# Ayush Chaudhary

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## Education

**University of Maryland** — College Park, MD
Masters of Science in Applied Machine Learning **(GPA: 4.0)** — Expected Graduation: May 2025

**Indian Institute of Technology** — New Delhi, India
B.Tech in Electrical Engineering with Minor in Computer Science **(GPA 9.1/10)** — May 2023

## Technical Skills

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|---|---|
| **Languages** | **Proficient:** Python(5 yrs), C++(4 yrs), MATLAB, **Familiar:** C, Java, Java Script, Dart |
| **Tools & Libraries** | **MLOps:** PyTorch, TensorFlow, Docker, Kubernetes **Cloud Computing:** AWS<br>**Databases:** SQL **Other Tools:** Matplotlib, Tableau, GitHub, HTML, LaTeX, Flutter |
| **Interests** | Computer Vision, Language Learning Models, Reinforcement Learning, Gen AI, Backend Web Development, Software Development, Statistical Analysis, Pattern Recognition |

## Industry Experience

**Mirage Lab, UMD** — College Park, MD
Machine Learning Researcher — June 2024 - Present

- Traditional metrology required manual measurement extraction, repeated for each part design using Hough Transforms.
- The new pipeline uses **LSD**, **ElDet** models, and a **fine-tuned LLM (GPT-4)** to automate dimension analysis from grayscale images, generalizing for any design with linear, elliptical, and circular features.
- This method achieves a **95%** reduction in measurement time per part, decreases manual programming time from **6 hours to 8 minutes** per design, and improves measurement uncertainty from **120 $\mu$m to 40 $\mu$m.**

**Mastercard** — Gurgaon, India
Machine Learning Engineer — June 2022 - July 2022

- Launched a **robust pipeline** of aggregate functions on **100k** data points, increasing the report generation speed by **80%**.
- Integrated Large Language Models such as Copynet and **GPT2** to train the extracted features, resulting in improved accuracy and efficiency in **identifying potential money laundering activities** by **30%**.
- Model deployment **automates manual tasks** performed by analysts, saving approximately **1800** man hours annually.

## Research Experience

**Transformer-based 3D motion estimation** — College Park, MD
Research Assistant at Teli's Lab — Nov 2023 - May 2024

- Developed a robust framework for 3D motion estimation in videos by integrating FlowFormer++ for **optical flow**, YOLOv8 for **object detection**, and GLPN for **monocular depth estimation**, achieving high accuracy and efficiency.
- Demonstrated exceptional **motion detection accuracy** (MDA) of **94.61%** and minimal **flow direction perturbance** (FDP) of **0.127** across diverse video datasets, showcasing the framework's effectiveness in real-world scenarios.
- Enhanced autonomous navigation, augmented and virtual reality, surveillance, sports analytics, and healthcare by providing detailed object motion analysis, contributing to improved operational effectiveness and user experiences.

**Handling Distribution change in Multiarm Bandits** — IIT Delhi, India
Research Assistant with Prof. Gourab Ghatak — Aug 2022 - Nov 2022

- Created an innovative algorithm using **Dynamic Multiarm Bandits** to optimize portfolio performance by **20%**.
- Remodelled a novel approach to make the exploratory MAB algorithm resilient to changes in the distribution.
- Performed extensive research and analysis to derive an upper bound on the probability of eliminating an arm with a **modified mean probability distribution**, ensuring the algorithm's effectiveness in various scenarios.

**SEMG-based Gesture Recognition using 3D CNN** — IIT Delhi, India
Research Assistant with Prof. Lalan Kumar — May 2021 - July 2021

- Devised a **gesture recognition CNN** using isometric and isotonic finger gestures from 18 subjects.
- Adapted a 3D-CNN architecture to better capture **spatial and temporal dependencies**, improving system robustness.
- Compared 2D and 3D convolution approaches, achieving an **accuracy boost: 97.1% to 98.6%** with the 3D method.