Dhagash **Desai**

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Education

Master's in Geodetic Engineering (Major in Mobile Sensing and Robotics) — *Bonn, Germany*

Universität Bonn | **GPA: 1.28*** **(current)** — *Oct. 2020 - Dec. 2023*

Bachelor's in Mechanical Engineering — *Jodhpur, India*

Indian Institute of Technology Jodhpur — *Jul. 2015 - May. 2019*

Skills

Tools	Robots Operating System (ROS), Git, Linux, Docker, Gazebo, CasADi, CARLA
Programming	Python, C++
Frameworks	Pytorch, Tensorflow, OpenCV, Open3D, NumPy, Matplotlib, Pandas

Experience

Mercedes-Benz AG — *Stuttgart, Germany*

Master Thesis Student — *Feb. 2023 - Present*

- Integrated decision cost module into scene-consistent prediction model for traffic scene evaluation
- Enhanced prediction model by considering factors like collisions, traffic rules, and formulated a decision-making process for optimal motion planning based on cost evaluation

Bosch Automated Driving — *Stuttgart, Germany*

Internship — *Jun. 2022 - Nov. 2022*

- Evaluated and improved RADAR object detection pipeline; devised KPIs to address inter-class confusion
- Conducted in depth analysis; adapted LiDAR based contrastive learning techniques for RADAR domain; implemented Pytorch-based data loaders for streamlined prototyping

Photogrammetry and Robotics Lab (Stachniss Lab) — *Bonn, Germany*

Graduate Student Research Assistant — *May. 2021 - Mar. 2022*

- Enhanced KPConv architecture with contrastive loss for leaf instance segmentation in sugar beat plants
- Conducted extensive benchmarking on prominent point cloud segmentation and classification architectures (PointNet, PointNet++, KPConv) to inform architecture selection decisions, contributing to a research project resulting in an RAL'23 publication

Robotics Research Center, IIIT Hyderabad — *Hyderabad, India*

Research Assistant — *Jul. 2019 - Aug. 2020*

- Developed a visual place recognition (VPR) pipeline for 180° opposite viewpoint place detection using floor signatures
- Enhanced indoor environment SOTA methods (Superpoint, NETVLAD, etc.) and integrated our VPR pipeline into a SLAM system for accelerated map reconstruction from opposite viewpoints, resulting in a VISAPP'20 publication

Flux Auto — *Bangalore, India*

Robotics Engineer — *May. 2018 - Jul. 2018*

- Worked on traffic sign and vehicle detection using YOLO architecture, benchmarked it on various scenarios recorded in Indian subcontinent
- Implemented and deployed the detection system on Nvidia Jetson Tx2

Projects

Visual Odometry for Agriculture Environments — *Oct. 2021 - Apr. 2022*

Universität Bonn

- Evaluated classical feature descriptors (SIFT and ORB) in orchard-like environments, setting performance benchmarks
- Developed a novel RGBD-based descriptor using object detection architectures and created a comprehensive visual odometry pipeline by leveraging learned feature detection and description frameworks like Superpoint

Visual Place Recognition

Oct. 2021 - Apr. 2022

Universität Bonn

- Devised a visual place recognition pipeline utilizing the Bag of Visual Words (BoVW) approach, proficiently written in C++
- Independently constructed all components of the pipeline, including k-means clustering, computation of BoVW histograms, and creation of the BoVW dictionary, showcasing hands-on expertise

Video Future Frames Prediction

Oct. 2021 - Mar. 2022

Universität Bonn

- Implemented an autoregressive hierarchical encoder-decoder model for future frame generation, augmented by lateral recurrent connections
- Benchmarked multiple recurrent models (LSTMs and GRUs) along with different feed-forward architectures (ResNets and VGGNets)

Game Theoretic Control for Multi-Robot Racing

Apr. 2021 - Sep. 2021

Universität Bonn

- Executed MPC implementation for optimizing track progress, maintaining track boundaries, ensuring car-to-car collision avoidance, and achieving an optimal race-line trajectory
- Developed and implemented Game Theoretic Control (GTC) using the Iterative Best Response (IBR) algorithm to enhance realism in multiplayer racing scenarios
- Demonstrated overtaking behavior between two cars through Game Theoretic Control in a realistic CARLA simulation environment

Design and Development of Vision based Compact AGV for industries

Aug. 2017 - Apr. 2018

Indian Institute of Technology, Jodhpur

- Developed and manufactured vision based compact Autonomous Guided Vehicle(AGV) which had a 700kg capacity
- Implemented ROS navigation stack with RTAB-Map on our robot. Developed a gazebo plugin for our robot and environment
- Deployed RTAB-Map and RGBD SLAM on mobile robot. Benchmarked the corresponding visual SLAM algorithm. Developed software architecture for communication of different component with ROS

Publications

Early Bird: Loop Closures from Opposing Viewpoints for Perceptually-Aliased Indoor Environments
Satyajit Tourani, Dhagash Desai, Udit Singh Parihar, Sourav Garg, Ravi Kiran Sarvadevabhatla, K. Madhava Krishna
VISAPP (2020). 2020

High Precision Leaf Instance Segmentation for Phenotyping in Point Clouds Obtained Under Real Field Conditions
Elias Marks, Matteo Sodano, Federico Magistri, Louis Wiesmann, Dhagash Desai, Rodrigo Marcuzzi, Jens Behley, Cyrill Stachniss
IEEE Robotics and Automation Letters 8.8 (2023) pp. 4791–4798. 2023