# Yunhao(Andy) Ge

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## Education

**University of Southern California** *Los Angeles, USA*

**PHD Candidate**, ilab, Computer Science Department *Aug. 2019 - Present*

- Amazon ML Fellowship
- Annenberg Graduate Fellowship at University of Southern California
- Advisor: Prof. Laurent Itti

**Stanford University** *Stanford, USA*

**Visiting PHD Studnet**, Stanford Vision and Learning Lab (SVL), Computer Science Department *Aug. 2022 - Present*

- Advisor: Prof. Jiajun Wu

**Shanghai Jiao Tong University** *Shanghai, China*

**MASTER OF SCIENCE**, Robotics and Intelligence Group, Robotics Institute *Sep. 2016 - June 2019*

- Overall **Ranking 6th/210**
- Advisor: Prof. Weixin Yan & Huanhua Liao & Prof. Yanzheng zhao
- Honor: Outstanding Graduate Thesis Award

**Shandong University** *Jinan, China*

**BACHELOR OF ENGINEERING**, Control Engineering and Mechatronics *Sep. 2012 - June 2016*

- Overall **Ranking 1st/66**
- Honor: Outstanding Undergraduate Thesis Award

## Research Interests

I'm interested in Machine Learning, Computer vision, and their applications towards Trustworthy, Human-like AI and Data-centric AI. My current research focuses include:
1) **Reliable Deep Learning**: Interpretability, Robustness, Out-of-distribution (OOD) Detection
2) **Synthesic data for Vision/Robotics (Sim2Real)**: using neural renderer (NeRF, DALL-E / Stable Diffusion, GAN) to synthesize realistic and physical plausible data to solve real-world Computer Vision and Robotics problems with minimal supervision
3) **Human-inspired Learning Algorithm**: Continual Learning, Multi-modal Models, Visual Reasoning

## Selected Publications [Google Scholar]

**[1] Improving Zero-shot Generalization and Robustness of Multi-modal Models**

**Yunhao Ge***, Jie Ren*, Yuxiao Wang, Andrew Gallagher, Ming-Hsuan Yang, Laurent Itti, Hartwig Adam, Balaji Lakshminarayanan, and Jiaping Zhao (*=equal contribution) PDF

*IEEE/ CVF International Conference on Computer Vision and Pattern Recognition(**CVPR**), 2023.*

**[2] Neural-Sim: Learning to Generate Training Data with NeRF**

**Yunhao Ge**, Harkirat Behl*, Jiashu Xu*, Suriya Gunasekar, Neel Joshi, Yale Song, Xin Wang, Laurent Itti, Vibhav Vineet (*=equal contribution) PDF Code

*European Conference on Computer Vision (**ECCV**), 2022.*

**[3] Contributions of Shape, Texture, and Color in Visual Recognition**

**Yunhao Ge***, Yao Xiao*, Zhi Xu, Xingrui Wang, Laurent Itti (*=equal contribution) PDF Code

*European Conference on Computer Vision (**ECCV**), 2022.*

**[4] DALL-E for Detection: Language-driven Compositional Image Synthesis for Object Detection**

**Yunhao Ge**, Jiashu Xu, Brian Nlong Zhao, Laurent Itti, Vibhav Vineet arXiv preprint, 2022.

**[5] EM-guided Cut-Paste with DALL-E Augmentation for Image-level Weakly Supervised Instance Segmentation**

**Yunhao Ge**, Jiashu Xu, Brian Nlong Zhao, Laurent Itti, Vibhav Vineet arXiv preprint, 2022.

**[6] Invariant Structure Learning for Better Generalization and Causal Explainability**

**Yunhao Ge**, Sercan Ö. Arik, Jinsung Yoon, Ao Xu, Laurent Itti and Tomas Pfister arXiv preprint, 2022.

**[7] A Peek Into the Reasoning of Neural Networks: Interpreting with Structural Visual Concepts**

**Yunhao Ge**, Yao Xiao, Zhi Xu, Meng Zheng, Srikrishna Karanam, Terrence Chen, Laurent Itti and Ziyan Wu

PDF Github Website

*IEEE/ CVF International Conference on Computer Vision and Pattern Recognition (**CVPR**), 2021.*

**[8] Zero-shot Synthesis with Group-Supervised Learning**

**Yunhao Ge**, Sami Abu-El-Haija, Gan Xin and Laurent Itti PDF Code Fonts Dataset Website

*International Conference on Learning Representations (**ICLR**), 2021.*

**[9] Encouraging Disentangled and Convex Representation with Controllable Interpolation Regularization**

**Yunhao Ge**, Zhi Xu, Yao Xiao, Gan Xin, Yunkui Pang and Laurent Itti PDF

*IEEE/CVF Winter Conference on Applications of Computer Vision (**WACV**), 2023.*

**[10] Graph Autoencoder for Graph Compression and Representation Learning**

**Yunhao Ge***, Yunkui Pang*, Linwei Li, Laurent Itti ( *=equal contribution ) PDF Code Img2SceneGraph

*Neural Compression: From Information Theory to Applications–Workshop@ (**ICLR**), 2021.*

**[11] Pose Augmentation: Class-agnostic Object Pose Transformation for Object Recognition**

**Yunhao Ge**, Jiaping Zhao, Laurent Itti PDF Github

*European Conference on Computer Vision (**ECCV**), 2020.*

**[12] Beneficial Perturbation Network for designing general adaptive artificial intelligence systems**

Shixian Wen, Amanda Rios*, **Yunhao Ge*** and Laurent Itti ( *=equal contribution ) PDF

*IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**), Jan 2021.*

**[13] Unpaired MR to CT Synthesis with Explicit Structural Constrained Adversarial Learning**

**Yunhao Ge***, Dongming Wei*, Zhong Xue, Qian Wang, Xiang Zhou, Yiqiang Zhan, Shu Liao ( *=equal contribution ) PDF Code

*IEEE International Symposium on Biomedical Imaging (**ISBI**), 2019.*

**[14] Synthesis and inpainting-based MR-CT registration for image-guided thermal ablation of liver tumors**

Dongming Wei, Sahar Ahmad, Jiayu Huo, Wen Peng, **Yunhao Ge**, Zhong Xue, Pew-Thian Yap, Wentao Li, Dinggang Shen, Qian Wang PDF

*International Conference on Medical Image Computing and Computer-Assisted Intervention (**MICCAI**), 2019.*

**[15] Unpaired Whole-body MR to CT Synthesis with Correlation Coefficient Constrained Adversarial Learning**

**Yunhao Ge**, Zhong Xue, Tuoyu Cao, Shu Liao PDF Code

***SPIE-Medical Imaging**, 2019 [oral]*

## Intern & Work Experience

**Google Research** — *Los Angeles, CA, USA*

Student Researcher — *May. 2022 - current*

- Research topic: Improving Zero-shot Generalization and Robustness of Multi-modal models
- Advisor: Jiaping Zhao, Jie Ren, Balaji Lakshminarayanan, Ming-Hsuan Yang

**Google Cloud AI** — *Mountain View, CA, USA*

Student Researcher — *Aug. 2021 - Jan. 2022*

- Research topic: Explainable Concept learning in structural data
- Advisor: Sercan Arik, Jinsung Yoon

**Microsoft Research** — *Redmond,WA, USA*

Research Intern — *May 2021 - Aug. 2021*

- Research topic: Automatic using generative models to to boost discriminative models
- Advisor: Vibhav Vineet, Neel Joshi

**UII America, Inc** — *Boston, MA, USC*

Research Intern — *May 2020 - Aug. 2020*

- Research topic: General Visual Reasoning Framework: A Peek Into the Reasoning of Neural Networks: Interpreting with Structural Visual Concepts
- Advisor: Ziyan Wu, Srikrishna Karanam

**Flexiv Robotics** *Shanghai, China*

Computer Vision Research Engineer *May 2019 - Aug. 2019*

- Research topic: Robotics adaptive massage based on human pose detection and tracking with a lightweight local human 3D pose detection framework
- Advisor: Cewu Lu, Shuyun Chong

**United Imaging Intelligence** *Shanghai, China*

Research Intern *June 2018 - Apr. 2019*

- Research topic: Unpaired Image Synthesis with Adversarial Learning
- Advisor: Dinggang Shen, Shu Liao

# Honors & Awards

## SCHOLARSHIPS

**Amazon ML Fellowship (2022),** USC-Amazon Center on Trustworthy AI *Aug. 2022*

**Annenberg Project Grant for simulating human imagination,** awarded annually to 10 PhD students across USC for high-impact projects *April 2022*

**Annenberg Fellowship (PhD),** University of Southern California *Aug. 2019*

**National Scholarship (Graduate),** top graduate nationwide *Nov. 2017*

**National Scholarship (UnderGraduate),** top undergraduate nationwide *Nov. 2015*

**KaiYuan Motivational Scholarship,** top 0.5% in Shanghai Jiao Tong University *Apr. 2018*

**Presidential Scholarship,** top 0.2% in Shandong University *Nov. 2015*

**BaoGang Excellent student Scholarship,** 4 Places per year at Shandong University *Nov. 2015*

**First Prize Scholarship,** three-year continuous *2013-2015*

## CONTESTS

**The first prize,** 2017 ROBOMASTER **The World's Leading Robotics Competition** (Responsible for the design of electronic control in robotics) *Aug. 2017*

**Rank 1st (preliminary competition),** Tianchi: Precision medical competition-Artificial Intelligence Aided genetic risk prediction of diabetes **Pred-diabetes** *Dec. 2017*

**The first prize,** 9th International college students Ican innovation and entrepreneurship competition *Oct. 2015*

# Patent & software

**Systems and methods for image processing** *US Patent*

Shu Liao, **GE Yunhao**, WEI Dongming US Patent App. 16/729,303. *July 2020*

**Pulmonary Nodular Assisted Detection System Based on AI(V1.0)** *Software*

Bin Li, **Yunhao Ge** 2018SR037095 *Jan. 2018*

**A two-layer barrier free parking robotics based on bionic manipulator** *Patent for invention*

**Yunhao Ge**, Shangze Yang, Zheng Zhang, Weixin Yan, Yanzheng Zhao CN201610712048 *Jan. 2017*