

Ruojin Cai

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RESEARCH INTERESTS

3D Computer Vision, World Models, Spatial Intelligence

EDUCATION

2019-2025 **Ph.D. in Computer Science**, Cornell University
Advisors: Prof. Noah Snavely and Prof. Bharath Hariharan

2015-2019 **B.E. in Automation**, Tsinghua University
GPA: 3.85/4.0 (top 3%)
Graduated with Outstanding Honor

ACADEMIC POSITION

2025-PRESENT **Kempner Research Fellow**, Kempner Institute for the Study of Natural and Artificial Intelligence, Harvard University

HONORS AND AWARDS

2025 Kempner Research Fellowship
2025 Selected Participant, CVPR Doctoral Consortium
2023 ICCV Best Student Paper Award
2022 Snap Research Fellowship
2018 Comprehensive Excellent Scholarship, Tsinghua University
2017 Qualcomm Scholarship
2015 National Scholarship

PUBLICATIONS

- Zhiyi Li, Peilin Wu, Xiaoshen Han, **Ruojin Cai**, and Yilun Du. Structured 4D Latent Predictive Model for Robot Planning. *International Conference on Machine Learning (ICML)*, 2026.
- Yuan Li, Yuanbo Xiangli, Hadar Averbuch-Elor, Noah Snavely, and **Ruojin Cai**. Long-Tail Internet Photo Reconstruction. *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2026.
- Yiwen Zhang, Joseph Tung, **Ruojin Cai**, David Fouhey, and Hadar Averbuch-Elor. Emergent Extreme-View Geometry in 3D Foundation Models. *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2026.
- Hanyu Chen, **Ruojin Cai**, Steve Marschner, and Noah Snavely. ArchSym: Detecting 3D-Grounded Architectural Symmetries in the Wild. *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2026.

- **Ruojin Cai**, Jason Y. Zhang, Philipp Henzler, Zhengqi Li, Noah Snavely, and Ricardo Martin-Brualla. Can Generative Video Models Help Pose Estimation? *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2025. **Highlight**.
- Yuanbo Xiangli, **Ruojin Cai**, Hanyu Chen, Jeffrey Byrne, and Noah Snavely. Doppelgangers++: Improved Visual Disambiguation with Geometric 3D Features. *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2025. **Highlight**.
- Hana Bezalel, Dotan Ankri, **Ruojin Cai**, and Hadar Averbuch-Elor. Extreme Rotation Estimation in the Wild. *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2025.
- Joseph Tung*, Gene Chou*, **Ruojin Cai**, Guandao Yang, Kai Zhang, Gordon Wetzstein, Bharath Hariharan, and Noah Snavely. MegaScenes: Scene-Level View Synthesis at Scale. *European Conference on Computer Vision (ECCV)*, 2024. (*equal contribution)
- **Ruojin Cai**, Joseph Tung, Qianqian Wang, Hadar Averbuch-Elor, Bharath Hariharan, and Noah Snavely. Doppelgangers: Learning to Disambiguate Images of Similar Structures. *International Conference on Computer Vision (ICCV)*, 2023. **Oral**.
- Qianqian Wang, Yen-Yu Chang, **Ruojin Cai**, Zhengqi Li, Bharath Hariharan, Aleksander Holynski, and Noah Snavely. Tracking Everything Everywhere All at Once. *International Conference on Computer Vision (ICCV)*, 2023. **Best Student Paper Award**.
- Haotong Lin, Qianqian Wang, **Ruojin Cai**, Sida Peng, Hadar Averbuch-Elor, Xiaowei Zhou, and Noah Snavely. Neural Scene Chronology. *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2023.
- **Ruojin Cai**, Bharath Hariharan, Noah Snavely, and Hadar Averbuch-Elor. Extreme Rotation Estimation using Dense Correlation Volumes. *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2021.
- Le Yang*, Haojun Jiang*, **Ruojin Cai**, Yulin Wang, Shiji Song, Gao Huang, and Qi Tian. CondenseNet V2: Sparse Feature Reactivation for Deep Networks. *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2021. (*equal contribution)
- **Ruojin Cai***, Guandao Yang*, Hadar Averbuch-Elor, Zekun Hao, Serge Belongie, Noah Snavely, and Bharath Hariharan. Learning Gradient Fields for Shape Generation. *European Conference on Computer Vision (ECCV)*, 2020. **Spotlight**. (*equal contribution)
- Zhixiang Chen*, **Ruojin Cai***, Jiwen Lu, Jianjiang Feng, and Jie Zhou. Order-Sensitive Deep Hashing for Multimorbidity Medical Image Retrieval. *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2018. (*equal contribution)

RESEARCH EXPERIENCE

2019-2025 **Graduate Research Assistant in Department of Computer Science**, Cornell University
Advisors: Prof. Noah Snavely and Prof. Bharath Hariharan

2023-2024 **Research Intern**, Google
Advisor: Ricardo Martin-Brualla

2021 **Research Intern**, Adobe
Advisors: Kalyan Sunkavalli and Yannick Hold-Geoffroy

- 2018 **Research Intern in Department of Computer Science**, Cornell University
Advisors: Prof. Kilian Weinberger and Prof. Gao Huang
- 2017-2019 **Undergraduate Researcher in Department of Automation**, Tsinghua University
Advisors: Prof. Jie Zhou and Prof. Jiwen Lu

INVITED TALKS

- 2026 3D World Models for Understanding the Spatial and Physical World
Spring into Science 2026, Kempner Institute at Harvard University
- 2026 Toward Spatial and Physical World Understanding
All Hands meeting, Kempner Institute at Harvard University
- 2025 Pushing the Boundaries of 3D Spatial Understanding
Columbia University; Kempner Institute at Harvard University
- 2022 Learning 3D Structures under Extreme Scenarios
Vision and Graphics seminar at Tel-Aviv University
- 2022 Learning Gradient Fields for Shape Generation
Toronto Geometry Colloquium

SERVICE

- Paper Reviewer of CVPR, ECCV, ICCV, 3DV, WACV, Eurographics, SIGGRAPH Asia.
- Volunteer Reviewer, Travel Grants Committee, CVPR 2022.
- Teaching Assistant:
 - Introduction to Computer Graphics (Fall 2019)
 - Foundations of Artificial Intelligence (Spring 2020)
 - Introduction to Computer Vision (Spring 2021-2025)