

Udit Singh Parihar

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EDUCATION

International Institute of Information Technology

MS By Research Computer Science; **GPA: 8.67/10.00**

Hyderabad, India

2019 – 2021

Indian Institute of Technology

B. Tech Mechanical Engineering; **GPA: 7.1/10.0**

Jodhpur, India

2014 – 2018

WORK EXPERIENCE

Qualcomm

Computer Vision, DL and SLAM Research Engineer

Bangalore, India

July 2023 – Present

Improving Qualcomm and Google AndroidXR 6DoF SLAM system:

- Improved 6DoF head tracking system which is part of AndroidXR in the key areas of pose estimation, stereo triangulation, and tracking
- Achieved latency under 20 ms and very low power requirements for the 6DoF SLAM system
- Brought down 6DoF accuracy under 5 mm and improvement of 50% in low texture and HDR scenarios

Fusing IMU with Camera based deep feature matching (2 Patents submitted):

- First in literature to integrate vision based transformer architecture with IMU priors for tracking
- Solves the problem of feature matching in low texture environment, high rotation changes
- Proposed uncertainty estimation of a deep learning based feature matching pipeline which is fused in downstream task for EKF state estimation

Ground truthing system for Visual Inertial Odometry (VIO):

- Bring up a mechanically constrained hardware solution for determining accuracy of VIO system
- Developed a multi checkerboard setup to estimate the multi camera and IMU pose
- Initiated and developed pipeline to use total station for calculating accuracy of VIO system

OLA Electric

Computer Vision, DL and SLAM Research Engineer

Bangalore, India

July 2021 – July 2023

Autonomous agent development:

- Developed multimodal network to predict Semantic occupancy grid and drivable waypoints directly from camera and GPS Coordinate
- Developed simulation in loop and hardware in loop testing for the autonomous agent
- Converted the pytorch model to TensorRT and developed a ROS wrapper to deploy on Mahindra E2O car achieving final control prediction at 25 HZ, in a zero shot paradigm

Lidar based mapping and localization:

- Extended the Lidar based SLAM LeGO-LOAM for the Ouster lidars and ported ROS1 to ROS2 in C++
- Calibrated the Lidar and IMU/GNSS sensors for extrinsic calibration

Kaggle Image Matching Challenge:

- Won the silver medal in the Kaggle Image Matching Challenge 2022
- Developed an Ensemble of Deep feature matching algorithm of SuperGlue and LoFTR

RESEARCH PUBLICATIONS

1. **Estimation of Appearance and Occupancy Information in Bird's Eye View from Surround Monocular Images** 📝 | *OLA Electric*
International Conference on Robotics and Automation (ICRA), Autonomy 2.0, 2022
Sarthak Sharma, Unnikrishnan R. Nair, Udit Singh Parihar, Midhun Menon S and Srikanth Vidapanakal

2. **RoRD: Rotation-Robust Descriptors and Orthographic Views for Local Feature Matching** | [IIITH](#)
International Conference on Intelligent Robots and Systems (IROS), 2021
Udit Singh Parihar*, Aniket Gujarathi*, Kinal Mehta*, Satyajit Tourani*, Sourav Garg, Michael Milford and K. Madhava Krishna
3. **Early Bird: Loop Closures from Opposing Viewpoints for Perceptually-Aliased Indoor Environments** | [IIITH](#)
International Conference on Computer Vision Theory and Applications (VISAPP), 2021
Satyajit Tourani*, Dhagash Desai*, **Udit Singh Parihar***, Sourav Garg, Ravi Kiran Sarvadevabhatla, Michael Milford and K. Madhava Krishna
4. **Topological Mapping for Manhattan-like Repetitive Environments** | [IIITH](#)
International Conference on Robotics and Automation (ICRA), 2020
Sai Shubodh Puligilla* , Satyajit Tourani* , Tushar Vaidya* , **Udit Singh Parihar*** , Ravi Kiran Sarvadevabhatla and K. Madhava Krishna

PROJECTS

Tutorial on Pose Graph Optimization | [Project Link](#)

Teaching Assistant in Mobile Robotics course | Sep 2020

- Created Open source tutorials for 2D pose graph optimization with loop closure and 3D pose graph optimization with landmarks using g2o library
- Obtained more than 50 stars and forks on GitHub for the tutorials

Development of Robotics Toolbox | [Project Link](#)

Mobile Robotics Coursework | Aug 2019

- Implemented Bundle Adjustment from scratch. Compared performance of Gauss Newton and LM algorithm for optimization
- Implemented Extended Kalman Filter algorithm on the standard "Lost in the Woods" dataset

Development of Parallel Computing Toolbox | [Project Link](#)

Parallel Scientific Computing Coursework | Jan 2019

- Implemented PCA algorithms for image compression using C++/Cuda. Compared performance against MATLAB standard PCA implementation
- Implemented parallel Monte Carlo algorithm for calculation of digits of PI using OpenMP and MPI

SKILLS

Programming: C++, Python, C, MATLAB

Libraries: PyTorch, Keras, CUDA, TensorRT, ROS1/ROS2, Ceres, GTSAM

RELEVANT COURSEWORK

Major coursework: Computer Vision, Mobile Robotics, Topics in Applied Optimization, Introduction to Parallel Programming, Deep Learning Theory and Practices, Probability and Statistics, Programming and Data Structures