

Aniket Dashpute | CV

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I am a Ph.D. candidate at Northwestern University in the Electrical Engineering Department, advised by [Prof. Oliver Cossairt](#). I graduated in Electrical Engineering from IIT Delhi. After my graduation, I worked at Samsung Bangalore on the rendering engine for Ultrasound modalities. I am interested in theory & applications related to Computational Imaging, Computer Graphics & Computer Vision.

Education

- **Northwestern University** **Evanston, USA**
Ph.D. Electrical Engineering, CGPA 3.9/4.0 *Jan, 2021-Present*
- **Indian Institute of Technology Delhi** **New Delhi, India**
B.Tech. Electrical Engineering, CGPA 8.44/10 *2014–2018*
- **R.Y.K. Science College Nashik** **Nashik, India**
Maharashtra Higher Education Board (HSC), Percentage 88% *2014*
- **Kilbil St. Joseph's High School Nashik** **Nashik, India**
Maharashtra Secondary Education Board (SSC), Percentage 98.9% *2012*

Academic Achievements & Awards

- Awarded the prestigious **Cabell First Year Fellowship**, only ten students are selected to receive this fellowship in a school-wide competition at **Northwestern University**
- Awarded **Samsung Citizen Award** - June 2019 (People & Process), Nov 2019 (Technical Excellence)
- Awarded **Software Professional** Certification after clearing **Samsung** Software Competency Test (SWC)
- **One of the two** students to be nominated from IIT Delhi for **Academic Exchange** to **IMT Ales France**
- Selected for **KVPY** Fellowship in 2014 (KVPY is a National Program of Fellowship in Basic Sciences, initiated by the Department of Science and Technology, Govt. of India)
- Amongst **top 300** students selected for **INPhO** (Indian National Physics Olympiad), **INChO** (Chemistry)
- **Silver Medal** at **Dr. Homi Bhabha Young Scientist Award**, 2011 by Mumbai Science Teacher's Association
- **MTSE Scholar** (Maharashtra Talent Search Exam conducted by State Govt. of Maharashtra, India) 2008,2010

Publications

Journal.....

- Dashpute, A*, Anand, C*, & Sarkar, M. (2018). Depth Resolution Enhancement in Time-of-Flight Cameras Using Polarization State of the Reflected Light. *IEEE Transactions on Instrumentation and Measurement (TIM)*. [[Paper Link](#)]

Conference.....

- Parihar, R*, Dashpute, A*, & Kalra, P. (2018). Scene Adaptive Cosmetic Makeup Transfer. *Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP-2018)*. [[Paper Link](#)]

* Joint first authors

Current Research

- **Material classification using transient Thermal Spread Functions** Aug, 2022 – Present
Prof. Ashok Veeraraghavan, ECE, Rice University
 - Developing non-invasive methods to classify materials in the thermal domain
 - Using the uniqueness of the diffusivity and emissivity combination to classify materials into various classes
 - Using Physics Inspired Neural Networks to inculcate the underlying physics of heat diffusion while training a network to classify materials into different categories
 - Also working on identifying the exact material in a controlled lab setting
- **Thermal Computational Imaging** Sept, 2021–Present
Prof. Oliver Cossairt, CS, & Prof. Aggelos Katsaggelos, EE, Northwestern University
 - Developing computational imaging techniques for imaging in the long-wave infrared domain (7-15 μm)
 - Working on inverse (neural) thermal rendering - recovering thermal properties of objects in a scene given some captured thermal data, using techniques from the Thermal Classification project
 - Also working on a project that involves 3D shape detection using thermal cameras - inferring shape from heat maps
 - Performed an extensive literature review on Differentiable Rendering including NeRF and its successors
- **Shape Estimation using Event Sensors** May, 2022–Present
Prof. Florian Willomitzer, Optics, University of Arizona
 - Developing computational lighting methods to infer 3D shape of complex scenes at a very fast rate
 - Developing analytical methods using event cameras to get shape of objects in the wild - for all types of BRDFs
 - Using in-the-wild screens for reflective objects to build deflectometry setup as projectors don't work for them

Experience

Health & Medical Equipment, Samsung R & D, Bangalore.....

Worked on the rendering engine for all series of Ultrasound Modalities by SAMSUNG MEDISON

- **Development and performance optimization of volume rendering algorithms** Jan, 2019–Dec, 2020
 - Worked on developing features based on surface and translucency rendering
 - DirectX 11 API was used to interact with the GPU to achieve hardware-accelerated rendering
 - Used GPUView tool to profile performance on hardware, removed bottlenecks at both CPU and GPU level
 - Used NVIDIA Nsight tool to perform detailed analysis on NVIDIA GPUs, helpful in optimizing shader code
 - Obtained speed gains of up to 3x that boosted market sales of particular Ultrasound Modality modelsReceived the prestigious **Samsung Citizen Award** (People & Process) for contribution to Engine version up
- **STIC - clinical Fetal Heart assessment** July, 2019–Oct, 2019
 - Worked in improvement of Spatio-Temporal Image Correlation (STIC) feature having 2D, 3D cine sequences
 - CPU pre-processing filters implemented on GPU with the help of Compute Shaders
 - Image Caching implemented to prevent duplicate rendering. Up-to 10X speed-up was observed.Received **Samsung Citizen Award** (Technical Excellence) for contribution to STIC feature release
- **Performance optimization of Image Processing filters** June, 2018–Jan, 2019
 - Implemented Label Set Erosion and Dilation filters on GPU using Compute Shaders in DirectX 11
 - There was an improvement of over 5X upon the existing version of already multi-threaded ITK filters
 - This improvised filter formed an integral part of the Follicle Detection algorithm used for Embryo transfer

Projects

- **Propagation of Vector Beam through Random Media** Feb, 2017–December, 2019
Prof. Kedar Khare, Dept. of Physics, IIT Delhi
 - Devised a novel method of using a robust engineered beam to give better real time imaging through random scattering media. Employed Laguerre-Gaussian beam modes in cross polarization to generate the beam
 - Conducted extensive simulations modeling thick diffuser & observing quality of propagated combined beam
 - Performed experiments in lab and proved through SNR measurement that the combined beam had better beam retention compared to the widely used Gaussian beam

- Combined beam was found to be robust to variations caused by scattering and time-varying phase fluctuations due to the complementary nature of its component LG beams
- **Depth Resolution Enhancement in Time-of-Flight Cameras** Aug, 2015 – Dec, 2017
Prof. Mukul Sarkar, Dept. of Electrical Engineering, IIT Delhi
 - Presented a novel method for reducing depth measurement error using polarization state of reflected light
 - Transmission angle of the linear polarizer was varied for a fixed object distance from camera. Sinusoidal variations were observed for depth error with clear maxima and minima
 - Depth error was minimum when polarization angle equals ToF phase shift, observed error reduction of 87% for 3m
- **Scene Adaptive Makeup Transfer** Aug, 2017 – June, 2017
Prof. Prem Kalra, Dept. of Computer Science, IIT Delhi
 - Developed a robust makeup transfer pipeline which can transfer face makeup from a reference image onto a subject image. Used Scalismo-faces library for 3D reconstruction of face model from a single image.
 - Implemented makeup transfer framework analogous to physical makeup by decomposing the face images into color & structured layers. Information is then transferred between these layers to get resultant makeup
 - 3D Face models were used to implement relighting of face images to match lighting conditions of reference and subject image. User-defined lighting is also possible post makeup transfer
 - Realistic addition of face accessories was made possible as the reconstructed 3D face models were available

Internships

- **GIF Creator Application, Framework and UI - Samsung R & D, Bangalore** May, 2017–July, 2017
 - Created the framework and User Interface of GIF Creator Application in Samsung's *Tizen* Platform for IoT
 - Selected key frames from video, reduced their resolution & converted to GIF, developed in native Tizen environment

Relevant Coursework

- **Imaging:** Computational Photography, Computational Imaging, Computer Vision, Advanced Computer Vision, Computer Graphics, Intermediate Computer Graphics, Advanced Graphics Seminar, Digital Image Analysis, Photonic Information Processing, Medical Imaging, Advanced Biophotonics
- **Electrical Engineering & Computer Science:** Signals & Systems, Control Systems, Circuit Theory, Digital Electronics, Analog Electronics, Embedded Systems, Data Structures & Algorithms, Machine Learning, Deep Learning, Deep Reinforcement Learning
- **Mathematics:** Linear Algebra, Calculus, Probability & Stochastic Processes

Teaching Assistant.....

CS331: Introduction to Computational Photography, Northwestern University

Technical and Personal skills

- **Programming Languages:** JAVA, C, C++, Python, Matlab, OCaml
- **Software/Tools:** Autodesk, Arduino, Origin, L^AT_EX, OpenCV, OpenGL, DirectX 9, DirectX 11, PyTorch
- **Languages:** Marathi, Hindi, English, French (Basic)

Interests and extra-curricular activity

- Winner of many State, Zonal and Inter-University level competitions in **Table Tennis**
- Fine Arts: Charcoal Painting, Graffiti Making, Wall painting
- **Audio Guide Application** for the National Museum Delhi; A **Documents and Menu Reader** mobile phone application for the visually impaired