Anar Nurizada

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Education

Stony Brook University — **NY, USA**
Ph.D. in Mechanical Engineering / Computer Science, GPA: ***3.71*** — *2022 – present*

Stony Brook University — **NY, USA**
M.S. in Mechanical Engineering, GPA: ***3.86*** — *2020 – 2022*

Experience

DL-RL — **Brooklyn, NY**
Robotics Engineer — *April 2025 – Present*

- Generated large-scale synthetic datasets in **Isaac Sim** for the **SO 100 robotic arm**, leveraging inverse kinematics to create diverse, task-relevant data supporting training of **Gr00t**-based control models. Published datasets on **Hugging Face**, where they receive over **200 monthly downloads**.
- Fine-tuned **Gr00t** using **PyTorch** on both simulated and real-world data, with direct inference and testing on the physical **SO 100** arm to assess generalization and behavior consistency. Employed **Git** for version control of codebases and dataset generation pipelines.
- Conducted closed-loop experiments in both simulation and on-device environments, achieving **90–95% success rates** on pick and pick-and-place tasks—significantly improving upon the company's baseline performance.

Stony Brook University — **Stony Brook, NY**
Graduate Research Assistant — *Sep 2020 – Present*

- **Designed and implemented multi-modal dual-decoder transformers with Mixture-of-Experts (MoE)** for path synthesis, achieving **15% higher accuracy** than baseline and **200 ms inference latency**.
  - **MoE-augmented decoders**: 8 experts with **2 active + 1 shared** expert, **dynamic gating**, and **forced expert utilization** for stable, diverse outputs.
  - **Dual-branch architecture**: Parallel RMSNorm-enabled, cross-attention decoders for curve and graph modalities, fused via a **contrastive ResNet encoder**.
  - **Training optimizations**: Classifier-Free Guidance + LoRA fine-tuning reduced training compute by **30%** while preserving accuracy; gradient tracking for smooth convergence.
- **Built diffusion-based transformer variants** (mean-variance DiT and flow-matching DiT) for multi-modal path generation, improving sequence smoothness by **12%**.
- **Led full-stack ML pipeline**: Constructed custom multi-modal datasets (**12M+ samples**), automated large-scale training on **HPC (SLURM)** and cloud GPUs (Lambda, VAST.AI), and tracked 200+ experiments with **Weights & Biases**.
- **Tech stack**: PyTorch (Lightning), Hugging Face, NumPy, SciPy, OpenCV, Git/GitHub, SLURM, W&B.

Zortag — **St. James, NY**
Machine Learning — *Aug 2024 – Aug 2025*

- Fine-tuned **YOLOv8**, boosting detection accuracy from **90%** to **nearly 100%** and cutting inference to milliseconds by replacing a two-step pipeline with a single-step approach.
- Automated **myCobot 280 PI** for video/image capture, reducing manual workload **60%** and tripling labeling speed via a custom pipeline. Automated AWS S3 uploads to expand datasets and improve model generalization.
- Built an iPhone-based real-time QR detection system using **SwiftUI** + **CoreML** with minimal latency, and containerized via **Docker** for scalable iOS deployment.

Project — **Brooklyn, NY**
Advanced RAG-Powered Document Chatbot — *2024–Present*

- Built production-ready **RAG** system using **FastAPI** backend and **Together.API**'s free tier (**Llama-3-70B**), achieving **<2s** latency.
- Engineered **FAISS** vector search with optimized chunking via **LangChain**'s RecursiveCharacterTextSplitter and **PyPDF**.
- Deployed secure **AWS** infrastructure: **S3** (encrypted storage), **DynamoDB** (state management), and **Secrets Manager** (credentials). Achieved zero cloud costs through strategic utilization of all services in a free tier.

Publications and Awards

2025: **Nurizada, A.**, Dhaipule, R., Lyu, Z., Purwar, A.. "A Dataset of 3M Single-DOF Planar 4-, 6-, and 8-bar Linkage Mechanisms with Open and Closed Coupler Curves for Machine Learning-Driven Path Synthesis." *ASME Journal of Mechanical Design*, 1-16. doi:10.1115/1.4067014.

2025: **Nurizada, A.**, Lyu, Z., Purwar, A.. "Path Generative Model based on Conditional β- Variational Auto Encoder for Mechanism Design." *ASME Journal of Mechanisms and Robotics*, 1-14. doi:10.1115/1.4067169.

2023: **Nurizada, A.**, Purwar, A.. "An invariant representation of coupler curves using a variational AutoEncoder: Application to path synthesis of four-bar mechanisms." *ASME Journal of Computing and Information Science in Engineering*, doi:10.1115/1.4063726.

2022: **Nurizada, A.**, Purwar, A.. "Transforming hand-drawn sketches of linkage mechanisms into their digital representation." *ASME Journal of Computing and Information Science in Engineering*, doi:10.1115/1.4064037.

2021: **Nurizada, A.**, Kirane, K.. "Induced anisotropy in the fracturing behavior of 3d printed parts analyzed by the size effect method." *Engineering Fracture Mechanics*, 239, 107304. doi:10.1016/j.engfracmech.2020.107304.

2024: **PASHA HACKATHON 4.0 Winner** and **TransitHack Hackathon Winner**, Baku, Azerbaijan