

I am privileged to have had mentors, as early as high school¹, take an active interest in my success. Paying this support forward is a driving motivation for my seeking a faculty position, and here, I detail my existing efforts to do so.

TEACHING EXPERIENCE

My formative experiences, as a teaching assistant for Prof. Scott Klemmer's *Introduction to Human-Computer Interaction* class at Stanford University, demonstrated the importance of **teaching as coaching**. I led two weekly design studios of fifteen students each, and designed in-studio activities to engage students in active learning and peer feedback. These activities included rapid prototyping based on in-studio prompts, heuristic evaluations of each other's work, and reflective journaling exercises. The goal was to foster an environment where failure was not frowned upon and recovery facilitated by timely and actionable feedback. In end-of-quarter student evaluations, my studios were highly rated with one student commenting that "[Arvind's] studio was probably the best section-like class I've ever had."

In a subsequent *Interaction Design Studio* class, co-taught by Profs. Jeffrey Heer and Michael Bernstein, I was the lead TA and responsible for developing material for supplementary lab classes. Through hands-on demonstrations and prototyping "sandboxes," students were exposed to gestural technologies (e.g., Microsoft Kinect) necessary for their final projects. My aim was to, once again, lower the barrier for students and several reported that my tools helped build their confidence. Others were encouraged to take a risk with experimental technology such as the Leap Motion sensor (an alpha product at the time). I found it particularly rewarding to see the interest these classes, the first two in Stanford's undergraduate HCI sequence, sparked in students. Many have since joined research programs and published papers in HCI, or are now in user experience and interaction design roles in industry. Students have asked me to write letters of recommendation on their behalf, and one was even the second hire at my start-up as Director of User Experience!

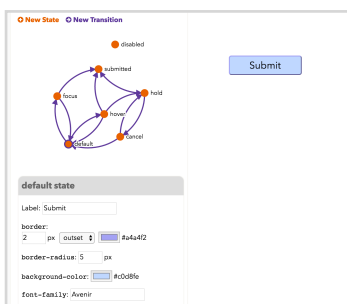


Figure 1: A simple graphical interface to introduce students to interaction design as state machines.

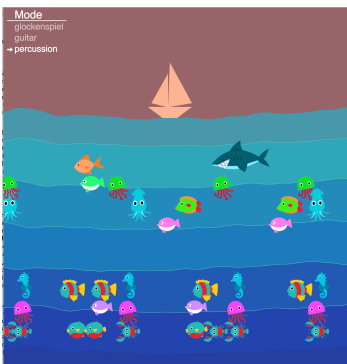


Figure 2: A networked art project to collaboratively create music. Instances are designated different instruments, and animated sea creatures "visualize" the music a la Guitar Hero.

My most recent experience has been with *User Interface Software & Technology*, a master's-level class which I co-taught at the University of Washington with Prof. Jeffrey Heer. In only its second offering, there was ample opportunity to redesign course content to better reflect the needs of our diverse student body, which included returning professionals and continuing undergraduates from a range of backgrounds such as computer science, psychology, architecture, art, and design. A restructured syllabus, and an array of new assignments I created, better balanced **teaching the conceptual underpinnings** of user interfaces and **building transferable skills**. For example, I developed a simple graphical interface (Figure 1) for our new first assignment that students used to specify the interactive states of submit and radio buttons. As a result, they were introduced to thinking of interaction design as a state machine without immediately being burdened by the complexities of event-driven programming. Similarly, we transitioned a prior "computational art" project from bespoke infrastructure to the widely used p5.js library (a JavaScript port of Processing). Students still learned the fundamentals of graphics and animation, but did so in a more concrete and applicable format. An example project is shown in Figure 2. These efforts helped raise the average course evaluation score from 3.4 to 4.5 out of 5, with students commenting "Arvind and Jeff are incredibly intuitive and are skilled at creating and delivering course content that everyone, regardless of level of familiar with CS prior to class, is able to learn something from."

Moving forward, besides courses on human-computer interaction and user interface technologies, I am also interested in teaching classes on *Interactive Data Visualization*. At the undergraduate level, I envision a sequence of two upper-division courses. First, students would be introduced to the fundamentals of visualization including data literacy & modeling, human perception & cognition, and visual encoding & interaction techniques. These concepts would be reified through a series of short projects. A second-semester *Visualization Design Studio* class would then task students with developing new visualization techniques or sys-

¹ Why we call it a "community." *Six Apart*, 2007. <http://web.archive.org/web/20130401140454/http://www.movabletype.com/blog/2007/02/why-we-call-it-a-community.html>

tems to tackle *real-world challenges*. Given visualization's broad applicability, I would solicit project ideas from both internal and external domain experts including scientists and journalists. In doing so, I would hope to expose students to new problem domains and provide new opportunities for collaboration.

At the graduate level, I look forward to teaching *Research Topics in Interactive Visualization*, which would couple readings & discussion of current research with an open-ended, multi-week research project. Like the studio class, I hope to attract graduate students from diverse disciplines seeking to leverage visualization to advance their own research.

MENTORING EXPERIENCE

I have had the pleasure of working with several talented undergraduate and graduate students, and follow an **apprenticeship model**. Students begin by working closely with me on tightly-scoped projects, typically contributing engineering effort to existing work. This approach allows them to build familiarity, momentum and thus, confidence with the research space while making tangible contributions to high-profile open-source projects. Once they feel comfortable tackling deeper challenges, I help them identify a research problem, apply appropriate methods to address it, and then communicate their findings through posters, presentations, or published papers. Here, I summarize my experiences with two students.

Ryan Russell, a University of Washington undergraduate, began working with me by improving support for touch-based interactions in Reactive Vega. He constructed a number of examples (e.g., Figure 3), tested them on Microsoft's multitouch PixelSense display, and then contributed necessary bug fixes. His hard work formed a central part of our evaluation of Vega's expressiveness, and he was the second co-author on our InfoVis 2015 paper. We continue to use the examples he built, which have wowed audiences at OpenVis Conf and the U.N. Data Viz Camp. With my encouragement, Ryan extended his research contributions via a senior honors thesis where he investigated optimizations to the Vega parser and dataflow graph. He has since accepted a full-time position at Microsoft.

I have similarly mentored Jane Hoffswell, a junior PhD student in our lab, as she developed *visual debugging techniques* for Reactive Vega visualizations (Figure 4). I helped guide her through conducting formative interviews with stakeholders, prototyping alternative designs, evaluating them with end-users, and then finally deploying and documenting the techniques as part of our public-facing infrastructure. Jane presented this work at EuroVis 2016, and was the lead author on the corresponding research paper. She is continuing her PhD research, building new tools to support programming interactive systems, and I continue to help advise her.

DIVERSITY

I am fortunate to have participated in several series of social justice retreats while serving as an undergraduate Resident Advisor at UC San Diego. These training sessions helped me develop an understanding of the multi-faceted role of privilege in our society, and how systematic and implicit biases can hold underrepresented populations back. I put this knowledge to use as a student government senator by coordinating our response to on-campus racial unrest in 2010, and organized several award-winning events to raise awareness of social justice thinking and build empathy amongst the student body.

In graduate school, I have invested time in reaching out to women and am proud to have gender parity among the students I have mentored. I have role-modeled ways of building a more inclusive environment — for example, through the use of gender-neutral language and gently correcting micro-aggressions — and carried this ethos through to co-founding a start-up. For my co-founders and I, it was a point of pride to build a company far-removed from the typical white, male-dominated culture: two of my co-founders and our first two hires were women of color.

As a faculty member, I will continue to be deeply committed to reaching and supporting a diverse range of students.

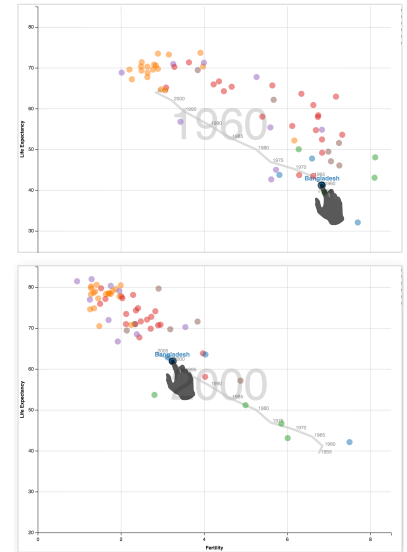


Figure 3: DimpVis, a touch-based interaction to emulate Hans Rosling's narrative style. Ryan recreated this example with Vega, using it to identify and fix bugs.

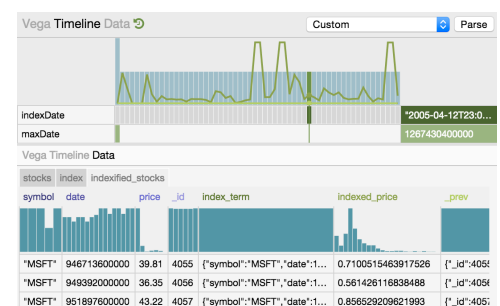


Figure 4: Jane's debugging techniques visualize interactive and data state over time. Users can inspect or replay these values.