Hardik Shah

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Education

- **ETH Zurich, [5.70 / 6]** (Transcript) *2023 - Present*
  MSc in Computer Science
- **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 Intern 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 (Bachelor's 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 in various compression methods, including **pruning** and **low-rank factorization**.
  - Optimized **on-device latency** of large vision models used for OCR tasks in Google products like Lens, and QR-code scanning in GooglePay for faster inference while maintaining accuracy.
- **Robot Vision Lab, Karlsruhe University of Applied Sciences [🐙] [🌐]** *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** *Spring '24*
  Semester Project, 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** *Spring '24*
  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** *Fall '23*
  Course Project, 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** *2020 - 2022*
  Rover Navigation and Autonomy Lead [🐙] [🌐] [▶]
  - Development of a Mars Rover as part of the University Rover Challenge(URC). Led the code design, implementation and deployment of mapping, planning and control nodes for obstacle avoidance and 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