

# Nisarg Anish Shah

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## EDUCATION

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### Ph.D. in Electrical and Computer Engineering

*Johns Hopkins University*

Advisor: Dr. Vishal Patel

Maryland, USA

2022 - 2026

### B.Tech. in Electrical Engineering

*Indian Institute of Technology Jodhpur*

Advisors: Dr. Anil Kumar Tiwari, Dr. Himanshu Kumar

Rajasthan, India

2017 - 2021

## POSITION

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### Applied Scientist II

*Amazon Web Services, Amazon, Inc.*

April 2026 – Present

*Santa Clara, CA*

Applied Scientist at AWS AI working on LLM agents, focused on model routing, critic and evaluator models, and multi-step planning for autonomous agents

*Prev: Research Intern*

May 2025 – August 2025

Research Intern at AWS AI/ML supervised by *Pengkai Zhu, Srikar Appalaraju, Ankan Bansal*, building preference-aligned LLM agents for code and computer use, planning API toolchains and executing GUI actions

### Research Intern

*Netflix, Inc.*

June 2024 - Nov 2024

*Los Gatos, CA*

Research Intern at Netflix supervised by *Amir Ziai, Chaitanya Ekanadham, Benjamin Klein* working on Long-Video (Multi-modal) LLMs and improving reasoning capabilities

### Research Engineer, Computer Vision

*AI Foundation*

July 2021 - July 2022

*San Francisco, CA, Remote*

*Prev: Research Intern*

Mar 2021 - July 2021,

Research Engineer at the AI Foundation Science supervised by *Dr. Gaurav Bharaj* working on efficient Generative Models for rendering purposes

### Research Intern

*National University of Singapore*

Apr 2020 - Sep 2020

*Singapore*

Research intern at the School of Computing supervised by *Dr. Angela Yao*. Worked on development of novel training and dataloader sampling strategies to mitigate the issue of long-tail classification for Action Recognition.

## PUBLICATIONS

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1. **Nisarg A Shah**, Shameema Sikder, S. Swaroop Vedula, Vishal M. Patel. ”**Scaling GRPO with Data Curation: Offline Signals for Annotation-Efficient Alignment**”. *[In Prep]*
2. Ruozhen He, **Nisarg A Shah**, Qihua Dong, Zilin Xiao, Jaywon Koo, Vicente Ordonez. ”**Beyond Referring Expressions: Scenario Comprehension Visual Grounding**”. *[Under Review]*
3. **Nisarg A Shah**, Amir Ziai, Chaitanya Ekanadham, Vishal M. Patel. ”**Cinéaste: A Fine-grained Contextual Movie Question Answering Benchmark**”. *Workshop on Emerging Directions in Data for Multimodal Foundation Models, CVPR, 2025*
4. **Nisarg A Shah**, Mingze Xia, Shameema Sikder, S. Swaroop Vedula, Vishal M. Patel. ”**Learning Action Conditioned World Models for Cataract Surgery from Unlabeled Videos**”. *[Under Review]*

5. **Nisarg A Shah**, Bardia Safaei, Shameema Sikder, S. Swaroop Vedula, Vishal M. Patel. **"StepAL: Step-aware Active Learning for Cataract Surgical Videos"**. *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2025*
6. **Nisarg A Shah**, Mingze Xia, Subhasri Vijay, Shameema Sikder, S. Swaroop Vedula, Vishal M. Patel. **"A Vision Foundation Model for Cataract Surgery Using Joint-Embedding Predictive Architecture"**. *Medical Imaging with Deep Learning (MIDL), 2025*
7. **Nisarg A Shah**, Vibashan VS, Vishal M Patel. **"LQMFormer: Language-aware Query Mask Transformer for Referring Image Segmentation"**. *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2024*
8. **Nisarg A Shah**, Shameema Sikder, Swaroop Vedula, Vishal M Patel. **"GLSFormer: Gated - Long, Short Sequence Transformer for Step Recognition in Surgical Videos"**. *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2023* [Early Accept]
9. **Nisarg A Shah**, Gaurav Bharaj. **"Towards Device Efficient Conditional Image Generation"**. *British Machine Vision Conference (BMVC), 2022* [arXiv]
10. Sauradip Nag\*, **Nisarg A Shah\***, Anran Qi\*, Raghavendra Ramachandra. **"How Far Can I Go ? : A Self-Supervised Approach for Deterministic Video Depth Forecasting"**. *Machine Learning for Autonomous Driving, 35th Conference on Neural Information Processing Systems (NeurIPS), 2021*
11. Sourya Dipta Das, Saikat Dutta, **Nisarg A Shah**, Dwarikanath Mahapatra, Zongyuan Ge. **"Anomaly Detection in Retinal Images using Multi-Scale Deep Feature Sparse Coding"**. *International Symposium on Biomedical Imaging (ISBI), 2022*
12. Aditya Raj\*, **Nisarg A Shah\***, Anil Kumar Tiwari. **"A novel approach for fundus image enhancement"**. *Biomedical Signal Processing and Control 71 (2022): 103208.*
13. Sourya Dipta Das\*, **Nisarg A Shah\***, Saikat Dutta, Himanshu Kumar. **"DSRN: an Efficient Deep Network for Image Relighting"**. *IEEE International Conference on Image Processing (ICIP), 2021*
14. Saikat Dutta, **Nisarg A Shah**, Anurag Mittal. **"Efficient Space-time Video Super Resolution using Low-Resolution Flow and Mask Upsampling"**. *New Trends in Image Restoration and Enhancement workshop, IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2021*
15. Saikat Dutta, Sourya Dipta Das, **Nisarg A Shah\***, Anil Kumar Tiwari. **"Lightweight model for Bokeh Effect Rendering on Low cost devices"**. *Mobile AI workshop, IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2021*
16. Sourya Dipta Das\*, **Nisarg A Shah\***, Saikat Dutta. **"MSR-Net: Multi-Scale Relighting Network for One-to-One Relighting"**. *Differentiable computer vision, graphics, and physics in machine learning, 34th Conference on Neural Information Processing Systems (NeurIPS), 2020*
17. **Nisarg A Shah**, Divij Gupta, Romil Lodaya, Ujjwal Baid, Sanjay Talbar. **"Colorectal Cancer Segmentation using Atrous Convolution and Residual Enhanced UNet"**. *Fifth IAPR International Conference on Computer Vision Image Processing (CVIP), 2020*
18. Aditya Raj, **Nisarg A Shah**, Anil Kumar Tiwari, Maria G Martini. **"Multivariate Regression-Based Convolutional Neural Network Model for Fundus Image Quality Assessment"**. *IEEE Access 8 (2020): 57810-57821.*
19. Ujjwal Baid, **Nisarg A Shah**, Sanjay Talbar. **"Brain Tumor Segmentation with Cascaded Deep Convolutional Neural Network"**. *Brain Lesion (BrainLes) workshop, 22nd International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI), 2019*

\* indicates authors contributed equally to the work.

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⇒ Challenge Reports on the last page.

## SELECTED PROJECTS

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- **Efficient Generative Networks for Faster Rendering**

Advisor: Dr. Gaurav Bharaj | AI Foundation

March 2021 - July 2022

- Proposed a device-agnostic two-stage method (channel condensing followed by pruning with student-teacher fine-tuning) to compress conditional image generation autoencoders without loss in quality
- Enabled real-time inference of generative models (segmentation-to-face, cartoonization, CycleGAN) on CPU-only devices; published at BMVC 2022

- **Self-Supervised Learning for Forecasting of 3d motion of Dynamic scene**

Advisor: Prof. Raghavendra Ramachandra | NTNU, Norway

Feb 2021 - Present

- Proposed a novel self-supervised method to anticipate the depth estimate for a future, unobserved real-world urban scene in an unsupervised manner
- Estimated the depth of an unobserved frame as a view-synthesis problem, treating it as an auxiliary task while synthesizing back the views using learned pose.

- **Long Tailed Action Recognition**

Advisor: Dr. Angela Yao | National University of Singapore

Apr 2020 - Sep 2020

- Proposed and implemented various sampling and loss-based methods for solving the problem of Long-tailed distribution of datasets in real world where the number of action classes range in the order of thousands
- Performed an intensive survey of the state-of-art work done in the field of action recognition mainly for three important datasets i.e. YouTube-8M, CrossTask, and EPIC Kitchens

- **Uncertainty Aware Curriculum Model Adaptation for night time image segmentation**

HUST, China | Winning solution for UIOU Dark Zurich Challenge, at CVPR'20

Apr 2020 – Dec 2020

- Proposed a framework using concepts like pseudo label generation, and unsupervised image-to-image translation to mitigate performance degradation observed under adverse weather and illumination conditions
- Formulated framework included an Uncertainty aware method for rectifying semantic predictions and spatial prior assisted method for making pseudo labels more reliable

- **Real-time Single and Multi-scene Deep Image Relighting**

Advisor: Dr. Himanshu Kumar | IIT Jodhpur, India

Jan 2020 – Apr 2020

- Proposed a robust network for translating image color temperature from input-to-target image and also for generation of light gradient with respect to the target image
- Resulting multi-scale architecture is highly efficient in terms of run-time and memory-usage, and could be easily deployed in low-cost mobile devices

## SKILLS

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- **ML / LLM:** PyTorch, HuggingFace Transformers, LLM post-training (GRPO/SFT), RAG, multi-agent systems
- **Languages:** Python, C++, C
- **Tools:** Git, Docker, AWS (SageMaker, Bedrock)

## RELEVANT COURSEWORK

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Computational Imaging, Calculus and Linear Algebra, Complex Analysis and Differential Equations, Machine Learning\*, Fundamentals of Computer Vision\*, Probability Statistics and Random Processes, CS 231n: CNNs for Visual Recognition\*, Deep Learning specialization\*, Digital Logic and Design, Electrical Machines, Data Structures and algorithms\*, Object-oriented Programming\*, Computer Networks\*

\* indicates Massive Open Online Courses(MOOCs)

## ACHIEVEMENTS

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- Presented the winning solution of UIOU Dark Zurich Challenge at Vision for all Seasons: Adverse Weather and Lighting Conditions Workshop at CVPR, 2020
- Among 0.5% of the applied students (approximately 11,00,000) across India to clear Joint Entrance Examination -Advanced (IIT-JEE)
- Successfully cleared *KVPY* examination, 2017
- Ranked in top 20 of Gujarat Secondary Education Board Exam amongst 900,000 candidates

## POSITIONS OF RESPONSIBILITY

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- Secretary, Hostel Cultural and Literary Society , IIT Jodhpur
  - Established a non-academic library for the members of the hostel and other aspirants for UPSC examination - India
  - Led a team of 6 members to organize various events to celebrate festivals at hostel level
- Student Volunteer, Alumni Relations Committee, IIT Jodhpur
  - Led a team of three members for creating a detailed database of Alumni for Alumni Relations Committee
  - Facilitated and overseen Travel and Accommodation arrangements of 180 Alumni and their parents for Convocation'18, IIT Jodhpur with 2 other team members.

## CHALLENGE REPORTS

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- "NTIRE 2021 challenge on video super-resolution". *New Trends in Image Restoration and Enhancement workshop on image and video restoration and enhancement, IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2021*
- "Fast and accurate quantized camera scene detection on smartphones". *Mobile AI Workshop, IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2021*
- "AIM 2020: Scene Relighting and Illumination Estimation Challenge". *Advances in Image Manipulation workshop, European Conference on Computer Vision (ECCV), 2020*
- "AIM 2020 Challenge on Rendering Realistic Bokeh". *Advances in Image Manipulation workshop, European Conference on Computer Vision (ECCV), 2020*
- "NTIRE 2020 Challenge on Real Image Denoising: Dataset, Methods and Results". *New Trends in Image Restoration and Enhancement workshop on image and video restoration and enhancement, IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2020*