Vardeep Singh Sandhu

Perception Engineer

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Profile

Perception engineer with 3+ years building production-grade 3D perception for autonomous driving and off-road robotics. Specialised in deploying deep learning models on embedded GPUs with **CUDA** and **TensorRT**, with a research background in radar and LiDAR point cloud segmentation. Published in *IEEE T-RO*, *ICRA*, and *ICRA Workshops*.

Skills

Languages	C++ • Python • CUDA • Bash
ML / CV	PyTorch • LibTorch • ONNX • OpenCV • Thrust • Open3D
Deployment	TensorRT • INT8/FP16 Quantization • Docker • CI/CD • ROS2
Domains	3D Object Detection • LiDAR / Radar • Sensor Fusion • Edge Inference

Experience

sensmore

Apr 2025 – Present

Robotics Engineer

▶ Developing the real-time perception stack for **autonomous wheel loaders** in unstructured off-road environments, taking research prototypes to on-vehicle production systems.

▶ Co-authored ***sensVLA***, a spatially-grounded Vision-Language-Action model for autonomous heavy machinery — accepted at the *ICRA 2026 Workshop on VLA Pipelines for Real Robots*.

▶ Own end-to-end deployment of deep learning perception models on embedded GPUs, including quantisation, TensorRT engine builds, and CUDA-based pre/postprocessing.

Motor AI GmbH

Mar 2023 – Mar 2025

Perception Engineer – HPC

▶ ***LiDAR 3D Object Detection.*** Shipped a production 3D detection model to the test vehicle by engineering a **TensorRT** inference engine and custom **CUDA** pre/postprocessing kernels — reaching **24 FPS** on the embedded GPU and meeting real-time constraints.

▶ ***LiDAR Lane Segmentation.*** Built the end-to-end inference pipeline with a custom CUDA NMS kernel for lane outputs, achieving ∼**20 FPS** on the edge device and unblocking on-road deployment.

▶ ***Data & Annotation Tooling.*** Designed the ODD data-collection pipeline and built an in-house **3D LiDAR annotation tool**, then led the in-house labelling team — scaling training-data throughput for downstream perception models.

CARIAD SE (Volkswagen Group)

May 2022 – Nov 2022

Master's Thesis Student

▶ ***Radar Moving-Object Segmentation.*** Designed a novel temporal transformer network for sparse radar point clouds; trained on the in-house Porsche Radar Dataset and RadarScenes.

▶ Achieved **state-of-the-art** results with a **12%** improvement over the prior baseline; work published in *IEEE Transactions on Robotics (T-RO)* under **Prof. Dr. Cyrill Stachniss** (IPB Lab, University of Bonn).

Stachniss Lab, University of Bonn

Aug 2020 – Mar 2021

Graduate Student Assistant (HiWi)

▶ Researched LiDAR **intensity calibration** methods to improve ego-vehicle localisation accuracy, and implemented a non-learning-based approach for dynamic-object removal from LiDAR scans.

Robidia GmbH
Jan 2022 – Mar 2022

Computer Vision Intern

▶ Developed an **identity tracking and motion prediction** stack for a robotic camera slider and deployed the model on an NVIDIA edge device at **60 FPS**.

SCREWERK GmbH
Jun 2021 – Dec 2021

Deep Learning Intern

▶ Built a CNN-based screw-density classifier for industrial camera images and integrated it into the operator UI via a WebSocket service — **enabling full automation of the machine**.

Education

University of Bonn
Oct 2019 – Nov 2022

M.Sc. in Mobile Sensing and Robotics — Grade 1.4

Focus: SLAM, 3D Object Detection, Point Cloud Analysis, Bundle Adjustment, CUDA, Deep Learning for Vision.

Guru Nanak Dev University
Jul 2013 – Apr 2017

B.Tech. in Electronics and Communications Engineering — Grade 1.7

Publications

G. K. Erabati, B. Johannsen, A. Stewart, **V. S. Sandhu**. **"sensVLA: Spatially-Grounded Vision-Language-Action Model for Autonomous Wheel Loader"**, *ICRA 2026 Workshop: From Data to Decisions — VLA Pipelines for Real Robots*.

M. Zeller, **V. S. Sandhu**, B. Mersch, J. Behley, M. Heidingsfeld, C. Stachniss. **"Radar Instance Transformer: Reliable Moving Instance Segmentation in Sparse Radar Point Clouds"**, *IEEE Transactions on Robotics (T-RO), 2024*.

M. Zeller, **V. S. Sandhu**, B. Mersch, J. Behley, M. Heidingsfeld, C. Stachniss. **"Radar Velocity Transformer: Single-scan Moving Object Segmentation in Noisy Radar Point Clouds"**, *IEEE International Conference on Robotics and Automation (ICRA), 2023*.

Selected Projects

3D Object Detection and Motion Prediction — Waymo Open Dataset
Apr 2021 – Sep 2021

▶ Trained and benchmarked state-of-the-art 3D detectors on the Waymo Open Dataset.
▶ Predicted future trajectories of detected objects using **Social GAN** and a constant-velocity baseline.

Bag of Visual Words — Place Recognition
Apr 2020 – Aug 2020

▶ Implemented the BoVW pipeline in **C++14** for place recognition, with >90% unit-test coverage.

Languages

English (Fluent) • **German** (Elementary, A2) • **Hindi** (Native) • **Punjabi** (Native)