Udit Singh Parihar

+91 9131546120 | uditsinghparihar96@gmail.com | Website | LinkedIn | GitHub | Google Scholar |
Bangalore, India

Education

International Institute of Information Technology — Hyderabad, India
MS By Research Computer Science; ***GPA: 8.67/10.00*** — *2019 – 2021*

Indian Institute of Technology — Jodhpur, India
B. Tech Mechanical Engineering; ***GPA: 7.1/10.0*** — *2014 – 2018*

Research Publications

1. **Estimation of Appearance and Occupancy Information in Bird's Eye View from Surround Monocular Images**
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**
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**
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**
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*

Work Experience

OLA Electric — Bangalore, India
Computer Vision and SLAM Research Engineer — *Aug 2021 – Present*

Autonomous agent development:
- Developed an end to end autonomous driving agent using cameras, GPS and IMU sensors
- Ported the agent from Carla simulator to NuScenes Dataset
- Converted the pytorch model to TensorRT and developed a ROS wrapper to run on real 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

Development of Self Supervised Monocular Depth Estimation Network:
- Trained PackNet-SfM on indian driving dataset and on Carla simulator dataset
- Converted the pytorch model to TensorRT to achienved 28 FPS and developed a ROS wrapper around the model

Projects

Feature matching under extreme viewpoint | *Project Page*
Accepted at IROS 2021

- Proposed rotation invariant deep feature descriptors and matching via orthographic view generation to enhance descriptor quality
- Achieved twice the recall rate in Image Retrieval task and 80 % reduction in Rotation Error compared to state of art

Place recognition from opposite viewpoint | *Paper Link*
Accepted at VISAPP 2021

- Developed a Visual Place Recognition algorithm to detect places from 180^0 opposite viewpoints, using a novel idea to localize based on floor signatures
- Incorporated our VPR pipeline into SLAM system to allow map reconstruction from 180^0 opposite robot viewpoint

SLAM on feature-less environment | *Project Link*
Accepted at ICRA 2020

- Used semantics understanding for assisting loop closure detection and localization
- Implemented our algorithm using libraries RTAB-Map, PCL, g2o, OpenCV on p3dx bot using RGB-D Sensor, IMU and wheel odometry

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, ROS1/ROS2, G2O, GTSAM, TensorRT

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