

I believe every student has a spark. My mission is to help the student find that spark and ignite it. I look forward to inspiring students to build technologies that positively impact the world.

My teaching philosophy is shaped by Papert's constructionism theory, my experiences as a scuba instructor, and by my teachers and students. I use the following pedagogical principles:

Un-learn the basis. As one gains experience in scuba, the various steps to performing a necessary action amalgamate, so as an instructor, it is important to learn to unlearn and explain the individual steps to a student. This has implications for computer science classrooms too, where I take my time to learn, unlearn, and explain the concepts step-by-step, situating them in a broad real-world context and the theoretical underpinnings.

Learn by doing. Students have a diversity of backgrounds and skill set, and I believe using only instruction-based teaching may not reach every student. Consequently, I have always provided plenty of hands-on learning and self-exploration opportunities through projects, group discussion, and community engagement activities.

Uplift to take ownership. I often promote guided yet open-ended explorations and encourage students to test their ideas with different viewpoints. This process helps build self-esteem and uplifts the students to take ownership of a problem in new, unexplored contexts.

Promote inclusive spaces. One of my primary goals is to build inclusive spaces where students from diverse abilities and backgrounds feel excited and empowered to learn.

Communicate effectively. Being an effective communicator is central to any career. It is especially important for an academic. As an HCI researcher, I am passionate about writing papers and delivering talks that can be understood by both technical and non-technical audiences, which I aim to inculcate in my research group. In classrooms, I will continue to encourage multimodal communication techniques and accessibility best practices. Relatedly, for student meetings, I believe in providing timely, constructive, yet candid feedback.

TEACHING EXPERIENCE

I have taught in a variety of contexts spanning rural areas in South Africa to high tech classrooms in France using various teaching styles such as lectures, design studios, and small group instruction. Below, I describe three examples that particularly emphasize the diversity and inclusion in my teaching.

DIY workshops. I believe that practical, hands-on work in the real-world can greatly enhance a student's learning. As part of MIT's CS outreach initiatives, I have taught in seven one-week 'hackathon' style workshops in four countries where bookish education is prominent. For two of these workshops, I was the primary organizer responsible for obtaining funding, developing curriculum, procuring materials (*e.g.*, maker kits, fabrication machines), recruiting students, and providing instruction. I taught HCI theory, brainstorming, prototyping, and evaluation methods, which the students



Two examples of worldwide disseminated products that were originally innovated by student teams at my one-week DIY workshops: an electronic cane attachment to sense proximity to objects and a surgical clamp to hold small blood vessels.

then used to design and evaluate a functional prototype to address a local or environmental issue. Attendees ranged from 7 to 61 years old and included high school students, undergraduate students, and professionals such as engineers, biologists, and farmers. The energy and enthusiasm in these workshops were phenomenal and led to a huge impact. Many teams continued their one-week projects, leading to patents, publications, and even disseminations through multinational corporations (*e.g.*, [ShiraMedTech](#), [TorchIT](#)). Some students also followed-up with local community building efforts such as creating makerspaces in their schools or teaching coding to underprivileged girls.

Teaching assistant. I have also served as a teaching assistant in a breadth of computer science classes (*e.g.*, HCI, embedded systems, computer networks, accessibility). At UW, I was a two-time TA for HCI class, with Prof. Fogarty and Prof. Reinecke. During my second term, I designed the weekly in-studio activities as the lead TA and co-instructed two of the four sessions each week with a total of 42 students. The activities included brainstorming, prototyping, heuristic evaluation, and user research. My aim was to lower the barrier through fun and play and teach the practical utility of the HCI methods. Several reported my studio helped increase their confidence by allowing them to grasp the concepts taught in lectures.

Lecture Class. In 2017, I was invited to teach the user-interface design portion of the inaugural Inclusive Design class at IIT Delhi to 36 students. It included seven lectures and a small project. I designed a curriculum containing the basis of human perception (*e.g.*, motor skills, color vision, attention), important design principles (*e.g.*, learnability, visibility, input/output models), and various prototyping methods (*e.g.*, video prototyping, Wizard of Oz). As I am hard of hearing, I supplemented communication with a real-time captioning technology, which the students appreciated. My role was particularly instrumental in setting up real-world engagement in the projects. Specifically, I paired teams of four students with a client with a disability. Together, they designed an interface that supported the client's particular need in daily life. The course was very well received, with comments such as: "*Dhruv [...] really met me at my [skill] level. The concepts were broken down and appeared so simple and obvious.*" "*I can now design anything I want [...] while being socially conscious.*"

Teaching Workshops. I also participated in three structured faculty teaching workshops at UW, and incorporated many techniques I learnt into my teaching, such as building rapport, fostering an inclusive environment, and promoting hands-on engagement.

MENTORING EXPERIENCE

In my graduate school career, I have directly mentored 18 undergraduate, two masters, and two junior PhD students. My interactions with them have been very fruitful; nearly all my publications include an undergraduate student co-author and open-source releases led by them.

I follow a hierarchical mentoring strategy. A new student is first closely mentored by my existing student on tightly scoped projects (*e.g.*, contributing engineering effort to existing work). This process helps them build familiarity and momentum with the team, while contributing to tangible outcomes. Once the student gains experience, they focus on more challenging problems with me, and I adapt my mentoring style to fit their needs. Here, I summarize two mentoring instances.

Khoa Nguyen, a University of Washington undergraduate student, began working with my existing student, Hung Ngo, on improving the user interface for our smartwatch sound awareness app. With Hung's guidance, he prototyped multiple interfaces, took the team's feedback, and deployed the final app prototype on the Google Play Store. He then took charge of the full app pipeline, continued improving it based on online reviews, and demoed

it in a flagship HCI conference, where it won a best artifact award. Working closely with me, Khoa then contributed to the full-scoped ProtoSound research project, where he led the design and evaluation of our novel few-shot sound recognition pipeline and is the second author on our paper. He has now accepted a full-time position at Amazon, and is mentoring another student, Quan Dang, on ProtoSound's open-source release. Quan will soon collaborate with me on a new research project, AdaptiveSound.

I have similarly mentored **Greg Guo and Robin Yang**, who jointly first authored a poster submission for the augmented reality sound awareness project. Subsequently, Greg and Robin guided other undergraduate students in our and other research groups. Both were accepted to the master's program at UW CSE.

COMMUNITY

I believe that as educators, we have a responsibility to uplift students beyond our immediate research group. Consequently, I have closely mentored several students from underserved communities. For example, I mentored Rohit Satija, who is currently pursuing a postdoc at UC Berkeley. Rohit was an undergraduate student from India in my 2014 DIY workshop, who I continued to mentor till he was accepted into a PhD program in the US.

Besides the DIY workshops, I have also organized other local community events. For example, from 2018 to 2020, I co-organized meetups of local HCI researchers and practitioners to expand the HCI community in Seattle. Throughout my graduate career, I have engaged with and given talks to various local government programs and science museums about our group's research. I also helped set up the first American sign language class at MIT.

POTENTIAL COURSES

I am most qualified to teach courses in the following areas, as well as a broad range of intro-level CS courses. In these courses, I look forward to intermixing theoretical foundations with practical hands-on exercises and local community engagement wherever possible.

Human-Computer Interaction. Example courses include introduction to HCI, interaction design studio, and user research methods. Topics include needfinding, brainstorming, prototyping, and evaluation.

Applied Artificial Intelligence. Example courses include applied machine learning, human-AI interaction, and human-centered ML, with topics of common ML techniques and workflows, human agency, AI ethics and bias, methods for obtaining high quality data, applications in accessibility, health, and environmental sustainability.

Accessibility. Example courses include accessible technology, inclusive design, and accessibility project studio. Undergraduate topics include design, technology, and user research with people with disabilities with a project focus. Grad courses will include research topics in general accessibility and intersectionality with other marginalized populations such as the global south or women.

Sound and Speech Capstone. A graduate-level course I am excited to introduce with topics of audio recording and playback, encoding and decoding, sound and speech synthesis, sound recognition, speech transcription, and human interfacing.