Harrison Dong
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EDUCATION

University of Chicago

Master of Science in Computer Science — December 2024 (Expected)
Bachelor of Science in Computer Science (Machine Learning Specialization) — September 2020 – June 2024
Bachelor of Science in Mathematics

EXPERIENCE

Actuated Experience Lab, UChicago — Chicago, IL
Human-Computer Interaction Researcher — January 2022 – Present

- Prototyped devices using DC motors, C++, and 3D prints, designing and running a user study.
- Exhibited a swarm robotic dynamic sculpture at Ars Electronica, with animations and UI built in Processing (Java).
- Implemented a graph-based path planning algorithm for robotic swarm control in Python and C++.
- Contributed to an AI-powered 3D modeling interface using text processing, gesture & speech recognition.

School of Computer Science, UChicago — Chicago, IL
Teaching Assistant (Grading for Computer Architecture for Scientists) — January 2024 – April 2024

- Evaluated students' RISC-V assembly code for correctness.
- Proctored and graded exams and communicated student performance to the professor.

Summer Special Project — Linz, Austria
Human-Computer Interaction Researcher — June 2023 – September 2023

- Conducted research on human-computer interaction, robotics, and art, and submitted a research paper which was accepted and later published at the 2024 ACM Creativity and Cognition conference.

Commvault Systems, Inc — San Francisco, CA
Software Development Internship — June 2022 – September 2022

- Wrote multiple REST APIs to integrate data from multiple DTOs in order to streamline database interaction.
- Expanded test coverage on code base for a web portal app by 20% using Java technologies like Spring Framework.
- Pushed production code and managed back end database using Spring Data JPA, SQL and database tools.
- Navigated 3-year-old Java code base with hundreds of modules and thousands of lines of code.

Booth School of Business, UChicago — Chicago, IL
Research Assistant — December 2021 – May 2024

- Engineered a Python web scraping script to extract data on thousands of companies from a third-party website.
- Compiled and visualized data regarding correlation between CEO traits and company success for a research paper.

DoorDash, Inc. — Chicago, IL
Fleet Specialist — July 2021 – October 2021

- Reduced delivery times by 30% in DashMart's startup environment with management, data representation ideas.
- Managed a fleet of 60+ e-bike couriers, onboarded and coached 20+ new e-bike couriers.
- Retrieved and visualized delivery metrics from Snowflake using SQL in Chartio and Excel.

Candor *(https://candor.co/author/harrison-dong)* — Chicago, IL
Freelance Finance Journalist — July 2021 – December 2021

- Published articles on finance topics such as derivative (options, etc.), forex trading, and Modern Portfolio Theory.

- Key articles published include:
    1) *Hedging Your Losses with Put Options (October 26, 2021)*
    2) *Is Modern Portfolio Theory Still Relevant? (October 22, 2021)*
    3) *How to Trade Forex With Little Upfront Cost (September 27, 2021)*
    4) *Limiting Downside Risk With Call Options (July 19, 2021)*

PUBLICATIONS

- Ramarko Bhattacharya, You Li, Emilie Faracci, **Harrison Dong**, Yi Zheng, and Ken Nakagaki. 2024. Threading Space: Kinetic Sculpture Exploring Spatial Interaction Using Threads In Motion. In *Proceedings of the 16th Conference on Creativity and Cognition (C&C '24)*. Association for Computing Machinery, New York, NY 288–292.
- **Harrison Dong**, Anup Sathya, Ken Nakagaki. 2024. FocuShift: Actuated Intervention to Prevent Smartphone Overuse via Phone-Attached Shape-Changing Device. Submitted to the *2025 ACM CHI Conference on Human Factors in Computing Systems*.

PROGRAMMING PROJECTS

- *Software Development/UI Development* – Developed a user interface for the Threading Space exhibition in Processing that allowed for intuitive user interaction with the parameters of our exhibit.
- *Software Development* – Adapted Threading Space's path planning algorithm into a library in GitHub for other lab members to use in future projects.
- *Software Development* - Implemented key functionality in Chiventure, a UChicago terminal-based text adventure game engine coded entirely in C.
- *Parallel Programming* - Developed a load balancing algorithm by implementing concurrent data structures such as the Lamport queue and concurrent hash tables as well as locks such as Anderson's Array Lock in C.
- *Functional Programming* - Reimplemented the "Flappy Bird" game using CSS, and HTML, and Haskell.
- *Generative AI* – Improved efficiency of Denoising Diffusion Probabilistic Model in PyTorch by guiding the forward diffusion process using the learned distribution from a pre-trained VAE model, resulting in high quality images with 50% fewer time steps
- *Computer Vision* – Fine-tuned a DETR object detection model on the Global Wheat Head Detection dataset using PyTorch and the Pandas Python Library.

LEADERSHIP/ACTIVITIES

Robotics Club, UChicago Chicago, IL

Co-Founder January 2021– June 2024

- Won 1st place in the 2024 MakeHarvard Makeathon with a computer vision facial recognition device for the blind.
- Recruited 40 members in the first year and facilitated construction of a battle robot for the RoboBrawl competition.
- Raised $35,000 - $50,000 in funding in each of the club's first two fully operational years.

TAMID Chicago, IL

Member September 2021 – June 2024

- Pitched stock investments using fundamental analysis to a group of 50+ finance members quarterly.
- Analyzed long term investment value using methods of Discounted Cash Flow, Public Comparables, WACC, etc.

United States Naval Academy Summer Seminar Annapolis, MD

Student Trainee Summer, 2019

- Learned true leadership and accountability by directly participating in the most disciplined naval academy program.
- Completed vigorous daily physical training and took classes to experience real life as a navy midshipman.
- Deepened my heartfelt appreciation for those who serve our country and protect us from all enemies.

SKILLS

Relevant CS Courses: *(1) Software Development, (2) Functional Programming, (3) Data Analytics – Approximation, Randomization, Distributions, (4) Theory of Algorithms, (5) Parallel Computing, (6) Computer Architecture, (7) Computer Graphics (8) Machine Learning, (9) Deep Learning, (10) Computer Vision, (11) Computer Security, (12) Autonomous Laboratories, (13) Engineering Interactive Electronics onto Printed Circuit Boards, and (14) Research in Computer Science, etc.*

Computer/Mathematics: C/C++, Java, Python, GitHub, Spring Boot, JPA, Parallel Programming, HTML, CSS, Haskell, Web Scraping, PyTorch, Computer Vision, Deep Learning, Machine Learning, HCI, UI/UX Design, RISC-V, Statistics, Algorithms, Linear Algebra.

Language: Spanish and Chinese as second languages.

I am driven to pursue a PhD in Human-Computer Interaction (HCI) to investigate ways in which different technologies can aid people in improving their own health and wellbeing or augment their capabilities, whether through context-aware and ubiquitous computing, AI/ML, or physical and tangible computing. I am applying to the Computer Science PhD program of the Fu Foundation School of Engineering and Applied Science (SEAS) at Columbia University to work with leading experts in the field of HCI.

Research Interests. I believe that the Columbia SEAS's emphasis on advancing the role of computing in our lives through research aligns perfectly with my passion to build the technologies that benefit humankind.

I would love to further pursue my current research direction under *Dr. Orson Xu* in his SEA Lab. His work on interventions to remedy smartphone overuse presented in papers like *Time2Stop*, *MindShift*, and *TypeOut* appeal to me a great deal. I am also inspired by Dr. Xu's work in areas of large language models for health prediction and efficient communication between patients and providers in healthcare.

I believe Dr. Xu's research aligns perfectly with my interests and experience. My own experiences and those of my peers led me to a deep dive on HCI papers combatting digital distraction, and immediately, I was hooked on the idea of behavioral interventions promoting wellbeing. I developed FocuShift, a shape-changing phone case-attached device, as a tangible intervention to combat smartphone overuse. An Android app was also designed to trigger the shape-change intervention based on screen time. FocuShift is a tangible alternative to some existing anti-distraction apps (e.g., One Sec, Opal) that are easy to be dismissed and ignored, and others that fully block distracting apps and remove the user agency essential to developing self-awareness, self-moderation and habit formation.

A 48 hour in-the-wild study comparing screen time between baseline phone usage and phone usage with the shape-changing intervention was conducted, which showed a significant 39.7% reduction in distracting app usage across all participants. A qualitative analysis revealed that all participants found the ergonomic intervention enhanced their awareness of phone use, and successfully redirected their attention toward healthier and more productive tasks (e.g., reading a book as opposed to scrolling on social media). The significance of the study affirmed my desire to explore novel ways in which technologies such as AI and context-aware devices and systems can monitor user behavior and intervene when necessary to assist users in improving their own lives. A paper on the study has been submitted for review at *CHI 2025*.

Working with Dr. Brian Smith as part of the Computer-Enabled Abilities Lab (CEAL) would also be a great way to satisfy my research desires. I would love to explore ways in which emerging technologies like computer vision and AR can be leveraged to extend people's capabilities and make them more productive and involved agents in the world as a way of promoting overall wellbeing. His work on *StreetNav* and *Surveyor* are particularly inspiring to me as efforts to empower blind and low-vision individuals to experience the world more fully, leading to increased safety and access to entertainment respectively.

I am also inspired by *Dr. Xia Zhou*'s work in employing light as a medium for sensing behaviors and objects, specifically her work on a noninvasive glucose monitoring device using

light, which coincides closely with my interest in health monitoring using mobile devices such as wearables and smartphones.

My interest in HCI first took shape when I worked on a multi-robot control system in my junior year, named "Zorozoro", under Dr. Ken Nakagaki in the AxLab at the University of Chicago (UChicago). Zorozoro controls "Toio" robots developed by Sony. I expanded the hardware to control more robots and implemented more advanced robot movement functions through Rust and Processing code. I then worked on *Threading Space,* which utilized up to ten pairs of Toio robots and explored the transformation of spatial perception by reconfiguring the robots' collective animation. A grid-based path planning algorithm was employed to allow for seamless transitions. This development resulted in a 5-day exhibition in Linz, Austria and a conference publication at *C&C 2024*.

Early Encounters with STEM. I did not fall in love with STEM intentionally. I was placed in Kumon for after-school learning in math at an early age. I learned to love the subject through the fulfilment of becoming one of a select few who reached the level of calculus while in middle school. With inflated confidence, I joined the UC Berkely Math Circle, where I was force-fed the reality that I was not, in fact, the smartest in the world. In a room full of young math geniuses, I strove to become one of them. I first became acquainted with computer science in high school, when I registered for concurrent enrollment in a local community college. My first class was in C++, a challenging language for a young beginner. I saw hours of hard work and debugging on my final project manifest a fully functional Sudoku game onto my computer screen. The ability to create with just a keyboard and my brain is what drew me into the world of computer science. I now seek to share the benefits I reaped from the opportunities I had with others.

STEM Outreach. During the summer of 2023, a UChicago mathematics professor was teaching a class to K-12 Chicago Public School teachers on an effective method of teaching mathematics under the Polk Bros Foundation, an organization dedicated to Chicago's communities most affected by poverty and inequity. I was honored to be his teaching assistant (TA) and hoped to make a positive impact. I taught and met with these teachers four times a week throughout the summer to lead and guide discussions of effective strategies of teaching mathematics in early education. By the end of summer, most of them mastered the skills that we taught and were eager to apply them to their students.

Leadership & Community Building. In my freshman year, I coordinated with some of my friends and co-founded the UChicago Robotics Club RSO (recognized student organization). Through the peak of COVID-19 and the years thereafter, I co-chaired the club and recruited over 40 active members. I secured the funding required to build our first full-sized battle robots by our second year. I led the club to enter UIUC's Robobrawl competition two years in a row and win first place at Harvard's MakeHarvard makeathon. My club hosted numerous robotics workshops for middle school and high school students in the Chicago Public Schools system and received the *Outstanding New RSO Award* and the *Organization of the Year* award from UChicago, honoring our commitment to community outreach and leadership in the field.

I sincerely hope to make a meaningful contribution to human-centric research in either an academic setting or industry in the future, equipped with the expertise and experience that I stand to gain from the Computer Science PhD program of SEAS at Columbia.