Gaukhar (Gau-har) Nurbek

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Summary

PhD student in Computer Science specializing in machine learning for time series analysis and signal processing, with accepted papers at NeurIPS 2025 and the IEEE ICDM 2025 Workshop. Multidisciplinary researcher with experience in software engineering and academic research, with a proven record of building production software at Uber and developing deep learning pipelines for astrophysical signal detection and projects leveraging time series foundation models. Skilled in simplifying complex problems, developing solutions from scratch, and communicating ideas effectively. Seeking a Summer 2026 AI/ML research internship.

Education

University of Texas Rio Grande Valley | Edinburg, TX
PhD in Computer Science | Expected May 2028 | GPA: 4.0/4.0
Thesis: Machine Learning-Driven Signal Processing and Time Series Analysis for Gravitational Wave Detection from Supernova Events

University of Texas Rio Grande Valley | Edinburg, TX
MS in Computer Science | May 2024 | GPA: 4.0/4.0

University of Texas Rio Grande Valley | Edinburg, TX
MS in Interdisciplinary Studies in Science and Technology | May 2021 | GPA: 3.93/4.0

Kazakh-British Technical University | Almaty, Kazakhstan
BEng in Information Systems | May 2018 | GPA: 3.5/4.0

Publications

An Efficient Self-Supervised Learning Framework for Swarm Robot Trajectory Analysis
Brooklyn Berry, **Gaukhar Nurbek**, Juan Manuel Perez, Richard Tapia, Qi Lu, Yifeng Gao *IEEE ICDM 2025 Workshop (Accepted)*

TRACE: Grounding Time Series in Context for Multimodal Embedding and Retrieval
Jialin Chen, Ziyu Zhao, **Gaukhar Nurbek**, Aosong Feng, Ali Maatouk, Leandros Tassiulas, Yifeng Gao, Rex Ying *NeurIPS 2025 (Accepted)*

Search for Core-Collapse Supernovae Signals in LIGO's Third Observation Run Using a Multiclass CNN
Shahrear K. Faisal, **Gaukhar Nurbek**, Michael Benjamin, Bhawana Sedhai, Soma Mukherjee *Physical Review D 110, 064055, 2024*

Research Experience

Graduate Research Assistant | University of Texas Rio Grande Valley | Sept 2024 – Present

- Conducted experiments and co-authored paper on self-supervised learning for swarm robot trajectory analysis using embedding compression; tools: Python, PyTorch
- Developed 14 out-of-distribution benchmark datasets to evaluate model-agnostic methods for localized anomaly detection in multivariate time series
- Evaluated six foundation time series models (Chronos, MOMENT, TimeMOE, Moirai, TimerXL, TimeFM) in zero-shot and fine-tuned settings for cross-domain generalization
- Helped develop a benchmark for time series and text QA/forecasting in finance and weather; created leaderboard web interface with TypeScript and drafted introduction and related work sections
- Improved neural network inference 4× and built pipelines for large-scale gravitational wave data using Python, PyTorch, and distributed computing; collaborated with LSC astrophysics research group to apply ML and statistical methods for supernova signal detection.

Graduate Research Assistant | University of Texas Rio Grande Valley | Aug 2023 – May 2024

- Designed and implemented reinforcement learning framework for 3D locomotion control using Temporal Graph Neural Networks (T-GNNs) with policy gradient methods (PPO), leveraging graph-structured state representations; tools: Python, PyTorch, PyTorch Geometric, MuJoCo

Staff Research Assistant | University of Texas Rio Grande Valley | July 2021 – July 2022

- Improved signal detection algorithm for gravitational wave detection by 5% and conducted data analysis using signal processing techniques in MATLAB, C++, Python, and Bash scripting on NSF-supported project

Graduate Research Assistant | University of Texas Rio Grande Valley | Aug 2019 – May 2021

- Enhanced gravitational wave signal classification pipeline using deep learning (CNNs) and time-frequency features; achieved 80% noise reduction through data preprocessing using MATLAB and Python

Industry Experience

Software Engineering Intern | **Uber** | Sunnyvale, CA | May 2023 – Aug 2023

- Developed key feature for internal developer productivity tool serving **15,000+ weekly active users** using Go backend and TypeScript frontend
- Wrote comprehensive unit tests achieving 85% code coverage
- Participated in full software development lifecycle including code reviews and cross-functional collaboration

Data Scientist | **Kazdream Technologies** | Astana, Kazakhstan | May 2019 – Aug 2019

- Trained multilingual (Kazakh/Russian) speech-to-text deep learning model on 200K audio samples using wav2letter framework, Python, CUDA, and Docker for deployment

Data Analyst | **Center for Sustainable Capital Development** | Astana, Kazakhstan | Aug 2018 – Feb 2019

- Built time series regression model achieving 90% accuracy; deployed in web application with Flask REST API, HTML/CSS, and JavaScript
- Implemented web crawler and processed 1 million rows of data using Python, Selenium, Beautiful Soup, and SQL

Skills

ML/DL Frameworks: PyTorch, TensorFlow, PyTorch Geometric, LangChain, scikit-learn
Programming Languages: Python, C++, Go, TypeScript, MATLAB, SQL, Bash, JavaScript
Tools & Platforms: Git, Docker, Jupyter, VS Code, CUDA, MuJoCo, OpenAI API, Weights & Biases
Specializations: Time Series Analysis, Self-Supervised Learning, Signal Processing, Graph Neural Networks, Multimodal Learning, Reinforcement Learning, Foundation Models, Computer Vision

Teaching Experience

Graduate Teaching Assistant | University of Texas Rio Grande Valley | Fall 2022 – Spring 2024

- Led lab sections, held office hours, and graded assignments for Deep Learning, Reinforcement Learning, and Object-Oriented Programming courses
- Mentored 300+ undergraduate and graduate students on debugging, algorithm implementation, and ML conceptual understanding

Selected Projects

ML Interview Prep Tutor Chatbot | June 2024
Built interactive ML interview preparation assistant using Python, Django, LangChain, and OpenAI API; optimized retrieval with vector embeddings