XUANCHI REN

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EDUCATION

University of Toronto, Toronto, ON, Canada   Sept. 2022 – Present
Ph.D. in Computer Science
Advisor: Prof. Sanja Fidler

The Hong Kong University of Science and Technology, Hong Kong   Aug. 2017 – Jun. 2022
B.Eng. in Computer Science and **B.Sc.** in General Mathematics
Advisor: Prof. Qifeng Chen

École Polytechnique Fédérale de Lausanne (EPFL), Switzerland   Feb. 2020 – Jun. 2020
Computer Science | Exchange Program
Advisor: Prof. Alexandre Alahi

EMPLOYMENT

NVIDIA Spatial Intelligence Lab, Toronto   Nov. 2022 – Present
Research Intern   Manager: Sanja Fidler

Microsoft Research Asia, Beijing   Jun. 2020 – Dec. 2021
Research Intern   Manager: Yuwang Wang

RESEARCH

* indicates equal contribution

Preprints

1. **Cosmos-Drive-Dreams: Scalable Synthetic Driving Data Generation with World Foundation Models**
   Xuanchi Ren*, Yifan Lu*, Tianshi Cao*, Ruiyuan Gao*, Shengyu Huang, Amirmojtaba Sabour, Tianchang Shen, Tobias Pfaff, Jay Zhangjie Wu, Runjian Chen, Seung Wook Kim, Jun Gao, Laura Leal-Taixe, Mike Chen, Sanja Fidler, Huan Ling
   White Paper, Project, Paper

2. **Cosmos-Transfer1: Conditional World Generation with Adaptive Multimodal Control**
   NVIDIA (**Core Contributor**; Featured in Jensen Huang's GTC 2025 keynote)
   White Paper, Project, Paper

Conference Papers

1. **InfiniCube: Unbounded and Controllable Dynamic 3D Driving Scene Generation with World-Guided Video Models**
   Yifan Lu*, **Xuanchi Ren***, Jiawei Yang, Tianchang Shen, Jay Zhangjie Wu, Jun Gao, Yue Wang, Siheng Chen, Mike Chen, Sanja Fidler, Jiahui Huang
   International Conference on Computer Vision (**ICCV**), 2025, Project, Paper

2. **GEN3C: 3D-Informed World-Consistent Video Generation with Precise Camera Control**
   Xuanchi Ren*, Tianchang Shen*, Jiahui Huang, Huan Ling, Yifan Lu, Merlin Nimier-David,

Thomas Müller, Alexander Keller, Sanja Fidler, Jun Gao
Computer Vision and Pattern Recognition (**CVPR**), 2025, **(Highlight)**, Project, Paper, Code

3. **Difix3D+: Improving 3D Reconstructions with Single-Step Diffusion Models**
Jay Zhangjie Wu*, Yuxuan Zhang*, Haithem Turki, **Xuanchi Ren**, Jun Gao, Mike Zheng Shou, Sanja Fidler, Zan Gojcic†, Huan Ling†
Computer Vision and Pattern Recognition (**CVPR**), 2025, **(Oral, Best Paper Award Candidate)**, Project, Paper, Code

4. **SCube: Instant Large-Scale Scene Reconstruction using VoxSplats**
Xuanchi Ren*, Yifan Lu*, Hanxue Liang, Jay Zhangjie Wu, Huan Ling, Mike Chen, Sanja Fidler, Francis Williams, Jiahui Huang
Neural Information Processing Systems (**NeurIPS**), 2024, Project, Paper, Code

5. **XCube: Large-Scale 3D Generative Modeling using Sparse Voxel Hierarchies**
Xuanchi Ren, Jiahui Huang, Xiaohui Zeng, Ken Museth, Sanja Fidler, Francis Williams
Computer Vision and Pattern Recognition (**CVPR**), 2024, **(Highlight)**, Project, Paper, Code

6. **Blind Video Deflickering by Neural Filtering with a Flawed Atlas**
Chenyang Lei*, **Xuanchi Ren***, Zhaoxiang Zhang, Qifeng Chen
Computer Vision and Pattern Recognition (**CVPR**), 2023, Project, Paper, Code

7. **Look Outside the Room: Synthesizing A Consistent Long-Term 3D Scene Video from A Single Image**
Xuanchi Ren, Xiaolong Wang
Computer Vision and Pattern Recognition (**CVPR**), 2022, Project, Paper, Code

8. **Learning Disentangled Representation by Exploiting Pretrained Generative Models: A Contrastive Learning View**
Xuanchi Ren*, Tao Yang*, Yuwang Wang, Wenjun Zeng
International Conference on Learning Representations (**ICLR**), 2022, Paper, Code

9. **Retriever: Learning Content-Style Representation as a Token-Level Bipartite Graph**
Dacheng Yin*, **Xuanchi Ren***, Chong Luo, Yuwang Wang, Zhiwei Xiong, Wenjun Zeng
International Conference on Learning Representations (**ICLR**), 2022, Project, Paper, Code

10. **Towards Building A Group-based Unsupervised Representation Disentanglement Framework**
Tao Yang, **Xuanchi Ren**, Yuwang Wang, Wenjun Zeng, Nanning Zheng
International Conference on Learning Representations (**ICLR**), 2022, Paper

11. **Safety-Aware Motion Prediction with Unseen Vehicles for Autonomous Driving**
Xuanchi Ren*, Tao Yang*, Li Erran Li, Alexandre Alahi, Qifeng Chen
International Conference on Computer Vision (**ICCV**), 2021, Paper, Code

12. **Self-Supervised Dance Video Synthesis Conditioned on Music**
Xuanchi Ren, Haoran Li, Zijian Huang, Qifeng Chen
ACM International Conference on Multimedia (**ACM MM**), 2020, **(Oral)**, Paper, Code

Journal Papers

1. **fVDB: A Deep-Learning Framework for Sparse, Large-Scale, and High-Performance Spatial Intelligence**
Francis Williams, Jiahui Huang, Jonathan Swartz, Gergely Klár, Vijay Thakkar, Matthew Cong, **Xuanchi Ren**, Ruilong Li, Clement Fuji-Tsang, Sanja Fidler, Eftychios Sifakis, Ken Museth
ACM Transactions on Graphics (**TOG**), 2024, Project, Paper

HONORS & AWARDS

- Best Paper Award Candidate at CVPR 2025   2025
- Vector Scholarships in Artificial Intelligence, Vector Institute   2022
- Hong Kong PhD Fellowship Scheme   2022
- Mr Armin and Mrs Lillian Kitchell Undergraduate Research Award (top 3 students)   2021

ACADEMIC SERVICES

Conference Reviewer

- IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)
- International Conference on Computer Vision (ICCV)
- European Conference on Computer Vision (ECCV)
- Conference on Neural Information Processing Systems (NeurIPS)
- International Conference on Learning Representations (ICLR)

Journal Reviewer

- IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI)
- IEEE Transactions on Multimedia (TMM)
- ACM SIGGRAPH
- ACM SIGGRAPH Asia