Hardik Shah

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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 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.
  - 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 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.
- **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*
- Recipient of the Singapore International Pre-Graduate Award (**SIPGA**) *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