Chinmay Talegaonkar

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Education

University of California, San Diego — San Diego, CA
Ph.D. in Electrical and Computer Engineering — *Sept 2022 – Present*
Advisor: Prof. Nicholas Antipa — GPA: 4.0/4.0

University of California, Los Angeles — Los Angeles, CA
M.S. in Electrical and Computer Engineering — *2019 – 2021*
Advisor: Prof. Achuta Kadambi — GPA: 4.0/4.0

Indian Institute of Technology, Bombay — Mumbai, India
B.Tech. in Electrical Engineering — *2015 – 2019*
Minor in Computer Science — GPA: 9.07/10.0
Advisor: Prof. Ajit Rajwade

Work Experience

Research Intern — *San Diego, CA*
Qualcomm AI — *June 2023 – Sept 2023*

- Developed a memory-efficient generalizable NeRF-like method to create human avatars from monocular videos. Achieved comparable accuracy to existing methods. *Patent Pending*
- Invented a point-based 3D scene representation for human modeling that reduces memory usage by 10x and training time by 100x respectively.
- Engineered an end-to-end pipeline to estimate SMPL mesh, and segmentation masks from videos.

Senior Deep Learning Engineer — *Mountain View, CA*
Intrinsic.ai — *May 2022 – Sept 2022*

- Led the development of a novel HDR fusion algorithm, resulting in higher pose estimation accuracy for difficult lighting scenarios.
- Implemented a deep learning-based feature extractor to improve stereo matching and point cloud generation from a multi-view camera setup.

Senior Deep Learning Engineer — *Palo Alto, CA*
Akasha Imaging - **acquired** by Intrinsic.ai (an Alphabet company) in May 2022. — *May 2021 – May 2022*

- Developed an end-to-end deep learning based multi-view pose estimation pipeline with more than 99% reliability and sub-millimeter accuracy. This led to the company's first product order.
- Engineered a synthetic data generation pipeline to generate training data for segmentation and keypoint estimation algorithms.
- Contributed to tools for ML Ops, CI/CD testing, pose evaluation frameworks, and data collection setups.

Deep Learning Software Intern — *Santa Clara, CA*
NVIDIA — *June 2020 – Sept 2020*

- Optimized CUDA kernels for backpropagation in 2D and 3D convolution layers in popular CNN architectures, resulting in 30% speedup.
- Implemented a linearized thread launching algorithm resulting in over 30 % speedup for 3D convolutions with low channel counts.
- Enabled complex valued convolution kernels in *CUTLASS* achieving more than 90% compute resource utilization.

AI/ML Compute DevTech Intern — *Bengaluru, India*
NVIDIA — *May 2018 – July 2018*

- Developed CUDA kernels for optimizing routing layer and back-propagation in capsule networks resulting in a 2x speedup
- Parallelized end-to-end implementation of *DBscan* using *CUTLASS* and *thrust* libraries for **NVIDIA Rapids** platform

Publications

Pose Estimation of Buried Deep-Sea Objects using 3D Deep Learning Models
Jerry Yan*, ***Chinmay Talegaonkar****, Nicholas Antipa, Eric Terrill, Sophia Merrifield
OCEANS Conference and Expositions, 2024. Paper Code

Visual Physics: Discovering Physical Laws from Videos
Pradyumna Chari*, ***Chinmay Talegaonkar****, Yunhao Ba*, Achuta Kadambi
ICCP 2020 Poster, CVPR 2020 Tutorial. arXiv PrePrint
Journal Version: *On learning mechanical laws of motion from video using neural networks.*
IEEE Access, 2023. Paper

Compressive Phase Retrieval Under Poisson Noise
Chinmay Talegaonkar, Parthasarthi Khirwadkar, Ajit Rajwade
IEEE International Conference on Image Processing (**ICIP**) 2019. Paper

Performance Bounds For Tractable Poisson Denoisers With Principled Parameter Tuning
Chinmay Talegaonkar, Ajit Rajwade
IEEE Global Conference on Signal and Information Processing (**GlobalSIP**) 2018. Paper

Key Skills

Programming Languages: C & C++, CUDA, Bash, Python, MATLAB
Frameworks: Pytorch, OpenCV, scikit-learn, numpy, scipy, pandas, blender, mitsuba3, Slang.D
Development Tools: Github, Jenkins, Google Cloud, Docker

Research Projects

Exact Volume Rendering of 3D Gaussians Aug 2024 - Present
Guide: Prof. Nicholas Antipa and Prof. Ravi Ramamoorthi

Developed a method for fast, exact volume rendering of 3D Gaussians. Demonstrated improvements over 3D Gaussian Splatting for modeling flat top surfaces, and volume rendering 3D Gaussian densities. Currently exploring potential applications in Computed Tomography.

Defocus Blur Rendering with 3D Gaussian Splatting Jan 2024 - Present
Guide: Prof. Nicholas Antipa and Prof. Ravi Ramamoorthi

Devised an approach for accurately rendering 3D Gaussians with defocus blur by incorporating lens blur in the splatting process. Achieved higher fidelity blur rendering compared to 3D Gaussian Splatting for large aperture sizes. Demonstrated applications in focal stack rendering.

Monocular Depth Diffusion Models with Defocus Cues Jan 2024 - Present
Guide: Prof. Nicholas Antipa

Identified depth ambiguities in monocular depth diffusion models caused by biases in training data. Developed a test-time optimization method utilizing defocus blur and coded aperture masks to resolve depth ambiguities. The proposed approach also enables metric depth estimation through these models.

Novel View Synthesis in the Presence of Phase Optics Sept 2022 - Dec 2022
Guide: Prof. Ravi Ramamoorthi

Explored NeRF-based view synthesis for sparse views captured with a microlens array. Simulated multi-view data through a microlens array in Mitsuba3. Achieved improved detail recovery with microlens array data compared to pinhole cameras in ultra-sparse configurations. Code Report

Teaching Assistant

- Introduction to Quantum Physics — IIT Bombay, Fall 2016
- Software Systems Lab — UCLA, Winter 2020
- Reinforcement Learning — UCLA, Spring 2020
- Introduction to Computer Vision — UCLA, Winter 2021
- Computational Imaging — UCSD, Spring 2024