Anuva Banwasi

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EDUCATION

Columbia University, School of Engineering and Applied Sciences — **Graduated May 2024**
B.S. in Computer Science, Concentration: Intelligent Systems (GPA: 3.996 / 4.0)
cum laude, C.P. Davis Scholar

- Machine Learning, AI, NLP, Deep Learning for Computer Vision, Computational Robotics, Robot Learning, Spoken Lang Processing

Stanford University — **March 2025 - present**
Artificial Intelligence Graduate Certification (GPA: 4.0/4.0)

- CS231a - From 3D Perception to 3D Reconstruction, CS227 - Robot Perception

RESEARCH EXPERIENCE

Researcher, Interactive Perception and Robot Learning Lab, Stanford University — **April 2025 – present**
Mentors: Prof. Jeannette Bohg, Dr. Cherie Ho — Palo Alto, CA

- *Mobile Manipulation & Interaction Memory.* Integrating multimodal perception with persistent memory for adaptive task planning. Leveraged VLMs to predict object affordances. Extended Hydra from MIT for building live 3D scene graph enabled with interaction history and maneuverability data. Tested in Mujoco/IsaacSim and real-world experiments with TidyBot.
- *Dexterous manipulation*. Built grasp evaluation model for multi-finger grasping leveraging 3D Gaussian Splatting for object representation. Encoded 3DGS with custom VQ-VAE model implemented in PyTorch, concatenated with Allegro grasp config and optional DINO-based image embedding. Trained grasp evaluator and refiner on 2 TB of data (3.5M grasps, 4.3K objects). Achieved SoTA 95% grasp success rate in Isaac Gym, outperforming NeRF and BPS representations.

Self Evaluation Using Zero-shot Learning for Long-Horizon Tasks, Columbia University — **Nov 2022 – Sep 2023**
Mentor: Prof. Shuran Song — New York, NY

- *Robot learning & Computer Vision*. Led a team of 4 researchers to build zero-shot learning framework that assesses step-by-step task execution for long-horizon tasks. Algorithm describes predicted step outcome with LLM, evaluates video data against language outcome description with VLM, and assesses incremental progress with custom scoring metric.
- First author on paper published in International Conference for Robotics and Computer Vision (ICRCV 2023).

Undergraduate Researcher, Speech Lab, Columbia University — **May 2023 – Dec 2023**
Mentor: Prof. Julia Hirschberg — New York, NY

- *Multimodal ML & Conversational AI*. Built multimodal system integrating speech processing, text + audio analysis, and fine-tuned LLMs to detect emotion shifts such as from neutral or positive to frustration or anger. Trained on 150 videos and 10GB of data. Improved accuracy on IEMOCAP benchmark from 40% to 78% via LLM fine-tuning and few-shot learning.

Student Researcher, Creative Machines Lab, Columbia University — **Sep 2022 – Dec 2022**
Mentor: Prof. Hod Lipson — New York, NY

- *Deep learning & robotics*. Proposed model to learn and represent the kinematics of a robot using only 2d single-view video using NeRF-inspired approach. Designed, trained, and tested neural network in PyTorch that predicts space occupancy given input of 3D coordinates and joint angles. Obtained projection matrix from PyBullet and computed field of view and focal length for modified NERF model. System generates a fuzzy 3D model of robot that similarly matches ground truth.

PROJECTS

Adv Topics in Deep Learning Project, Columbia University — **Jan 2024 – Jun 2024**
Mentor: Prof. Peter Belhumeur — New York, NY

- *LLM Guardrails & controllability*. Led a team of four evaluating LLM guardrail frameworks (Meta Llama Guard, NVIDIA NeMo Guardrails) for custom-defined datasets. Performed supervised fine-tuning with QLoRA and PEFT. Built ensemble model combining guardrail frameworks with MLP and random forest, enhanced prompt-classification accuracy from 89% to 99%.

Machine Learning Research, Columbia University — **Oct 2023 – Jul 2024**
Mentor: Prof. Michelle Levine — New York, NY

- *ML & statistical forecasting*. Built forecasting models using vector autoregression to predict electric vehicle (EV) adoption based on policy incentive data and charging infrastructure growth over the past decade. Culminated in first-author publication at the International Conference on Time Series and Forecasting (ITISE 2024).

HONORS & AWARDS

Best Presentation, Artificial Intelligence & Pattern Recognition International Conference — **Sep 2023**
Tau Beta Pi Engineering Honor Society Member (awarded to top 10% at Columbia Engineering) — **Nov 2023**
PearX Summer 2024 Cohort - top-tier startup accelerator by Pear VC (<1% acceptance, 4.5k applications) — **March 2024**
Columbia Venture Competition Winner - 3rd place, awarded 10k seed funding — **Apr 2021**
C.P. Davis Scholar, Columbia Undergraduate Scholars Program - 1 of 25 selected of Columbia Engineering class — **Sep 2020**

SKILLS

Python, Java, C, PyTorch, TensorFlow, ROS, PyBullet, IsaacGym, OpenCV, scikit-learn, Git, Linux/Unix, SQL, JavaScript

WORK EXPERIENCE

Founder, Self Eval **Jun 2023 - Aug 2024**
Building the future of real-time verification & quality assurance for high-stakes manufacturing. Palo Alto, CA

- Smart co-pilot uses zero-shot multimodal ML to evaluate the operator's actions in real-time. Funded by Pear VC, Menlo Park. Partnered with Johnson & Johnson to verify workmanship on their line for medical robots with over 100 operators.

Software Engineer, MongoDB **Sept 2024 - present**
Search & AI team San Francisco, CA

- Developed drill-sideways ("hold one out") faceting for lexical search leveraging Apache Lucene. Estimated to increase usage by top customers by 30%. Implemented faceting for multi-value queries in Atlas Search. Established storage-optimized search nodes with AWS, saving customers 50% on storage costs. Backend development in Java, Go, and TypeScript.

Machine Learning Intern, Altair Engineering **May 2021 - Aug 2021, Apr 2022 - Jun 2022**
3D Modeling and HyperWorks Simulation team Troy, MI

- *Computer Vision*. Developed model for 3D object detection on CAD model. Trained & tested YOLOv5 object detection model in Python/PyTorch to locate and classify connectors in images of 3D CAD model. Implemented back-projection algorithm to project 2D coordinates of feature in multi-view images to 3D bounding box around the feature in CAD model via view matrix.
- Recognized by CTO, reduced labeling time for CAD engineers from 2 weeks to < 2 hours.

Software Engineer Intern, National Institutes of Health **Jun 2021 - Aug 2021**
Coding it Forward Fellowship Bethesda, MA

- *Natural Language Processing*. Built supervised ML model in Python to classify grant applications based on their title and abstract text (GitHub code). Model correctly classified 95% of proposals with an area under ROC curve of 0.90. Deployed app with Docker, YAML & Streamlit - continued use by 75+ analysts at Office of Data Science and Emerging Technologies (ODSET).

PEER-REVIEWED PUBLICATIONS

1. **Self Evaluation Using Zero-shot Learning**
   Anuva Banwasi, Xinghua Sun, Rohith Ravindranath, March Vazquez
   2023 5th International Conference on Robotics and Computer Vision (ICRCV), Nanjing, China
   doi: 10.1109/ICRCV59470.2023.10329149.
   Keywords: Large language models; visual language models; language grounding for vision and video understanding; robotics
   Date published: 30 November 2023, Link: https://doi.org/10.1109/ICRCV59470.2023.10329149

2. **Promoting Electric Vehicle Growth through Infrastructure and Policy: A Forecasting Analysis**
   Anuva Banwasi, Adele M Sinai, Brennan Xavier McManus.
   10th International Conference on Time Series and Forecasting, Gran Canaria, Spain, Engineering Proceedings. 2024.
   Date published: 18 July 2024, Link: https://doi.org/10.3390/engproc2024068060

3. **A Comparative Analysis of Guardrail Frameworks for LLMs and Enhancement with Ensemble Techniques**
   Anuva Banwasi, Samuel Friedman, Michael Khanzadeh
   64th Annual Meeting of the Association for Computational Linguistics (ACL 2026)
   Under review at ACL 2026, Link: https://github.com/llmguardrails/LLMGuardrailsPaper

4. **Hands Off, Splat On: Dexterous Grasp Evaluator with 3D Gaussian Encodings**
   Anuva Banwasi, Yi Du, Ashwin Mahendran
   Robotics: Science and Systems (RSS 2026).
   Submitting to RSS 2026, Link: https://github.com/Dude346/CS231A