Toby Jia-Jun Li Teaching Statement

The opportunity to teach and mentor both undergraduate and graduate students is one of my main motivations to pursue an academic career. I thoroughly enjoy helping students from varying backgrounds achieve their personal development, academic, and career goals. I am passionate about continually refining my teaching practices, reflecting on my personal teaching and mentoring experiences, and learning from the latest findings and techniques of evidence-based pedagogical research. As I transit to a faculty position, I look forward to expanding my impact as a teacher and mentor.

TEACHING EXPERIENCE

Over the past 8 years, I have worked as a teaching assistant on 5 occasions for 4 different courses with varying class sizes and classroom formats. I have completed formal training classes in *Creating Inclusive Classroom Environments*, *Delivering Constructive Feedback*, *Delivering Effective Lectures*, and *Syllabus Design* through Carnegie Mellon University (CMU)'s Eberly Center for Teaching Excellence and Educational Innovation. Both my practical experience and formal training in instruction have shaped my approach to teaching that I hope to carry forward as faculty.

My teaching philosophy has a strong emphasis on **centering the course around projects with real-world applications**. From my observations, this approach motivates the students with a greater sense of accomplishment, illustrates how topics fit together, and rewards the students with a realistic artifact for their portfolios. I applied this approach as a member of the teaching staff for the course *User-Centered Research & Evaluation* in Fall 2018 at CMU, where I was fortunate to be involved in a complete redesign of the course. This course is one of the "flagship courses" for the professional master's program in Human-Computer Interaction (HCI) at CMU. We designed the entire course around a real problem from a client, developed team assignments that practice user research and prototyping skills in the client's context, and arranged opportunities for the students to communicate with the client throughout the course. A final outcome of the course was a design and research report similar to what a professional firm would produce for a consulting project. Another example of applying this approach was my work as a TA for the course *Designing Human-Centered Systems* in Spring 2019 at CMU, where I helped design and run "bake-offs"—a series of team projects where students built prototypes of interactive systems and had friendly competitions on their user evaluation performance. The learning-by-doing projects in both courses have been positively rated by the students, suggesting the effectiveness of this approach.

I believe that an important teaching strategy is to illustrate abstract concepts with sets of **concrete examples and demonstrations** that students are familiar with. I also believe that **active-learning** is an effective approach for all parties involved. As an undergraduate at the University of Minnesota, I assisted for the course *Discrete Structures of Computer Science* for two semesters from Fall 2013 to Spring 2014. This course covered the foundations of discrete mathematics for pre-major Computer Science undergraduate students. For one of the largest courses in the department with more than 200 students in the lecture, a significant pedagogical challenge was to accommodate the different student needs. I identified this as the main goal for my role of leading a weekly 30-person recitation session and holding office hours. I developed a set of examples close to student interests (e.g., college life) to illustrate concepts, and demonstrated hand-drawing trees and graphs to supplement their formal definitions. I also designed group activities where the students generated their own examples and counterexamples to explain the concepts to each other. This course provided me valuable experience in explaining complex and conceptually challenging subject matters to students with diverse backgrounds, prior expertise, and learning styles.

I am also experienced in developing and teaching **massive open online courses** (MOOCs). I assisted with creating the course *From GPS and Google Maps to Spatial Computing* on Coursera, where I worked as the head TA that recorded a lecture video, developed the assignments and quizzes, recruited and supervised a team of community volunteers, and oversaw the discussion board with more than 20,000 enrolled students globally in the initial Fall 2014 offering.

Recently, I have been engaging in the efforts for designing more **diverse, equitable, and inclusive** (DEI) courses. As a member of the newly-formed Anti-Racism Work Group at CMU, I am leading a group of 8 Ph.D. students to develop a new guideline with 13 heuristic rules for auditing the course syllabus for DEI issues. As of Fall 2020, this guideline has been widely used within our department. As I start as a faculty member, I will leverage these resources

and my prior expertise to create a more inclusive learning environment, to design course contents that reflect cultural, racial, and gender diversity in the subject area, and to cover important ethical and societal implications of technology in my courses.

My teaching has been favorably-rated by the students: My personal performance as an additional instructor of record for *User-Centered Research & Evaluation* in Fall 2018 was **rated 4.78 out of 5** overall in the course evaluation (the average score across CMU was 4.23). The student reviews commented that I was "*patient and responsible*", "*super helpful to my team in terms of instructions, direction, and feedback*", "*attentive to students' needs*", and "*further explained a lot of key ideas of the subject matter*".

MENTORING EXPERIENCE

During my 5 years in the Ph.D. program, I have been fortunate to directly supervise the research of 13 undergraduate and master students: 5 non-CMU students as full-time summer interns through the Research Experiences for Undergraduates (REU) program, and 8 CMU students through Independent Study. The majority of my mentees (9 out of 13) have become co-authors on 10 published research papers, including two papers where they were first authors. I have also mentored several younger Ph.D. students in an informal capacity.

A key piece of my mentoring strategy is to achieve a balance among the students' **diverse prior backgrounds**, their **personal development and career goals**, and the alignment with my **research agenda**. This often involves breaking the barriers between traditional academic subdisciplines within Computer Science. My students Marissa Radensky (now a Ph.D. student in HCI at the University of Washington), Kirielle Singarajah (now a Master student in Language Technologies at CMU, and William Timkey (now a Master student in Natural Language Processing at the University of Cambridge) have gone to graduate schools to continue pursuing research interests originated from our projects. Other students now work various roles including Designer, Machine Learning Engineer, Product Manager, and Data Scientist at major companies (e.g., Google X, Microsoft), start-ups, and academic institutions (e.g., MIT), often applying the unique research skillsets acquired through their work with me. Recently, my REU student Lindsay Popowski was nominated for the CRA Undergraduate Research Award by Harvey Mudd College. In the future, I look forward to further practice and evolve my mentoring strategy as a faculty member where I can form longer-term mentorship with my research students.

I seek to **promote diversity and inclusivity in science** through my mentorship. My mentees include 8 women, 4 international students, 2 from underrepresented racial groups in computing, and 2 from primarily undergraduate institutions. As a member of the Ph.D. admissions committee in 2018–2019 and a member of the CMU SCS Anti-Racism workgroup, I have been also actively engaged with multiple initiatives that seek to broaden the participation in our summer research programs, address concerns with the culture at our research labs, and establish graduate school application mentorship programs for students from underrepresented groups in computing.

EXAMPLE COURSES

My interdisciplinary background and prior teaching experience have prepared me to teach undergraduate and graduate-level courses on Human-Computer Interaction, User Research, Natural Language Processing, Dialog Systems, Applied Machine Learning, Web and Mobile App Programming, as well as a broad range of intro-level computer science and information science courses. In addition, I am excited to develop new courses such as:

Human-AI Interaction: an advanced undergraduate/graduate course that introduces the methodology and principles around designing the user experience for AI systems, discusses the role of humans in the AI pipeline, and studies the ethical and societal implications of AI. The course activities will involve a mix of system prototyping, critical reflection and discussion, and surveying the literature.

Natural Language Interfaces: a project-based advanced undergraduate/graduate course that covers both the design and the technical aspects of building natural language interfaces. Topics include design and evaluation strategies for conversational user experience, natural language understanding, and generation techniques, and multi-modal interfaces that combine spoken natural language with another modality (e.g., gesture, vision).

Human Aspects of Software Engineering: a graduate-level seminar course that investigates the research on empirical studies of programmers and tools that empower programmers. The course will specifically focus on research on specific groups of programmers, such as developer tools and domain-specific languages for novice programmers/learners, domain experts for other STEM areas, and end-user programmers.