

Arpan Roy

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EDUCATION

University of Waterloo

Bachelor of Mathematics (co-op); GPA: 3.8

Waterloo, ON

Sep. 2024 – Apr. 2029 (Expected)

EXPERIENCE

Autonomy Software Engineer

Oct. 2024 – Present

Waterloo Aerial Robotics Group

Waterloo, ON

- Identified and successfully resolved a critical OpenCV rendering bug that disrupted drone image feed display, significantly boosting system uptime by **30%** and ensuring reliable and consistent mission performance.
- Redesigned the image processing pipeline to resolve compatibility issues caused by mismatched GPU driver versions and OpenCV dependencies, reducing latency by **300 ms** and improving frame processing efficiency by **25%**.
- Achieved a **95%** reduction in image processing errors through the development of robust, automated testing scripts, significantly enhancing system reliability and performance across diverse and challenging flying environments.

Lead Programming Teacher

Apr. 2023 – Aug. 2024

CS Base

Chatham, NJ

- Designed over **50 programming lessons**, adapting content to address the learning needs of **200+ students**.
- Taught core and **advanced Python concepts**, improving students' problem-solving and computational skills.

Programming Teacher

Nov. 2022 – Mar. 2023

First Robotics

Markham, ON

- Led **10+** interactive workshops to equip team members with troubleshooting skills and mentored 25 students in Java, optimizing robotic functionality and performance for competitions.
- Collaborated with team members on **15+ coding projects**, providing expert feedback and ensuring seamless integration of software and mechanical systems.

PROJECTS & CERTIFICATIONS

J.P. Morgan Quantitative Research Program | Completed on Forage

- Developed a Python gas storage contract pricing model including injection/withdrawal rates, storage costs, and market volatility via advanced computational methods, producing results similar to established production models.
- Deployed a **highly optimized Random Forest Classifier** for loan default risk analysis, training on a **10,000-entry dataset** with multidimensional features, achieving significant predictive accuracy.
- Created an **advanced data binning algorithm** for FICO score segmentation using both Mean Squared Error (MSE) and **Log-Likelihood optimization** methods, enhancing credit risk assessment capabilities.

Walmart USA Advanced Software Engineering Program | Completed on Forage

- Engineered a **UML class diagram** enabling dynamic data processing modes (Dump, Passthrough, Validate) and database adaptability (**Postgres**, Redis, Elastic), enhancing pipeline modularity and scalability.
- Automated ETL workflow populating **SQLite** from multi-source data, normalizing **1,000+ records across spreadsheets** for shipment tracking, ensuring seamless data integration and reporting accuracy.

Neural Network Visualizer | HTML, CSS, JavaScript

- Developed an **interactive neural network** visualization tool, designed to enhance users' understanding of the mathematical foundations and operations of neural networks.
- Enabled users to **experiment and explore** complex concepts like gradient descent, backpropagation, and activation functions through an **intuitive interface**.

Image-Based Human Detection and Classification Model | Python, Fast AI

- Achieved **95% accuracy** in identifying humans within images by creating a prediction model leveraging Fast AI's transfer learning capabilities.
- Enhanced model reliability through **data preprocessing** and advanced augmentation techniques to boost generalization and reduce overfitting on small datasets.

TECHNICAL SKILLS

Languages: Python, Java, JavaScript, SQL, HTML, CSS, Racket

Libraries: Scikit-Learn, OpenCV, Pandas, Matplotlib, NumPy, PyTorch, Plotly, Streamlit, Fast AI

Courses: Google ML Course, Fast AI Practical Deep Learning, Python for Data Science and Machine Learning