

# Alexiy Buynitsky

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## GOAL

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

## EXPERIENCE

<b>ML Engineering Intern   Persona AI   Houston, TX</b> <ul style="list-style-type: none"><li>Engineered architectural &amp; training improvements for learning tasks using visuomotor policies and VLAs</li><li>Built teleoperation pipeline with Gello &amp; SpaceMouse for large-scale data collection on bimanual manipulators</li><li>Designed data processing pipeline, converting raw data into frequency-synchronized, model-agnostic datasets and generating model-specific datasets for training</li><li>Created evaluation pipelines using digital twins in NVIDIA Isaac Lab and quantitative metrics</li></ul>	May 2025 - Aug 2025
<b>Graduate Robotics Researcher   CoMMA Lab   Purdue</b> <ul style="list-style-type: none"><li>Research Active Vision &amp; Behavioral Cloning for manipulators under the supervision of Prof. Zachary Kingston</li><li>Achieve 250× speedup in generating expert trajectories for point-to-point motion planning in tabletop environments using RRT-Connect with hardware-accelerated planning (VAMP)</li><li>Extended M<math>\pi</math>Nets to learn point-to-point motion planning via Behavioral Cloning from expert trajectories generated by VAMP</li></ul>	Oct 2024 - May 2025
<b>AI Engineering Intern   Armada AI   Remote</b> <ul style="list-style-type: none"><li>Develop spatially-aware Code-as-Policies methods for controlling PTZ Cameras on the edge</li><li>Perform model distillation by generating synthetic data and finetuning LLMs using SFT and DPO</li><li>Developed VLM/LLM VideoQA agent for real-time video Q&amp;A for security camera footage</li></ul>	Oct 2023 - May 2025
<b>Undergraduate Robotics Researcher   CoRAL Lab   Purdue</b> <ul style="list-style-type: none"><li>Conduct research on robotic learning under the supervision of Prof. Ahmed Qureshi</li><li>Extended Unitree simulator to support Unitree B1 Quadruped Robot in Gazebo and PyBullet</li><li>Advance Motion Planning in dynamic environments via Network Time Fields and Sign Distance Fields</li><li>Teach robots to navigate through Purdue with custom knowledge using LLMs, RAG, and vector databases</li></ul>	Aug 2023 - Sept 2024
<b>Engineering Intern   SpaceX   Redmond, WA</b> <ul style="list-style-type: none"><li>Develop mechatronic / software solutions for quicker manufacturing and assembly of Starlink Satellites</li><li>Prototype satellite assembly cells, working with 6-axis robotics arms, CV, actuators, sensors, &amp; safety hardware</li><li>Achieve 80x speedup between PLC &amp; CV software by developing an IP-style communication library</li></ul>	May 2023 - Aug 2023
<b>Undergraduate ML Researcher   Duality Lab x Google   Purdue</b> <ul style="list-style-type: none"><li>Build data pipeline for MaskFormer and Mask2Former in TensorFlow Model Garden</li><li>Generate, and load TFRecords for panoptic segmentation, adding data augmentations, configs and dataloaders</li></ul>	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 – Present

- 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, RPC

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