# Hardik Shah

hardik01shah@gmail.com | hardik01shah.github.io | hardik01shah | hardik01shah

## Education

- **ETH Zurich, [5.70 / 6]** (Transcript) *2023 - Present*
  *MSc in Computer Science, w/ Major in Machine Intelligence & Minor in Data Management Systems*
- **BITS Pilani, Goa [9.64 / 10]** (Transcript) *2019 - 2023*
  *B.E. in Computer Science, w/ Minor in Data Science*
  - **Institute Rank 6** in a batch of 900 students. Recipient of BITS Goa **Merit Scholarship** for all 8 semesters awarded to **top 10** students across all departments – 100% tuition fee waiver.

## Experience

- **Jet Propulsion Laboratory, NASA** *Apr'25 - Present*
  *Visiting Student Researcher with Dr. Shehryar Khattak, Supported by the Zeno Karl Master Thesis Grant* Pasadena, United States
  - MSc Thesis at 347J - Perception Systems. Leveraging vision-based systems for semantic mapping and planning in large-scale off-road and vegetated environments for legged robots.
- **Scandit AG** *Jul'24 - Mar'25*
  *Computer Vision Student Researcher* Zurich, Switzerland
  - Lightweight Interest Point Detection and Matching for SLAM-Based AR Visualization. Replaced traditional keypoint detectors with **learned detection and matching methods** in the tracking pipeline of Scandit's MatrixScan
- **Google Research [*Accepted to* CVPRW'24]** *Aug'22 - Jun'23*
  *Student Researcher, Supervised by Dr. Prateek Jain (Undergraduate Thesis)* Bangalore, India
  - Developed a versatile **neural network compression** toolbox that optimizes for the model's FLOPs via a novel $\frac{l_1}{l_2}$ latency surrogate across a family of compression methods, including **pruning** and **low-rank factorization**. Optimized **on-device latency** of large vision models used for OCR tasks in **Google Lens**, and **GooglePay**.
- **Robot Vision Lab, Karlsruhe University of Applied Sciences [Code] [Website]** *May'22 - Aug'22*
  *Summer Research Intern, funded by DAAD WISE Scholarship. Supervised by Prof. Dr.-Ing. Niclas Zeller* Karslruhe, Germany
  - Developed an end-to-end pipeline for 3D dense reconstruction using Intel RealSense, integrating multi-view stereo data with a self-supervised U-Net architecture (MonoRec) for stable point cloud output.

## Projects

- **Learning Scene Imagination for Efficient Exploration [*Accepted to* CVPRW'25] [Code]** *Feb'24 - Mar'25*
  *Graduate Student Researcher, Robotics and Perception Group (Prof. Dr. Davide Scaramuzza)*
  - Developed **ForesightNav**, an **imagination-driven exploration strategy** for efficient long-horizon and **open-vocabulary** navigation using CLIP-grounded semantic and geometric predictions of unseen regions.
- **POLD2: Unified Point and Line Feature Detection and Description** *Mar'24 - Mar'25*
  *Graduate Student Researcher, Computer Vision and Geometry Group (Prof. Dr. Marc Pollefeys).* ***Grade: 6/6***
  - Developed POLD2, a deep learning-based pipeline that jointly detects and describes both **point and line features** in images, optimizing feature extraction(**9.5x speedup**) for 3D vision tasks like SLAM and pose estimation.
- **A Monocular Visual Odometry Pipeline [Code] [Report] [Demo]** *Fall '23*
  *For Vision Algorithms for Mobile Robotics, ETH Zurich*
  - Implemented a continuous pipeline for camera pose estimation from 2D↔3D correspondences using **keypoint tracking**, **landmark triangulation** and **local bundle adjustment** for trajectory refinement.
- **Adding JAX Support to NPBench [Code] [Report]** *Fall '24*
  *For Design of Parallel and High Performance Computing, ETH Zurich*
  - Integrated **JAX** into NPBench, a scientific computing benchmark suite. Achieved **3x runtime improvement** over NumPy on multi-core CPUs using JAX's JIT compilation, by porting all benchmarks to JAX as pure functions.
- **Project Kratos, A Mars Rover [Code] [Website] [Demo]** *2020 - 2022*
  *Rover Navigation and Autonomy Lead*
  - Led the development of a Mars Rover for the University Rover Challenge (URC), actively driving the code design, implementation & deployment of mapping, planning, & control nodes for obstacle avoidance & object tracking.

## Awards and Achievements

- Recipient of the Zeno Karl Schindler Foundation Master Thesis Grant *2025*
- University Rover Challenge, Utah: Project Kratos secured **1st** position in India, **2nd** position in Asia *2022*
- Recipient of **DAAD WISE** research scholarship (Germany) *2022*
- Recipient of **MITACS Globalink** research scholarship (Canada) *2022*

## Skills

- **Programming Languages:** Python, C++, C, JAVA, C#, MATLAB, Latex, HTML, CSS
- **Softwares and Packages:** Pytorch, Tensorflow, Keras, JAX, Numpy, OpenCV, Unity, Gazebo, Verilog, Robot Operating System (ROS), AutoCAD, Android Studio