Shaurya Kishore Panwar

Machine Learning and Robotics Researcher

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Education

Delhi Technological University — **Dec. 2020 – Present**
B.Tech. in Engineering Physics (Minors in Computer Science), ***CGPA: 8.3/10*** — *Delhi, India*

St. Xavier's Senior Sec. School — **Jan. 2018 – Mar. 2020**
Central Board of Secondary Education, Percentage: ***89.4%*** — *Rohini, Delhi, India*

Languages:

- English - C1
- Hindi - Native
- German - A1
- French - A1

Relevant Coursework

- Deep Learning
- Algorithms Design & Analysis
- Machine Learning
- Instrumentation & Control
- Database Management System
- Object-Oriented Programming

Publications

- **Shaurya K. Panwar**, Anil S. Parihar *"Elevating Semantics: Fine-Grained Semantic Grounding for Enhanced Aerial Vision and Language Navigation"* Bachelor's Thesis at DTU

Experience

Visiting Researcher - Bern University of Applied Science — **Jun. 2023 – Aug. 2023**
Advisor: Prof. Marcus Hudrich — *Bern, Switzerland*

Worked on *"No GPS Drone"* project to develop system for visual navigation, removing reliance on GPS.

- Enhanced segmentation accuracy from F1 score of 64.11 to 88.38. Redesigned ML network using transformer based decoder(UNetFormer). Expanded training dataset with augmentation and leveraged transfer learning techniques to optimize performance. While maintaining fast inference rate(67 FPS) on Jetson Orin Nano.
- Led the selection and integration of critical sensors, including cameras, altimeters, IMU, etc. Developed a synchronized data acquisition pipeline with data filtering and augmentation for seamless integration into the drone.

Student Researcher - Delhi Technological University — **Jan. 2022 – Present**
Advisor: Prof. Anil Singh Parihar — *Delhi, India*

- Interdisciplinary research in Computer Vision, Deep Learning and Natural Language Processing, specifically with applications in embodied navigation using Visio-linguistic data in unknown environments.
- Authored a significant work in the field of Vision-Language Navigation(VLN), **Ranking #5 in VLN Leaderboard.** (results under Team Name *"MLR-Lab-DTU"*)
- Teaching Assistant on **CO302: Deep Learning**, Lectured "Hands On Sessions" on Attention, GANs, Transformers and multi-modal models.

Autonomous Systems Intern - Euler Motors — **Jul. 2022 – Aug. 2022**
Advisors: Mr. Gaurav Taank — *Delhi, India*

Developed autonomous stack for autonomous delivery vehicle for large factories, capable of Level 3 driving (Improved and modified "AutoWare" an open-source platform)

- Implemented LiDAR-Camera fusion for cost-effective 3D Semantic Mapping, reducing company expenses.
- Made path detection algorithm robust to noise and error by using nodes (with Kalman filters, RANSAC, etc).

Projects

Autonomous Systems Engineer - Team Defianz-DTUSDC — **Nov. 2020 – Jul. 2023**
Advisors: Prof. Anil S. Parihar & Prof. Qasim Murtaza — *Delhi, India*

Developing Autonomous Framework for Open-Wheeled Formula Student Driverless Race car, one of the first driverless team in India. Achieved 8th Position worldwide in FS Italy 2022

Perception Subsystem | *Python, TensorFlow, ROS, Darknet-YOLOv4*

- Developed high-speed CV pipeline for traffic cone detection, localization, and classification. Enhanced accuracy by 20% using image augmentation, transfer learning, and custom synthetic data generation from limited initial dataset

- Developed system for high speed 3D object detection in pointclouds from LIDAR data using PointPillar technique.

Model-Based Planning Subsystem | *Python, C++, Matplotlib, Numpy*

- Developed BayesRace, a model-based planning algorithm using Bayesian Optimization to generate optimal racing lines in seconds. Implemented Gaussian Process Model for iterative trajectory optimization, outperforming traditional methods

Age-Invariant Face Recognition | *Python, TensorFlow, TensorBoard, OpenCV* **Sept. 2022**

- Built an Age-Invariant Face Recognition model using TensorFlow, trained on CACD. A unified deep architecture performs cross-age face synthesis and recognition simultaneously, removes the requirement of paired data and label.
- Extended from auto-encoder based GAN, an Encoder and discriminator pair is used to learn discriminative and robust facial features disentangled from age.

NXP Self Driving Car Model | *Python, TensorFlow, ROS2, OpenCV* **Aug. 2021**

- Engineered a Deep-learning based framework for visual navigation using Imitation Learning in an urban environment laid with obstacles such as pedestrians, barricades and other cars. Deployed End-to-End CNN model with regularization technique with ROS2 in a simulated environment.
- Significantly improved accuracy from a very small dataset of 1000 images for 5 categories, by creating custom dataset with image augmentation and data scraping; And smart pre-training of YOLOv4 Tiny.

Achievements and Awards

- **ThinkSwiss Scholarship Awardee** at Bern University of Applied Sciences, Switzerland.
- **8th** in **FS Italy 2022** Engineering Design Event
- **3rd** in **NXP AIM India Smart Car Race Challenge** and Best Car Model Award from over 400 teams nationally
- **2nd** in **Formula Bharat FSEV** Software and Integration Report.
- Successfully Passed **TensorFlow Developer Certification**. A 5-hour rigorous test, testing a candidate's proficiency in solving Machine learning problems from various domains.
- **Mr. Personality (Runner-Up)** in annual personality contest.

Technical Skills

Languages: Python, C++, Java, Arduino, MATLAB/Octave, Bash Scripting, LaTeX

Machine Learning/Data Analysis: Deep Learning including CNNs, RNNs, VAEs, GANs, Transformers, NeRFs; Machine Learning including SVM, KNN, Decision Trees, Bayes

Framework and Libraries: Linux, PyTorch, TensorFlow, OpenCV, SciKit-learn, ROS(Robot Operating System), ROS2, AutoWare, Gazebo, Pandas, Flask, HTML, Bootstrap, NumPy, Matplotlib, SQL

Tools: Git, postgres SQL, Anaconda

Leadership / Extracurricular

Team Defianz-DTUSDC Racing **Jan. 2022 – Present**

Team Manager & Autonomous System Lead *Delhi Tech. University*

- Personally responsible for acquiring Title Sponsorships worth over $5000 from a tech giant like NXP Semiconductors.
- Supervised and managed over 40+ people in the team.
- Responsible for the system integration of autonomous system into EV and review of departmental progress
- Served as one of the Electrical Systems Officers (ESO), certifying the vehicle and its High Voltage (HV) systems for safety, demonstrating expertise in electrical systems and compliance standards
- Carried out recruitment process, managing 10+ new recruits, overlooking their training and turning them into an asset for the team in under 2 months