Debabrata Mandal

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Research goals

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)

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.

Publications

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

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

[3] Aberration Correcting Vision Transformers for High-Fidelity Metalens Imaging, B. Lee, … **D. Mandal** (6th), P. Chakravarthula, E. Park (**under review**) (**Submitted** *AAAI'26*)

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