

# Debabrata Mandal

## Research goals

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Broadly interested in developing optical and computational methods for real-time scene restoration, with applications in consumer photography and AR/VR applications. Recently, focusing on integrating aesthetic camera dynamics within video generative models. Past interests in optimizing defect detection workloads on bare-metal systems and human shape and pose modeling through deformable meshes.

## Education

### UNC CHAPEL HILL

PHD IN COMPUTER SCIENCE

2023-Present NC, USA

Advisor: Praneeth Chakravarthula

### UNC CHAPEL HILL

MS IN COMPUTER SCIENCE

2023-2025 NC, USA

GPA: H (Highest)

### IIT BOMBAY

B.TECH IN COMPUTER SCIENCE

2017-2021 Mumbai, India

- Cum. GPA: 8.69 / 10.0
- Worked under Prof. Parag Chaudhuri for 3D hand mesh registration. Awarded with a distinction grade for exemplary work.

## Core Competencies

- 2D/3D Generative models
- Real-time inference
- Nanoscale optic design
- End-to-end camera design
- Convex optimization
- Ray tracing and inverse rendering
- High performance computing

## Skills

### PROGRAMMING

Python • C/C++(11/14/17) • Julia • Matlab • GoLang

### MISCELLANEOUS

Linux systems • Tensorflow • Torch • Scikit • CUDA • Zemax OpticStudio • OpenGL/WebGL • Blender • Open3D

## Awards

[2022] Kaggle's November ML Research Spotlight global winner (top 3 out of all submissions)  
[2020, 2021] The Linux Foundation x2 times LiFT scholar (top 500/1.5k applications)

## Publications

[1] UniCoRN: Latent Diffusion-based Unified Controllable Image Restoration Network across Multiple Degradations, **D. Mandal**, S. Chattopadhyay, G. Tong, P. Chakravarthula (**Accepted WACV'26**)

[2] High Quality HDR on Metalens Cameras via Multi-Exposure Bursts, **D. Mandal**, Z. Peng, Y. Wang, P. Chakravarthula (**Accepted WACV'26**)

[3] Aberration Correcting Vision Transformers for High-Fidelity Metalens Imaging, B. Lee, ... **D. Mandal** (6<sup>th</sup>), P. Chakravarthula, E. Park (*under review*)

[4] Split-Knit Convolution: Enabling Dense Evaluation of Transpose and Dilated Convolutions on GPUs, A. Vadakkeveedu, **D. Mandal**, P. Ramachandran and N. Chandrathoodan (**Accepted HiPC' 2022**)

## Research work

### VCAIL (Research Assistant)

PROF. PRANEETH CHAKRAVARTHULA

Aug 2023 – Present UNC-CH

- Exploring generative and end-to-end image restoration algorithms for reconstruction from thin diffractive elements aimed towards revolutionizing consumer applications like photography and VR.
- Developing metasurface structures for single lens cameras
- Demonstrating consumer photography applications in real time speeds

### AMD (GenAI Co-Op Intern)

ADVANCED GRAPHICS PRODUCTS TEAM

June – July 2025 Santa Clara, USA

- Explored camera control mechanism within video diffusion architectures
- Curated novel dataset for fine-tuning LoRA for enhanced camera controls

### VIGIL LAB (Undergraduate research project)

PROF. PARAG CHAUDHURI

Jan 2021 – Sep 2022 IIT, Bombay

- Extended 3D hand mesh registration using (SMPL+H) from depth only to RGBD images using a non-linear entropy-minimization framework.

## Experience

### AI ENGINEER

ADVANCED COMPUTING LAB (AI-ACL), KLA-TENCOR

June 2021 – Jun 2023 Chennai, India

- Optimised inference throughputs of defect detection networks by 6x (2x compute & 3x memory) on Nvidia GPUs using model quantization and eliminating prefetch thread locks.
- Part of the global team responsible for building next-gen inference framework shipped with runtime improvements over Tensorflow.

### LFX MENTEE

OPEN HORIZON (IBM), THE LINUX FOUNDATION

March 2021 – June 2021 Remote, Paid

- Implemented (in Go) a secret sharing mechanism between edge nodes and management nodes in a distributed edge computing framework

### OPEN SOURCE CONTRIBUTOR (GSOC'21)

JAVIS.JL, THE JULIA PROJECT

March 2021 – Present Remote, Paid

- Fix issues to the 2D animation package Javis.jl and maintain JavisGraphs.jl as a package to animate network graphs (work started as part of GSOC'21)

### OPEN SOURCE CONTRIBUTOR (GSOC'20)

BOOST.C++

May 2020 – Sep 2020 Remote, Paid

- Designed a generic multidimensional histogram container class tailored for Boost.GIL using template meta-programming in C++11.