Mark Beliaev

Scientist & Engineer – Post-Training Multimodal Language Models

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Background

My interests lie in developing methods that enhance Multimodal Large Language Models (MLLMs) for complex real-world tasks. My research experience spans RL [1, 4, 6, 10], adversarial ML [2, 8], multi-agent systems [3, 9, 5], and MLLM-based solutions in industry [7]. I also have experience with large-scale recommendation systems.

Education

- **University of California Santa Barbara** — Santa Barbara, CA
  PhD in Electrical and Computer Engineering — *Jun 2020 – Dec 2024*

- **University of California Santa Barbara** — Santa Barbara, CA
  Master of Science in Electrical and Computer Engineering — *Sep 2018 – Jun 2020*

- **Stony Brook University** — Stony Brook, NY
  Bachelor of Engineering in Electrical Engineering & Applied Mathematics and Statistics — *Aug 2013 – Jun 2017*

Experience

- **TikTok (ByteDance)** — San Jose, CA
  Machine Learning Scientist/Engineer — *Apr 2025 – Present*

  Developed post-training methods that combine SFT and RL to improve lightweight vision-language models for content understanding and safety. Supervised a graduate intern's project on routing strategies to boost the efficiency of deployed models.

  Machine Learning Engineer Intern — *Jun 2024 – Sep 2024*

  Contributed to the recommendation system by implementing new training methods for production ML models. Led a research project evaluating GPT-4o and Gemini for multimodal classification, producing actionable insights for the company. This work culminated in a workshop paper accepted at ICLR 2025.

- **University of California Santa Barbara** — Santa Barbara, CA
  Student Mentor — *Sep 2022 – Jun 2023*

  Mentored undergraduates conducting NLP research on adversarial training of LLMs, providing guidance in experiment design, data pipelines, and model evaluation.

  Visiting Scholar at RE Touch Lab (led by Prof Yon Visell) — *Sep 2018 – Dec 2019*

  Interdisciplinary lab conducting research in haptics and interactive technologies. Designed computational methods for simulating neuronal responses from measured propagating mechanical waves under the skin.

  Teaching Assistant — *Sep 2018 – Dec 2022*

  Taught courses including Machine Learning (ECE 186, ECE 283), Advanced Probability Theory (ECE 235), and Signal Processing (ECE 130B, ECE 160). Created lab materials for a new undergraduate Machine Learning course (ECE 186), emphasizing project-based learning and fundamental pattern recognition concepts.

  Private Tutor — *Jan 2019 – Dec 2020*

  Provided one-on-one tutoring through the Campus Learning Assistance Services program.

- **Stony Brook University** — Stony Brook, NY
  Intern at Experimental Neuro-Rehab Lab (led by Prof Prithvi Shah) — *Sep 2015 – Apr 2016*

  Interdisciplinary lab researching neurorehabilitation techniques for rodent spinal cord injuries. Developed tools for electrical muscle stimulation (EMS), working closely with engineering and neuroscience teams.

Honors & Awards

- **Graduate Division Dissertation Fellowship (2024)**: Awarded by the ECE department at UCSB.
- **Outstanding Teaching Assistant Award (2018,2021)**: Awarded by the ECE department at UCSB.
- **Magna Cum Laude (2017)**: Graduated Stony Brook University with an overall GPA of 3.84.
- **University Scholar (2013)**: Enrolled into the 4-year scholar program at Stony Brook University.

Refereed Conference & Journal Publications

[1] Mark Beliaev and Ramtin Pedarsani. "Inverse Reinforcement Learning by Estimating Expertise of Demonstrators". In: *AAAI Conference on Artificial Intelligence*. 2025. URL: https://arxiv.org/abs/2402.01886.

[2] Mark Beliaev, Payam Delgosha, Hamed Hassani, and Ramtin Pedarsani. "Efficient and Robust Classification for Sparse Attacks". In: *IEEE Journal on Selected Areas in Information Theory* (2024). DOI: 10.1109/JSAIT.2024.3397187.

[3] Mark Beliaev, Negar Mehr, and Ramtin Pedarsani. "Pricing for multi-modal pickup and delivery problems with heterogeneous users". In: *Transportation Research Part C: Emerging Technologies* (2024). DOI: https://doi.org/10.1016/j.trc.2024.104864.

[4] Mark Beliaev*, Andy Shih*, Stefano Ermon, Dorsa Sadigh, and Ramtin Pedarsani. "Imitation Learning by Estimating Expertise of Demonstrators". In: *ICML International Conference on Machine Learning*. 2022. URL: https://proceedings.mlr.press/v162/beliaev22a.

[5] Mark Beliaev, Erdem Biyik, Daniel A. Lazar, Woodrow Z. Wang, Dorsa Sadigh, and Ramtin Pedarsani. "Incentivizing Routing Choices for Safe and Efficient Transportation". In: *ACM/IEEE International Conference on Cyber-Physical Systems*. 2021. DOI: 10.1145/3450267.3450546.

[6] Woodrow Z. Wang*, Mark Beliaev*, Erdem Biyik*, Daniel A. Lazar, Ramtin Pedarsani, and Dorsa Sadigh. "Emergent Prosociality in Multi-Agent Games Through Gifting". In: *IJCAI International Joint Conference on Artificial Intelligence*. 2021. DOI: 10.24963/ijcai.2021/61.

Conference Versions & Workshop Proceedings

[7] Mark Beliaev, Victor Yang, Madhura Raju, Jiachen Sun, and Xinghai Hu. "Optimizing GPT for Video Understanding". In: *ICLR Workshop on Deep Generative Model in Machine Learning: Theory, Principle and Efficacy*. 2025. URL: https://arxiv.org/abs/2502.09573.

[8] Mark Beliaev, Payam Delgosha, Hamed Hassani, and Ramtin Pedarsani. "Efficient and Robust Classification for Sparse Attacks". In: *IEEE International Symposium on Information Theory*. 2022. DOI: 10.1109/ISIT50566.2022.9834832.

[9] Mark Beliaev, Negar Mehr, and Ramtin Pedarsani. "Congestion-aware Bi-modal Delivery Systems Utilizing Drones". In: *ECC European Control Conference*. 2022. DOI: 10.23919/ECC55457.2022.9838052.

[10] Mark Beliaev*, Woodrow Z. Wang*, Daniel A. Lazar, Erdem Bıyık, Dorsa Sadigh, and Ramtin Pedarsani. "Emergent Correlated Equilibrium". In: *RSS Workshop on Emergent Behaviors in Human-Robot Systems*. 2020. URL: https://iliad.stanford.edu/pdfs/publications/beliaev2020emergent.pdf.

Technical Skills

- **Languages**: Python, Matlab, C++, SQL
- **Deep Learning, RL & Data Tools**: PyTorch, TensorFlow, Docker, Apache Spark, Hugging Face, TRL, Accelerate, DeepSpeed, Gym, Stable-Baselines, RLlib, Ray, Scikit-learn, W&B, hydra, NumPy, Pandas