Computer-Human Interaction
CSCE 436 (Spring 2024)

Lecture + Studio combined class. In this class, you will learn principles of interaction design and prototyping techniques for human-computer interaction. The intent of this class is to provide a general understanding of Human-Computer Interaction (HCI) theories, design principles, implementation techniques, and resources, then to offer fundamental skills for the rapid prototyping of interactive digital systems– hardware and software.

Learning Outcomes

With the focus on a broad spectrum of technical HCI, you will be able to (1) describe fundamental interaction design principles in your language, (2) understand late-breaking technical HCI research topics and underlying technologies (3) prototype digital/physical artifacts using machines and tools, (4) conduct evaluations of new service and computational tools.
Skills you gain include sketch programming, TinkerCAD for circuit design and simulation, p5.js for event (interaction) based programming, paper.js for interactive data visualization/manipulation, openCV for image/camera input processing, pyphox.js for live sensor data manipulation using machine learning, OpenSCAD for parametric 3D modeling, and more.

Syllabus details, including homework deadlines, and office hours may be changed and announced in class before/after the changes.

Teaching Staff

Jeeeun Kim (Instructor, http://jeeeunkim.com/)
- Email: Jeeeun.kim@tamu.edu
- Office Phone: 979-862-2275
- Office hours: Tuesday 3-5 pm, or by appointment
- Office location: PETR 336

Meeting times & Location

Mon/Wed/Fri 11:30 am - 12:20 pm ZACH 310

If you need to attend the class ***remotely***, please email the instructor

Course Prerequisites

CSCE 315 w/Min Grade D (concurrency)

Course Website

https://canvas.tamu.edu/

Course Schedule & Lecture Slides

Week 1

1/15, Mon.	1/17, Wed.	1/19, Fri.

No class. Martin Luther King Day.	lecture - Intro to HCI and Interaction Design week1-Intro to HCI	studio - *Warm-up Exercise:* *week1b-pinhole camera*

- Reading/Resources:
  - *User-Centered Design Process by MIT CSAIL HCI*
  - *Curiosity, Creativity, and Surprise as Analytic Tools: Grounded Theory Method by Muller*
  - *Concepts, Values, and Methods for Technical Human-Computer Interaction Research by Hudson & Mankoff*
- Submissions:
  - Assignment #0 (No formal submission, Not graded): Sign up for the team
    CSCE436-500 Team registration
  - Assignment #1: Media of your camera use-cases (due 1/25th)

Week 2

1/22, Mon.	1/24, Wed.	1/26, Fri.
• lecture - Prototyping week2-Prototyping	• lecture - Prototyping (contd)	• Studio - Wireframing week2c-Wireframing

- Reading/Resources:
  - *Reflective Physical Prototyping through Integrated Design, Test, and Analysis by Hartmann, Klemmer, Bernstein, Abdulla, Burr, Robinson-Mosher, & Gee*
  - *Integrating Craft Materials and Computation by Blauvelt, Wrensch, & Eisenberg*
  - *What do Prototypes Prototype? (In Handbook of Human-computer Interaction) by Houde & Hill*
  - *Multiple Views of Participatory Design by Sanoff*
- Submissions:
  - Assignment #2: User journey with wireframes

Week 3

1/29, Mon.	1/31, Wed.	2/2, Fri.
• lecture - Design for Access & Assistive Technology week3a-Design4Acc…	• lecture - Interaction Design Principles week3b-DesignPrinci…	• studio - Reverse engineering machines using cardboard week3c-Cardboard …

- Reading/Resources:
  - *Graphic Design* by MIT CSAIL
  - *Research Through Design in HCI by Zimmerman & Folizzi*
  - *Universal Design: Process, Principles, and Applications by Burgstahler*
- *Submissions:*
  - Assignment #3: Storytelling of your cardboard machine

Week 4

2/5, Mon.	2/7, Wed.	2/9, Fri.

• lecture - Needfinding Study week4a-Understand …	• lecture - Evaluation Methods week4b-Evaluation …	• studio - Developing persona week4c-Developing …

- Reading/Resources:
  - *Needfidning Tools by Stanford d.School*
  - *Getting the Right Design and the Design Right: Testing Many Is Better Than One by Tohidi, Buxton, Baecker, Sellen*
- *Submissions:*
  - *Assignment #4: Your four persona*

Week 5

2/12, Mon.	2/14, Wed.	2/16, Fri.
• lecture - Input & Output week7-InputOutput	• lecture - Gamification (slide to come)	• studio - Event-driven interface design p5.js

- Reading/Resources:
  - *P5.js* https://p5js.org/
  - *Input Technologies and Techniques by Hinckley*
  - *Touché: Enhancing Touch Interaction on Humans, Screens, Liquids, and Everyday Objects by Sato, Pouupyrev, Harrison*
- Submissions
  - Assignment #5: P5.js challenge & Screen recording of interactive systems
    Assignment#4-p5

Week 6

2/19, Mon.	2/21, Wed.	2/23, Fri
• lecture - Interactive data visualization week6a-Data Visuali…	• lecture - Color and Typography week6b-Color and T…	• studio - Vector graphics & paper.js Week8-Paper.js

- Reading/Resources:
  - *Sensor Data Streams by Voida, Patterson, & Patel*
  - *Paper.js* http://paperjs.org/about/
- Submissions
  - Assignment #6: Paper.js Assignment#5 PaperJS

Week 7

2/26, Mon.	2/28, Wed.	3/1, Fri
• lecture - Intelligent User Interfaces week7a-Intelligent U…	• lecture - (contd)	• studio - Teachable Machine week7c-Teachable M…

- Readings:
  - *The Promise of Empathy: Design, Disability, and Knowing the "Other"* by Bennett & Rosner 📪
- Submissions
  - Assignment #7: Your trained machine and data description

Week 8

3/4, Mon.	3/6, Wed.	3/8, Fri.
• Midterm Review	• Study day	• Midterm

Week 9

- 3/11-15, Spring break (No class)

Week 10

3/18, Mon.	3/20, Wed.	3/22, Fri
• lecture - Image Processing & Camera Input week10a-Image Pro…	• lecture - (contd)	• studio - OpenCV week10b-OpenCV.js

- Reading/Resources:
  - OpenCV OpenCV.js
  - *Javascript frameworks and libraries for human features & behavior detection*
  - *Computers as Persuasive Social Actors by Fogg*
  - *Single-view 3D Openable Part Detection by Jiang, Mao, Savva, and Chang*
- Submissions:
  - Project milestone #1 (by 3/31, Sun)

Week 11

3/25, Mon.	3/27, Wed.	3/29, Fri
• studio - Ubiquitous computing Week11-Phyphox	• lecture - real-time sensing	• studio - Phyphox

- Reading/Resources:
  - Physical Phone Experiments https://phyphox.org/
  - *E3D: Harvesting Energy from Everyday Kinetic Interactions Using 3D Printed Attachment Mechanisms* by Arabi, Kim

Week 12

4/1, Mon.	4/3, Wed.	4/5, Fri

• Project meetings and feedback (Team 1-6)	• Project meetings and feedback (Team 7-12)	• Project meetings and feedback (Team 13-18)

- Submissions:
  - Project milestone #2 (by 4/14, Sun)

Week 13

4/8, Mon.	4/10, Wed.	4/12, Fri
• lecture - 3D Modeling	• studio - SketchUp 3D modeling	• *Work on your project*

Week 14

4/15, Mon.	4/17, Wed.	4/19, Fri
• Guest lecture Haptic Feedback	• studio - Social Computing	• *Work on your project*

- Submissions
  - Project milestone #3 (by 4/28, Sun)

Week 15

4/22, Mon.	4/24, Wed.	4/26, Fri
• Final presentation (Team 1-6)	• Final presentation (Team 7-12)	• Final presentation (Team 13-18)

Week 16

- 4/29, Mon. (Reserved for delayed final presentation) Week15-Final presentation
- 5/1-3. Reading days & Finals. No class.
- Submissions:
  - Project milestone #4 (by 5/5, Sun)

Grading Policies

Scale

90-100	A
80-89	B
70-79	C

60-69	D
<60	F

Weight

- Participation (attendance, class participation): 10%
- Assignments, Quiz, In-studio activities (Individual, unless specified): 30%
- Midterm: 30%
- Project milestone* (Group project): 30%
  **project grading will be partly peer-reviewed (50%), and breakdowns will be available online*

Check scale

Label	*Points*	*Description*
✔+ +	*10/10*	*Reserved for design awards (top 5 submissions)*
✔+	*9/10*	*Exceeds expectations: The assignment is complete and has design components exceeding written expectations showing strong engagements with the design process and thoughtful iterations through improvements beyond given requirements. Impeccable presentation.*
✔	*8/10*	*Satisfactory: The assignment fulfills expectations showing some engagement with the design/production process but some issues remain. There exist incomplete components. Presentation understandable.*
✔−	*7/10*	*Needs improvements: Some components of the assignment are incomplete, many issues remain. Presentation may fall short (e.g., poor scans, completion status cannot be verified through submitted photos only, incomplete descriptions).*
−	*5/10*	*Unsatisfactory: The assignment is missing substantial components. Does not represent engagement with the design cycle.*
✘	*0/10*	*Incomplete: No submission or late submission than a grace period.*

Grading Example

- Your assignment labels/points:

	Assignment #1	Assignment #2	Assignment #3	Assignment #4	Assignment #5
Label	✔+	✔+	✔+	✔+ +	✔
Points	*9*	*9*	*9*	*10*	*8*

  Total: 45/50
  Earned towards final grades: 45/50 * 35 = 31.5
- Your midterm Score: 95/100
  Earned towards final grades: 95/100 * 25 = 23.75
- Your final project milestone labels/points:

	Milestone #1	Milestone #2	Milestone #3	Milestone #4
Label	✔+	✔+	✔	✔
Points	9	9	8	8

  Total: 34/40

Earned towards grades: 34/40 * 30 = 25.5

- If you have not missed any classes and participated well, your participation is 10
- **Total earned towards grades: 90.75/100 = A**

Deliverables

- Always due by Thursday 11:59 pm (CT) of the following week, unless specified.
- Assignment (Individual): HCI observation activities, interactive system design/prototyping practices, evaluation techniques, and peer-review critiques. **Attending and completing studios often result in complete assignments with ✔*(Satisfactory) grades, 9/10*.** Some more work and elaboration could be done to deserve ✔+ *(Exceed expectations) grade.*

- Final project: Prototype of your own interactive system/machine
    - **Project milestone #1: What to solve and why?**
        - Target domain & context and problem statement
        - Target product/service ideas
        - Background research on current design/state-of-the-art
    - **Project milestone #2: Product prototype (1st iteration)**
        - Initial low-fi mockup
        - User scenario (Storyboard)
        - Choice of your needfinding study, documentation about study process, result & analysis
    - **Project milestone #3: Preliminary user evaluation for iteration (2nd iteration)**
        - High-fidelity prototype
        - Choice of your user evaluation method, progress report, & analysis
        - Findings and insights
    - **Final Presentation**
    - **Project milestone #4: Project website containing**
        - Introduction and motivation
        - YouTube promotion video
        - Design process (low fidelity mock-up to final prototype)
        - Conclusion and future work
        - A paper written in ACM SIGCHI Extended Abstracts format*

* Section 200 only

Textbook

None

Attendance Policy

In-person attendance is encouraged, particularly for studios. Missing assignment submissions means you missed the studio, which will result in a -1 from your participation grade. See below the attendance & makeup policies for more detail.

Late Work Policy

If an absence is excused, make an appointment with the instructor (jeeeun.kim@tamu.edu) for make-up work. The subject and task will vary upon your absent assignment and deliverables. The make-up work must be completed in a timeframe not to exceed 30 calendar days from the last day of the initial absence.

Extensions/make-ups can be given 12 hours prior to the deadline upon written/in-person request. 10 min. will be given as a grace period. Otherwise, 50% off from the credit you got for that submission. If you have more than two late submissions, your final letter grade will be downscaled by one letter. All other submissions of a deliverable after the established deadline without prior request constitute late work.

Use of Generative AI for Your Assignment/Project Milestone

Writing. Analytical, and critical thinking are part of core learning outcomes, this course assumes that all work submitted by students will be generated by the students themselves. Students should not have another person/entity do the writing of any substantive portion of an assignment for them, which includes hiring a person or a company to write assignments and using artificial intelligence tools like ChatGPT. Students must cite any AI-generated materials that informed their work beyond what has been instructed through the assignment and project deliverable descriptions. Using of a generative AI tool without proper attribution qualifies as academic dishonesty. See https://www.chicagomanualofstyle.org/qanda/data/faq/topics/Documentation/faq0422.html for formatting. (adapted from University of Massachusetts Amherst)

Computer Code. In principle, and as some particular assignment guidelines instruct, you may submit AI-generated code, or code that is based on or derived from AI-generated code, as long as this use is properly documented in the comments: you need to include the prompt and the significant parts of the response. AI tools may help you avoid syntax errors, but there is no guarantee that the generated code is correct. It is your responsibility to identify errors in program logic through comprehensive, documented testing. Moreover, generated code, even if syntactically correct, may have significant scope for improvement, in particular regarding the separation of concerns and avoiding repetitions. The submission itself must meet our standards of attribution and validation.
(from Boris Steipe (2023) “Syllabus Resources”. The Sentient Syllabus Project http://sentientsyllabus.org .)

Email Policy

Like many professors, I get a ton of emails. When you email me, please be sure that the question you ask requires my answer in one or two short sentences. Otherwise, I put it back to respond with a full (long) context, then, unfortunately, may forget.

University Policies

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments. Please refer to Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reasons deemed appropriate by the instructor. Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines. Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1). "The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2). Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case"
(Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at https://aggiehonor.tamu.edu.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit https://disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and Stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):
• The incident is reasonably believed to be discrimination or harassment.
• The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's

goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

Health and Wellness

To help protect Aggieland and stop the spread of COVID-19, Texas A&M University urges students to be vaccinated and to wear masks in classrooms and all other academic facilities on campus, including labs. Doing so exemplifies the Aggie Core Values of respect, leadership, integrity, and selfless service by putting community concerns above individual preferences. COVID-19 vaccines and masking — regardless of vaccination status — have been shown to be safe and effective at reducing spread to others, infection, hospitalization, and death.