

# Alexiy Buynitsky

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## GOAL

I'm a CS Master's student at UCSD and I love learning anything new. I want to apply my experiences and knowledge to cutting-edge projects. I'm confident my drive, passion, work ethic, and curiosity will help me make valuable contributions.

## EDUCATION

<b>UC San Diego</b> <i>La Jolla, CA</i>	Sept 2025 – Jun 2027
<i>Master of Science in Computer Science</i>	<b>GPA: 4.00/4.00</b>
<b>Courses:</b> Generative AI, Parallel Computing	
<b>Purdue University</b> <i>West Lafayette, IN</i>	Aug 2022 – May 2025
<i>Bachelors of Science in Computer Science, Bachelors of Science in Mathematics</i>	<b>GPA: 3.99/4.00</b>
<b>Graduate Courses:</b> Robot Learning, Robot Manipulation, Deep Learning, Compilers, Datamining & ML	
<b>Undergraduate Courses:</b> Analysis of Algorithms, Complex Analysis, Abstract Algebra, Statistics, Physics E&M Computer Architecture, Artificial Intelligence, Probability, Linear Algebra, Real Analysis Systems Programming, Data Structures & Algorithms, C Programming, Discrete Math	
<b>De Anza College</b> <i>Cupertino, CA</i>	Jun 2021 – Jun 2022
<i>Dual Enrolling HS Student</i>	<b>GPA: 4.00/4.00</b>
<b>Courses:</b> Differential Equations, Multivariable Calculus, C++ Programming, x86 Programming, Python Programming	

## EXPERIENCE

<b>Graduate Researcher</b>   <b>UCSD Wang Lab</b>   <i>La Jolla, CA</i>	Sept 2025 - Present
• Researching dexterous manipulation under the supervision of Prof. Xiaolong Wang	
<b>ML Engineering Intern</b>   <b>Persona AI</b>   <i>Houston, TX</i>	May 2025 - Aug 2025
• Engineered architectural & training improvements to visuomotor policies and VLAs for humanoid robots	
• Built teleoperation pipeline with Gello & SpaceMouse for large-scale data collection on bimanual manipulators	
• Designed data processing pipeline, converting raw data into frequency-synchronized, model-agnostic datasets and generating model-specific datasets for training	
• Created evaluation pipelines using digital twins in NVIDIA Isaac Lab and quantitative metrics	
<b>Graduate Researcher</b>   <b>CoMMA Lab</b>   <i>West Lafayette, IN</i>	Oct 2024 - May 2025
• Research Active Vision & Behavioral Cloning for manipulators under the supervision of Prof. Zachary Kingston	
• Achieve 250× speedup in generating expert trajectories for point-to-point motion planning in tabletop environments using RRT-Connect with hardware-accelerated planning (VAMP)	
• Extended M $\pi$ Nets to learn point-to-point motion planning via Behavioral Cloning from expert trajectories generated by VAMP	
<b>AI Engineering Intern</b>   <b>Armada AI</b>   <i>Remote</i>	Oct 2023 - May 2025
• Develop spatially-aware Code-as-Policies methods for controlling PTZ Cameras on the edge	
• Perform model distillation by generating synthetic data and finetuning LLMs using SFT and DPO	
• Developed VLM/LLM VideoQA agent for real-time video Q&A for security camera footage	
<b>Undergraduate Researcher</b>   <b>CoRAL Lab</b>   <i>West Lafayette, IN</i>	Aug 2023 - Sept 2024
• Conduct research on robotic learning under the supervision of Prof. Ahmed Qureshi	
• Extended Unitree simulator to support Unitree B1 Quadruped Robot in Gazebo and PyBullet	
• Advance Motion Planning in dynamic environments via Network Time Fields and Sign Distance Fields	
• Teach robots to navigate through Purdue with custom knowledge using LLMs, RAG, and vector databases	
<b>Engineering Intern</b>   <b>SpaceX</b>   <i>Redmond, WA</i>	May 2023 - Aug 2023
• Develop mechatronic / software solutions for quicker manufacturing and assembly of Starlink Satellites	
• Prototype satellite assembly cells, working with 6-axis robotics arms, CV, actuators, sensors, & safety hardware	
• Achieve 80x speedup between PLC & CV software by developing an IP-style communication library	
<b>Undergraduate ML Researcher</b>   <b>Duality Lab x Google</b>   <i>West Lafayette, IN</i>	Jan 2023 - May 2023
• Build data pipeline for MaskFormer and Mask2Former for TensorFlow 2's Model Garden	
• Generate, and load TFRecords for panoptic segmentation, adding data augmentations, configs and dataloaders	

## PUBLICATIONS AND PATENTS

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Liu, Y., **Buynitsky, A.**, Ni, R., and Qureshi, A.H., 2025. Physics-informed Neural Motion Planning via Domain Decomposition in Large Environments. Published in *2025 IEEE International Conference on Intelligent Robots & Systems (IROS)*

Chen, W., Liu, Y., **Buynitsky, A.**, and Qureshi, A.H., 2025. Self-supervised Hierarchical Robot Navigation Policy Learning using Physics Priors in Unknown Environments. Published in *2025 IEEE International Conference on Intelligent Robots & Systems (IROS)*

**Buynitsky, A.**, and Kingston, Z., 2025. Faster Behavioral Cloning with Hardware-Accelerated Motion Planning. Published in RoboARCH Workshop at *2025 IEEE International Conference on Robotics & Automation (ICRA)*

**Buynitsky, A.**, Ehsani, S. and Mishra, P.K., Armada Systems Inc, 2025. *Robotic Control Using Natural Language Commands* U.S. Patent 12289517 B1.

**Buynitsky, A.**, Ehsani, S. and Mishra, P.K., 2024. Camera Control at the Edge with Language Models for Scene Understanding. Published in *11th International Conference on Control, Automation and Robotics (ICCAR)*

## PROJECTS

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**Edge Probing for Decoder-only Transformers** | Pytorch, Python, NLP Mar 2025 – June 2025

- Developed a two-stage interpretability framework (Block Pruning and Edge Probing) to identify which transformer blocks contain NLP-Related Information on 7 NLP tasks (POS, NER, CP, SR, UD, SRL, CR), achieving up to 92% sparsity in hidden block embeddings while maintaining comparable performance on NLP tasks
- Finetune GPT-2 on auxiliary NLP objectives, reducing perplexity by 9% compared to finetuning only on self-supervised objective using OWT

**Predicting Student Dropout** | Pytorch, Python Oct 2024 – Dec 2025

- Achieve a 89% accuracy in predicting student dropout using an ensemble voting classifier composed of KAN, MLP, Decision Trees, Logistic Regression, SVM, XGBoost, Naive Bayes, and Random Forest
- Perform EDA and feature selection by removing non-critical features using permutation feature importance

**Gesture Controlled HCI** | Pytorch, Flask, MongoDB Jan 2024 – Mar 2024

- Built a continuous learning model to detect hand poses at 30FPS allowing for customizable hand poses
- Categorized hand gestures through VLMs and vector databases and create custom actions using open-interpreter

**Robotics Mini-Projects** | Pytorch, Gazebo, PyBullet, ROS Jan 2024 – May 2024

- Implement RRTConnect, RRT\* for cars and 6-DOF arms; Iterative/Analytic PID for Quadruped robots and 2-DOF arms; MPNet in 2D/3D environments; VPG for 2-DOF arm

**1st Place Purdue BoilerMake X Hackathon Dagshub** | Pytorch, MLFlow, DVC, Dagshub Jan 2023

- Used seq2seq model to study key factors affecting air quality. Created a robust, modular testing environment for time-series forecasting with any data through MLFlow, DVC, and git using DagsHub

**Image Processing** | Pytorch Oct 2022

- 1st place in ML@Purdue Pokémon Classifier Competition using VGG16s, and transfer learning with ResNets
- Tracked objects with K-means clustering, and created image masks and filters

## TECHNICAL SKILLS

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**Languages:** Python, C/C++, Java, Twincat3, C#, Bash, x86 Assembly, SQL

**Frameworks:** Pytorch, ROS, Tensorflow

**Platforms/Tools:** Docker, Conda, Linux, VIM, Git/Github, Dagshub, Onshape