

CS6724 F23 Advanced Topics HCI: Human Factors in AI-Powered Systems

Instructor: [Yan Chen \(ych@vt.edu\)](mailto:ych@vt.edu)

Description: This course will explore the design and creation of interactive AI-powered systems and technologies for various types of users, including professional software developers, end-user developers, learners, artists, and designers. The course will cover topics such as AI-assisted programming systems, AI-assisted learning systems, and AI-assisted creative systems, with a focus on the human factors involved in designing and implementing these systems. By the end of the course, students will be able to conduct research on topics such as learning at scale and collaboration in a learning context.

Temporary Format: The course will include a combination of paper readings and discussions, group projects, and prototype creation and demos.

Temporary Course Structure: This course is designed to be highly interactive, with an emphasis on hands-on learning and collaboration among students. The course will consist of most of the following activities:

1. **Reading Response:** Each week, students will be assigned 2-3 readings related to the week's topic. In the days before class, students will write a one-paragraph reflection about each reading assignment and post it to Canvas.
2. **Discussion Leader:** Each week, two students will be assigned as discussion leaders. In class, they will summarize the readings and students' responses, and spur in-class discussion.
3. **In-Class Participation and Activities:** Each class will feature peer discussions facilitated by the discussion leaders. Occasionally, a class will also feature an in-class activity designed by the discussion leaders or informal presentations of project updates or assignments. When we have an invited guest, students will be expected to participate in asking questions to the guest.
4. **Group Projects:** Students will work in groups to complete two major projects during the course. The first project will involve designing an AI-powered system for a specific user group, while the second project will involve prototyping and testing a functional version of the system.
5. **Final Presentation:** At the end of the course, each group will present their final project in a 10-minute presentation.
6. **Assignments:** There will be several short assignments throughout the course to help students deepen their understanding of the course topics.
7. **Milestones and Feedback:** There will be several milestones throughout the course to help students stay on track with their projects. Students will also receive feedback on their work from the instructor and their peers.

Expectations:

Participation and Preparation: Students are expected to attend and actively participate in all class sessions. This includes completing assigned readings, participating in group discussions and activities, and presenting their work when required. Students are also expected to be respectful and attentive towards their classmates and the instructor.

Deadlines and Extensions: Deadlines are set to help the class run smoothly. If students require an extension due to extenuating circumstances, they should reach out to the instructor as soon as possible to discuss the issue.

A Note on Diversity and Respectful Conduct: This course welcomes students of all backgrounds and identities. Students are expected to treat their classmates and the instructor with respect and create an inclusive learning environment. Any incidents that challenge this commitment to a supportive and inclusive environment should be reported to the instructor.

Example Reading List:

"What It Wants Me To Say": Bridging the Abstraction Gap Between End-User Programmers and Code-Generating Large Language Models. Michael Xieyang Liu, Advait Sarkar, Carina Negreanu, Ben Zorn, Jack Williams, Neil Toronto, Andrew D. Gordon. CHI 2023.

SemanticOn: Specifying Content-Based Semantic Conditions for Web Automation Programs. Kevin Pu, Rainey Fu, Rui Dong, Xinyu Wang, Yan Chen, Tovi Grossman. UIST 2022.

VizProg: Identifying Misunderstandings by Visualizing Students' Coding Progress. Ashley Zhang, Yan Chen, Steve Oney. ACM Conference on Human Factors in Computing Systems (CHI), 2023.

StoryBuddy: A Human-AI Collaborative Agent for Parent-Child Interactive Storytelling with Flexible Parent Involvement. Zheng Zhang, Ying Xu, Yanhao Wang, Bingsheng Yao, Daniel Ritchie, Tongshuang Wu, Mo Yu, Dakuo Wang, and Toby Jia-Jun Li. CHI 2022.

Investigating and Designing for Trust in AI-powered Code Generation Tools.
<https://arxiv.org/pdf/2305.11248.pdf>

Early insights and opportunities of AI-powered pair-programming tools. <https://dl.acm.org/doi/pdf/10.1145/3589996>

Understanding the Usability of AI Programming Assistants. Jenny T. Liang, Chenyang Yang, Brad A. Myers. <https://arxiv.org/pdf/2303.17125.pdf>