Chelsea Joe

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Education

Dartmouth College, Hanover, NH **Jun 2025**
Bachelor of Arts, Double Major in Computer Science and Neuroscience, Minor in Digital Arts **GPA 3.80/4.0**

- **Relevant Coursework:** *Introduction to Programming & Computation* ***(Python),*** *Software Design and Implementation* ***(C),*** *Deep Learning Robustness and Generalization* ***(Pytorch),*** *AR/VR Development* ***(C#)***
- **Honors/Awards:** *2024 Activision Blizzard King Inclusion in Gaming Scholar***,** *Neukom Research Scholar*, *Lovelace Research Scholar, Meta ABCS Program, Apple Pathways Alliance Program*

Professional Experience

MIT Summer Research Program (MSRP - Personal Robots), Boston, MA **Jun 2024 – Aug 2024**
Undergraduate Research Intern – Advised by Professor Cynthia Breazeal, Dr. Hae Won Park

- Designed an independent project "Learning to Parent" with the goal of training the model (GPT-4o) to mimic human experiential learning to generate and refine parenting strategies
- Trained model in Parent to Child (DAMI-P2C) video dataset to analyze parent storybook interaction with their children, and return targeted feedback to parents on areas the parent excelled and offered suggestions for improvement
- Presented findings as a formal presentation at the Media Lab and at the Samberg Conference Center Research Forum
- Work in submission to ACM SIGCHI Conference on Computer-Supported Cooperative Work & Social Computing **(CSCW '25)** as first author

MIT Media Lab (Personal Robots), Boston, MA **Sept 2023 – Present**
Undergraduate Research Assistant – Advised by Professor Cynthia Breazeal

- Led development of MedFlow, a comprehensive medical reasoning benchmark that transforms existing NEJM medical cases into sequential clinical conversations and decision-making tasks.
- Created a dataset on NEJM clinical cases in order to train a Proactive Agent model, transforming LLMs into proactive agents that can identify information gaps and correct misinformation (Supervised by Yubin Kim)
- Organized and ran a workshop educating current high school students on generative AI and surveying teachers opinions on the role of AI in education (Supervised by Isabella Pu) – In submission to ACM Conference on Human Factors in Computing Systems **(CHI '25)**
- Developed a game with Unity and Firebase to encourage social-emotional learning in children and promote human-robot interaction when presented with fictional scenarios. (Supervised by Safinah Ali)
- Investigated the ability of GPT-3.5 and GPT 4 in expressing big 5 personality traits and gender bias, through score analysis and testing. (Supervised by Brayden Zhang)

LISP Lab, Hanover, NH **Mar 2023 – Dec 2023**
Undergraduate Research Assistant – Advised by Professor Peter Chin (Engineering Sciences)

- Developed a hinting system incorporating synonyms and antonyms in controllable common sense inference (supervised by Dr. Pedro Colón-Hernández)
- Competed in NSF Algorithms for Threat Detection (ATD) 2023 Challenge to develop a multivariate time series forecaster

Paramount, Los Angeles, CA **Jun 2023 – Sep 2023**
iOS Software Development Intern, Paramount+ Team

- Worked on the Paramount Growth team to implement new experimental features for the Paramount+ application **(Swift)**
- Designed and developed a new Video End Card system and improved the offline experience on the Paramount+ platform for both iOS and tvOS systems using SwiftUI and Objective C

Projects/Related Experience

DALI Lab VR Design Lead, Hanover, NH **Jan 2023 – Present**
VR Design Lead

- Managed hiring cycle for incoming 3D modelers and game designers for the lab as the first VR Design Lead
- Mentored new designers at the DALI Lab by helping them learn software such as Unity and Autodesk Maya for VR Design
- Developed new prompts and curriculum for onboarding new designers focused in game design, 3D modeling

DALI Lab Anivision Project, Hanover, NH **Feb 2022 – Aug 2023**
Neukom Scholar and VR Developer and Designer

- Developed features such as enemy pathfinding and minigame systems on Unity Engine **(C#)**
- Led design in VR and Desktop user interfaces, polished gameplay visuals, and created new gameplay modes for prototyping
- Created storyline and gameplay mode for prototyping and whiteboxing

DALI Lab Mobile App Design and Development Project (WISP Intern), Hanover, NH **Dec 2021 – Jun 2022**

- Developed Frontend using using React and React Native with Redux, Backend using Node.js with MongoDB database
- Designed the application through conducting user studies, creating UI/UX interfaces in Figma, and testing results

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Activision Blizzard King Inclusion in Games Scholar '24 **Jan 2024 – Mar 2024**
- Awarded for advancing diversity and inclusion in the gaming industry through AI and educational initiatives
- Attended the Game Developers Conference (GDC) as a scholarship recipient with an All Access Pass, participating in networking events and award ceremonies
- Engaged with leading industry professionals and developers, gaining insights into innovative practices and diversity initiatives within the gaming community

Meta ABCS Program Participant (Above and Beyond Computer Science) **Aug 2022 - Dec 2022**
- Reinforced knowledge of data structures, algorithms, and Computer Science fundamentals with Meta Engineers and peers
- Participated in mock coding interviews with Meta Software Engineers to practice problem solving and verbal articulation

CodePath Intermediate iOS Development **Feb 2022 – May 2023**
- Studied Swift fundamentals with Codepath Instructors, fellows, and peers in weekly homework and lab assignments
- Recreated mobile apps such as Instagram and BeReal and developed a final mobile application with a team of three students

Apple Pathways Alliance Program **Jan 2024 – Present**
- Attended seminars run by Apple employees to introduce undergraduate students to different fields of software development
- Engaged with Apple software engineers and learned about diverse work environments across different departments

Leadership and Service

Dartmouth College, Hanover, NH

Teaching Assistant for COSC 74: Machine Learning and Statistical Data Analysis ***(Machine Learning)*** **Sept 2024 – Nov 2024**
- Held 2 hours of Office Hours per week to help with assignments
- Graded weekly homework assignments and exams

Teaching Assistant for COSC 70: Foundations of Applied Computer Science ***(Linear Algebra)*** **Mar 2024 – June 2024**
- Held 2 hours of Office Hours per week to help with assignments
- Graded weekly homework assignments and quizzes

Teaching Assistant for COSC 89.31: Deep Learning Generalization and Robustness ***(Pytorch)*** **Jan 2024 – Mar 2024**
- Held 2 hours of Office Hours per week to help with assignments
- Designed and graded problems for homework assignments, quizzes, and final exam

Learning Fellow for COSC 50: Software Design and Implementation ***(C)*** **Aug 2022 – Jan 2023**
- Attended classes to answer students' questions about short assignments and C programming
- Led group discussions and problem solving sessions 3 times a week to create a collaborative learning environment

Teaching Assistant for COSC 67: Introduction to Human-Computer Interaction ***(Figma, Autodesk Maya)*** **Sep 2023 – Jan 2024**
- Held 6 hours of Office Hours per week to help with assignments
- Advised 6 combined undergraduate and graduate students in Figma and prototyping techniques 3 times a week

Teaching Assistant for COSC 22: 3D Digital Modeling ***(Autodesk Maya)*** **Sep 2023 – Mar 2024**
- Held 6 hours of Office Hours per week to help with assignments
- Advised and graded assignments for section of 6 students in 3D modeling (Autodesk Maya) techniques

Teaching Assistant for COSC 1: Introduction to Programming & Computation ***(Python)*** **Jan – Mar 2022**
- Held 3 hours of Office Hours per week to help with short assignments and labs and graded assignments, labs, and tests
- Led a section of 10 students in weekly recitations to reinforce lessons learned in class

Skills & Interests

Programming: Python, Java, C, C#, Swift, HTML, Javascript, CSS, React, React Native
Software: Visual Studio, Unity, Photoshop, Figma, Autodesk Maya, Procreate
Skills: Indie game developer, Freelance illustrator, Proficient in Spanish, Thai, Latin; basic skills in Korean and Ancient Greek
Interests: DALI Lab, Dartmouth XR Club, Dartmouth Women in Computer Science Club, Dartmouth Society of Women Engineers

Statement of Purpose
Chelsea Joe, Ph.D. Applicant

Though my grandfather just celebrated his 90th birthday, he remains remarkably youthful in both spirit and body, often saying he still feels like he's 50. His positivity is contagious, and he stays active, living with an energy that defies his age. Yet, despite this youthful spirit, he shows subtle signs of aging that are hard to ignore. Small moments, like forgetting what he ate yesterday or struggling to recall recent events, serve as reminders of the inevitable changes he faces. My grandmother, now undergoing dialysis in Thailand, endures long hours of treatment leaving her exhausted in ways that are hard to witness, especially knowing I can't always be there to help. They were my first teachers, instilling in me essential life skills and values that formed the foundation of who I am today. Now, as their needs increase, our roles have begun to reverse, and I find myself wanting to support them in new ways. This personal journey has driven my passion for AI and personalized technology, inspiring me to develop innovations that can provide companionship, medical support, and ongoing learning tailored to each individual's unique needs. I hope to study at Columbia, where I can work at the forefront of AI to create technology that honors and supports individuals like my grandparents, ensuring they never feel isolated in their later years.

My journey in research began as a 2024 MIT Summer Research Program (MSRP) intern at the MIT Media Lab's Personal Robots group, where I worked under the mentorship of Dr. Hae Won Park and Professor Cynthia Breazeal on developing personalized AI for parenting. My project, Learning Parent Strategies, trained a model to generate and refine parenting strategies by analyzing the DAMI dataset of parent-child interactions. By designing a trajectory inspired by reinforcement learning, the model could differentiate successful strategies from less effective ones, storing these insights in long-term memory for future retrieval. Using context-based similarity, it suggested tailored strategies to help parents navigate challenging interactions. This work bridged experiential learning, memory systems, and contextual adaptation, demonstrating how AI could be designed to understand and respond to individual human needs. This work is currently in submission to CSCW '25 as a first author paper.

This foundational work sparked my interest in creating AI systems that adapt and personalize to meet diverse needs, leading me to explore the role of AI in education. As a continued research assistant in the Personal Robots group, I organized a workshop to gather insights from high school students and teachers on how AI could support learning. This experience deepened my understanding of users' needs through qualitative coding and workshop design, directly influencing the development of AI-driven personalized learning applications. This research is now in submission to CHI '25. In parallel, I contributed to a project called Hinting, which addressed generating commonsense assertions in story contexts using language models. By leveraging prefix prompting techniques with both hard and soft prompts, I improved inference control and context alignment. This work, submitted to the ACL Rolling Review, where I am the second author, marks significant progress in advancing intelligent, responsive educational agents—an essential part overarching goal to develop AI that supports individualized support.

Building on these experiences, my interest shifted toward applying personalized AI to medicine, where the stakes of adaptive reasoning and tailored responses are even higher. I am currently leading the MedFlow project, a comprehensive dialogue dataset for NEJM cases, which I will be developing through October 2025. This dataset aims to simulate real-world physician-patient interactions to enhance medical reasoning and diagnostic training with LLMs. By establishing baseline performance, defining key metrics, and structuring a taxonomy of key attributes, MedFlow will support model comparison and highlight reasoning challenges in LLMs. Additionally, I am part of the Illusions in Medical AI project, focusing on

reducing medical hallucinations in LLMs by improving data quality and curation. This complements my work on Proactive Medical Agents, where I construct medical knowledge graphs and synthetic counterfactual data to enhance risk factor analysis and counterfactual reasoning, ultimately fine-tuning LLMs to ensure safe and clinically reliable responses. Ultimately my goal is to understand how to develop AI that can benefit medicine and become more effective personal agents.

The Columbia Computer Science PhD program stands at the forefront of AI development, and I would love the opportunity to explore the intersection of AI and medicine here. I am particularly excited about the chance to work with Columbia Medical School and affiliated hospitals, where I can build on my background in natural language processing, personalized learning, and neuroscience to develop AI technologies tailored to healthcare. Columbia's leadership in interdisciplinary research will allow me to grow technically and collaborate across fields to address complex challenges, such as designing AI systems that improve healthcare outcomes and create meaningful human-AI interactions.

At Columbia, I am drawn to the interdisciplinary research opportunities with faculty such as Dr. Bianca Dumitrascu, whose work in AI and genomics inspires me to advance our understanding of the human genome and improve patient health and drug delivery. Additionally, Dr. Gamze Gürsoy's focus on medical data analysis aligns with my goal of developing AI systems for disease diagnosis and enhanced patient care. Additionally, Dr. Elham Azizi's research in biomedical machine learning resonates with my passion for leveraging technology to address healthcare challenges. I hope to create tools that deepen our understanding of health and contribute to impactful solutions in biomedical informatics.

I would like to become a Professor and PI in an academic research lab where I can continue my work at the intersection of AI and language. By pushing the boundaries of what language and AI can achieve together, I aim to create tools that enhance empathy, connection, and understanding across diverse human experiences. At Columbia, I hope to grow as a researcher, student, and mentor, paying it forward to those who have guided me to where I am today, especially my grandparents, whose teachings and unwavering support first inspired my dedication to using technology to serve and uplift others.