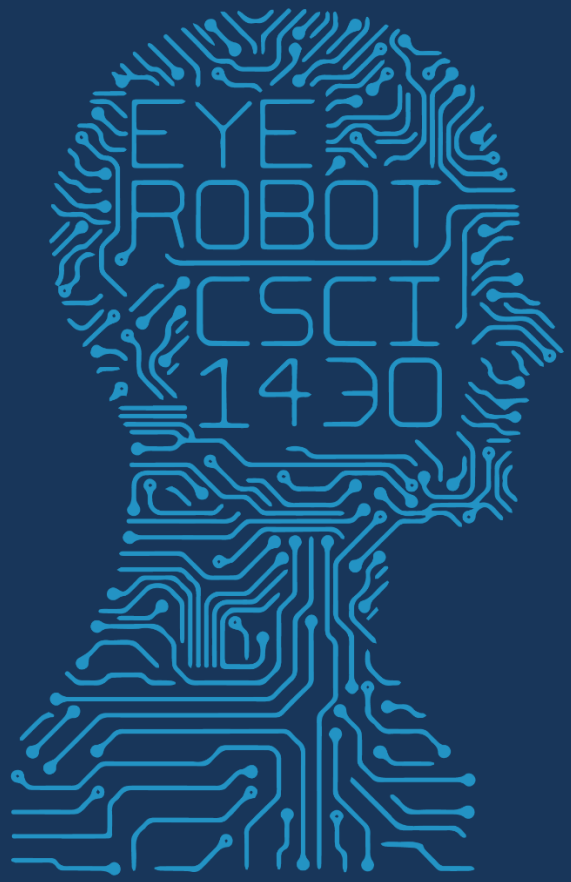
1950

Future Vision



2017 MWF 1pm 368

Computer Vision

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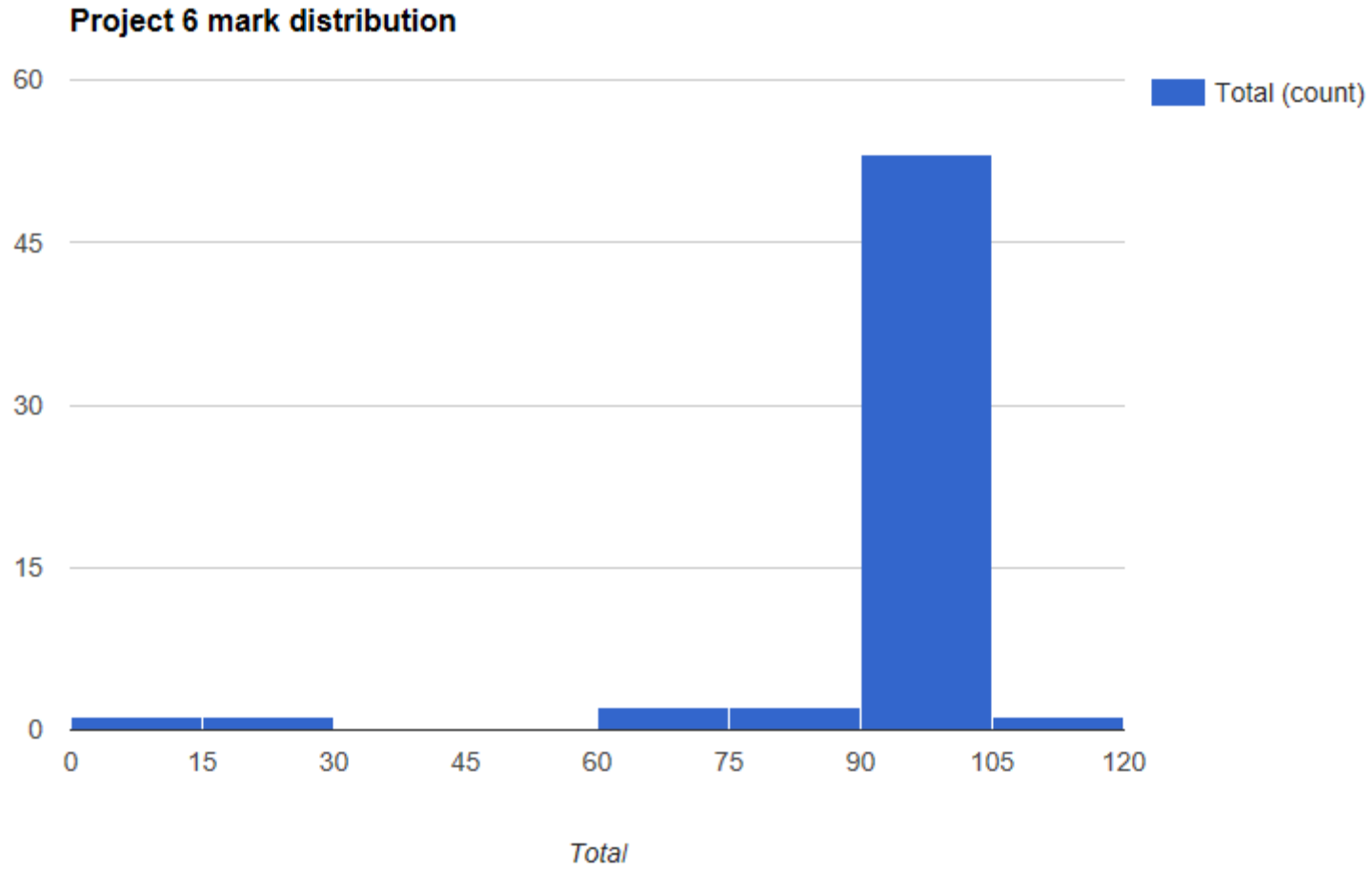

Project 6 mark distribution
Total (count)
60
45
30
15
0
0
15
30
45
60
75
90
105
120
Total

Paper 3: ScanNet (CVPR 2017)

Has everything!

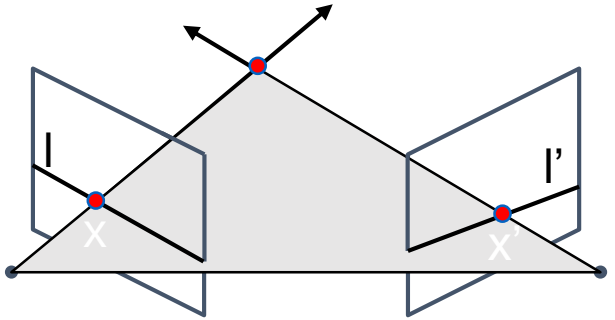
Stereo, geometry reconstruction, dataset generation, mturk, classification, CNNs, dataset retrieval – oh my.

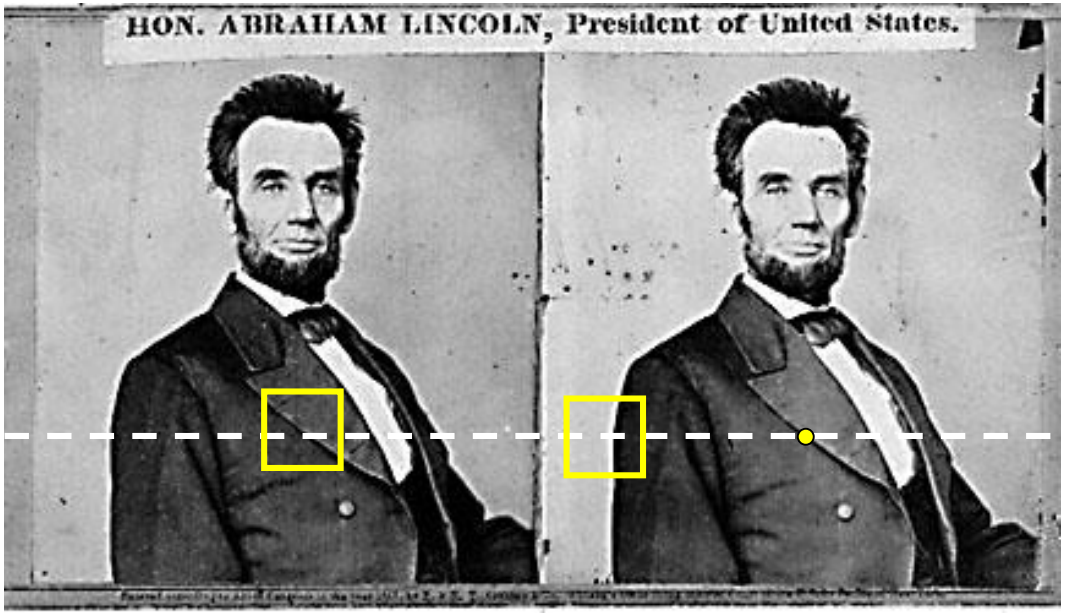
How does a depth camera work?

Stereo in infrared.

Stereo correspondence

- Let *x* be a point in left image, *x'* in right image
- Epipolar relation
  - *x* maps to epipolar line *l'*
  - *x'* maps to epipolar line *l*





How does a depth camera work?

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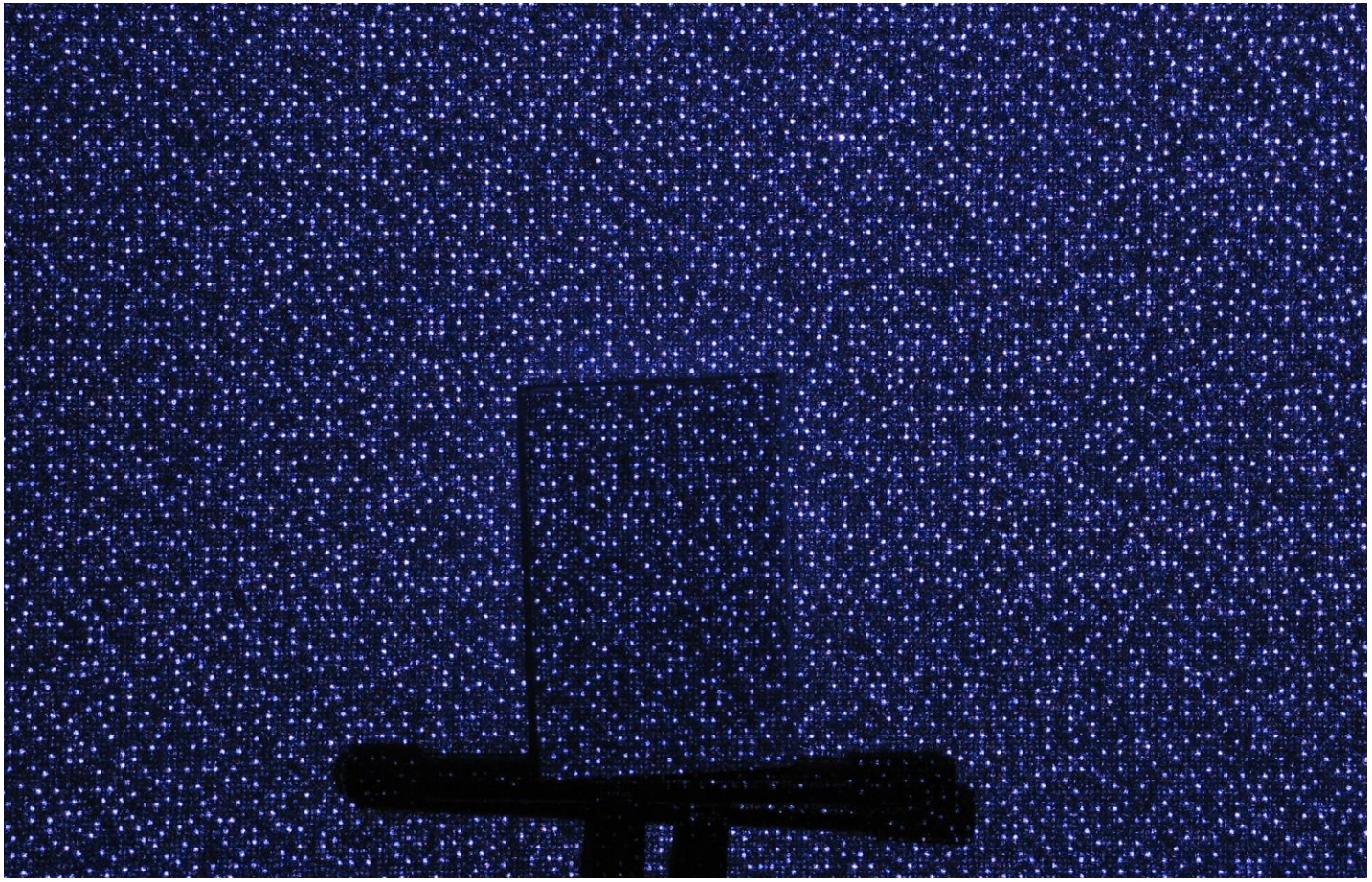
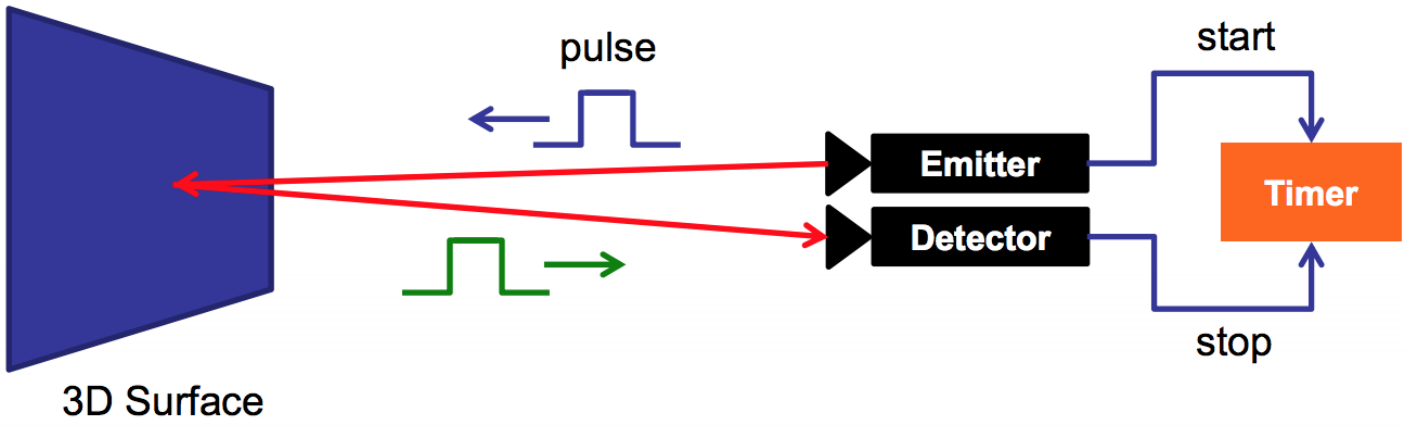
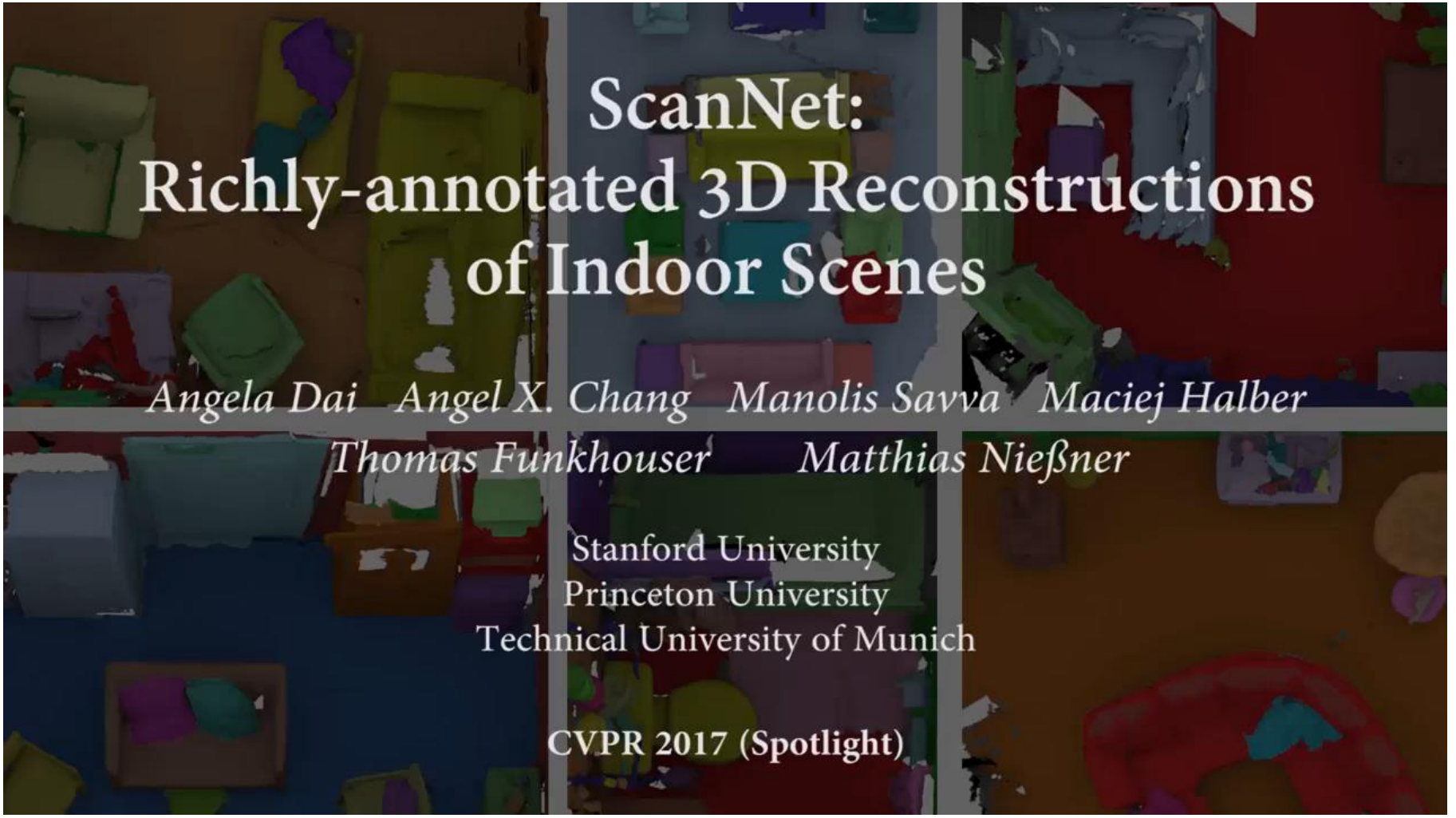


Time of Flight





ScanNet: Richly-annotated 3D Reconstructions of Indoor Scenes

Angela Dai *Angel X. Chang* *Manolis Savva* *Maciej Halber*
Thomas Funkhouser *Matthias Nießner*

Stanford University
Princeton University
Technical University of Munich

CVPR 2017 (Spotlight)

BundleFusion: Real-time Globally Consistent 3D Reconstruction using Online Surface Re-integration

Angela Dai[1] *Matthias Nießner*[1]
Michael Zollhöfer[2] *Shahram Izadi*[3]
Christian Theobalt[2]

[1]Stanford University
[2]Max Planck Institute for Informatics
[3]Microsoft Research

(*contains audio*)

The final illusion…

…is a transformation.

January 2017…

You (actually me)

Computer vision –
it’s pixels and stuff.

We learned about image formation.

Light, color, frequency, and filtering.

May 2017…

If I feed my CNN images with more than 3 spectral responses, will it still learn a compressed 3-dimensional basis for color?

You

We learned about camera geometry.

Camera calibration, stereo, multi-view geometry.

May 2017…

Is human perceptual shape understanding more like photogrammetry or more like database learning?

You

We learned about features and matching.

Gradients, local interest points,
motion models, model fitting.

May 2017…

My brain can compute correspondence so quickly, but it's a pretty rough approximate – maybe we can simulate this to speed up feature matching?

You

We learned about recognition.

Supervised and unsupervised learning, detection, classification, validation.

May 2017…

Maybe I can use dimensionality reduction as a pre-process to factor out the illumination variance in my small dataset…

You

We learned about ConvNets.

Neural networks, regularization, inception.

May 2017…

If we can fool a CNN easily by tweaking gradients, but not a human, then what visual information am I not yet modeling?

You

Modeling visual inference problems.

Your MATLAB-fu is also better.

What’s next?

Spring 2018: CSCI 2951-I

- Computer Vision for Graphics and Interaction

- Read state of the art papers + present + discuss
- Learn *how* to read a paper
- Learn *how* to present a paper
- Open-ended project

Inferring physically-meaningful models.
How does augmented reality work?

Please give us feedback

- I will put up an anon Google form; please let me & the TAs known what you liked / what we can improve.

- The Critical Review