




Ashkan Mirzaei

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My research focuses on developing innovative solutions for 3D/4D reconstruction, generation, and editing. As a PhD student, my research advances controllable generative modelling to enable Photoshop-like workflows for static and dynamic 3D scenes. I leverage the power of large-scale generative models to revolutionize the way we interact and manipulate with scenes and objects. With a strong belief in the intuition and creativity enabled by 3D/4D interfaces, I aim to expand the capabilities of generative models beyond 2D image synthesis and bring them into the third dimension.

EDUCATION

University of Toronto, PhD in Computer Science Toronto, Canada	GPA: A⁺	Sep 2021 - Present
Sharif University of Technology, BSc in Computer Engineering Tehran, Iran	GPA: 19.92/20	Sep 2017 - Jun 2021
Young Scholars Club, IMO National Team Preparation Camp Tehran, Iran		Sep 2016 - Jun 2017

EXPERIENCE

Nvidia Toronto AI Lab, Research Intern | Toronto, Canada Sep 2023 - Nov 2024

I'm working under the supervision of Sanja Fidler on 3D/4D reconstruction and content creation. The list of my collaborators during this internship includes Zan Gojcic (my mentor), David Acuna, and Seung Wook Kim.

Samsung AI Center Toronto, Research Intern (MITACS) | Toronto, Canada Jul 2022 - Sep 2023

Worked with Alex Levinshtein, Konstantinos Derpanis, and Marcus A. Brubaker on 3D editing. My work at Samsung resulted in publications in top Computer Vision conferences, including CVPR and ICCV.

Toronto Intelligent Systems Lab (TISL), Research Assistant | Toronto, Canada Sep 2021 - Present

My PhD work under the supervision of Igor Gilitschenski and Jonathan Kelly is on 3D scene editing and 3D generative models, with a focus on Neural Radiance Fields and Gaussian Splatting as the underlying representations. My proposed thesis topic is "Leveraging Generative Priors for 3D Editing".

Sharif University of Technology, Research Assistant | Tehran, Iran Jun 2019 - Jun 2021

I worked on my undergrad thesis project under the supervision of Mohammadhossein Rohban. The project involved designing a variation of the mean-squared error loss function, which does not prefer blurry images.

Cafe Bazaar, Software Engineer | Tehran, Iran Jun 2019 - Aug 2019

Developed the backend of a navigation software mainly using Django.

Honors and Awards

- MITACS Accelerate Fellowship, May 2023.
- All-time highest GPA in the history of Sharif University in the country's most competitive program, Jun 2021.
- Gold medal at the Iranian National Mathematics Olympiad, Aug 2016.
- Bronze medal at the Iranian National Mathematics Olympiad, Aug 2015.
- Bronze medal at the International Mathematics Competition (IMC), Aug 2015.

Peer-reviewed Papers

- Ashkan Mirzaei***, Nicolas Moenne-Loccoz*, Or Perel, Riccardo de Lutio, Janick Martinez Esturo, Gavriel State, Sanja Fidler, Nicholas Sharp, Zan Gojcic, **3D Gaussian Ray Tracing: Fast Tracing of Particle Scenes**, ACM Transactions on Graphics (TOG) 2024, SIGGRAPH Asia 2024 Journal Track.
- Ashkan Mirzaei**, Tristan Aumentado-Armstrong, Marcus Brubaker, Jonathan Kelly, Alex Levinshtein, Konstantinos Derpanis, Igor Gilitschenski, **Watch Your Steps: Local Image and Scene Editing by Text Instructions**, ECCV 2024 (Oral).
- Ashkan Mirzaei***, Tristan Aumentado-Armstrong*, Marcus A. Brubaker, Jonathan Kelly, Alex Levinshtein, Konstantinos G. Derpanis, Igor Gilitschenski, **Reference-guided Controllable Inpainting of Neural Radiance Fields**. ICCV, 2023.
- Ashkan Mirzaei**, Tristan Aumentado-Armstrong, Konstantinos G. Derpanis, Jonathan Kelly, Marcus A. Brubaker, Igor Gilitschenski, Alex Levinshtein, **SPIn-NeRF: Multiview Segmentation and Perceptual Inpainting with Neural Radiance Fields**. CVPR, 2023.
- Ashkan Mirzaei**, Yash Kant, Jonathan Kelly, Igor Gilitschenski, **LaTeRF: Label and Text Driven Object Radiance Fields**. ECCV, 2022.
- Umangi Jain, **Ashkan Mirzaei**, Igor Gilitschenski, **GaussianCut: Fast Interactive Segmentation via Graph Cut for 3D Gaussian Splatting**, NeurIPS 2024.
- Jiawei Ren, Kevin Xie, **Ashkan Mirzaei**, Hanxue Liang, Xiaohui Zeng, Karsten Kreis, Ziwei Liu, Antonio Torralba, Sanja Fidler, Seung Wook Kim, Huan Ling, **Large 4D Gaussian Reconstruction Model**, NeurIPS 2024.
- Ashkan Mirzaei***, Tristan Aumentado-Armstrong*, Marcus A. Brubaker, Jonathan Kelly, Alex Levinshtein, Konstantinos G. Derpanis, Igor Gilitschenski, **Exploring Reconstructive Latent-Space Neural Radiance Fields**. ICCV NeRF4ADR, 2023.
- Tiahshu Kuai, Akash Karthikeyan, Yash Kant, **Ashkan Mirzaei**, Igor Gilitschenski, **CAMM: Building Category-Agnostic and Animatable 3D Models from Monocular Videos**. CVPR DynaVis, 2023.
- Andrei Ivanovic, Rowan McAllister, **Ashkan Mirzaei**, Igor Gilitschenski, **Coordinated Multi-Agent Motion Planning via Imitation Learning**. ICRA Autonomous Driving, 2022.

Under-review Papers

- **Ashkan Mirzaei***, Hanxue Liang*, Jiawei Ren*, Antonio Torralba, Ziwei Liu, Igor Gilitschenski, Sanja Fidler, Cengiz Oztireli, Huan Ling, Zan Gojcic, Jiahui Huang, **Feed-Forward Bullet-Time Reconstruction of Dynamic Scenes from Monocular Videos**, 2025.
- **Ashkan Mirzaei**, Riccardo De Lutio, Seung Wook Kim, David Acuna, Jonathan Kelly, Sanja Fidler, Igor Gilitschenski, Zan Gojcic, **RefFusion: Reference Adapted Diffusion Models for 3D Scene Inpainting**, 2024.
- Toshiya Yura, **Ashkan Mirzaei**, Igor Gilitschenski, **EventSplat: 3D Gaussian Splatting from Moving Event Cameras for Real-time Rendering**, NeurIPS 2024.