

# THE FUTURE OF PHOTOGRAPHY

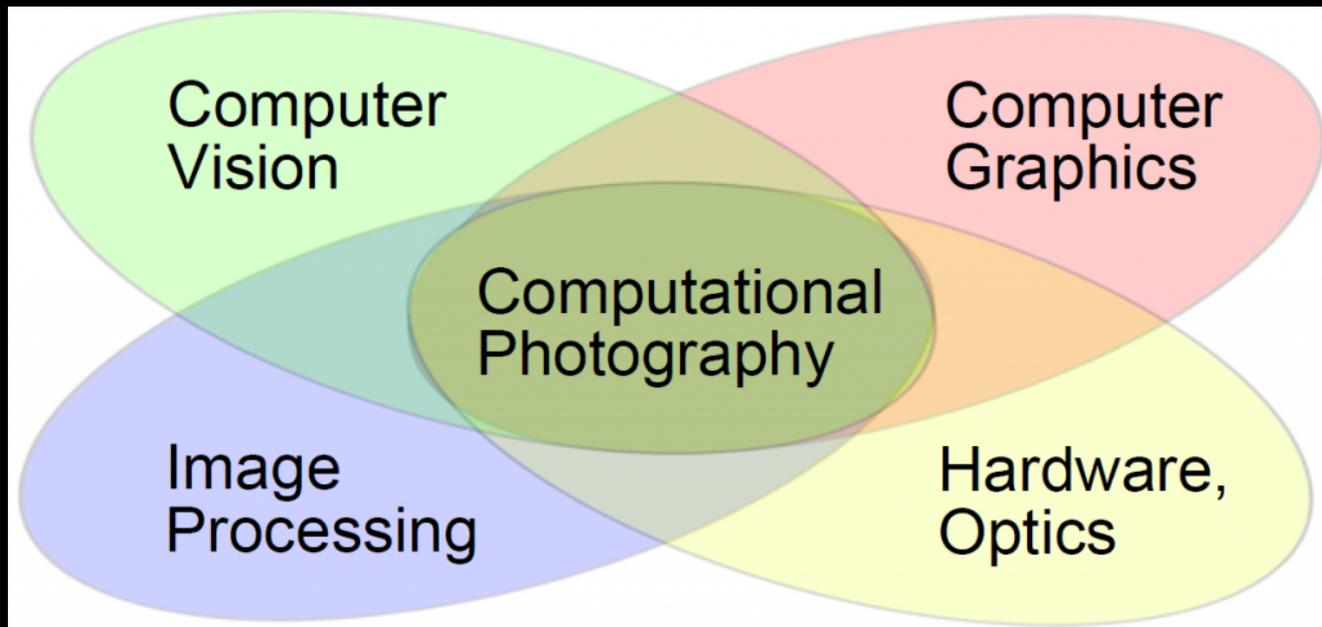
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HOW COMPUTATIONAL PHOTOGRAPHY WILL REDFINE  
THE CAMERA INDUSTRY

BY LEAH ARMER

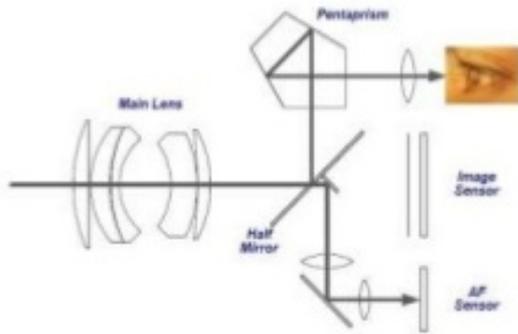
# WHAT IS COMPUTATIONAL PHOTOGRAPHY?

“Computational Photography captures a machine-readable representation of our world to synthesize the essence of our visual experience.”

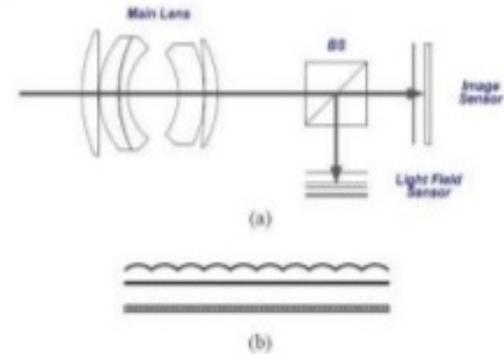


# TRADITIONAL VS COMPUTATIONAL

\* Traditional Method of recording light



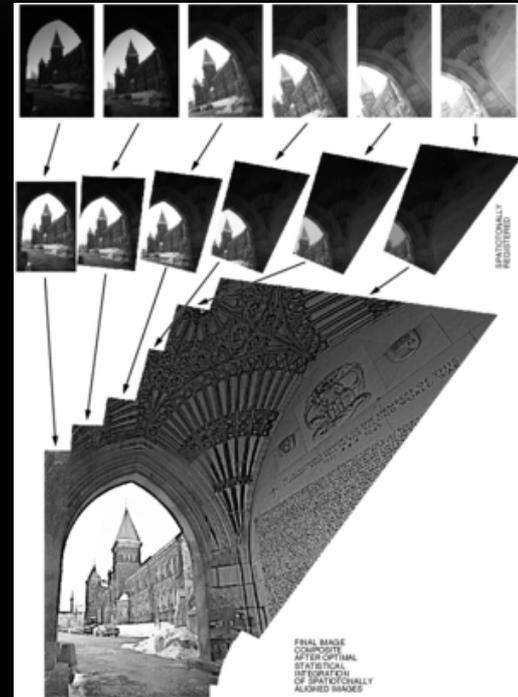
\* New Method of recording Light



- Picture-making device → data-collecting device
- Pixels vs. Rays

# APPLICATIONS

- High-dynamic-range (HDR) imaging
- Flash/no-flash imaging
- Coded-aperture and coded-exposure imaging
- Digital photomontage
- Multi-perspective and panoramic stitching
- All-focus imaging
- Light-field imaging
- HDR and Panoramic stitching in Iphones/Smartphones



# COMMERCIAL CAMERAS

- Mark Levoy's Frankencamera prototypes: open-sourced programmable cameras (2011)
  - F2 Frankencamera
  - API program/Nokia N900
  - SynthCam app



F2 Frankencamera

Nokia N900

# COMMERCIAL CAMERAS

- Lytro's Light Field Cameras
  - Recreates the light field using an array of microlenses
  - Can alter focus depth of field
  - Slide the point of view of the camera, similar to 3D imaging



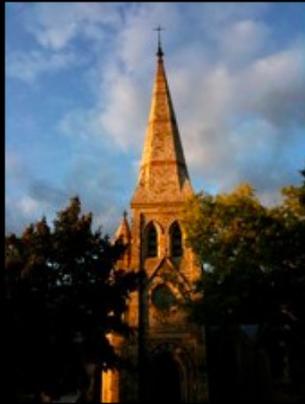
# PROBLEMS WITH LYTRO

- Lytro Illum: The Camera of the Future
- Expensive- \$1600
- Low resolution
- Refocusable images, only within limits



# COMPUTATIONAL PHOTOGRAPHY TODAY

- Shift toward smartphones
- HDR, panoramic stitching
- Updated software, smaller lenses, two camera system, wide angle and telephoto pair
- Iphone 7's depth of field



iPhone photo #1  
Harvard Square church



iPhone photo #2  
Harvard Square church



TrueHDR app output  
Harvard Square church

# ON THE HORIZON

- New ideas for smartphone hardware
- 3D object capture, video capture
- Analysis for virtual reality and augmented reality,
- Better real-time AR interaction
- Selfies that resemble you more closely
- Lytro Immerge: Cinematic Virtual Reality



# ON THE HORIZON

- Light's L16



# REFERENCES

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- Experimental Platforms for Computational Photography: <https://graphics.stanford.edu/papers/camera20/levoy-platforms-cga10.pdf>
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- Integrity of the Image: [https://www.worldpressphoto.org/sites/default/files/upload/Integrity%20of%20the%20Image\\_2014%20Campbell%20report.pdf](https://www.worldpressphoto.org/sites/default/files/upload/Integrity%20of%20the%20Image_2014%20Campbell%20report.pdf)
- Computational Photography MIT: <http://web.media.mit.edu/~raskar/photo/>