

# 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

#### *System Development: PyTutor Platform Engineering*

*PyTutor is an AI tutoring platform for introductory Python programming, deployed at MIT, GSU, and QCC.*

- Developed a multimodal RAG pipeline using LLM-based document parsing and context-enriched chunking to improve the retrieval of instructional material.
- Built an LLM-driven student progress assessment system that analyzes chat history and contextualizes the tutor agent for more individualized responses.
- Implemented a personalized feedback system that uses classroom performance (e.g., quiz results) to generate longitudinal feedback and condition the tutor agent with individualized context.

#### *Evaluating Language Models as Effective AI Tutors*

- Developed an evaluation framework that identifies harmful pedagogical behaviors and differentiates instructional styles in LMs, enabling cross-model benchmarking as AI tutors.
- Designed randomized controlled trials with varied learning scenarios, Bloom's-aligned assessments, and learner surveys to measure the impact of LMs on student learning and preferences.

#### *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 on Calculus problems.
- Currently exploring visual reasoning capabilities of LLMs to enhance interactive visual tutoring.

#### *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

*Job Mobility Modeling*

- 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

*Bitcoin Network Analysis*

- Analyzed transactions 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, 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

<b>Giant Oak</b> , <i>Student Research Assistant</i>	Jun. 2022 – May 2023
Analyzed dimensionality reduction methods for affect-based embeddings for entity representation	
<b>Brain Asset Management</b> , <i>Research Intern</i>	Winter 2019
Conducted market analysis on the global semiconductor industry	
<b>Mertiz Securities</b> , <i>Research Intern</i>	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

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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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