

TEACHING STATEMENT

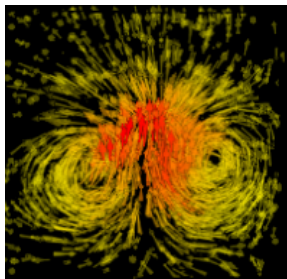
Jeffrey Michael Heer

Working as both a teacher and mentor has been a highlight of my years in graduate school, and the ability to continue to work with students is a primary motivation for my seeking a faculty position. My approach to education is to engage students in projects that require the application of course material to real-world problems, hopefully sparking a sustained interest or furthering students' pre-existing research. This approach has been borne out in my experiences serving as a research mentor and as an instructor of both undergraduate and graduate courses.



Design storyboards for student projects in new media.

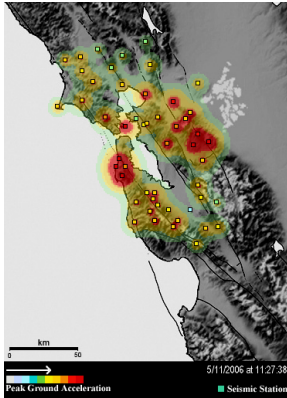
1. A digital health trainer
2. Virtual world demonstration



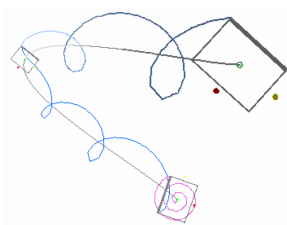
Student project on GPU-based flow visualization.

My first teaching experience was as the head Graduate Student Instructor for *Foundations of New Media*, an undergraduate course blending technological and socio-cultural considerations in the study of digital media. Working with Professors Marc Davis and Peter Lyman, I helped design the curriculum for the first-ever offering of the course, led weekly discussion sections, and delivered multiple course lectures. Designing course material for a diverse student body spanning computer science, communications, business, and journalism proved a rewarding challenge. For example, to teach basic programming principles to students with varied technical backgrounds, I created a simple programming language based on LOGO by which the students could control a “GSI-BOT”—*i.e.*, me. The opportunity to programmatically control their teaching assistant engaged a league of creative amateur programmers, though left myself somewhat dizzied. Working in collaborative teams with members of varying skills, students also completed multiple projects in which they redesigned existing media technologies along themes of programmability, social communication, and game play. I was greatly rewarded by the enthusiasm the class sparked in the students, a number of whom have gone on to pursue research and graduate studies based on their experiences in the course.

In subsequent semesters, I co-organized two graduate courses: *Information Visualization* with Prof. Marti Hearst in the Information School and *Visualization* with Prof. Maneesh Agrawala in Computer Science. In each case, I helped design the course syllabus, prepared and delivered lectures, wrote and graded assignments, and advised student projects. In both courses, teams of students identified visualization problems and developed solutions for their final projects. Prof. Agrawala and I also organized a student project competition with an invited panel of outside visualization experts serving as judges. The competition proved quite successful and brought motivation and recognition to the students. These experiences fostered my appreciation for project-based learning as a means to engage students with course material. I observed that project-based classes provide an opportunity for students to integrate material learned in the course with pre-



Student project visualizing seismic wave propagation.



Visual interface for authoring motion paths in zoomable UIs.



Scented widgets embed visualizations into user interface controls to aid navigation.

existing research projects, many of which come from different sub-disciplines. As a result, I found that project-based courses can both support student research and facilitate cross-pollination between research areas.

I have also had the privilege of serving as a research mentor for a number of gifted students. In each case, I have helped students develop their own research programs and learn research skills in an active, hands-on manner. This process includes identifying a relevant problem and proper methods for addressing it, carrying out the research, and authoring subsequent papers and presentations. I believe the role of a good mentor is to develop both the creativity and skills of the student. This involves working side-by-side with students in a collegial manner while also providing guidance so that students avoid pitfalls and overcome obstacles encountered in the research process. Here I summarize the work of two students I have mentored.

Brien Colwell worked with me as an undergraduate researcher, developing interaction and visualization techniques for authoring complex animation paths in zoomable interfaces. In addition to developing Brien's research skills, mentoring helped me develop my management skills. After successfully completing some difficult technical challenges, Brien faced more mundane integration tasks. To motivate Brien, I put a stronger focus on the application space of our techniques, pushing him to look beyond the current tasks. Spurred by an interest in poetry, Brien finished the remaining systems-building tasks and used the resulting system to create engaging presentations of poems using animated tours and kinetic typography. Though only an undergraduate, Brien's work was awarded 2nd place by independent judges in a graduate-level Visualization course, beating out a class full of graduate students. With graduation approaching, I put Brien in contact with a number of visualization start-ups, all of whom made him job offers. After a few years in industry, Brien is now applying to graduate programs.

I have also served as a mentor at the graduate level. Wesley Willett worked with me to develop *scented widgets*, a framework for embedding visualizations in standard graphical user interface controls in order to facilitate navigation in information spaces. I helped mentor Wesley in the development of the research plan for this work, which included building a toolkit-level framework for adding embedded visualizations to interface widgets and a controlled experiment evaluating use of these widgets in a collaborative data analysis environment. Wesley was the lead author on a resulting research paper and presented our work at INFOVIS 2007. Wesley is now continuing his Ph.D. research and developing his next research project.

FUTURE OBJECTIVES

I hope to continue teaching and mentoring undergraduate and graduate students as a professor. In addition to core courses on computer science fundamentals, I intend to develop and teach courses in visualization and human-computer interaction.

User Interface Design: Undergraduate-level introduction to user interface design, prototyping, implementation, and evaluation. Topics include user-centered design; affordances and conceptual models; fieldwork and contextual inquiry; brainstorming; prototyping; event-based programming; user interface toolkits; and both formal and informal evaluation. Students will work on a group project in which they identify an application area and iteratively design, prototype, and evaluate a proposed interface.

Foundations of New Media: Undergraduate-level introduction to the design and study of digital media. Topics include digital representation; media transcoding; theories of media production and reception; socio-cultural analyses of media adoption; and new media design practice. The course aims to bridge technology design with social and cultural theory and involves critique and redesign of contemporary media technologies.

Visualization: Graduate-level introduction to techniques for scientific, cartographic, and information visualization. Topics include human perception and cognition; visual encoding guidelines; color theory; focus+context techniques; data modeling; graph and tree visualization; visualization evaluation; and techniques for automated visualization design. Students are expected to complete a course project in which they identify a relevant data set for which they then design an effective visualization.

Visualization Design Studio: A second-semester course providing a studio environment for developing novel visualization systems. The class will involve identification of relevant applications, design of visualization techniques and systems, group design critiques, and evaluation through controlled experimentation or study of real-world deployment.

Research Topics in Human-Computer Interaction: A graduate-level course on research methods in human-centered computing. Topics include design methods; user interface toolkits; quantitative and qualitative evaluation; computer-supported cooperative work; social computing; visualization; and ubiquitous and context-aware computing.

In addition, I would like to lead seminar courses on current research topics. These classes would involve reading and discussing current papers and developing a research agenda. Example topics of interest include *social computing*, *emerging display technologies* (e.g., mobile devices, large displays, multi-touch displays), and *end-user interface creation*.