

# Eugene Park

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## EDUCATION

### New York University, Courant Institute of Mathematical Sciences

M.S. in Mathematics

New York, NY

Sept. 2021 - May 2023

Advisor: Prof. Kenneth Winston

Thesis: "PCA and Hidden Markov Model for Forecasting Stock Returns"

### Boston College

B.A. in Mathematics, B.A. in Economics (Honors)

Chestnut Hill, MA

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*

- Implemented advanced RAG pipeline with multimodal LLM-based document parsing and context-enriched chunking.
- Integrated an LLM-based student progress tracker for individualized responses.
- Built a feedback generation feature based on student classroom performance (e.g. quiz results) for LLM-generated longitudinal feedback that further contextualizes tutor responses.

*Evaluating Pedagogy and Effectiveness of Language Models as 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.

*Exploring 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).
- 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 to inform AI curriculum designs.

### 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.

- 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

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### In Preparation

- [1] **Eugene Park**, Daniel Wjendel, Grace Lin, Sharifa Alghowinem, Eric Klopfer, Cynthia Breazeal. “*Pedagogical Misalignment: Instructional Integrity in Large Language Models*”. *International Conference on Machine Learning (ICML)*. 2026.

### In Submission

- [1] **Eugene Park**, Daniel Wjendel, Grace Lin, Sharifa Alghowinem, Eric Klopfer, Cynthia Breazeal. “*An Evaluation Framework for Pedagogical Large Language Models*”. *International Society of the Learning Sciences (ISLS) Workshop*. 2026.

### 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*”. *International Conference on Learning Representations (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*”. *International Conference on Learning Representations (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*”. *Empirical Methods in Natural Language Processing (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).

### 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.

## RESEARCH INTERESTS

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

## SELECTED PROJECTS

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### 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. The system passed the six-month evaluation by the Robo Advisor Test Bed Center and was launched in November 2024 with \$6.7k capital, generating a 15.58% annualized return.

### Pricing Exotic Derivative Contract

May 2022

Developed a pricing routine for an exotic put option by modeling equity and interest-rate dynamics using stochastic differential equations and implementing a Monte Carlo simulation to estimate fair value.

## INDUSTRY EXPERIENCE

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### 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

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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

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**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

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**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

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**Prof. Cynthia Breazeal**

MIT Media Lab

Professor of

Media Arts & Science

cynthiab@media.mit.edu

**Prof. Hal Abelson**

MIT Department of EECS

Professor of

CS & Engineering

hal@mit.edu

**Dr. Aikaterini Bagiati**

MIT Open learning

Principal Research Scientist

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