Abhinav Raj Gupta

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LinkedIn Profile URL • Web Portfolio URL • GitHub

EDUCATION

Texas Tech University, Lubbock, Texas — May 2026
Bachelor of Science in Computer Science — **GPA: 4.0**
Minor in Mathematics | Minor in Computing Applications for Bioinformatics

CodePath.org — August 2025
Technical Interview Preparation (TIP 102) | Web Development (WEB 101, passed with Honors)

EXPERIENCE

2x Research Intern | Undergraduate Research Assistant — Summer 2024, June 2025 - Present
Center for Advancing Sustainable and Distributed Fertilizer Production (CASFER**)** — Lubbock, TX

- Continued prior research, developing a CNN architecture-based object detection module to identify microplastics in wastewater, improving detection precision and recall from **74%** to **88%**.
- Designed a **novel** CNN-based instance segmentation model to characterize microplastics by shape, size, and color, achieving **~81% precision, ~76% recall**.
- Reduced inspection time for 10ml wastewater samples from **7 hours to under 1 minute**.
- Explored advanced applications in Raman spectroscopy and IR detection for enhanced microplastics analysis and initiated a research paper to establish new standards for future studies.

Undergraduate Research Assistant - Quality Assurance — October 2022 – May 2025
Advanced Particle Detector Laboratory (Collaboration with CERN) — Lubbock, TX

- Improved defect detection accuracy from **65%** to **98%** by designing a YOLO-based CNN module for silicon detectors QA manufactured for the LHC ring, reducing risks of collision tracking failures.
- Developed and deployed a Django web platform across **3 international assembly centers** (USA, India, China), standardizing workflows for QA and reducing human inspection time by **90%**.
- Integrated real-time PyTorch inference to visualize performance metrics during manufacturing, meeting CERN's **<0.1%** false detection tolerance standard for QA processes.
- ***Proposed Publication (under CERN Journal Review)****: Use of deep learning-based object detection techniques in quality control of wire bonds in silicon detectors*

PROJECTS

Wirebonding Alignment Analyzer | Python, OpenCV, ML | GitHub

- Developed an ML-driven QA system using Hough Circle Transform to detect hole misalignments pre and post wirebonding, reducing shifts within **3µm** range and preventing **68%** of post-bonding defects.

HACKATHON PROJECT: CleanScan | YOLOv5, Flask, JavaScript, HTML, CSS | GitHub

- Achieved **92% mAP** accuracy in real-time waste classification, reducing manual labor by **40%.**

C Compiler Construction | C | GitHub

- Built a lexical analyzer and recursive descent parser, achieving **100% accuracy** in syntactic analysis.

Wine Quality Prediction Using Logistic Regression | Python, Jupyter Notebook | GitHub

- Predicted red wine quality using logistic regression, achieving high accuracy on dataset classification.

TECHNICAL SKILLS

- **Programming:** Python (ML/DL), Java, C, C++, SQL
- **Machine Learning:** PyTorch, TensorFlow, Scikit-Learn, Ultralytics, YOLO, CNN, DBSCAN
- **Databases & Cloud:** Basic knowledge of MySQL, PostgreSQL, MongoDB; AWS EC2, Google Cloud
- **WEB &Tools:** Django, Flask, HTML, CSS, JavaScript, GitHub, Linux, Jupyter Notebook

HONORS AND AWARDS

- 3x Morrow Eng. Scholarship Winner | TTU Presidential Scholarship | Best UG Research Poster 2023, 2024 | 3x Recipient of TTU Presidential List Honors | Merit Scholarships from the College of Engineering

EXTRACURRICULARS

- **Leadership**: Engineering Senate Rep., Student Govt. Assoc. TTU | Media & Comm. Strategist, Nepal Students' Assoc. TTU
- **Mentorship**: Mentor for K12, TTU Robotics Club
- **Volunteering**: Fundraiser for COVID Crisis | Biomedical Equipment Monitoring (MOT, Nepal)