

Manthan Patel

PHD STUDENT · ETH ZURICH · ROBOTICS & LEARNING

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Research Interest

Main Areas Foundation models, Embodied AI, Perception, Navigation, SLAM, Datasets

Education

Ph.D. in Robotics - ongoing

FOUNDATION MODELS FOR PERCEPTION AND NAVIGATION IN THE WILD.

SUPERVISORS: PROF. MARCO HUTTER, DR. CESAR CADENA

ETH Zurich

Apr. 2025 - Present

M.Sc. in Robotics Systems and Control - Grade: 5.9/6.0

THESIS: LEARNING TRAVERSABILITY MAPS FOR AUTONOMOUS OFF-ROAD NAVIGATION - BEST GRADE 6.0/6.0

ETH Zurich

Sep. 2021 - Apr. 2024

B.Tech. in Mechanical Engineering - Academic Rank: 1/140

THESIS: COLLABORATIVE MAPPING OF ARCHAEOLOGICAL SITES USING MULTIPLE UAVS - BEST GRADE 10.0/10.0

IIT Kharagpur

MICRO-SPECIALIZATION IN ENTREPRENEURSHIP AND INNOVATION

Sep. 2017 - Apr. 2021

Work and Research Experience

PhD Research Project

ETH ZURICH - ROBOTIC SYSTEMS LAB

- DeFM: Learning Foundation Representations from Depth for Robotics (Large-scale self-supervised pretraining)

Switzerland

4/2025 - Present

Research Engineer

ETH ZURICH - ROBOTIC SYSTEMS LAB

- Large-scale synthetic perception dataset for ground robots (TartanGround)
- Long-range autonomous hiking with ANYmal legged robot

Switzerland

6/2024 - 3/2025

Visiting Researcher (Master's Thesis)

NASA - JET PROPULSION LABORATORY

- Learning Traversability Maps for Autonomous Off-road Navigation using multiple cameras and LiDARs
- Development of the RoadRunner M&M framework and real-world field deployments

CA, USA

9/2023 - 4/2024

Research Project

ETH ZURICH - COMPUTER VISION LAB

- Dense monocular SLAM approach using a point cloud-based neural occupancy field
- Laid the foundation for the GLORIE SLAM framework

Switzerland

3/2023 - 6/2023

Computer Vision Intern

SONY RESEARCH AND DEVELOPMENT CENTER

- Spatio-temporal CNNs for Event-based Vision System
- Application for high-speed spin estimation of a rotating object

Switzerland

9/2022 - 2/2023

Semester Thesis

ETH ZURICH - VISION FOR ROBOTICS LAB

- Development of COVINS-G, a generic collaborative visual-inertial SLAM framework
- Large-scale collaborative SLAM with any arbitrary VIO, Stereo and tracking camera frontends

Switzerland

3/2022 - 8/2022

Research Project

ETH ZURICH - ROBOTIC SYSTEMS LAB

- Clustering-based object proposal pipeline for Subterranean environments using LiDAR range and intensity
- Application for long-range object detection using a Pan-Tilt-Zoom camera on ANYmal legged robot

Switzerland

7/2021 - 12/2021

Vising Researcher (Bachelor's Thesis)

MPI-INTELLIGENT SYSTEMS - ROBOT PERCEPTION GROUP

Germany

5/2020 - 4/2021

- Collaborative SLAM approach for a team of UAVs for archaeological mapping
- Informative path-planning for autonomous archaeological mapping with bounded-distributive strategy

Student Researcher

IIT KHARAGPUR - AUTONOMOUS GROUND VEHICLE RESEARCH GROUP

India

2/2018 - 4/2021

- Path tracking for Ackermann steering-based vehicles using optimal control methods like LQR and MPC
- Design and development of localization and sensor integration modules for Mahindra e2o driverless car

Teaching

- 2024-Pr **Student Supervision**, 7 x Master's Thesis, 2 x Semester Thesis, 2 x PLR projects
- 2023 **Teaching Assistance**, ETH - Robotics Summer School - Dr. Cesar Cadena
- 2018 **Mentor**, IEEE Winter Workshop on Autonomous robotics using Arduino

ETH Zurich

ETH Zurich

IIT Kharagpur

Others

SCHOLARSHIPS AND AWARDS

- 2023 **JPL Visiting Research Fellowship**, NASA Jet Propulsion Laboratory
- 2021 **ETH D-MAVT Scholarship**, for Master's Degree ETH Zurich
- 2021 **Dr. B C Roy Memorial Gold Medal**, Best all-rounder among all graduating (1400) B.Tech students
- 2021 **Institute Silver Medal (Academic Rank 1)**, Highest GPA, Department of Mechanical Engineering
- 2021 **TKT Srikrishnan Endowment Prize**, for Best Bachelor's Thesis, Department of Mechanical Engineering
- 2020 **DAAD-WISE**, for Bachelor's Thesis at MPI-IS
- 2020 **OP Jindal Engineering and Management Scholarship**, for academic and leadership excellence

USA

ETH Zurich

IIT Kharagpur

IIT Kharagpur

IIT Kharagpur

Germany

India

COMPETITIONS

- 2020 **Inter-IIT Tech Meet 9.0**, First Place - Vision-based obstacle avoidance and exploration drone
- 2019 **Inter-IIT Tech Meet 8.0**, Second Place - UAV swarm solution - search and reconnaissance
- 2019 **27th Intelligent Ground Vehicle Competition (IGVC)**, Second Place - AutoNav Challenge
- 2018 **Inter-IIT Tech Meet 7.0**, Third Place - Autonomous Agricultural Robot Prototype

IIT Guwahati

IIT Roorkee

Michigan, USA

IIT Bombay

OTHERS

- 2019 **Head, Robotix Society**, Led a team of 42 people for organizing one of India's biggest college robotics fest
- 2018 **Volunteer**, National Service Scheme (NSS) for rural empowerment in India

IIT Kharagpur

Kharagpur

Publications

JOURNAL ARTICLES

DeFM: Learning Foundation Representations from Depth for Robotics

Patel, Manthan, Jonas Frey, Mayank Mittal, Fan Yang, Alexander Hansson, Amir Bar, Cesar Cadena, Marco Hutter
Under Review (2026)

Large-Scale Autonomous Gas Monitoring for Volcanic Environments: A Legged Robot on Mount Etna

Julia Richter, Turcan Tuna, **Patel, Manthan**, Takahiro Miki, Devon Higgins, James Fox, Cesar Cadena, Andres Diaz, Marco Hutter
Under Review (2026)

RoadRunner M&M-Learning Multi-range Multi-resolution Traversability Maps for Autonomous Off-road Navigation

Patel, Manthan, Jonas Frey, Deegan Atha, Patrick Spieler, Marco Hutter, Shehryar Khattak
IEEE Robotics and Automation Letters (RA-L) (2024)

RoadRunner - Learning Traversability Estimation for Autonomous Off-road Driving

Jonas Frey, **Patel Manthan**, Atha Deegan, Nubert Julian, Padgett Curtis, Spieler Patrick, Hutter Marco, Shehryar Khattak
IEEE Trans. Field Robotics (2024)

CONFERENCE PROCEEDINGS

NaviTrace: Evaluating Embodied Navigation of Vision-Language Models

Tim Windecker, **Patel, Manthan**, Moritz Reuss, Richard Schwarzkopf, Cesar Cadena, Rudolf Lioutikov, Marco Hutter, Jonas Frey
IEEE International Conference on Robotics and Automation (ICRA) (2026)

TartanGround: A Large-Scale Dataset for Ground Robot Perception and Navigation

Patel, Manthan, Fan Yang, Yuheng Qiu, Cesar Cadena, Sebastian Scherer, Marco Hutter, Wenshan Wang
International Conference on Intelligent Robots and Systems (IROS), 2025

Covins-G: A generic back-end for collaborative visual-inertial slam

Patel, Manthan, Marco Karrer, Philipp Bänninger, Margarita Chli

IEEE International Conference on Robotics and Automation (ICRA), 2023

LiDAR-guided object search and detection in Subterranean Environments

Patel, Manthan, Gabriel Waibel, Shehryar Khattak, Marco Hutter

2022 IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR), 2022

Collaborative mapping of archaeological sites using multiple uavs

Patel, Manthan, Aditya Bandopadhyay, Aamir Ahmad

International Conference on Intelligent Autonomous Systems, 2021

WORKSHOPS

Splat-slam: Globally optimized rgb-only slam with 3d gaussians

Erik Sandström, Ganlin Zhang, Keisuke Tateno, Michael Oechsle, Michael Niemeyer, Youmin Zhang, **Patel, Manthan**, Luc Van Gool, Martin Oswald, Federico Tombari

Proceedings of the Computer Vision and Pattern Recognition Conference, 2025