

# Alexiy Buynitsky

669-246-0140 | [abuynitsky@ucsd.edu](mailto:abuynitsky@ucsd.edu) | [abuynits.github.io](https://github.com/abuynits) | [linkedin.com/in/alexiybuynitsky](https://www.linkedin.com/in/alexiybuynitsky) | [github.com/abuynits](https://github.com/abuynits)

## 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

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

## EXPERIENCE

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

## 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