

VINAYAK GUPTA

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EDUCATION

Indian Institute of Technology Madras (IIT Madras)

B.Tech in Electrical Engineering and MTech in Data Science CGPA: 8.88/10

Chennai, India

Nov 2020 - May 2025

PUBLICATIONS / WORKING PAPERS

* : indicates equal contribution

- PaintScene4D: Consistent 4D Scene Generation from Text Prompts** [Paper] [Website]
Vinayak Gupta, Yunze Man, Yuxiong Wang
Under Review at International Conference on Computer Vision (ICCV) 2025
- PhotonSplat: Splatting Photon for Scene Reconstruction with High-Speed Camera Captures** [Website]
Sai Sri Teja*, Sreevidya Chintalapati*, Vinayak Gupta*, Mukund Varma T, Haejoon Lee, Aswin C Sankaranarayanan, Kaushik Mitra
Under Review at International Conference on Computational Photography (ICCP) 2025
- GANESH: Generalisable NeRF for Lensless Imaging** [Paper][Website]
Rakesh Raj*, Akshat*, Badhri Narayanan*, Vinayak Gupta, Rohit Chowdhary, Chandrakala S, Kaushik Mitra
Winter Association for Computer Vision (WACV) 2025
- GAURA: Generalisable Approach for Unified Restoration and Rendering of Arbitrary Views** [Paper][Website]
Vinayak Gupta*, Rongali Girish*, Mukund Varma T*, Ayush Tewari, Kaushik Mitra
European Conference on Computer Vision (ECCV) 2024
- GSN: Generalisable Segmentation of Neural Radiance Fields** [Paper][Website]
Vinayak Gupta, Rahul Goel, Dhawal Sirikonda, P J Narayanan
Advancements in Artificial Intelligence (AAAI) 2024
- U2NeRF: Unsupervised Underwater Image Restoration and Neural Radiance Fields** [Paper][Website]
Vinayak Gupta*, Manoj S*, Mukund Varma T*, Kaushik Mitra
International Conference on Learning Representations, Tiny Papers (ICLR Tiny Papers) 2024

RESEARCH INTERNSHIPS

Computational Imaging Lab @ CMU

Prof. Aswin Sankaranarayanan, Department of Electrical and Computer Engineering

Research Intern | August 2024 - Present
Pittsburg, USA

Vision Lab @ UIUC

Prof. Yuxiong Wang, Department of Computer Science

Research Intern | May 2024 - Present
Illinois, USA

Vision and Graphics Lab @ IIIT Hyderabad

Prof. P.J Narayanan, Department of Computer Science and Engineering

Summer Intern | May 2023 - Aug 2023
Hyderabad, India

Computational Imaging Lab @ IIT Madras

Prof. Kaushik Mitra, Department of Electrical Engineering

Student Researcher | Sept 2022 - Present
Chennai, India

SELECTED RESEARCH EXPERIENCE

Consistent 4D Scene Generation from Text Prompts

Summer Internship | Text-to-4D Scene Generation

UIUC | May 2024 - Present
Guided by: Prof. Yuxiong Wang

- Developed a framework for **text-to-4D scene generation**, advancing scene reconstruction beyond object-level synthesis.
- Designed a progressive warping and inpainting method ensuring **spatial and temporal consistency** in 4D representations.
- Improved 4D scene generation by enabling customizable and efficient **camera trajectory control** according to user-preference.

Splatting Photon for Scene Reconstruction with High-Speed Camera Captures

Dual Degree Project | 3D Single Photon Modelling

CMU and IITM | Aug 2024 - Present
Guided by: Prof. Aswin Sankaranarayanan and Prof. Kaushik Mitra

- Developed a framework for reconstructing high-speed scenes from single-photon captures by modeling **per-pixel photon probabilities**.
- Designed a **3D spatial filter** for noise reduction and proposed **view-consistent colorization** from a single blurry RGB input

Generalisable NeRF for Lensless Imaging

Dual Degree Project | Lensless Imaging and 3D Reconstruction

IITM | May 2024 - Sept 2024
Guided by: Prof. Kaushik Mitra

- Developed a **3D generalizable** framework for refining and rendering multi-view lensless captures, enabling novel view synthesis.
- Demonstrated effective transfer learning from synthetic to real-world data, showing robust scene reconstruction from lensless inputs.

Generalisable Approach for Unified Restoration and Rendering of Arbitrary Views

3D Restoration and Rendering

IITM | Oct 2023 - Mar 2024
Guided by: Prof. Kaushik Mitra

- Developed a novel 3D rendering framework that leverages latent codes, for robust novel view synthesis across diverse degradation types.
- Demonstrated **zero-shot inference** capability for rendering degraded scenes without any optimization, achieving universal adaptability.

- Enabled rapid adaptation to unseen degradations through efficient **fine-tuning strategies** using learned priors.

Generalisable Segmentation of Neural Radiance Fields

IITH | May 2023 - Aug 2023

Summer Internship | 3D Scene Segmentation and Generalisation

Guided by: Prof. P. J. Narayanan

- Developed a generalized NeRF integrating **per-pixel semantic features**, enabling novel view synthesis without scene-specific retraining.
- Enabled both **object and part segmentation** in novel views, leveraging per-pixel semantic features to support multi-task operations.

OTHER EXPERIENCE

Unsupervised Underwater Image Restoration and NeRFs

IITM | Sept 2022 - Feb 2023

Neural Radiance Fields and Compression

Guided by: Prof. Kaushik Mitra

- Extended radiance fields for rendering and restoring underwater views using **spatial and physical modeling**, achieving SOTA performance.
- Introduced UVS dataset with 12 underwater scenes, supporting novel view synthesis with synthetic and real data.

Baking Multiple Radiance Fields

IITH | May 2023 - Jun 2023

Neural Radiance Fields and Compression

Guided by: Prof. P. J. Narayanan

- Developed a novel **binary masking technique** for the integration of multiple radiance fields into a single radiance field.
- Achieved an 8-fold compression factor while preserving high accuracy and quality in scene reconstruction.

Denoising of Point Clouds

IITM | Aug 2022 - Mar 2023

Point Cloud Processing

Guided by: Prof. Nirav Bhatt

- Developed a robust approach for generating noisy point clouds, simulating real-world noise characteristics observed in LiDAR scans.
- Utilized transformer networks consisting of local module to capture the fine details and a global module to capture overall structure.

Text to Speech for Indic Languages

IITM and IITB | Aug 2022 - Mar 2023

Text-Speech Dataset and Model

Guided by: Prof. Nirav Bhatt and Dr. Venkatapathi

- Created the first text to speech paired data for Sanskrit language for poetic tune using web-scraping techniques.
- Built a Text-to-Video that takes in sanskrit text as input and outputs an audio modulated in a particular raga/style.

TEACHING SERVICES

Course Teaching Assistant

- **Deep Learning Practices(DLP) - Online BSc IIT Madras (Fall 2024):** Worked on setting up tutorial session and a kaggle competition on Monocular Depth Estimation. Introduced on the UNet based architecture and the stereo-based Unsupervised methods.
- **EE5176 - Computational Photography (Fall 2024):** Actively involved in setting up tutorials and conducting tutorial sessions. Ideated problem statements on the final term-project for students on the topics of lensless imaging, camera parameters etc.
- **EE5178 - Modern Computer Vision (Spring 2024):** Conducted weekly tutorial sessions and live coding sessions for a batch of 70 students. Conducted a kaggle competition on low-light classification and object detection of mosquitos.
- **EE5180 - Introduction to Machine Learning (Spring 2023):** Worked on setting up tutorial and term paper for the course. Conducted a kaggle competition on a classification problem whether or not a client will purchase a bank insurance or not.

Workshop Teaching Assistant

- **TKM Workshop 2022:** Conducted a 3-day introductory workshop on hands-on Deep Learning, instructing over 100 students.
- **Shaastra Workshop 2022:** Conducted a 2-day introductory workshop on hands-on Computer Vision, instructing over 60 students.
- **CFI Summer School 2022:** Headed sessions and conducted programming tutorials on basics of ML for over 200 students.
- **CFI Summer School 2021:** Conducted interactive sessions and programming workshops on ML fundamentals for 200+ students.

AWARDS & ACHIEVEMENTS

- Secured Bronze Medal in Bosch Deep Learning High Prep Event in the Inter IIT Tech Meet(2022)
- Awarded the Young Research Fellowship (YRF) at IIT Madras among the 1000 candidates.
- Secured All India Rank **2011** in JEE (Joint Entrance Examination) Main 2020 among the 1.2 million candidates.
- Secured All India Rank **729** in JEE (Joint Entrance Examination) Advanced 2020 among the 1.2 million candidates.
- Ranked among the **National Top 1%** in the chemistry olympiad NSEC (National Standard Examination in Chemistry) 2019.
- Ranked among Top 10 in India in the International Collegiate Programming Contest (ICPC) among 100s of school teams 2018.

POSITIONS OF RESPONSIBILITY

- **Strategist, AI Club:** Headed 2 teams of 12 team members to lead one of the institute's most prestigious clubs.
- **Coordinator, AI Club:** Organized sessions on Deep Learning throughout the year to inspire the student body.
- **Coordinator, Shaastra:** Co-designed a RL based event from scratch, a complete information two agent environment.
- **Technical Head, ARJUNA Group:** Designed CompeteReady Profile product to assess student's performance for competitive exams.
- **Academic Super-Coordinator, SAATHI:** Supervised a team of 30 students, overseeing the academic vertical of SAATHI.
- **Student Mentor, SAATHI:** Mentored a group of 10 freshmen students from IIT Madras and guided in their academic struggles.