SHRINIDHI BHAT

Relevant Skills and Interest: Machine Learning, 3D Computer Vision, 3D Perception, Machine Learning, Autonomous Driving, AI, MLOps
Working Style: Although a team player, can work independently to deliver end-to-end solutions. 4+ years of experience in CV, AI, Robotics and Embedded combined.

CONTACT

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EDUCATION

M.Sc. Robotic Systems Engineering
RWTH Aachen, Germany
Grade: 1.8 [10/2021 to 10/2024]
Relevant Courses/Topics: ML, CV, AI, Robot Kinematics and Dynamics, State Estimation, Sensor Fusion

B.Tech. Mechatronics Engineering
MIT Manipal, India
Grade: 9.06/10.0 [07/2015 to 05/2019]
Minor in Robotics and Automation. Ranked 4th amongst 81 student with an excellence award to go with.

SKILLS

Programming

Python
C++
C
JavaScript

IDE, Tools and Frameworks

Data Handling/Analysis
Numpy, scipy, pandas, scikit-learn
DL Frameworks
PyTorch, TF, Keras, ONNX
Visualisation
Matplotlib, gnuplot
Docker
OpenCV
Open3D
Torchvision
SQL
Gazebo
CMake

Project Management

Version Control
Git/Gitlab/GitHub/Gerrit
Agile Software Dev.
Jira, Stories, Spikes

Languages

English
German

WORK HISTORY

01/2025 - Present
Forschungs zentrum Jülich, Aachen
Researcher - Computer Vision

Topic: Computer Vision methods for in-situ electron microscopy)

- Building an entire in-house **computer vision** tech stack for in house model training and deployment.
- Collaborating with researchers from **KIT** to acquire high resolution 4D-STEM dataset.

03/2024 - 07/2024
BMW Autonomous Driving, Munich
Master Thesis - Computer Vision

Topic: Bandwidth efficient Learning on Vision Transformers for Semantic Segmentation (**Autonomous Driving**)

- Integrated **Mask2Former** a SoTA **vision transformer** model into existing stack and created pipeline for scalable cluster training.
- **Pioneered the entire architecture** for **image compression** on camera data using attention maps to identify and retain crucial image components, using **masked cross attention**, **optimizing storage** efficiency by 30%.
- Constructed entire data processing from scratch including developing **custom torchvision transforms** that reduced bandwidth by more than 70%.
- Leveraged **autoencoders (VAE)** to incorporate **generative AI** for diffusion based image recreation for model performance optimization.

09/2023 - 02/2024
Bosch Center for AI, Renningen
Research Intern - Robotics & 3D CV

Project: **Multi-view Segmentation** for 3D scene understanding

- Designed and developed **3D Multi-view segmentation pipeline** on a **multi-thread ROS2 node** for the **geometric perception** stack of a household Robotic application.
- Implemented custom python libraries to construct and **register 3D pointclouds** for mapping in **SLAM** using **RGBD** data and visualized using **Meshlab**.
- Developed baseline library functions that maps segments from one scene to another at a rate of 20Hz creating a global map.
- Integrated **SAM**, a multi modal **foundational model**, with transformer architecture for segmentation, **deployed on Docker**, in the pipeline.
- Integrated **GLIP**, a vision-language model, with SAM for segmentation based on prompts, optimizing the pipeline for deployment in Docker.

09/2022 - 08/2023
Aptiv PLC, Wuppertal
Embedded AI - Working Student

Project: Development and thorough unit testing of Visualization tool for deep perception models

- Customized and optimized **Netron**, a visualization tool, for efficient **model optimization** while also reducing debug time by over 50%.
- Developed features for model optimization, for all edge frameworks like **ONNXRuntime, TVM, ONNX**.
- Implemented **Docker containerization** for seamless **CI/CD integration**

07/2019 - 09/2021
Western Digital, India
Engineer, Firmware Engineering

Products: 18,20,22TB, 24TB HDD (Product Development) ; 16/18TB (Product sustenance)

- Designed and optimized **algorithms** to prioritize commands for HDD processing, utilizing complex data structures like **Queue, Graphs, Hashmaps**.
- Implemented features to seamlessly integrate incoming commands into the appropriate data structures. Constructed and used **ETL** for analysis
- Designed and delivered on **Customer facing failure demands** along with **Value demands** in the Dispatch eHDD team.
- Engaged in end-to-end **software development, testing, and validation** within an **Agile framework** following SAFe methodologies.

VOLUNTEERING ACTIVITY

Head of Incoming at IAESTE Aachen

+ Board member at LC Aachen. Directly responsible for guiding and consulting over 11 interns from around the world in 2 years for their internships in Aachen.
+ Responsibility to allocate resources to cater to interns needs along with finding an accommodation for them in Aachen, known for its low success rate of 5%.

Mentor

+ Mentored 2 interns and 1 new college graduate at WDC.
+ Mentored new internationals of WS2022.

Swachh Bharat Mission

+ 10+ hours of community service as part of CSR.

Fight Against Hunger

+ Packing and Weighing of over 1k ready-to-eat food packages for underprivileged people in India.

Tech Festival Manipal

+ Volunteered to host an event in the National Tech fest in Manipal.

OTHER ACHIEVEMENTS

Football U16 South-Zone champion

+ Took part in the national championships.

Winner or Runner-up in Public speaking competitions

+ Includes: Debate, Declamation, Master of Ceremony, Elocution ...

Trekked to a 18300 feet peak

+ Scaled a peak in the Himalayan range as part of a training camp.

HOBBIES

Football
Public speaking
Badminton
Hiking
Reading Novels
Volunteering

SELECT PROJECTS

3D Bounding Box prediction

- Developed an end-to-end deep learning pipeline for 3D bounding box prediction, integrating a custom dataloader, data augmentation, and a transformer-based model architecture.
- Conducted extensive research on state-of-the-art transformer methodologies, adapting them to enhance performance on limited datasets.
- Optimized model performance by refining loss functions and systematically tuning hyperparameters, achieving a mean Intersection over Union (IoU) of 0.27 with only 100 samples.
- Utilized Weights and Biases for comprehensive experiment tracking, enabling effective monitoring and analysis of model training and validation metrics.

Visual Odometry (C++) on KITTI dataset

- Developed monocular visual odometry algorithm that estimates camera motion between consecutive frames.
- Implemented image preprocessing, FAST feature detection, 5-point algorithm for essential matrix estimation, RANSAC for outlier rejection.
- Ensured clean, modular, and well structured C++ code with Git version control for effective collaboration and continuous integration.

Object Detection in LiDAR point clouds

- Use of readily available KITTI dataset
- Application of PointPillars architecture that uses grid cell approach for multiple object detection and classification
- Sourced, trained and designed the NN to predict detects within bounding box based on SSD.
- Use of confidence score thresholding and NMS for final hypothesis. Evaluation of model using MIoU

Metal Surface anomaly detection and classification

- Application of Local binary pattern feature extraction to classify using SVM.
- Applied transfer learning to the networks VGG16 and Resnet50 along with data augmentation.
- Explored the usage of **GANs** to bloat the dataset by 50%.
- **Published medium article**

Smart building lighting application - Embedded IoT (TAAL Tech [12/2018 - 06/2019])

- Developed the firmware for BLE Mesh protocol from the ground up for an external customer.
- Developed and tested the firmware using Embedded C on nRF52840 chipset that communicated with a mobile application.
- Integrated nRF52840 with UART for communication with sensors and drivers connected to the microcontroller.

Autonomous Inverse dynamics of a Robotic Arm

- Manual implementation of a supervised linear regression model extending to polynomial feature extraction.

ENGINEERING AND ACADEMIC AWARDS

Academic Excellence

- Secured 3rd Position amongst 81 others in the 3rd academic year.
- Issued by: Manipal Institute of Technology.

Fraunhofer ICNAP Hackathon - II Position

- Delivered and presented the solution to optimize an industrial oven job scheduling problem.
- Solution implemented the genetic algorithm that could be visualized in the Gantt chart.

Tech4Mobility Hackathon (Sustainable means of Transport) - II Position

- Created a dashboard with the team that gives users an option to choose the most sustainable means of transport.
- Dashboard also suggested the combinatory transportation possibilities with the least carbon emission footprint.