Mosam Dabhi

PH.D. STUDENT

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Research Interests

Machine Learning Geometric reasoning, Meta-learning, One-shot/Few-shot learning, Graph Representation learning

Computer vision Multi-view geometry, Neural 3D representations, Self-supervised labeling

Robotics Predictive control, Active Perception

Education

Carnegie Mellon University
Pittsburgh, PA, USA

PH.D. IN ROBOTICS — *Aug. 2021 - Present*

- **Advisor**: Simon Lucey and Laszlo Attila Jeni

Carnegie Mellon University
Pittsburgh, PA, USA

M.S. IN ROBOTICS — *Aug. 2019 - May 2021*

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

National Institute of Technology
Surat, Gujarat, India

B.TECH. IN ELECTRONICS AND COMMUNICATION ENGINEERING — *Aug. 2013 - May 2017*

Research Experiences

Carnegie Mellon University
Pittsburgh, PA, USA

GRADUATE RESEARCH ASSISTANT — *Aug. 2019 - Present*

- **Advisor**: Simon Lucey, Laszlo Attila Jeni
- Exploiting symmetries via graph representation learning to enable out-of-distribution generalization.
- In-the-wild data labeling at scale. [1]
- High-fidelity 3D reconstructions using 2 uncalibrated camera views. [2, 3]

Apple, Inc. (AI Research team)
Cupertino, CA, USA

RESEARCH SCIENTIST INTERN — *June 2023 - Present*

- Geometric reasoning - designing equivariant architectures over graph-structured data to enable prediction and out-of-distribution generalization for realtime applications within Computer Vision AI Research team.

Apple, Inc.
Sunnyvale, CA, USA

RESEARCH INTERN — *May 2022 - Aug. 2022*

- Meta-learning; Few-shot learning; O.O.D. detection.

Apple, Inc.
Sunnyvale, CA, USA

RESEARCH INTERN — *May 2021 - Aug. 2021*

- Research in active labeling, self-supervised learning. [1]

Apple, Inc.
Sunnyvale, CA, USA

RESEARCH INTERN — *May 2020 - Aug. 2020*

- Research on affordable setups to generate 3D groundtruth for computer vision applications [2].

Carnegie Mellon University
Pittsburgh, PA, USA

RESEARCH ASSISTANT — *May 2017 - May. 2019*

- **Advisor**: Nathan Michael
- Exploration & mapping for search and rescue, where robots must share information in realtime [4].
- Flights in unstructured, GPS-denied environments at accelerations exceeding 12 m/s^2 [5].
- Experience-driven Model Predictive Control (EPC) on computationally constrained platforms. [6, 7].
- Planning in cluttered environments using mixed-integer programming. [8]

Indian Institute of Science
Bangalore, India

RESEARCH INTERN — *May 2015 - Jul. 2015*

- **Advisor**: Prasanta Kumar Ghosh
- Home automation using speaking rate.
- Speech based digit identification.

Publications

[1] **Mosam Dabhi**, Chaoyang Wang, Tim Clifford, Laszlo 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.

[2] **Mosam Dabhi**, Chaoyang Wang, Kunal Saluja, Laszlo Jeni, Ian Fasel, and Simon Lucey. High Fidelity 3D Reconstructions with Limited Physical Views. In *2021 International Conference on 3D Vision (3DV)*. IEEE, 2021.

[3] **Mosam Dabhi**. Multi-view NRSfM: Affordable Setup for High-Fidelity 3D Reconstruction. Master's thesis, Carnegie Mellon University, Pittsburgh, PA, May 2021.

[4] 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.

[5] 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.

[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 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.

[8] **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.

Honors & Awards

2019 - Now	**Apple Research Grant**, Apple Inc.	*Sunnyvale, CA, USA*
2017	**Research Scholarship**, Federation of Indian Chambers of Commerce & Industry	*Pittsburgh, PA, USA*
2016 - 17	**Summer Scholar**, Robotics Institute Summer Scholar	*Pittsburgh, PA, USA*
2016	**Undergraduate thesis funding**, TEQIP Award, MHRD, Government of India	*Surat, India*

Academic Services

2023	**Conference Paper Reviewer**, NeurIPS; CVPR; ICCV; WACV	
2022	**Conference Paper Reviewer**, NeurIPS; CVPR	
2021	**Conference Paper Reviewer**, IROS	
2020	**Conference Paper Reviewer**, International Conference on Humanoid Robots	
2021 - 2023	**Admissions Committee**, Master of Science, Robotics, CMU (MSR)	*Pittsburgh, PA, USA*
2017 - 2019	**Admissions & Administrative Committee**, Robotics Institute Summer Scholars, CMU (RISS)	*Pittsburgh, PA, USA*

Teaching Experiences

Carnegie Mellon University *Pittsburgh, PA, USA*

Teaching Assistant

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

Selected coursework

Carnegie Mellon University *Pittsburgh, PA, USA*

Learning for 3D Vision (**A+**), Computer Vision (**A**), Advanced Machine Learning (**A**), Convex Optimization (**A**), Robot Localization and Mapping (**A+**), Mathematics Fundamentals for Robotics (**A**), Kinematics, Dynamics, and Controls (**A+**), Ethics in Robotics (**A**) *Aug. 2019 - Present*