

Mosam Dabhi

PH.D. STUDENT

Carnegie Mellon University, Pittsburgh, PA, USA

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Research Interests

AI systems with world-awareness.

- Computer vision** 3D Vision, Multi-view geometry, Physics [1–5]
AI / ML Optimization, SSL, Generative modeling, Graph [2–4, 6]
Graphics Implicit Functions, Differentiable Rendering [4]
Robotics Neuro-VLAs, SLAM, Control [7–11]

Education

Carnegie Mellon University

PH.D. IN ROBOTICS

Pittsburgh, USA

Aug. '21 - Present

- **Advisor:** Simon Lucey and László A Jeni

Carnegie Mellon University

M.S. IN ROBOTICS

Pittsburgh, USA

Aug. '19 - May '21

- **Advisor:** Simon Lucey
- Thesis: Multi-view NRSfM: Affordable Setup for High-Fidelity 3D Reconstruction

National Institute of Technology

B.TECH. IN ELECTRONICS AND COMMUNICATION ENGINEERING

Surat, India

Aug. '13 - May '17

Research Experiences

Carnegie Mellon University

PH.D. STUDENT

Pittsburgh, USA

Aug. '19 - Present

- **Advisors:** Simon Lucey and László A Jeni
- Geometric Foundation Models to improve 3D vision, reasoning, and action by integrating geometry with foundational models.
- Developed models like 3D-LFM [3, 5, 7] advancing scalable 3D reasoning and real-world robot actions.
- Introduced RAT4D [4] that creates dense animatable 3D models from RGB videos, enabling novel applications like gen-AI video correction.
- MV-NRSfM [1], MBW [2] enables scalable auto-labeling with minimal supervision, while 3D-LFM lifts 2D to 3D landmarks with graph-based transformers.

Apple Inc.

Cupertino, US

May '24 - Sep '24

RESEARCH SCIENTIST INTERN (AI)

- LLMs, LVMs, and 3D (*Vision Pro* team).

Apple Inc.

Cupertino, US

June '23 - Aug. '23

RESEARCH SCIENTIST INTERN (AI)

- Multimodal time-series modeling, shaping the foundation for lightweight AI foundation models (*Vision Pro* team).

Apple Inc.

Cupertino, US

May '22 - Aug. '22

RESEARCH SCIENTIST INTERN

- Few-shot learning and Out-Of-Distribution adaptation algorithms (*Vision Pro* team).
- Auto-labeling in the wild, driving substantial financial savings by auto-generating 3D labels for computer vision applications.

Apple Inc.

Cupertino, US

May '21 - Aug. '21

RESEARCH INTERN

- Active learning and self-supervised learning strategies (*Vision Pro* team).

Apple Inc.

Cupertino, US

May '20 - Aug. '20

RESEARCH INTERN

- Foundational ML work on multi-view 3D geometry, enabling economical 3D groundtruth labels (*Vision Pro* team).

Carnegie Mellon University

Pittsburgh, US

RESEARCH ASSISTANT

May '17 - May. '19

- **Advisor:** Nathan Michael
- Real-time robotic exploration policies for search and rescue, enabling advanced communication on extra-/sub-terrestrial surfaces [11].
- Robot policies for flights in GPS-denied terrains with accelerations over 12 m/s^2 [10].
- Experience-driven Model Predictive Control (E-MPC) for computationally constrained platforms [8, 12].
- Path planning policy in cluttered environments via mixed-integer programming [9].

Indian Institute of Science

Bangalore, India

RESEARCH INTERN

May '15 - Jul. '15

- **Advisor:** Prasanta Kumar Ghosh
- Speech models for mobile devices via Markovian models.

Publications

- [1] **Mosam Dabhi**, Chaoyang Wang, Kunal Saluja, László A Jeni, Ian Fasel, and Simon Lucey. High Fidelity 3D Reconstructions with Limited Physical Views. In *2021 International Conference on 3D Vision (3DV)*. IEEE, 2021.
- [2] **Mosam Dabhi**, Chaoyang Wang, Tim Clifford, László A Jeni, Ian Fasel, and Simon Lucey. Multi-view Bootstrapping in the Wild. In *Thirty-sixth Conference on Neural Information Processing Systems Datasets and Benchmarks Track*. NeurIPS, 2022.
- [3] **Mosam Dabhi**, László A Jeni, and Simon Lucey. 3d-lfm: Lifting foundation model. *2024 Computer Vision and Pattern Recognition (CVPR)*, 2024.
- [4] **Mosam Dabhi**, Simon Lucey, and László A Jeni. Rat4d: Rig and animate any object without templates in 4d. *2026 Winter Conference on Applications of Computer Vision (WACV)*, 2026.
- [5] Mukai Yu, **Mosam Dabhi**, Liuyue Xie, Sebastian Scherer, and László A Jeni. Unified spherical frontend: Learning rotation-equivariant representations of spherical images from any camera, 2025.
- [6] Liuyue Xie, George Z. Wei, Avik Kuthiala, Ce Zheng, Ananya Bal, **Mosam Dabhi**, Liting Wen, Taru Rustagi, Ethan Lai, Sushil Khymalia, Rohan Choudhury, Morteza Ziyadi, Xu Zhang, Hao Yang, and László A. Jeni. Maverix: Multimodal audio-visual evaluation reasoning index. In *Fortieth AAAI Conference on Artificial Intelligence (AAAI)*. AAAI, 2026. Accepted for Poster Presentation.
- [7] **Mosam* Dabhi**, Peiqi* Yu, László A Jeni, and Changliu Liu. Zero-shot deformable manipulation across robots via geometric reasoning, Under submission, 2025.
- [8] **Mosam Dabhi**, Alexander Spitzer, and Nathan Michael. Aggressive Flight Performance using Robust Experience-driven Predictive Control Strategies: Experimentation and Analysis. Technical Report CMU-RI-TR-19-08, Carnegie Mellon University, Pittsburgh, PA, June 2019.
- [9] **Mosam Dabhi**, Vishnu Desaraju, and Nathan Michael. Planning Aggressive, Dynamically Feasible and Optimal Trajectories for Autonomous Vehicles in Cluttered Environments using Mixed Integer Programming. Technical report, Carnegie Mellon University, Pittsburgh, PA, 2016.
- [10] Alex Spitzer, Xuning Yang, John Yao, Aditya Dhawale, Kshitij Goel, **Mosam Dabhi**, Matt Collins, Curtis Boirum, and Nathan Michael. Fast and agile vision-based flight with teleoperation and collision avoidance on a multirotor. In *International Symposium on Experimental Robotics*, pages 524–535. Springer, 2018.
- [11] Wennie Tabib, Kshitij Goel, John Yao, **Mosam Dabhi**, Curtis Boirum, and Nathan Michael. Real-Time Information-Theoretic Exploration with Gaussian Mixture Model Maps. In *Robotics: Science and Systems*, 2019.
- [12] **Mosam Dabhi**, Vishnu R Desaraju, and Nathan Michael. Evaluation of Explicit Experience-driven Predictive Control on a Computationally Constrained Platform. Technical report, Carnegie Mellon University, Pittsburgh, PA, June 2017.

Honors & Awards

- '19 - '23 **Apple Research Grant**, Apple Inc.
'17 **Research Scholarship**, FICCI, India
'16 - '17 **Summer Scholar**, Robotics Institute Summer Scholar
'16 **Undergraduate thesis funding**, TEQIP Award, MHRD, Government of India
'25 **Swartz Center, CMU**, Innovation Commercialization Fellow Award

Academic Services

- '22 - '25 **Conference Paper Reviewer**, NeurIPS; CVPR; ICCV; ECCV; WACV
'21 - '25 **Conference Paper Reviewer**, ICRA, IROS
'20 **Conference Paper Reviewer**, International Conference on Humanoid Robots
'23 - '25 **Admissions Committee @ CMU**, Doctor of Philosophy (PhD), Master of Science, Robotics (MSR), Master of Science, Computer Vision (MSCV)
'22 - '23 **M.S. in Robotics Thesis Committee**, Examinee: Heng Yu, Aarush Gupta
'17 - '19 **Admissions & Admin. Committee**, Robotics Institute Summer Scholars, CMU (RISS)

Teaching Experiences

Carnegie Mellon University

TEACHING ASSISTANT

- **Spring 2022** : Robot Localization and Mapping with Prof. Michael Kaess
- **Fall 2022** : Geometry-Based Methods in Vision with Prof. Shubham Tulsiani

Relevant coursework

Carnegie Mellon University

LEARNING FOR 3D VISION (**A+**), ADVANCED COMPUTER VISION (**A**), GEOMETRY METHODS IN VISION (**A+**), ADVANCED MACHINE LEARNING (**A**), CONVEX OPTIMIZATION (**A**), ROBOT LOCALIZATION AND MAPPING / SLAM (**A+**), MATH. FUNDAMENTALS FOR ROBOTICS (**A**), KINEMATICS, DYNAMICS, AND CONTROLS (**A+**)

Proficient Skills

Programming languages

PRIMARY: PYTHON, C/C++, L^AT_EX, MATLAB

SECONDARY: CUDA, LUA, HTML, JAVASCRIPT

Software libraries

PRIMARY: PYTORCH, TENSORFLOW, BLENDER, COLMAP

SECONDARY: OPENAIGYM, TORCH, CAFFE, OPENCV, VLFeat, PTHREAD