

Ayush Goel

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EDUCATION

University of Pennsylvania

Philadelphia, PA

Master of Science in Robotics | GPA: 3.83

May 2024

Coursework: Full Stack Deep Learning, Machine Learning, 3D & 2D Computer Vision, Advanced Robotics, Reinforcement Learning, State Estimation, Internet & Web Systems, Software Systems, Operating Systems

Position: Teaching Assistant for Data Structures, Algorithms and Software Design; and Operating Systems

Thapar Institute of Engineering and Technology

Punjab, India

Bachelor of Engineering - Mechatronics Engineering | GPA: 3.89

June 2018

SKILLS SUMMARY

Programming: C++, Python, JAVA, Shell Scripting, AWS, Elasticsearch, CUDA, Agile, Linux

Tools: Git/GitHub, Docker, Jenkins, CMake, Valgrind, Kafka, SQL, MongoDB, Linux, Microservices, Apache Tomcat, JIRA

Robotics: ROS(1&2), OpenCV, PCL, Eigen, Sensor Fusion, Gazebo, CARLA, Motion Planning, Open3D, Drake

AI/ML: PyTorch, Sklearn, TensorFlow, Tensor-RT, ONNX, Pandas, Numpy, ML Ops

WORK EXPERIENCE

TDK InvenSense

San Jose, California

Robotics Software Engineering Intern

May 2023 - Present

- Designed an efficient AWS pipeline combining IoT, Lambda, and Elastic Search; coupled with ROS2 C++ drivers, resulting in a 50% surge in data processing speed, 30% cost savings, and enhanced real-time dashboard.
- Incorporated ROS2 Nav2 point-to-point navigation for mobile robots using LiDAR, Depth Cameras, and IMUs with SLAM toolbox for Lifelong Mapping and fine-tuned adaptability with Behavior Trees for increased efficiency.
- Formulated a robust object detection system using NVIDIA Issac SDK, blending Depth Camera imagery with 3D point clouds, achieving a 60% mAP and reducing false positives for improved robotic reactions.

Unicommerce eSolutions Pvt. Ltd. 🌐

Gurugram, India

Senior Software Engineer

Aug 2019 - July 2022

- Supervised and mentored team of Software Engineers as Team Lead, actively engaging in code reviews to ensure high-quality software development and adherence to best practices.
- Pioneered infrastructure redesign, leveraging residential and datacenter proxies with load distribution and IP-rotation, achieving 25% cost reduction. Introduced self-service optimization tools, notably reducing in support tickets.
- Directed design & architecture of a robust platform, overseeing high & low-level changes, spearheading integration with major international marketplaces like Lazada & Shopee; expanding company's footprint to 7 international regions.

Capgemini India Pvt. Ltd.

Pune, India

Senior Software Engineer

Sep 2018 - June 2019

- Spearheaded migration of Malaysia's CIMB Bank's financial web app from SOAP to RESTful APIs and pioneered development of 'Capbook', enterprise social media platform using React and Spring, serving 500+ employees.

Programme in Autonomous Robotics, IIT Delhi

Delhi, India

Research Intern

Jan 2017 - July 2017

- Engineered Semi-Autonomous Mobile robot featuring autonomous & manual movement, with obstacle avoidance, real-time video surveillance, & Haar cascade-based face recognition, integrating touchscreen & audio engagement. 📺

PERCEPTION AND DEEP LEARNING PROJECTS

Object Detection, Tracking and Segmentation | Pytorch – Lightning, Attention, Segmentation

- Optimized SegFormer-B0 architecture with advanced Attention module and MixFFN, achieving 44.8% mIOU on ADE20K via weighted cross-entropy loss, surpassing benchmarks. 🐙
- Engineered an optimized convolutional neural network based on the YOLO framework, significantly enhancing object detection accuracy in dense urban environments, as evidenced by a 0.56 mAP achievement. 🐙
- Implemented the SOLO algorithm for instance segmentation tasks, utilizing deep neural networks to accurately demarcate instances of vehicles, pedestrians, and animals within the COCO dataset benchmarks. 🐙

3D Robotic Navigation using Stereo Visual Odometry | Geometric CV, C++, Ceres, KITTI, SLAM

- Extracted features from stereo images using GFTT and performed triangulation for 3D point location. Implemented Optical Flow for robust pose & feature estimation and Bundle Adjustment for backend optimization. 🐙

Multi-Sensor Fusion for Real-Time Vehicle Tracking using UKF | Unscented Kalman Filter, C++

- Fused LiDAR and Radar sensor measurements using UKF to accurately estimate multiple cars' positions and velocities in real time, validated with consistent RMSE thresholds. 🐙

Bird's Eye View Perception for Robotic Navigation and Obstacle Avoidance | Instance Segmentation

- Achieved 72% IOU in Instance Segmentation using Mask RCNN and Resnet50; implemented YOLOP for lane detection and drivable areas, assessing optical flow and time to collision. 🐙

Vision-based SLAM

- Implemented 2-view and multi-view stereo algorithms to convert 2D viewpoints into 3D reconstruction 🐙
- Implemented Bundle Adjustment using Ceres on BAL dataset (C++) 🐙
- Used Tracking and Pose Estimation to place several virtual object models in real world by estimating camera poses using Perspective-N-Point; and Persepective-three-point & Procrustes problem. 🐙