Mosam Dabhi

Ph.D. Student

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Research Interests

Computer vision 3D reconstruction, Multi-view geometry, neural 3D representations

Deep Learning Self-supervised learning, Active labeling, Structured optimization

Robotics Mapping, Active Perception, Planing and Control

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
- Generating high-fidelity 3D reconstructions using substantially reduced number of uncalibrated physical views. [1, 2]

Apple, Inc.
San Francisco, CA, USA

Research Intern — *May 2021 - Aug. 2021*

- **Mentor**: Ian Fasel
- Research in active labeling and self-supervised learning.

Apple, Inc.
San Francisco, CA, USA

Research Intern — *May 2020 - Aug. 2020*

- **Mentor**: Ian Fasel
- Research on affordable setups to generate 3D groundtruth for computer vision applications [1].

Carnegie Mellon University
Pittsburgh, PA, USA

Research Assistant — *May 2017 - May. 2019*

- **Advisor**: Nathan Michael, Wennie Tabib, Vishnu Desaraju
- Exploration & mapping for search and rescue, planetary exploration, and tactical operations where robots must share information in realtime [3].
- Aggressive autonomous flight in unstructured, GPS-denied environments at accelerations exceeding 12 m/s^2 in outdoor field experiments [4].
- Experience-driven Model Predictive Control (EPC) strategies for aggressive flight performance on computationally constrained platforms. [5, 6].
- Planning optimal and aggressive trajectories in cluttered environments using mixed-integer programming. [7]

Indian Institute of Science
Bangalore, India

Research Intern — *May 2015 - Jul. 2015*

- **Advisor**: Prasanta Kumar Ghosh
- Home automation prototype using speaking rate and pitch of the user voice from a mobile android device.
- Speech based digit identification using Support Vector Machines classifiers.

National Institute of Technology
Surat, India

Undergraduate Research Assistant — *May 2016 - May 2017*

- **Advisor**: Anand Darji
- Precision farming using a Multi-rotor robot.

Publications

[1] **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.

[2] **Mosam Dabhi**. Multi-view nrsfm: Affordable setup for high-fidelity 3d reconstruction. Master's thesis, Carnegie Mellon University, Pittsburgh, PA, May 2021.

[3] 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.

[4] 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.

[5] **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.

[6] **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.

[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.

Honors & Awards

2020-Present	**Graduate Fellowship**, Apple Inc.	*Pittsburgh, PA, USA*
2017	**Research Scholarship**, Federation of Indian Chambers of Commerce & Industry Research Scholarship (FICCI)	*Pittsburgh, PA, USA*
2016-17	**Summer Scholar**, Robotics Institute Summer Scholar	*Pittsburgh, PA, USA*
2016	**Undergraduate thesis funding**, Technical Education Quality Improvement Programme (TEQIP) Award, Ministry of Human Resource Development(MHRD), Government of India	*Surat, India*

Academic Services

2021	**Conference Paper Reviewer**, IROS: IEEE/RSJ International Conference on Intelligent Robots and Systems	*Prague, Czech Republic*
2020	**Conference Paper Reviewer**, IEEE-RAS International Conference on Humanoid Robots	*Munich, Germany*
2017-18	**Admissions & Administrative Committee**, Robotics Institute Summer Scholars (RISS)	*Pittsburgh, PA, USA*

Teaching Experiences

Carnegie Mellon University — *Pittsburgh, PA, USA*

Teaching Assistant — *Spring 2022*

- **Course**: Robot Localization and Mapping
- **Instructor**: Michael Kaess

Selected coursework

Carnegie Mellon University — *Pittsburgh, PA, USA*

Computer Vision (**A**), 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*

Proficient Skills

Programming Languages Python, C/C++, MATLAB, HTML, Lua

Software Libraries PyTorch, TensorFlow, OpenAI Gym, Torch, Caffe, OpenCV, Blender, Robot Operating System (ROS)