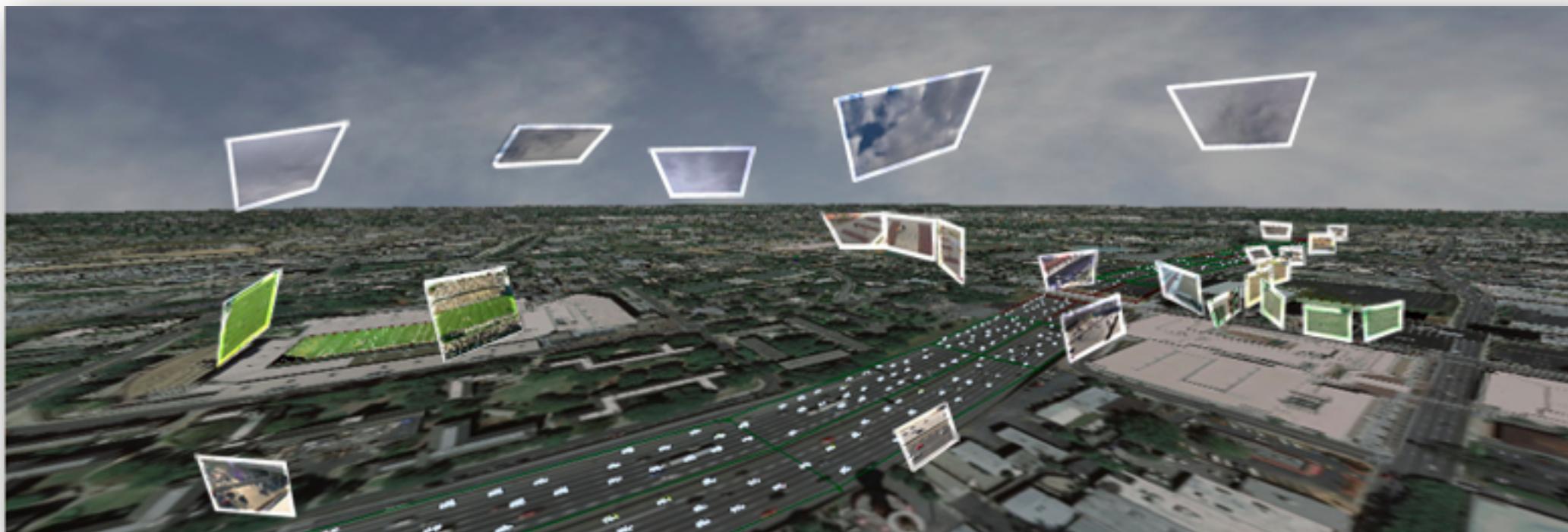
In Five weeks ...

1. What is Computational Photography?
2. How to Process Images?
3. How a Camera works?



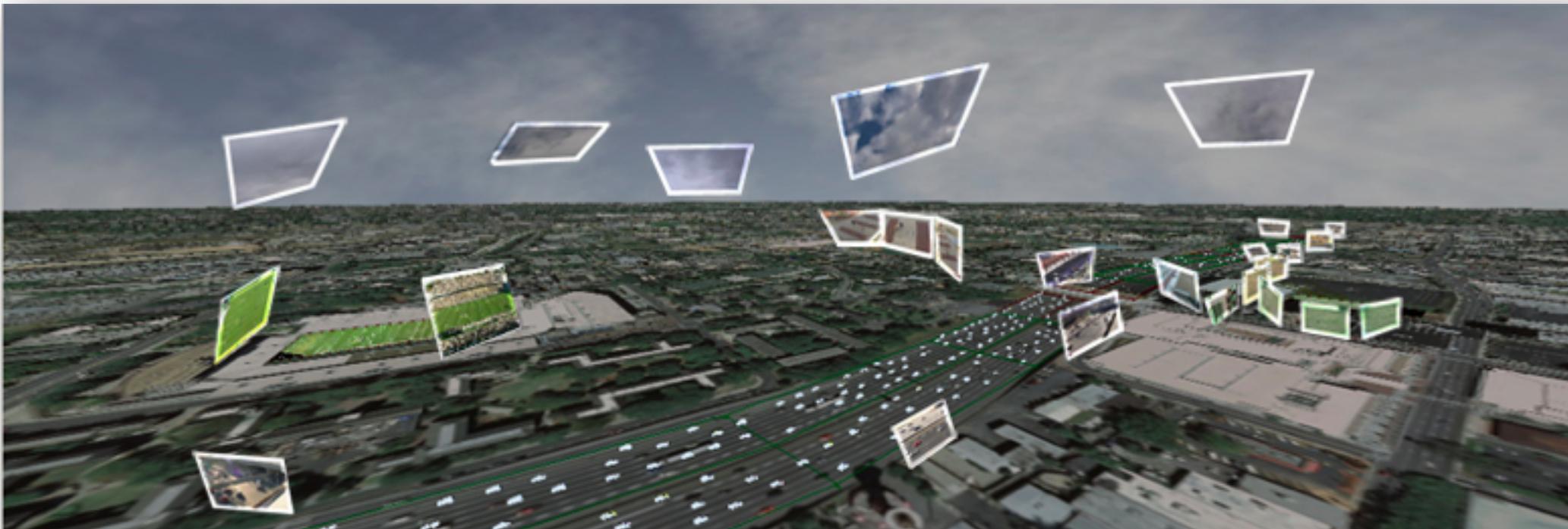
In Five weeks ...

1. What is Computational Photography?
2. How to Process Images?
3. How a Camera works?
4. From Processing Images to Computational Photography.

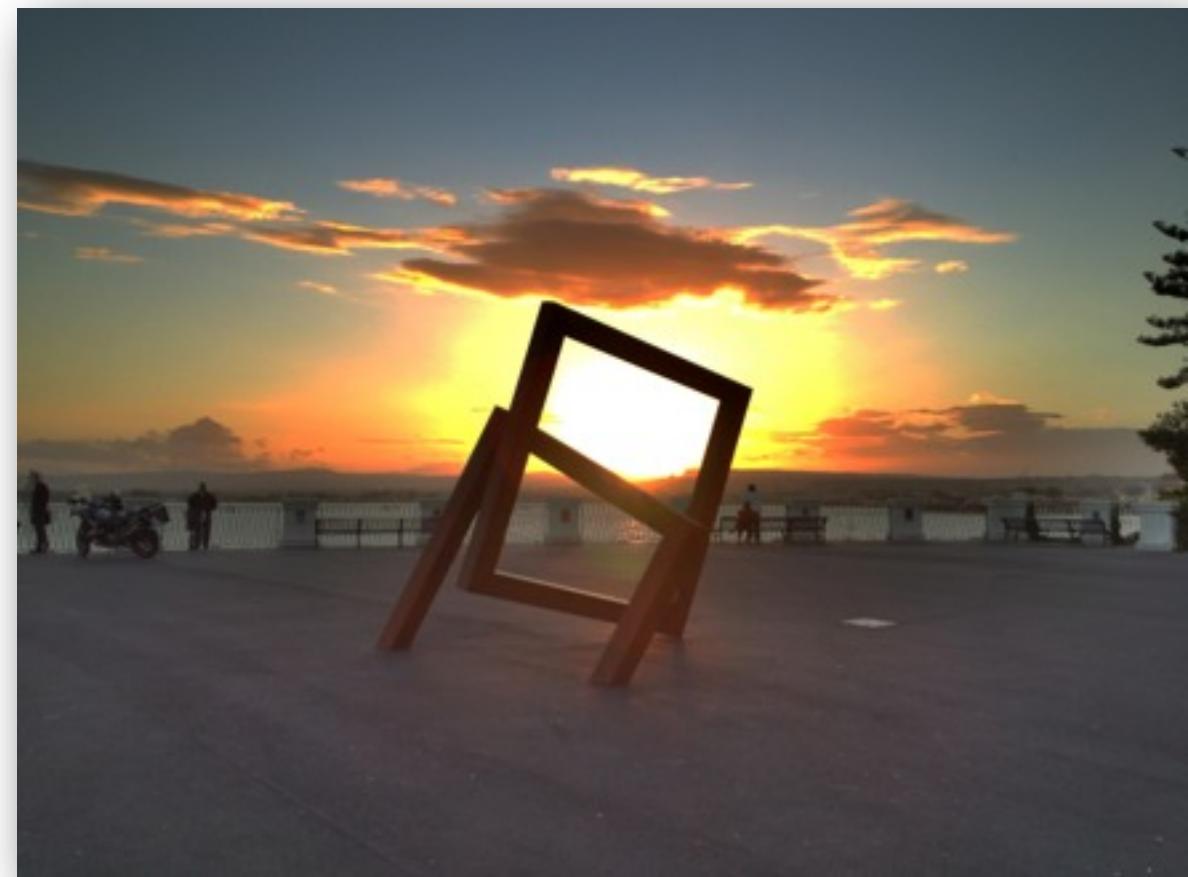


In Five weeks ...

1. What is Computational Photography?
2. How to Process Images?
3. How a Camera works?
4. From Processing Images to Computational Photography.
5. Video and Beyond Pixels.

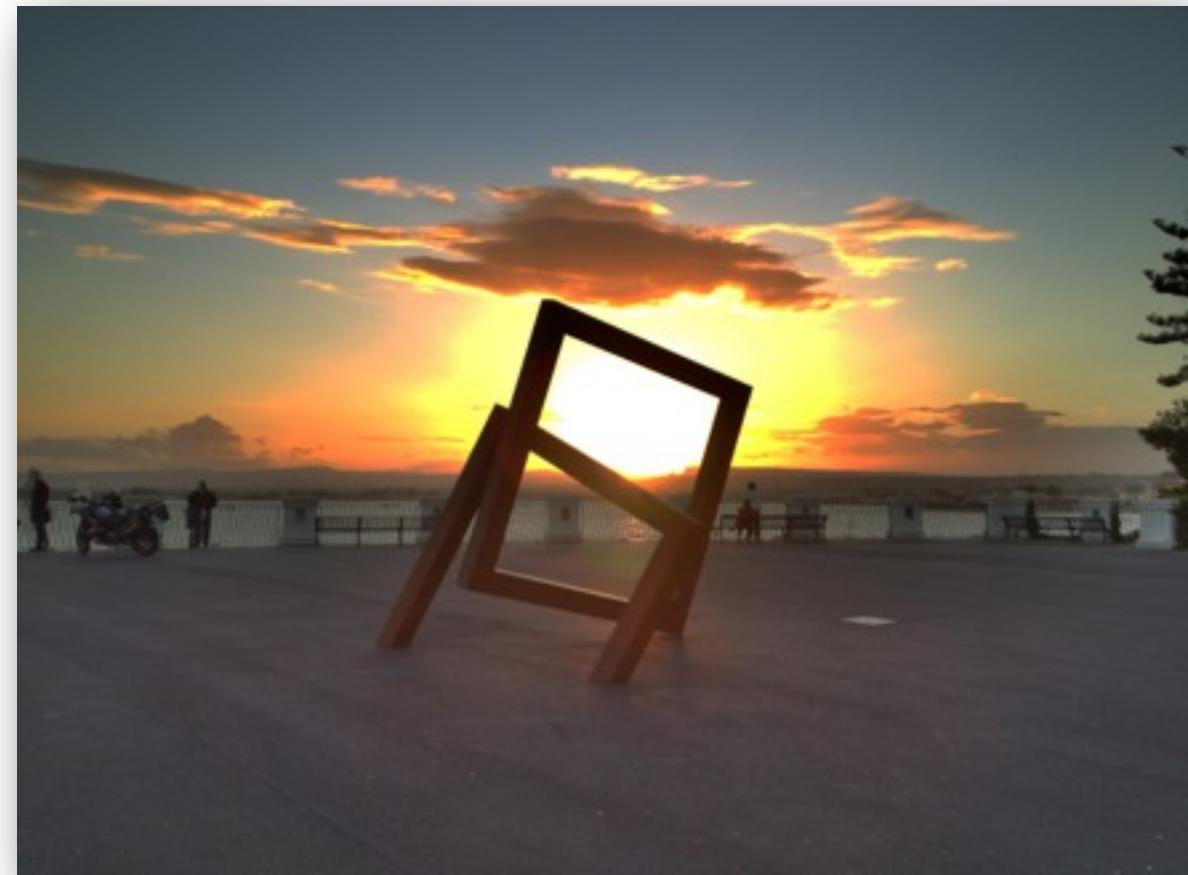


Week #0



Week #0

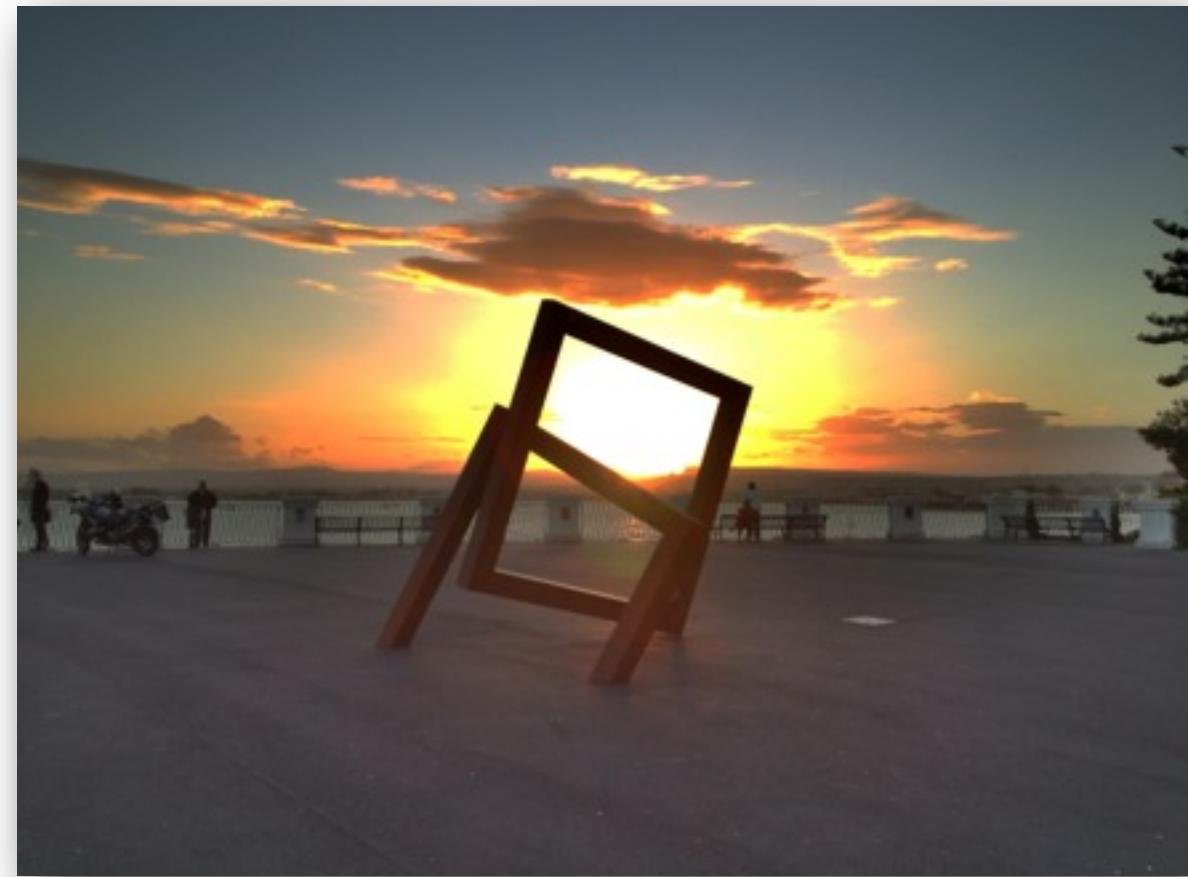
- ★ The discipline of Computational Photography
 - Epsilon Photography, Coded Photography, Computational Cameras, etc.



Week #0

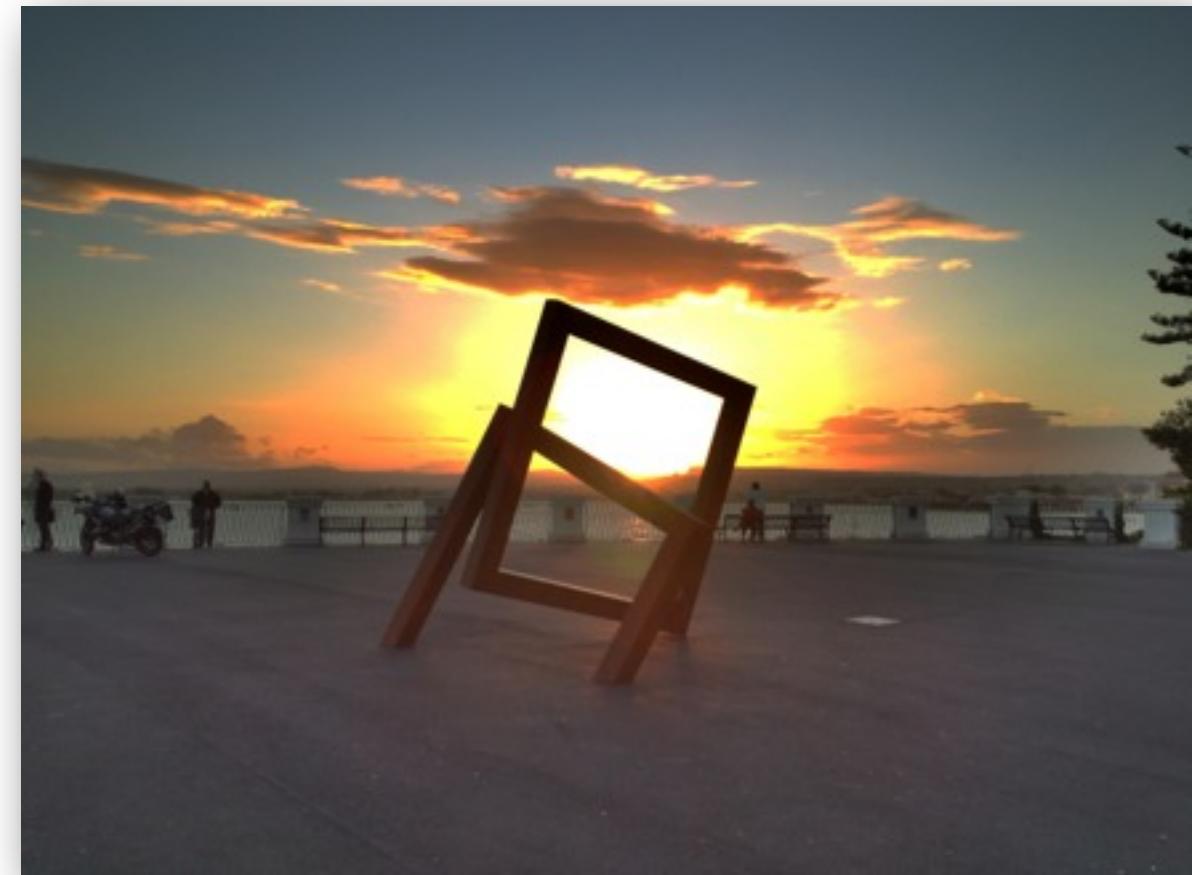
- ★ The discipline of Computational Photography
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- ★ Examples of
 - Dual Photography
 - Panorama



Week #0

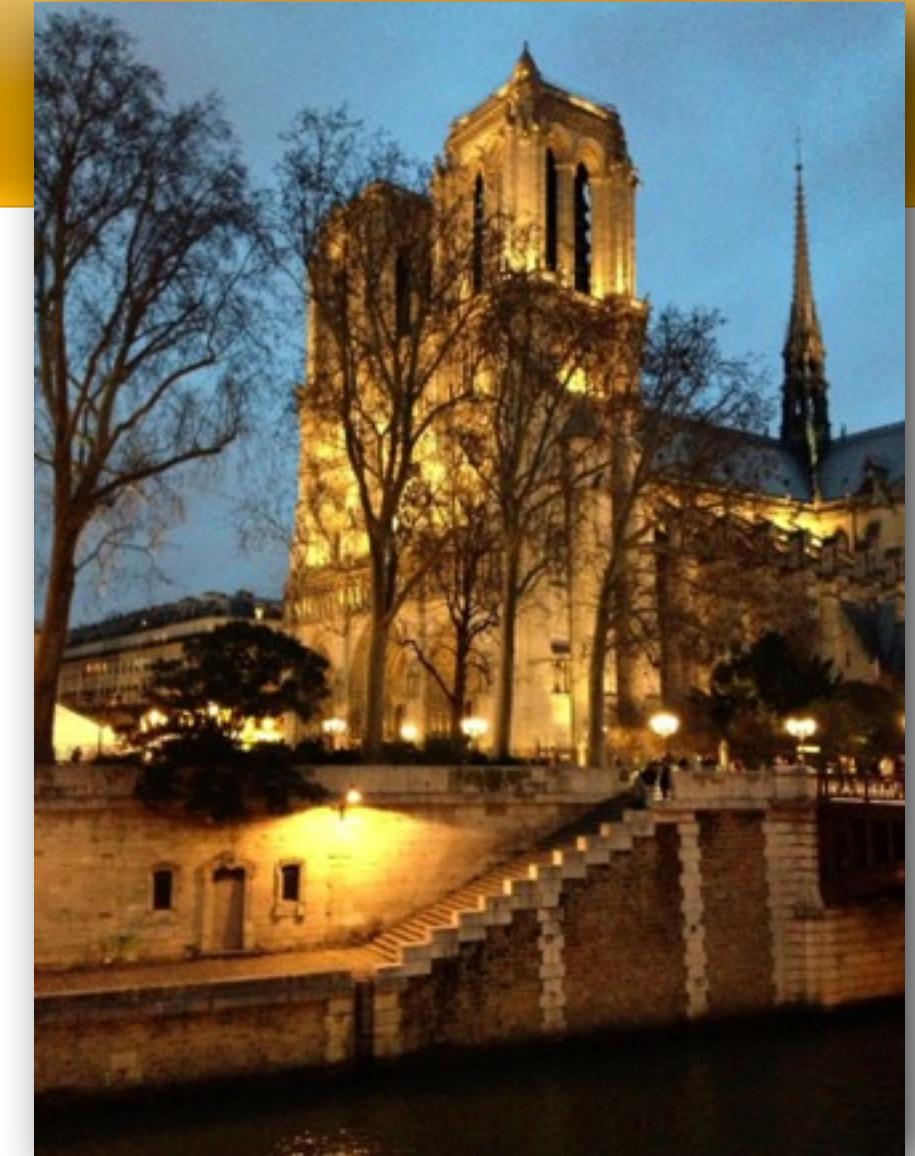
- ★ The discipline of Computational Photography
 - Epsilon Photography, Coded Photography, Computational Cameras, etc.
- ★ Examples of
 - Dual Photography
 - Panorama
- ★ Get set up to “Compute with Photographs”



Week #1

- ★ Image as a computable object
 - I/O with images
 - Process
 - Smooth, Convolve, Filter
 - Extract Signal Info

- ★ Practiced with computing with a photograph.



Week #3



Week #3

★ A Camera is

- A pinhole
- Lenses
- Aperture, Shutter, Sensitivity
- Sensor



Week #3

★ A Camera is

- A pinhole
- Lenses
- Aperture, Shutter, Sensitivity
- Sensor

★ Experimented with Epsilon Photography



Week #4



Week #4

★ A deeper dive into photographs

- Sampling
- Blending, Matching, Cutting



Week #4

★ A deeper dive into photographs

- Sampling
- Blending, Matching, Cutting

★ Panoramas/HDR



Week #4

★ A deeper dive into photographs

- Sampling
- Blending, Matching, Cutting

★ Panoramas/HDR

★ Experimented with Blending



Week #5

★ Video

- Video Textures

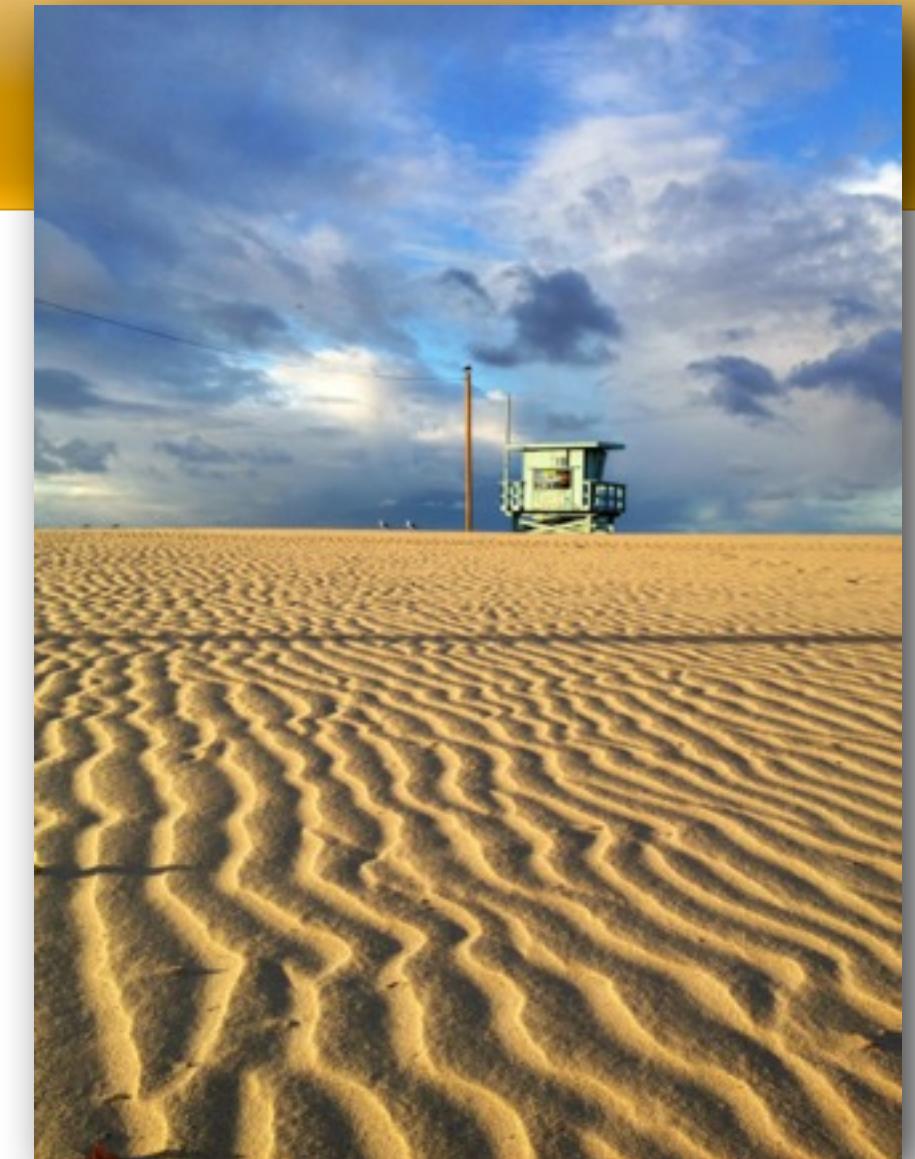
★ Beyond Pixels

- Light Fields

★ More hands-on experimentation

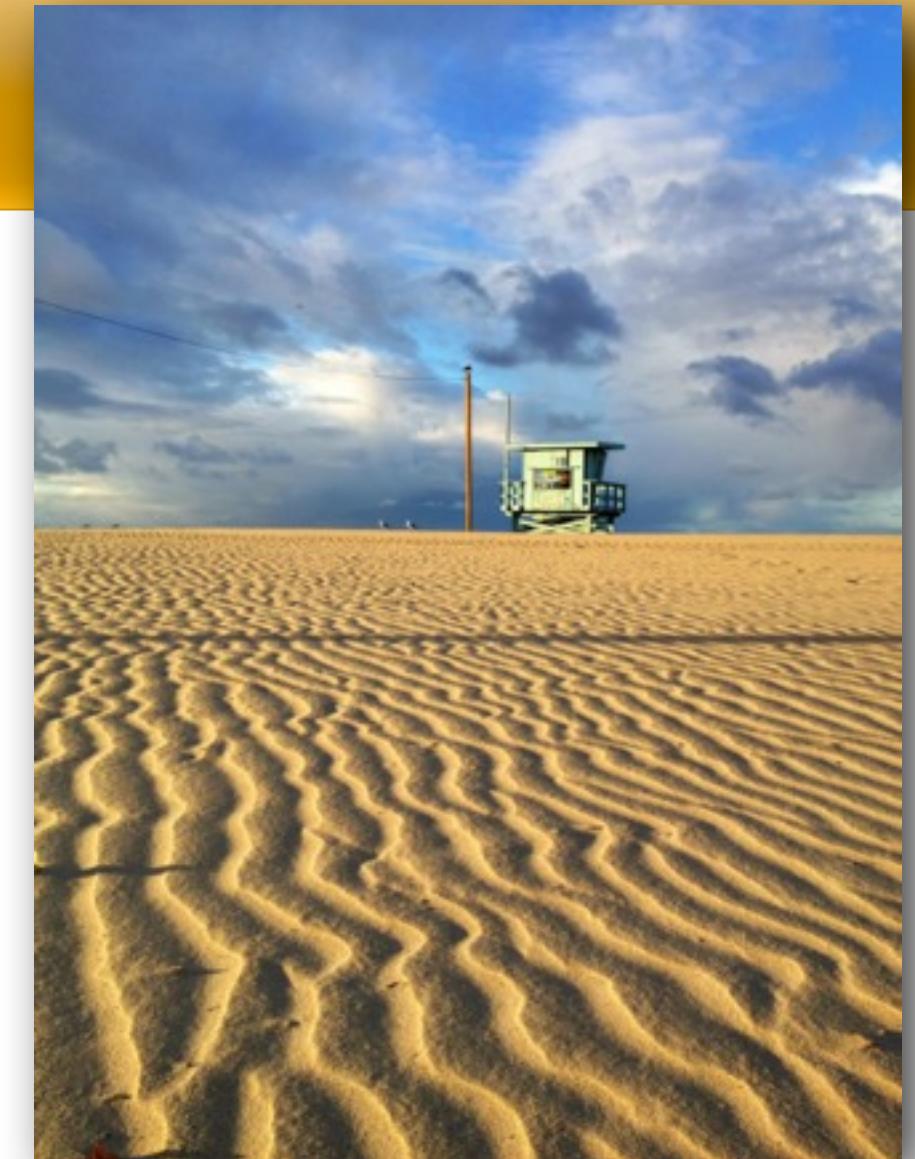


Other topics



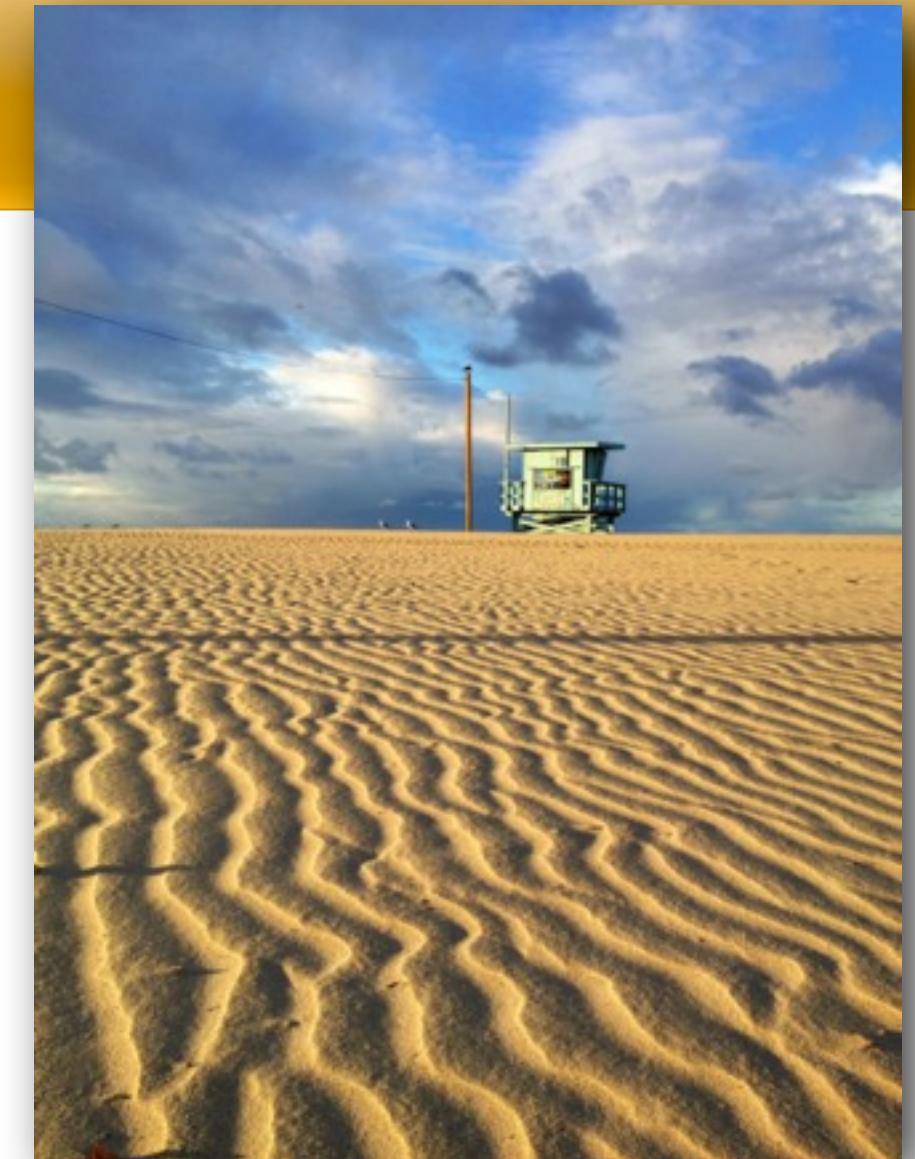
Other topics

- ★ Camera 2.0



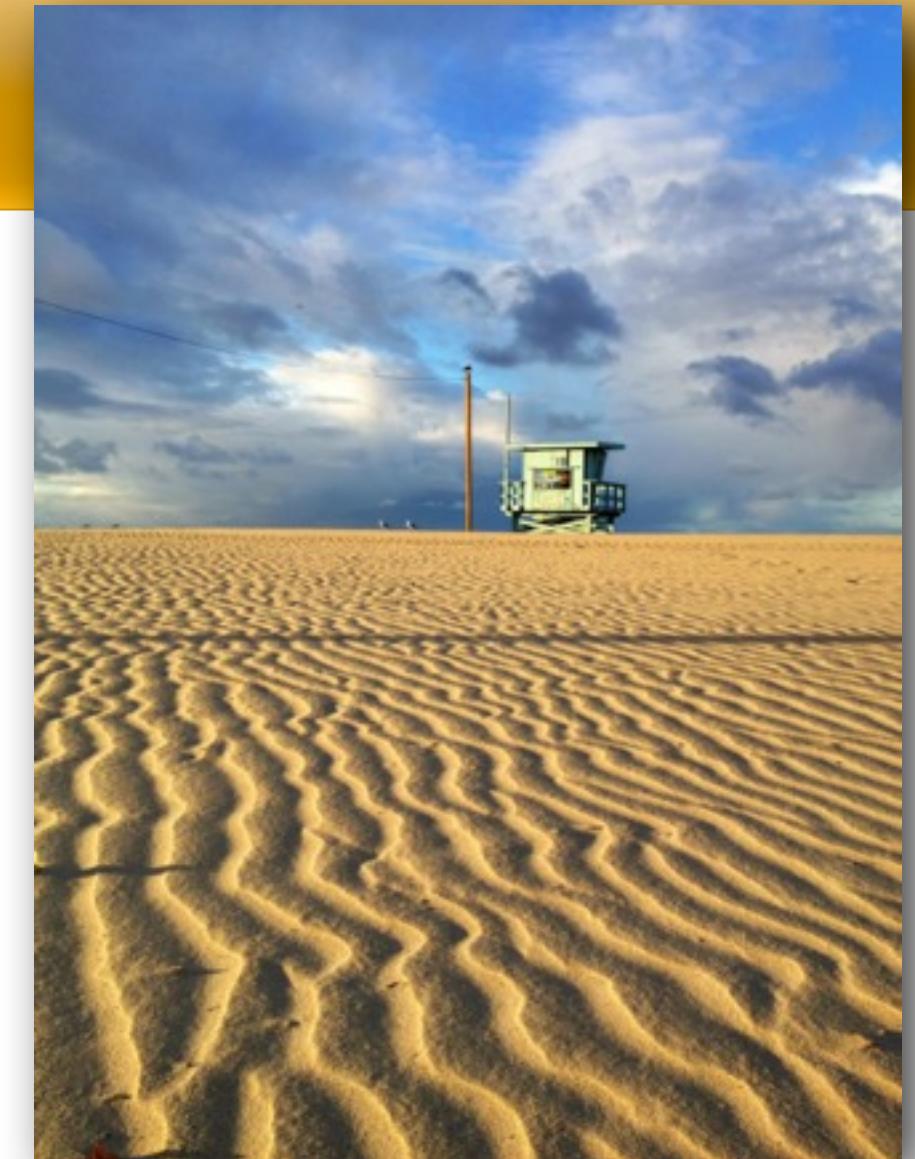
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- ★ Coded Photography



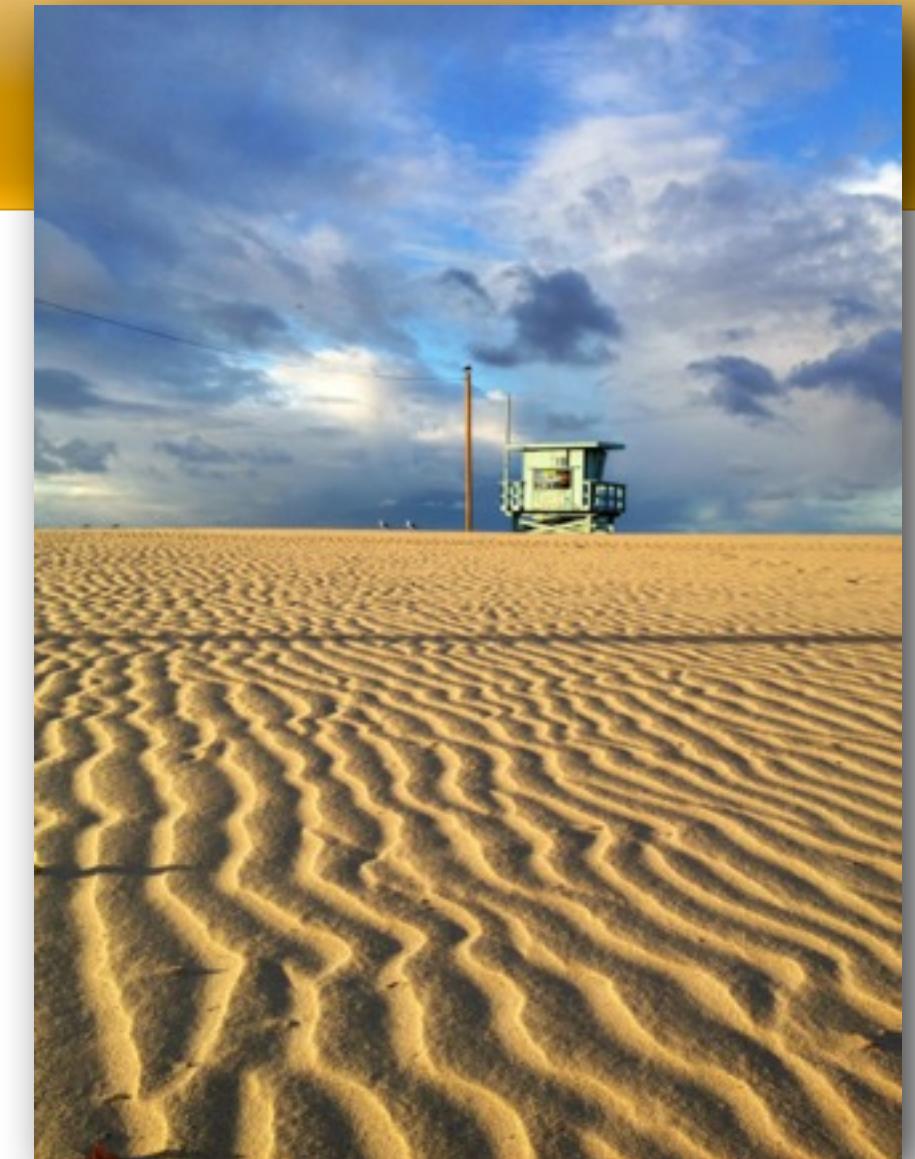
Other topics

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- ★ Computational Cameras



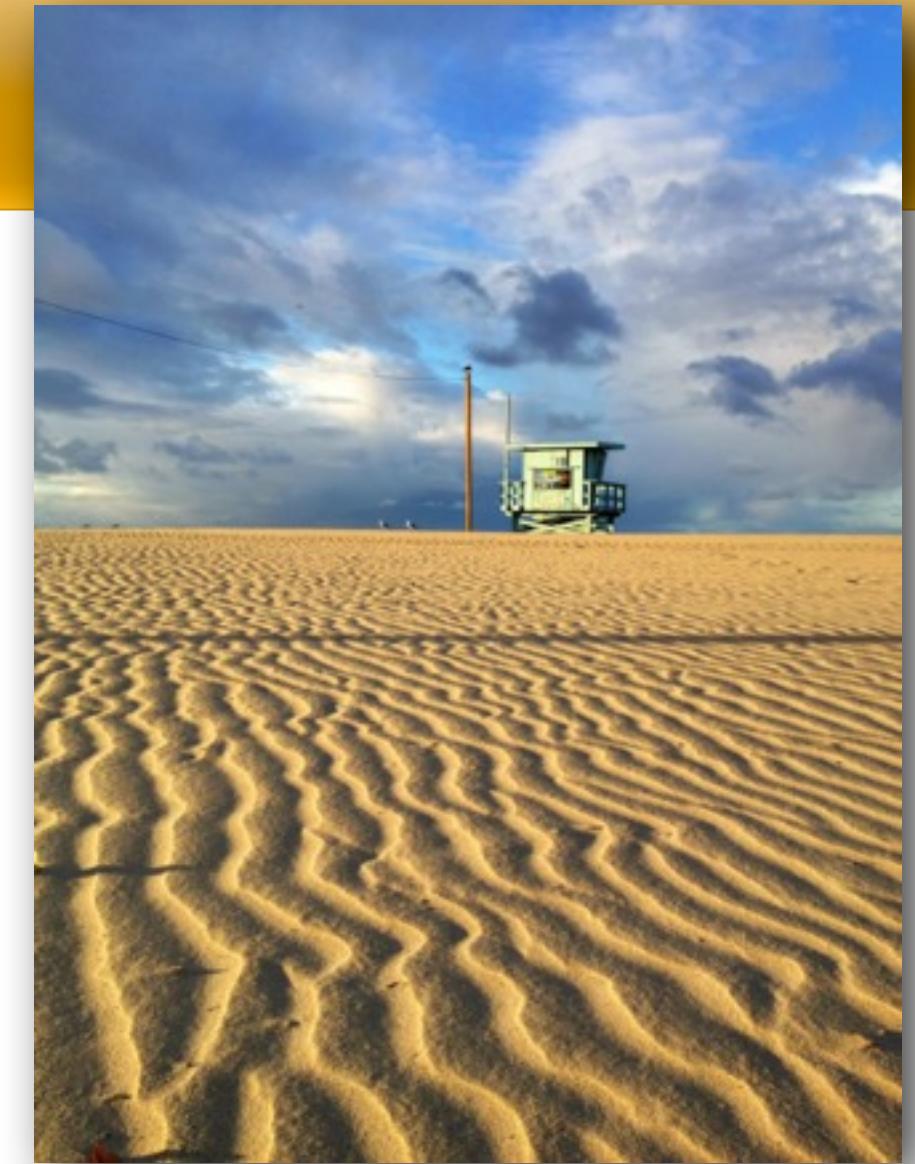
Other topics

- ★ Camera 2.0
- ★ Coded Photography
- ★ Computational Cameras
- ★ Image Editing, Enhancement



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- ★ Coded Photography
- ★ Computational Cameras
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- ★ Photo Montages/Mosaics/Collages



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- ★ Image Sharing/Collaboration



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- ★ Coded Photography
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- ★ Reconstruction



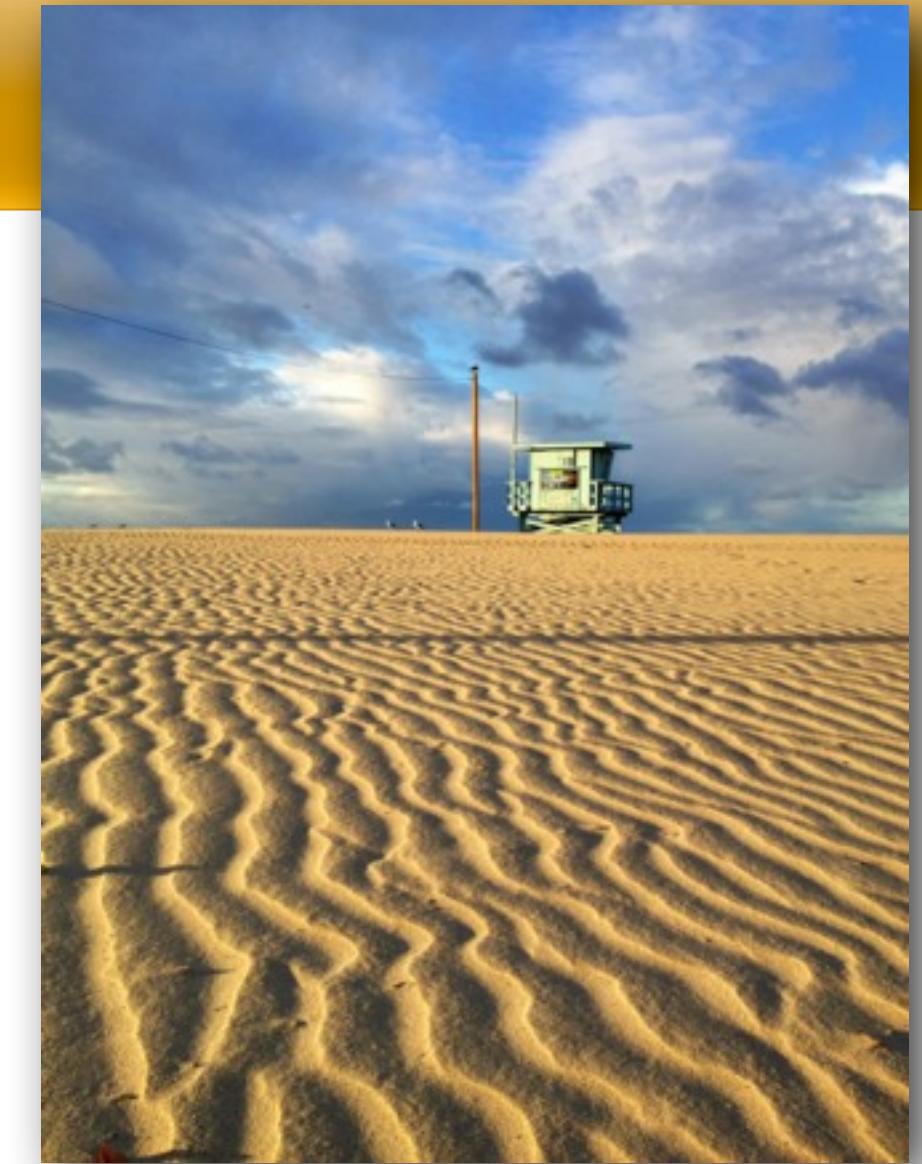
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- ★ Video



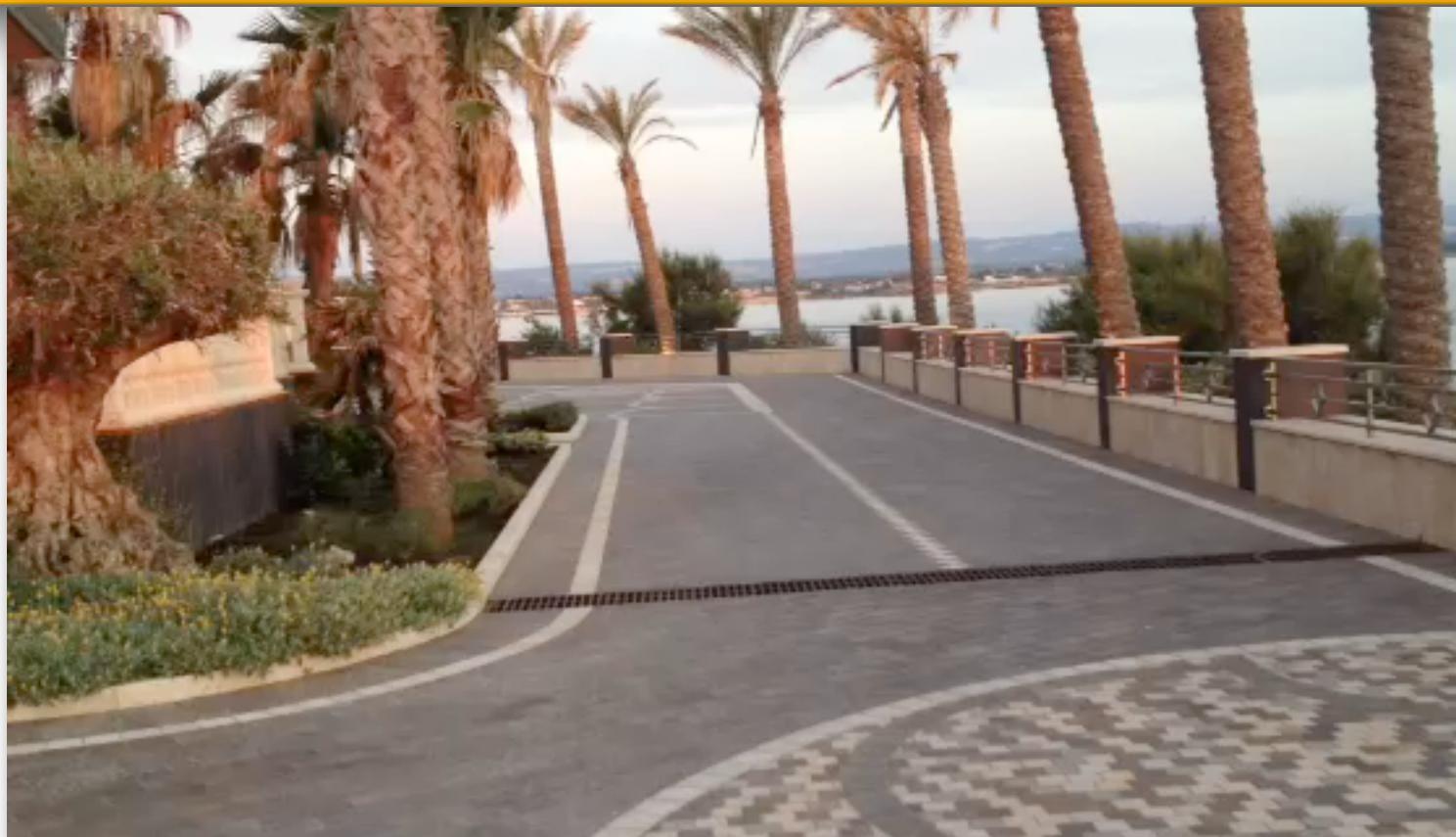
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- ★ Reconstruction
- ★ Video
- ★ Wearable Cameras



Examples of some of my groups recent work

Video Stabilization,
Grundmann, Kwatra, Essa (2011)



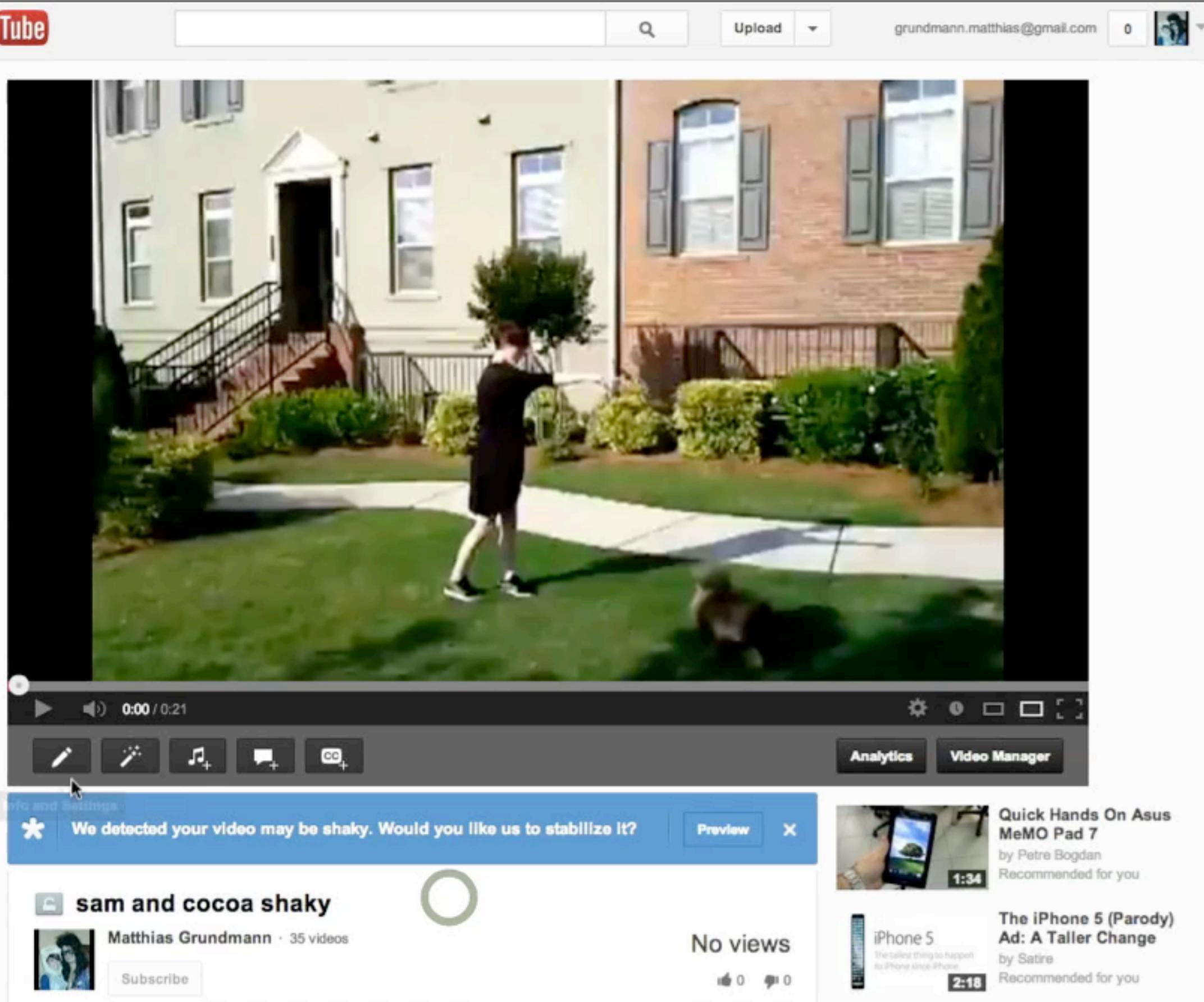
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Examples of some of my groups recent work

Video Stabilization,
Grundmann, Kwatra, Castro, Essa (2012)



Examples of some of my groups recent work

Running on YouTube, live and
via YouTube Capture

For more information

★ My Website

- <http://prof.irfanessa.com>

★ My Class Website

- <http://compphotography.wordpress.com/>
- (The class I teach at GA Tech)



Finally

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- ★ Instructional Designer
- ★ David Majerich



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- ★ Instructional Designer
 - ★ David Majerich
- ★ Studio Crew
 - ★ Brian Wilson
 - ★ Stephen Murphy
 - ★ Ed Bailey
 - ★ Aqueelah Sabir
 - ★ Kristen Anderson
 - ★ Kristin Potts
 - ★ Jeremy Kinnaird



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 - ★ Aqueelah Sabir
 - ★ Kristen Anderson
 - ★ Kristin Potts
 - ★ Jeremy Kinnaird
- ★ Overall Management/Support
 - ★ Pat Kelsey
 - ★ Pamela Buffington
 - ★ Mike McCracken



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★ Denis Lantsman



Finally

- ★ Denis Lantsman
- ★ My current students
 - Andrew Ziegler, Daniel Castro, Jing Wang, Josh Jones, Matthias Grundmann, S. Hussein Raza, Unaiza Ahsan, Vinay Bettadapura, Yachna Sharma



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- ★ Alicia Richhart (my Admin. Assistant)



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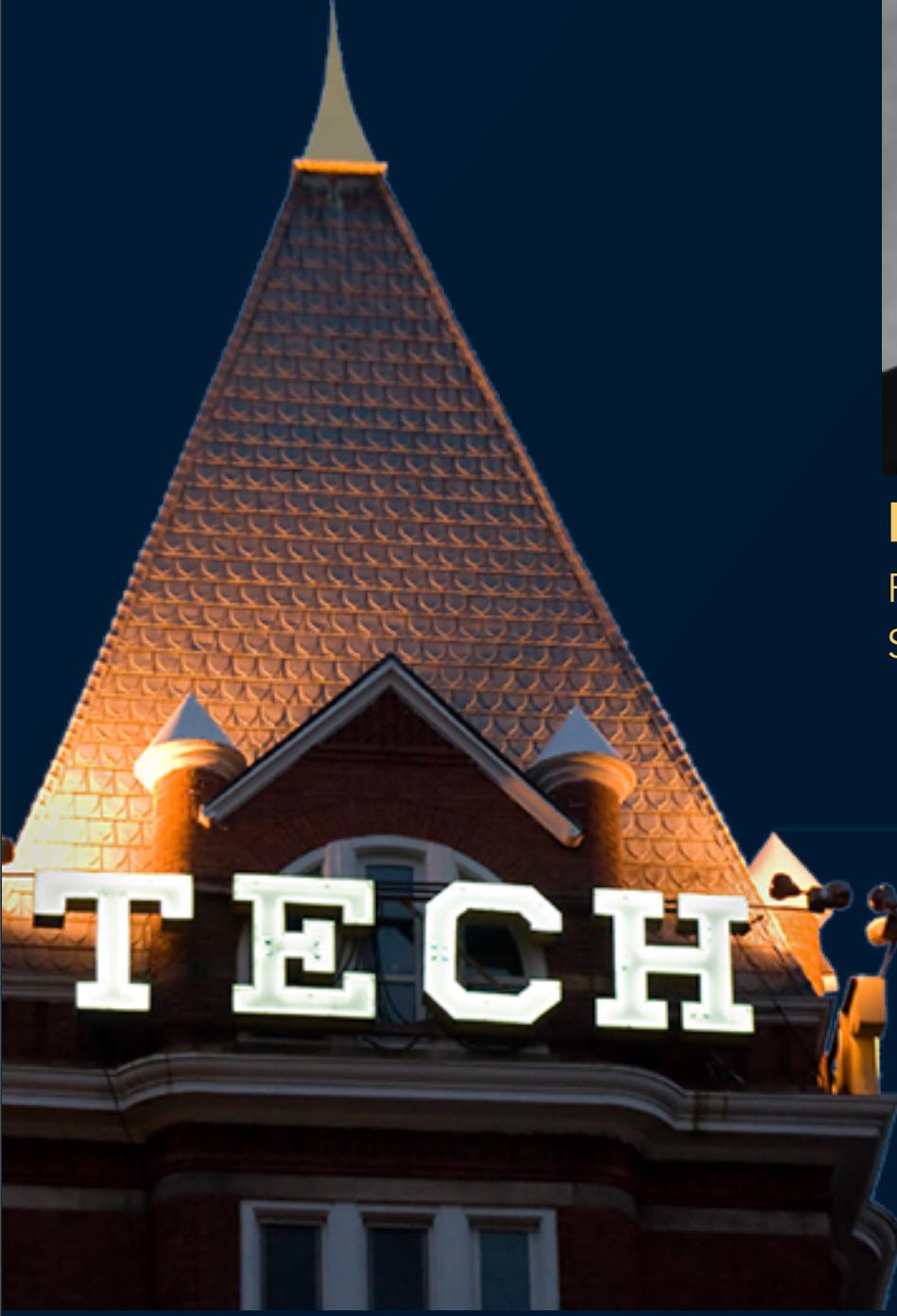
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- ★ Students in my GA Tech offering of CS4475
- ★ Alicia Richhart (my Admin. Assistant)
- ★ And many of my colleagues.



An Thanks to ALL of you



- ★ Irfan Essa
- ★ prof.irfanessa.com



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