

Hardik Shah

✉ hardik01shah@gmail.com | [github.io](https://github.com/hardik01shah) | [in](https://www.linkedin.com/in/hardik01shah) [hardik01shah](https://www.linkedin.com/in/hardik01shah) | [g](https://www.github.com/hardik01shah) [hardik01shah](https://www.github.com/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

- **Scandit AG** Jul'24 - Present
Computer Vision Student Researcher Zurich, Switzerland
 - Lightweight Interest Point Detection and Matching for SLAM-Based AR Visualization
 - Replacing traditional keypoint detectors with **learned detection and matching methods** in the tracking pipeline of Scandit's **MatrixScan** product
- **Google Research [Accepted in 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 QR-code scanning in **GooglePay** for faster inference while maintaining accuracy.
- **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 Karlsruhe, 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.
 - Implemented keyframe pose and keypoint tracking with **BASALT-VIO** and benchmarked trajectory estimation on the **TUM-VI** dataset prior to deployment.

PROJECTS

- **Vision-Language Grounded Semantic Exploration using CLIP Features** Feb'24 - Present
Graduate Student Researcher, Robotics and Perception Group (Prof. Dr. Davide Scaramuzza). Grade: 6/6
 - Developed a unified CLIP-based representation **combining geometry and semantics** for **Object Goal Navigation** in unseen environments.
- **POLD2: Unified Point and Line Feature Detection and Description** Mar'24 - Present
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

- **University Rover Challenge**, Utah: Project Kratos secured **1st** position in India, **2nd** position in Asia 2022
- **Anatolian Rover Challenge**, Turkey: Project Kratos secured **2nd** position globally 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