# Vanshika Jain

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**An experienced End-to-End Machine Learning Engineer (MLE) proficient in Data Science and Machine Learning.**

## WORK EXPERIENCE

**Autonomy & Intelligence Lab, Northeastern University (read more)** **Jan 2024 – Present**
**Machine Learning Research Engineer | Path Planning Autonomous Systems**

- Developed perception-aware path planners using imitation learning and Reinforcement Learning policies (PPO, MPPI), achieving an MSE loss of 0.1.
- Built predictive models to validate autonomous systems (robots, vehicles) with semantically perturbed observations, ensuring robust navigation and predictive accuracy.

**Silicon Synapse Lab, Northeastern University (read more)** **Sep 2023 – Dec 2023**
**Machine Learning Research Engineer | Autonomous Space Exploration**

- Utilized Exploratory Data Analysis techniques via SQL queries to analyze 10K images, categorizing them into 4 classes and providing valuable insights for identifying impact craters on the moon.
- Implemented perception domain in the mechanical robot COBRA for real-time scene segmentation, achieving a 0.78 IoU score for the ground class in testing data and deployed to NVIDIA's Jetson Orin.

**Viken Detection (read more)** **Jan 2023 – Aug 2023**
**Data Science Engineer | Narcotics Drug Classification**

- Engineered a Python-based supervised ML algorithm using ensemble and boosting techniques, achieving 96% overall accuracy in multi-class narcotics drug classification for law enforcement agencies.
- Employed peak detection and feature engineering methods to analyze tabular data comprising 80K samples from a library of 15 drugs, providing valuable insights into drug characteristics.
- Evaluated various A/B testing initiatives aimed at optimizing customer outcomes for predictive drug classification ensuring they receive quick, accurate, and actionable insights.
- Contributed to deploying this model into 30 production systems and developed classification features for the app using Android Studio and optimized performance to achieve a 3-second prediction time using C++.
- Collaborated on implementing, testing, and debugging model versions using Git to ensure accuracy with ~3% failure rate, while presenting clear statistical analyses of failures to stakeholders for interpretation.

**Embedded Systems Lab, Northeastern University (read more)** **Mar 2022 – Sep 2022**
**Machine Learning Research Engineer | Robots for Assisted Living**

- Enabled real-time human pose detection and tracking for assisting the elderly population, by achieving significant hardware acceleration through post-training quantization techniques.
- Achieved a 2x speedup on Intel's NCS2 and 10x on NVIDIA's Jetson while maintaining an accuracy of 72.4 MPJPE by leveraging model compression techniques, ROS2, OpenVINO, TensorRT, ONNX, and CUDA.

## ACADEMIC PROJECTS

**Adversarial Robustness in Autonomous Driving (read more)** **Sep 2023 – Dec 2023**

- Explored Vision Transformer against adversarial patches to build robust models for autonomous driving, yielding 63%.
- Experimented with 1K images utilizing Object Detection, and refined ViT and CNN models, achieving 97% accuracy.

**Enhancing 3D Object Detection (read more)** **Sep 2022 – Dec 2022**

- Innovated a novel approach to Frustum-PointPillars for 3D object detection using YOLO and PSP-Net segmentation model leveraging multi-stage sensor fusion of RGB and LiDAR data. Achieved a 3% improvement in the KITTI-hard dataset.

**NLP Question-Answering System (read more)** **May 2022 – Aug 2022**

- Obtained a 63.5% accuracy and 66.7 F1-score with the baseline Bi-LSTM model and a 77.3% accuracy with Distilled BERT, yielding an 85.4 F1-score for question-answering tasks.

## EDUCATION

**Master of Science in Computer Engineering, Northeastern University** **Jan 2022 – May 2024**
*Specialization in Computer Vision and Machine Learning* **GPA: 4.0**
Courses: Machine Learning, Deep Learning, Advanced Computer Vision, Natural Language Processing

**Bachelor of Engineering in Computer Engineering, Anna University** **Aug 2017 – May 2021**
Courses: Data Structures & Algorithms, Database Management Systems **GPA: 8.6**

## TECHNICAL SKILLS

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|---|---|
| **Programming** | Python (Proficient), SQL (Proficient), R-Studio, C++, MATLAB, LaTex |
| **Frameworks** | Pytorch, TensorFlow, Keras, Scikit-learn, Pandas, TensorRT, OpenVINO, JAX, OpenAI Gym, ROS2, NLTK |
| **Tools** | Git, Jupyter Notebook, Docker, Android Studio, VS Code, Apache Spark, spaCy, PySpark, ONNX |
| **Cloud Services** | Google Cloud Platform (GCP), Amazon Web Services (AWS), Microsoft Azure, Snowflake, Kubernetes |