Mosam Dabhi

PH.D. STUDENT

Carnegie Mellon University, Pittsburgh, PA, USA

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Research Interests

AI systems with world-awarness.

Computer vision	3D Vision, Multi-view geometry, Physics [1–4]
Machine Learning	Optimization, SSL, Generative modeling, Graph [2–4]
Graphics	Implicit Functions, Differentiable Rendering [4]
Robotics	Neuro-VLAs, SLAM, Control [5–9]

Education

Carnegie Mellon University   *Pittsburgh, USA*

PH.D. IN ROBOTICS   *Aug. '21 - Present*

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

Carnegie Mellon University   *Pittsburgh, USA*

M.S. IN ROBOTICS   *Aug. '19 - May '21*

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

National Institute of Technology   *Surat, India*

B.TECH. IN ELECTRONICS AND COMMUNICATION ENGINEERING   *Aug. '13 - May '17*

Research Experiences

Carnegie Mellon University   *Pittsburgh, USA*

PH.D. STUDENT   *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] advancing scalable 3D labeling 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*

RESEARCH SCIENTIST INTERN (AI)   *May '24 - Sep '24*

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

Apple Inc.   *Cupertino, US*

RESEARCH SCIENTIST INTERN (AI)   *June '23 - Aug. '23*

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

Apple Inc.   *Cupertino, US*

RESEARCH SCIENTIST INTERN   *May '22 - Aug. '22*

- 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*

RESEARCH INTERN   *May '21 - Aug. '21*

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

Apple Inc.   *Cupertino, US*

RESEARCH INTERN   *May '20 - Aug. '20*

- 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 [9].
- Robotic piolicies for flight in GPS-denied terrains with accelerations over 12 m/s^2 [8].
- Experience-driven Model Predictive Control (E-MPC) for computationally constrained platforms [6, 10].
- Path planning policy in cluttered environments via mixed-integer programming [7].

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] Peiqi* Yu, **Mosam* Dabhi**, László A Jeni, and Changliu Liu. Zero-shot robotic manipulation via semantic 3d lifting and neurosymbolic frameworks, 2025.

[6] **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.

[7] **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.

[8] 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.

[9] 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.

[10] **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++, LATEX, MATLAB

SECONDARY: CUDA, LUA, HTML, JAVASCRIPT

Software libraries

PRIMARY: PYTORCH, TENSORFLOW, BLENDER, COLMAP

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