

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

PH.D. IN ROBOTICS

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

Pittsburgh, PA, USA

Aug. 2021 - Present

Carnegie Mellon University

M.S. IN ROBOTICS

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

Pittsburgh, PA, USA

Aug. 2019 - May 2021

National Institute of Technology

B.TECH. IN ELECTRONICS AND COMMUNICATION ENGINEERING

Surat, Gujarat, India

Aug. 2013 - May 2017

Research Experiences

Carnegie Mellon University

GRADUATE RESEARCH ASSISTANT

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

Pittsburgh, PA, USA

Aug. 2019 - Present

Apple, Inc. (AI Research team)

RESEARCH SCIENTIST INTERN

- Geometric reasoning - designing equivariant architectures over graph-structured data to enable prediction and O.O.D. generalization for real-time applications within Computer Vision AI Research team.

Cupertino, CA, USA

June 2023 - Present

Apple, Inc.

RESEARCH INTERN

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

Sunnyvale, CA, USA

May 2022 - Aug. 2022

Apple, Inc.

RESEARCH INTERN

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

Sunnyvale, CA, USA

May 2021 - Aug. 2021

Apple, Inc.

RESEARCH INTERN

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

Sunnyvale, CA, USA

May 2020 - Aug. 2020

Carnegie Mellon University

RESEARCH ASSISTANT

- **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]

Pittsburgh, PA, USA

May 2017 - May. 2019

Indian Institute of Science

RESEARCH INTERN

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

Bangalore, India

May 2015 - Jul. 2015

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.	<i>Sunnyvale, CA, USA</i>
2017	Research Scholarship , Federation of Indian Chambers of Commerce & Industry	<i>Pittsburgh, PA, USA</i>
2016 - 17	Summer Scholar , Robotics Institute Summer Scholar	<i>Pittsburgh, PA, USA</i>
2016	Undergraduate thesis funding , TEQIP Award, MHRD, Government of India	<i>Surat, India</i>

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)	<i>Pittsburgh, PA, USA</i>
2017 - 2019	Admissions & Administrative Committee , Robotics Institute Summer Scholars, CMU (RISS)	<i>Pittsburgh, PA, USA</i>

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