Yang Zhang | Teaching Statement

I have had the fortune of working with many great students, who I enjoyed teaching as well as learning from. This is one of my strongest motivators for pursuing an academic career. I believe in three fundamental learning phases, which I practice myself, and encourage students in my mentorship to follow:

1) Know it: The first phase of learning is knowing the relevant information, which is crucial to forming mindsets and skillsets – critical tools in problem solving. To build these tools at the beginning of learning, I encourage my students to get to know a relevant field as much as possible, both through my teaching in the classroom and a wide range of information sources outside the classroom.

2) Replicate it: Knowing information is not equivalent to having knowledge. The conversion from information to knowledge requires practice, which forms the second phase of my teaching system: replication. I encourage students to replicate what they learn in a variety of real-world scenarios. Through replication, students solidify their knowledge and build up the confidence they need to innovate.

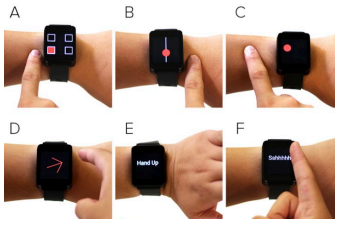
3) Innovate: As a teacher, I value students' creativity and initiatives to tackle the problems that they care about. I encourage students to expand technological boundaries and use existing technologies in new ways to solve real-world problems. In this phase, students reinforce their knowledge and gain a sense of achievement that motivates them to know more. This creates a positive feedback loop that cultivates lifelong learning.

Teaching Experience

I have been a teaching assistant for two large HCI classes. The first is *Applied Gadgets, Sensors and Activity Recognition in HCI,* an entry-level hardware course taught by Professor Scott Hudson. I believe the goal of teaching should be more about helping students achieve better versions of themselves than getting good grades. I remember helping a student debugging the wiring for an 8×8 LED matrix, not an easy task, even for someone with hardware experience. The student was frustrated about his failure to complete the homework on time and was even contemplating dropping the course entirely. I could have eased these worries by helping trace down the bug more efficiently, but instead, I taught the student tricks to debug hardware and let him lead the process himself. Though it took us a bit longer than my normal office hours, the student mastered a very important skill without which finishing the rest of the course would have been impossible. As a result, the student did not drop the class. Instead, he finished the class with an excellent grade and an amazing final project that helps blind people navigate using audio feedback.

Wireality, led by Cathy Fang, a ME undergraduate student I mentored, with a publication under review.

I have also assisted teaching *Designing Human-Centered Software*, an entry-level class on design, prototyping, and evaluation of interactive systems taught by Professor Chris Harrison. For this course, I gave lectures and led other two TAs. Many students from both classes became interested in HCI research and joined our lab to continue working on research projects.



AuraSense, led by Junhan Zhou, an ECE master student I mentored, with a paper published at UIST.

Mentoring Experience

Over the last 5 years, I have mentored two undergraduate and four graduate students, resulting in three papers published at CHI and UIST, and another two papers under review. I coached a team of eight students during a one-week hackathon using an open-source hardware I have been developing. During the hackathon, I worked closely with students, encouraging them as they developed their ideas. All students finished their projects. As a senior student in the lab, I have been working with my advisor to promote an open and healthy lab culture by encouraging communication between lab members, and I will continue to do so with my future research team. In my mentorship, I make sure my students have a sufficient technological foundation before they begin working more independently and take on additional responsibilities. For my future students, I will always be available when they need me. I will strive to provide necessary resources to help them learn and overcome obstacles that stand in the way of their educational goals and career objectives, all while helping them build their confidence as researchers.

Future Courses

With technologies woven into every aspect of our lives, future engineers, technologists, and researchers will need interdisciplinary mindsets and skillsets to tackle profound challenges facing our society. With this in mind, I will create a set of courses based on my background in HCI, computer science, electronics, and fabrication. These courses will start with building a solid technological foundation, and extend to practice, application, and problem solving in the real world.

Introduction to Human Computer Interaction: An introductory course covering the design, engineering, and evaluation of interactive systems. In this course, I will introduce user-centric design and evaluation methods to computer science students who are often not familiar with HCI approaches. This course will walk students through the evolution of computer interfaces, including mouse, touchscreen, gaze tracker, voice control, and more. Additionally, students will read and discuss the latest research at CHI and UIST. They will also practice what they learn by designing, building, and evaluating interactive systems based on topics they find interesting.

Rapid Prototype Interactive Systems: A practicum-based course with a focus on interactive systems in which students will learn how to rapidly prototype and bring their ideas to life. In this course, I will teach students skillsets for fast prototyping, including materials (e.g., paper, wood, plastic), digital tooling (e.g., laser cut, 3D print), open-source hardware (e.g., Arduino, RTL-SDR) and software (e.g., Processing). Students will learn the core principle of fast prototyping – "fail" fast and efficiently iterate on designs. Through practice, they will experience the entire life cycle of prototypes from low-fidelity to a presentable stage.

Applied Machine Learning in Real-Time Sensing Systems: An introduction to common Machine Learning techniques and their applications on real-time sensing systems. This course will focus on the practical side of machine learning, emphasizing the application of machine learning to solve a variety of real-world problems, rather than understanding the underlying theory. Students will learn relevant theoretical and engineering skills to implement, train, and deploy machine learning powered sensing systems for a wide range of applications, including smart home, digital health, failure prediction, end-user programming (e.g., IFTTT), and more.

Analog Circuit & Embedded System Design: A project-oriented course in which students will learn fundamentals of analog circuit design and embedded system development by building a wide array of sensing systems, from wearables (e.g., wristband and smart garment) to deployed sensors (e.g., smart thermometers and fire alarms). Students will master concepts such as analog-to-digital conversion, interrupt, serial and wireless communication, and will go through an end-to-end implementation of embedded systems, including circuit design, fabrication, verification, firmware development, and open source.

Mobile and Ubiquitous Computing: A reading- and discussion-based course in which I will introduce the status-quo technologies of mobile computing and ubiquitous computing, including mobile hardware, sensors, haptics, context-aware computation, crowdsourcing, Internet of Things, cloud and edge computing. Students will be exposed to the latest research as well as commercial technologies via in-class presentations and discussions. Based on these foundations, students will propose their own ideas and practice writing grant proposals and startup pitch decks, from which experience they will learn how to develop and sell their ideas.