

# Zelun (Alan) Luo

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## Education and Academic Achievements

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### Stanford University

*Ph.D. in Computer Science*

**Jun 2018 - Present**

GPA (M.S. & Ph.D.): 3.99/4.00

- Advisor: Fei-Fei Li
- Research impact: citations=1376, h-index=13 (Sep 2022)

### Stanford University

*M.S. in Computer Science, specialized in Artificial Intelligence*

**Sept 2015 - Jun 2018**

- Advisor: Fei-Fei Li
- Among top 7% students offered full assistantship

### University of Illinois at Urbana-Champaign

*B.S. in Computer Engineering, minor in Mathematics*

**Aug 2012 - May 2015**

GPA: 3.94/4.00

- Advisors: Gabriel Popescu, Narendra Ahuja, Jia-Bin Huang
- Dean's List and James Scholar Honors Program for academic achievement in every semester
- PURE Best Research Award

### Teaching

- Instructor, MED 277 / CS 337 (AI-Assisted Health Care), Fall 2021
- Head Course Assistant, CS 131 (Computer Vision), Fall 2015 & Fall 2016
- Course Assistant, CS 109 (Probability), Winter 2016 & Spring 2016
- Course Assistant, CS 224N (Natural Language Processing), Winter 2017
- Course Assistant, CS 231N (Convolutional Neural Networks), Spring 2017
- Head Course Assistant, MED 277 / CS 337 (AI-Assisted Health Care), Fall & Winter 2018

### Professional Activities

- Program Chair: 1st International Workshop on Privacy for Vision & Imaging, CVPR 2021
- Program Committee: Socially Responsible Machine Learning Workshop, ICML 2021
- AI Publication Reviewer: CVPR, AACL, NeurIPS, ICCV, ECCV, ICML, ICLR, TPAMI
- Medical Publication Reviewer: MLHC, JBHI

## Highlighted Research Experience

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### Intensive Care Unit Clinical Pathway Support

*Leading PhD Researcher*

**Sept 2015 - Present**

- Advised by Prof. Fei-Fei Li and Prof. Arnold Milstein, I applied and refined computer vision technology in the ICU to make it easier for clinicians to continuously identify opportunities to detect and respond to changes in patients' health status.
- I am building the Clinical Behavior Atlas, a high-throughput assay of clinical care delivery with vision-based ambient intelligence covering eight clinical bundles.
- I developed MOMA [1], a new activity recognition framework tailored to crowded clinical settings.

**AI-assisted Senior Care****Sept 2015 - Present***Leading PhD Researcher*

- Advised by Prof. Fei-Fei Li and Prof. Arnold Milstein, I designed an computer vision-based solution for the remote monitoring, assessment and support of seniors living independently at home.
- I digitized seniors' independent living and quality of live with the descriptive analysis of basic and instrumental Activities of Daily Living (ADLs & IADLs).
- Trustworthy AI for Healthcare: I developed a scalable differential privacy algorithm [2] and proposed an ethical research guideline [4].

**Quantitative Light Imaging Laboratory, Beckman Institute****Jan 2013 - May 2015***Research Assistant*

- Advised by Prof. Gabriel Popescu, I digitized a large number of clinical biopsy slides through highly optimized implementation of image stitching, using computer vision technology.
- I developed software for alignment, assemble, and visualization of large scale holographic images, and improved digital archiving and storage procedure for bioimaging samples.
- I contributed to the research clinical imaging using Spatial Light Interference Microscopy (SLIM) technology.

## Work Experience

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**Nvidia****Santa Clara, CA***Research Intern**June 2021 - Dec 2021*

- Propose a privacy-preserving model that achieves the state-of-the-art privacy-utility tradeoff for deep neural networks trained on complex visual recognition tasks.

**Facebook Research****Menlo Park, CA***Research Intern**June 2019 - Dec 2019*

- Proposed a self-supervised learning method that reconstructs 3D models from RGB videos.

**Google Inc.****Sunnyvale, CA***Research Intern**June 2017 - Nov 2017*

- Proposed a distillation model that extracts information from multiple modalities.

**Amazon A9 Inc.****Palo Alto, CA***Research Intern, Visual Search Team**June 2016 - Sept 2016*

- Proposed a deep learning model for scene text recognition.
- Developed a text recognition pipeline on Amazon products in Tensorflow.

**Yahoo Inc.****Sunnyvale, CA***Software Engineering Intern, Homepage Team**May 2015 - Aug 2015*

- Created web applications and modules for Yahoo homepage.
- Developed and Extended Yahoo's next generation MVC framework.

**Phi Optics, Inc.****Champaign, IL***Software Engineering Intern**Dec 2013 - Jan 2014*

- Built an integrated software for biomedical imaging.

- Developed APIs and drivers for hardware devices.

**Shenzhen Grandia Nano-Tech Co., Ltd.**

*Research Intern*

**Shenzhen, China**

*June 2011 - Aug 2011*

- Assisted in vacuum coating and ultrasonic wave surface cleaning.
- Did research on the reflectivity of optimal coating for laser mirror.

## Technical and Personal skills

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**Programming Languages:** Python, C++, C, Java, x86 Assembly, Matlab, VHDL, Lua, Arduino.

**Web Development:** JavaScript, React, HTML, CSS (Sass/SCSS, Less, Atomic CSS), Bootstrap, jQuery, Node.js, Jinja2, MySQL, PHP.

**Libraries:** Tensorflow, Torch, Caffe, OpenCV, CUDA, Qt, Android, OpenGL, Boost.

**Tools & Platforms:** Visual Studio, Eclipse, Xcode, git, FPGA, Google Tango.

**Languages:** English, Mandarin, Cantonese, Hakka, Japanese (limited), Spanish (limited).

## Selected Publications

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- [1] **MOMA-LRG: Language-Refined Graphs for Multi-Object Multi-Actor Activity Parsing**  
Z. Luo, Z. Durante\*, L. Li\*, W. Xie, R. Liu, E. Jin, Z. Huang, L.Y. Li, J. Wu, J.C. Niebles, E. Adeli, L. Fei-Fei. *Conference on Neural Information Processing Systems (NeurIPS) Track on Datasets and Benchmarks*. 2022.
- [2] **MOMA: Multi-Object Multi-Actor Activity Parsing**  
Z. Luo\*, W. Xie\*, S. Kapoor, Y. Liang, M. Cooper, J.C. Niebles, E. Adeli, L. Fei-Fei. *Conference on Neural Information Processing Systems (NeurIPS)*. 2021.
- [3] **Scalable Differential Privacy with Sparse Network Fine-Tuning**  
Z. Luo, D. Wu, E. Adeli, and L. Fei-Fei. *Conference on Computer Vision and Pattern Recognition (CVPR)*. 2021.
- [4] **Harnessing the Power of Smart and Connected Health to Tackle COVID-19: IoT, AI, Robotics, and Blockchain for a Better World**  
F. Firouzi, B. Farahani, M. Daneshmand, K. Grise, J.S. Song, R. Saracco, L. Lu Wang, K. Lo, P. Angelov, E. Soares, P.-S. Loh, Z. Talebpour, R. Moradi, M. Goodarzi, H. Ashraf, M. Talebpour, A. Talebpour, L. Romeo, R. Das, H. Heidari, D. Pasquale, J. Moody, C. Woods, E.S. Huang, P. Barnaghi, M. Sarrafzadeh, R. Li, K.L. Beck, O. Isayev, N. Sung, and A. Luo. *IEEE Internet of Things Journal (IoT-J)*. 2021. [https://eprints.lancs.ac.uk/id/eprint/153515/3/FINAL\\_VERSION.pdf](https://eprints.lancs.ac.uk/id/eprint/153515/3/FINAL_VERSION.pdf)
- [5] **Ethical Issues in Using Ambient Intelligence in Health-Care Settings**  
N. Martinez-Martin, Z. Luo, A. Kaushal, E. Adeli, A. Haque, S.S. Kelly, S. Wieten, M.K. Cho, D. Magnus, L. Fei-Fei, K. Schulman, and A. Milstein. *The Lancet Digital Health*. Volume 3, Issue 2, February 2021. <https://www.thelancet.com/action/showPdf?pii=S2589-7500%2820%2930275-2>
- [6] **Label Efficient Learning of Transferable Representations across Domains and Tasks**  
Z. Luo, Y. Zou, J. Hoffman, and L. Fei-Fei. *Conference on Neural Information Processing Systems (NIPS)*. 2017. <https://arxiv.org/abs/1712.00123>
- [7] **Unsupervised Learning of Long-Term Motion Dynamics for Videos**  
Z. Luo, B. Peng, A. Alahi, D.-A. Huang, and L. Fei-Fei. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. 2017. <https://arxiv.org/abs/1701.01821>
- [8] **Towards Viewpoint Invariant 3D Human Pose Estimation**  
A. Haque, Z. Luo\*, B. Peng\*, A. Alahi, S. Yeung, and L. Fei-Fei. *European Conference on Computer Vision (ECCV)*. 2016. <https://arxiv.org/abs/1603.07076>
- [9] **Graph Distillation for Action Detection with Privileged Information**  
Z. Luo, J.-T. Hsieh, L. Jiang, J.C. Niebles, and L. Fei-Fei. *European Conference on Computer Vision (ECCV)*. 2018. <https://arxiv.org/abs/1712.00108>

- [10] **DF-Net: Unsupervised Joint Learning of Depth and Flow using Cross-Network Consistency**  
Y. Zou, **Z. Luo**, and J.B. Huang. *European Conference on Computer Vision (ECCV)*. 2018.
- [11] **Towards Vision-Based Smart Hospitals: A System for Tracking and Monitoring Hand Hygiene Compliance**  
A. Haque, M. Guo, A. Alahi, S. Yeung, **Z. Luo**, A. Rege, A. Singh, J. Jopling, N.L. Downing, W. Beninati, T. Platchek, A. Milstein, and L. Fei-Fei. *Machine Learning for Healthcare (MLHC)*. 2017.  
<https://arxiv.org/abs/1708.00163>
- [12] **Computer Vision-based Descriptive Analytics of Seniors' Daily Activities for Long-term Health Monitoring**  
**Z. Luo\***, J.-T. Hsieh\*, N. Balachandar, S. Yeung, G. Pusiol, J. Luxenberg, G. Li, L.-J. Li, N.L. Downing, A. Milstein, L. Fei-Fei. *Machine Learning for Healthcare (MLHC)*. 2018.
- [13] **Computer Vision-based Approach to Maintain Independent Living for Seniors**  
**Z. Luo**, A. Rege, G. Pusiol, A. Milstein, L. Fei-Fei, N.L. Downing. *American Medical Informatics Association (AMIA)*. 2017. <http://alan.vision/publications/AMIA-Poster.pdf>
- [14] **Vision-Based Hand Hygiene Monitoring in Hospitals**  
S. Yeung, A. Alahi, **Z. Luo**, B. Peng, A. Haque, and L. Fei-Fei. *American Medical Informatics Association (AMIA) / Workshop on Machine Learning in Healthcare, Neural Information Processing Systems (NIPS)*. 2016.  
[http://ai.stanford.edu/~syyeung/resources/vision\\_hand\\_hh\\_nipsmlhc.pdf](http://ai.stanford.edu/~syyeung/resources/vision_hand_hh_nipsmlhc.pdf)
- [15] **Vision-Based Gait Analysis for Senior Care**  
E. Darke, A. Sayana, K. Shen, D. Xue, J.-T. Hsieh, **Z. Luo**, L.-J. Li, N.L. Downing, A. Milstein, and L. Fei-Fei. *Workshop on Machine Learning in Healthcare, Neural Information Processing Systems (NIPS)*. 2018.  
<https://arxiv.org/pdf/1812.00169.pdf>
- [16] **Label-Free Tissue Scanner for Colorectal Cancer Screening**  
M. E. Kandel, S. Sridharan, J. Liang, **Z. Luo**, K. Han, M. Virgilia, A. Shah, R. Patel, K. Tangella, A. Kajdacsy-Balla, G. Guzman, G. Popescu. *Journal of Biomedical Optics (JBO)*. 2017.  
<http://dx.doi.org/10.1117/1.JBO.22.6.066016>
- [17] **Towards Quantitative Automated Histopathology of Breast Cancer using Spatial Light Interference Microscopy (SLIM)**  
H. Majeed, T. H. Nguyen, M. Kandel, K. Han, **Z. Luo**, V. Macias, K. Tangella, A. Balla, M. Do, and G. Popescu. *United States and Canadian Academy of Pathology (USCAP)*. 2016.
- [18] **Breast Cancer Diagnosis using Spatial Light Interference Microscopy**  
H. Majeed, M. Kandel, K. Han, **Z. Luo**, V. Macias, K. Tangella, A. Balla, and G. Popescu. *Journal of Biomedical Optics (JBO)*. 2015. <http://dx.doi.org/10.1117/1.JBO.20.11.111210>
- [19] **High Throughput Imaging of Blood Smears using White Light Diffraction Phase Microscopy**  
H. Majeed, M. Kandel, B. Bhadhuri, K. Han, **Z. Luo**, K. Tangella, and G. Popescu. *SPIE Photonics West: BiOS*. 2015. <http://dx.doi.org/10.1117/12.2080200>
- [20] **Diagnosis of Breast Cancer Biopsies using Quantitative Phase Imaging**  
H. Majeed, M. Kandel, K. Han, **Z. Luo**, V. Macias, K. Tangella, A. Balla, and G. Popescu. *SPIE Photonics West: BiOS*. 2015. <http://dx.doi.org/10.1117/12.2080132>
- [21] **C++ Software Integration for a High-Throughput Phase Imaging Platform**  
M. Kandel, **Z. Luo**, K. Han, and G. Popescu. *SPIE Photonics West: BiOS*. 2015.  
<http://dx.doi.org/10.1117/12.2080212>