Eugene Park

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Education

New York University, Courant Institute of Mathematical Sciences — New York, NY
M.S. in Mathematics, GPA: 3.60/4.00 — Sept. 2021 - May 2023
Advisor: Prof. Kenneth Winston
Thesis: *"PCA and Hidden Markov Model for Forecasting Stock Returns"*

Boston College — Chestnut Hill, MA
B.A. in Mathematics, B.A. in Economics (Honors), GPA: 3.74/4.00 — Aug. 2017 - May 2021
Advisor: Prof. Robert Murphy
Thesis: *"Stock Market Approach for the Financial Instability Hypothesis"*

Research Experience

MIT Media Lab, Personal Robots Group — Nov. 2024 - Present
Advisor: Prof. Cynthia Breazeal

Development on Deployed AI Tutoring System

- Enhanced the system's RAG pipeline by implementing document parsing with a multimodal LLM and context-enriched chunking method.
- Implemented an LLM-based student progress assessment feature that infers the student model through chat history and contextualizes the tutor LLM.
- Built a full-stack feature that uses classroom performance data (e.g. quiz results) to provide LLM-generated longitudinal feedback and further contextualizes the tutor LLM.

Evaluating Language Models as Effective AI Tutors

- Developed a two-layer evaluation framework that decomposes pedagogical behaviors into pedagogically harmful behaviors and instructional styles.
- Designed a controlled study across multiple sessions with varied learning scenarios and an assessments grounded on the Bloom's taxonomy to measure student learning outcomes.

Multimodal Tutoring with Large Language Models

- Built a multimodal data collection system that captures, cleans, and synchronizes drawing and conversational data from real human tutoring sessions.
- Conducted experiments on the sketch-generation capabilities of frontier large language models for visual tutoring with Calculus problems.

Language Model Alignment in High-Stakes Scenarios

- Benchmarked language models on their susceptibility to insider-threat behaviors (e.g. blackmail) across various prompting strategies.
- Designed a user study to validate multi-tier LLM agent decisions in real medical triage scenarios.
- Curated a multi-modal dataset of 6,876 NEJM clinical case reports, containing text, images, and tabular data, used to finetune LLMs for proactive clinical assistance.

Skills Demand Analysis for AI Curriculum Development

- Analyzed AI skills demand patterns in 301K+ U.S. job postings and informed the curriculum design of AI courses in community colleges.

MIT Open Learning Mar. 2024 - Oct. 2024
Advisor: Dr. George Westerman

- Modeled U.S. job mobility pathways using first-order Markov chains built from 59M+ worker career histories and derived high-value origin roles for advanced manufacturing career pipelines.

MIT Sloan School of Management July 2023 - Feb. 2024
Advisor: Prof. Antoinette Schoar

- Analyzed transactions data in the Bitcoin blockchain to identify adverse entities in the Bitcoin network and determine the reward structures of large mining pools.

Publications

In Preparation

[1] **Eugene Park**, Daniel Wjendel, Grace Lin, Sharifa Alghowinem, Cynthia Breazeal. *"Pedagogical Misalignment: Instructional Integrity in Large Language Models"*. ICML. 2026.

[2] **Eugene Park**, Daniel Wjendel, Grace Lin, Sharifa Alghowinem, Cynthia Breazeal. *"Benchmarking the Pedagogical Styles and Effectiveness of Large Language Models as AI Tutors"*.

Preprints

[1] Yubin Kim, Hyewon Jeong, Shan Chen, Shuyue Stella Li, Mingyu Lu, Kumail Alhamoud, Jimin Mun, Cristina Grau, Minseok Jung, Rodrigo Gameiro, Lizhou Fan, **Eugene Park**, Tristan Lin, Joonsik Yoon, Wonjin Yoon, Maarten Sap, Yulia Tsvetkov, Paul Liang, Xuhai Xu, Xin Liu, Daniel McDuff, Hyeonhoon Lee, Hae Won Park, Samir Tulebaev, Cynthia Breazeal. *"Medical Hallucination in Foundation Models and Their Impact on Healthcare"*. *medRxiv*. 2025.

[2] Chris Compton, **Eugene Park**, Matthew Walsh , George Westerman. *"Swamps, Springboards, and the Demographic Dynamics of Occupational Mobility Identifying Enablers and Inhibitors of Career Growth by Mining Education and Employment Histories for Millions of U.S. Workers"*. *SSRN*. 2024.

[3] Jeff Dieffenbach, **Eugene Park**, George Westerman. *"Real-World Pathways to Manufacturing Jobs"*. *SSRN*. 2024.

[4] **Eugene Park**. *"Principal Component Analysis and Hidden Markov Model for Forecasting Stock Returns"*. *ArXiv*. 2023.

Under Review

[1] Yubin Kim, Taehan Kim, **Eugene Park**, Chunjong Park, Cynthia Breazeal, Daniel McDuff, Hae Won Park. *"InvThink: Towards AI Safety via Inverse Reasoning"*. *ICLR*. 2026.

[2] Yubin Kim, Hyewon Jeong, Chanwoo Park, **Eugene Park**, Haipeng Zhang, Xin Liu, Hyeonhoon Lee, Daniel McDuff, Marzyeh Ghassemi, Cynthia Breazeal, Samir Tulebaev, Hae Won Park. *"Tiered Agentic Oversight: A Hierarchical Multi-Agent System for AI Safety in Healthcare"*. *ICLR*. 2026.

Peer-Reviewed

[1] Yubin Kim, Zhiyuan Hu, Hyewon Jeong, **Eugene Park**, Shuyue Stella Li, Chanwoo Park, Shiyun Xiong, MingYu Lu, Hyeonhoon Lee, Xin Liu, Daniel McDuff, Cynthia Breazeal, Samir Tulebaev, Hae Won Park. *"BehaviorSFT: Behavioral Token Conditioning for Clinical Agents Across the Proactivity Spectrum"*. *EMNLP Findings*. 2025.

[2] Yubin Kim, Taehan Kim, Wonjune Kang, **Eugene Park**, Joonsik Yoon, Dongjae Lee, Xin Liu, Daniel McDuff, Hyeonhoon Lee, Cynthia Breazeal, Hae Won Park. *"VocalAgent: Large Language Models for Vocal Health Diagnostics with Safety-Aware Evaluation"*. *Interspeech*. 2025. (Oral Presentation).

Research Interests

AI Alignment; AI Interpretability; AI systems for decision making under uncertainty

Selected Projects

Robo-Advisor for the Korean Individual Retirement Pension Funds Feb. 2024

- Developed a systematic algorithmic trading strategy for Individual Retirement Pension (IRP) accounts in South Korea; passed the six-months evaluation by the Robo Advisor Test Bed Center; launched in November 2024 with $6.7k capital and has generated a 15.58% annualized return

Pricing Exotic Derivative Contract May 2022

- Developed a pricing routine for an exotic put option by modeling the equity and interest-rate components with stochastic differential equations and implementing Monte Carlo simulation.

Industry Experience

Giant Oak, *Student Research Assistant* Jun. 2022 – May 2023
Analyzed dimensionality reduction for affect-based embeddings to improve entity representation.

Brain Asset Management, *Research Intern* Winter 2019
Conducted market analysis on the global semiconductor industry.

Mertiz Securities, *Research Intern* Summer 2018
Analyzed financial statements and wrote investment reports for YG Entertainment and Facebook.

Honors & Awards

2021 - Omicron Delta Epsilon, International Honor Society in Economics
2019 - Boston College Portfolio Challenge, 3rd Place
2018 - Citi Investment Banking Case Competition, 1st Place

Selected Coursework

Pure Mathematics: Linear Algebra*, Real Analysis*, Differential Geometry*, Abstract Algebra, Complex Variables*

Applied Mathematics: Partial Differential Equations*, Ordinary Differential Equations*, Dynamical Systems, Time Series Analysis, Probability & Stochastic Processes*, Stochastic Calculus & Option Pricing*, Risk & Portfolio Management*

Economics & Finance: Advanced Econometrics, Intermediate Microeconomic Theory, Intermediate Macroeconomic Theory, Monetary Economics, International Trade and Finance, Corporate Finance

* graduate-level

Technical Skills

Deep Learning Frameworks: PyTorch, HuggingFace transformers
Programming Languages: Python, SQL, R, Stata
Libraries: Pandas, NumPy, Scikit-learn, Matplotlib
Other Tools: FastAPI, Svelte, Firebase, Vercel, Render, Git, Docker

References

Prof. Cynthia Breazeal
MIT Media Lab
Professor of
Media Arts & Science
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Prof. Hal Abelson
MIT Department of EECS
Professor of
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Dr. Aikaterini Bagiati
MIT Open learning
Principal Research Scientist
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