Rio Aguina-Kang

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AI Research Engineer | 2D/3D Vision & Generative Modeling | Building Full-Stack Platforms for Multimodal Data

Technical Skills

Machine Learning & Deployment: PyTorch, TensorFlow, Hugging Face (transformers, diffusers), scikit-learn, timm, Docker, Weights & Biases, AWS S3, Run:AI
Computer Vision & 3D Graphics: OpenCV, PyTorch3D, Open3D, nvdiffrast, Blender, trimesh, polyscope, three.js
Data Analysis & Visualization: Pandas, NumPy, SciPy, Matplotlib, NLTK, SQL, d3.js
Software & Web Development: Git, GitHub, Flask, Node.js, MongoDB, Slurm, JUnit, HTML/CSS/JS
Model Expertise: LLMs, Transformers, Diffusion, GANs, NeRF/GSplat, CNNs, RNNs, Object Detection/Segmentation

Experience

Cognitive Tools Lab @ Stanford **Sept 2022 – Present**
Research Engineer *Palo Alto, CA*

- Designed behavioral experiments and led full-stack development of their web applications, collecting **90K+ multimodal data samples** spanning sketch, audio, visualization, and text-to-image tasks.
  - Developed a sketch-generation platform collecting 90K+ human & AI sketches across 128 categories; benchmarked recognition with 17 CV models. Collected and analyzed audio data of participants self-annotating while sketching.
  - Built interactive visualization tool (RAWGraphs, d3.js) supporting dataset-driven graph creation for 100+ users.
  - Built UI that allows users to generate images based on user-highlighted text with Stable Diffusion for narrative adaption in creative work.
- Engineered analysis pipelines (Python, R) to deploy mixed-effect regression models and run A/B tests, reducing experiment analysis time from hours to minutes.
- Published open-source datasets and manuscripts, expanding community access to data.

Adobe **June 2024 – August 2025**
Research Scientist/Engineer Intern *San Jose, CA*

- Engineered a scalable image-to-3D generative pipeline leveraging foundation models for segmentation, depth estimation, and VLM-guided object removal to deliver accurate, automated 3D scene reconstructions.
- Implemented MLP-based depth-alignment and RANSAC-style point cloud registration algorithms in PyTorch, improving object fitting accuracy by 15% and geometric robustness.
- Optimized ML pipelines on Run:AI cloud infrastructure, enabling 30% faster experimentation and benchmarking.
- Achieved state-of-the-art **+12.6% F-Score** and **+14.5% IoU** gains; work accepted at 3DV 2026.

Visual Computing Group @ Brown **June 2023 – June 2025**
Research Intern *Providence, RI*

- Developed a zero-shot generative model that leverages LLMs to automatically design 3D room layouts based on object descriptions and their spatial relationships.
- Implemented GPU-accelerated RAG pipeline: indexed **900K+ 3D objects and 500 textures** in CLIP latent space and used FAISS log-time similarity search to achieve ms-scale retrieval latency.
- Engineered a domain-specific language (DSL) for structured LLM prompts, applying advanced prompt engineering to reliably generate complex 3D scene layouts.
- Developed end-to-end evaluation pipelines for computing precision, recall, and additional metrics, ensuring consistent and reproducible model performance analysis.

Selected Publications

- Gumin, M., Han, D., Yoo, S., Ganeshan, A., Jones, R. K., **Aguina-Kang, R.**, Morris, S., and Ritchie, D. (2025). Procedural Scene Programs for Open-Universe Scene Generation: LLM-Free Error Correction via Program Search. *SIGGRAPH Asia.* [PDF]
- Mukherjee, K.*, Huey, H.*, Lu, X.*, Vinker, Y., **Aguina-Kang, R.**, Shamir, A., and Fan, J. (2023). SEVA: Leveraging Sketches to Evaluate Human–Machine Visual Alignment. *NeurIPS (Datasets & Benchmarks).* [Website] [PDF]
- **Aguina-Kang, R.***, Gumin, M.*, Han, D.*, Morris, S.*, Yoo, S*., Ganeshan, A., Jones, K., Wei, Q., Fu, K., and Ritchie, D. (2024). Open-Universe Indoor Scene Generation using LLM Program Synthesis and Uncurated Object Databases. *arXiv preprint.* [PDF]
- Additional publications and preprints available on my Google Scholar

Education

University of California, San Diego **Sept 2021 – June 2025**
B.S. Cognitive Science (Machine Learning specialization), Dual Minor in Data Science & Mathematics *La Jolla, CA*
Provost Honors (GPA: 3.7)