CPSC 4XXX - Introduction to Human Computer Interaction

Course Information

- Elective course for upper level undergraduate students (juniors and seniors)
- Suitable for computer science or computer information systems majors
- Class size: 20-25

Intended Audience

This course is intended for upper-level undergraduate students who have taken foundational computer science and software engineering courses. This course goes well with students who are taking more advanced software engineering courses and for students who are interested in UI/UX.

There are no official prerequisites for this course.

Lesson

Design and Interaction Principles

Topic Description:

In this lesson we will cover the basic principles of design and interaction types. Additionally we will explore examples of these principles in everyday things around us and within software. Finally we will relate how and why these principles matter in software design and engineering.

ABET and General Education Criteria

ABET Criteria

- Criteria for Accrediting Computing Programs 2023-2024
- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
    - This class - Given example interfaces and programs students will be able to identify design elements and how to best implement aspects of design into user-facing software applications.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline

        - This class - Summative assessment aims to have students design and build a solution for an application based on a predefined set of needs of a user.
    - Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
        - This class - Going over various design elements and how they affect people in their day to day lives and the implications of bad design on productivity, culture, and wellbeing. This includes accessibility and designing for all.
    - Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
        - This class - summative assessment will be a group project where group members will need to work together on the design of the application

General Education Criteria

- Ways of knowing: Students will use design concepts to explain how and why aspects of a user interface are appropriately designed.
- Communication: Students will demonstrate competence in visual communication through a group project with prototyping requirements
- Global Challenges: Students will demonstrate how various aspects of design are inclusive and how to design for inclusivity of all abilities.

Resources

- Book: Norman, Donald A. The Design of Everyday Things. MIT Press, 2013. (Will be referenced as TEDT)
- Book: Rogers, Y., Sharp, H., & Preece, J. (2023). Interaction design: Beyond human-computer interaction (6th ed.). John Wiley & Sons.
- In class activity: https://userinyerface.com/
- Online Resource of Resources: https://www.dol.gov/agencies/odep/program-areas/employment-supports/universal-design/resources
    - US Gov compiled resource of resources that links to multiple sites for Universal Design principles and other good design practices for accessibility

Lesson Plan

Resources:

- Book: Norman, Donald A. The Design of Everyday Things. MIT Press, 2013. (Will be referenced as TEDT)
- In class activity: https://userinyerface.com/
- Online Resource of Resources: https://www.dol.gov/agencies/odep/program-areas/employment-supports/universal-design/resources
    - US Gov compiled resource of resources that links to multiple sites for Universal Design principles
- Universal Design Principles - U of Washignton - https://www.washington.edu/doit/universal-design-process-principles-and-applications

Supplies:

- Please bring your laptop or device to class, we will be using a website activity as part of the class
- Prototyping supplies - pen and paper or online software (Adobe DX or Figma)
    - Adobe DX is available through CCIT
    - Figma Starter is also free - https://www.figma.com/

Learning Objectives:

1. Remembering: State 7 types of design concepts in interaction design
    a. Discoverability/Visibility, feedback, conceptual model, affordances, mappings, constraints, signifiers
2. Remembering: State the 4 main types of interaction
    a. Instructing, conversing, manipulation, exploring
3. Apply: Given an example application, label two design concepts and two interaction types.
4. Evaluate: Critique aspects of an example user interface using the 7 design concepts.
5. Create: Conceptualize and create a prototype for how a user might interact with a given example user interface using interaction types.

Lesson Plan and Activities

- (15-20 minutes) Introduce the 5 types of design concepts and 4 types of interactions using visual aids and definitions in a lecture style format
- (10-15 minutes) Activity: Show example of a UI that has bad design and have the students note down out what might wrong/right/how to fix it
    - Have students try and sign up on this website https://userinyerface.com/
    - Assesses LOs: 1, 2, 4

    - Gives the students an opportunity to see and apply what they have just learned]
    - Also pretty funny/frustrating creating a relatable experience with everyone in the class
    - Everyone has used a signup page before
- (10 minutes) Walk through each of the setups pages of user interface and have students point out what was really frustrating
    - Took me 8+ minutes to get through the initial setup, not everyone may get through it and would like to walk through each page and explain what goes wrong and why
    - Have the students point out what was super frustrating about aspects of the design in userinyerface
- (5 minutes) Lecture: the importance of design with respect to software development, relate it back to the examples in the userinyerface
- (2 minutes) Follow up with quick intro to Universal Design Principles (the next logical lesson in this series)

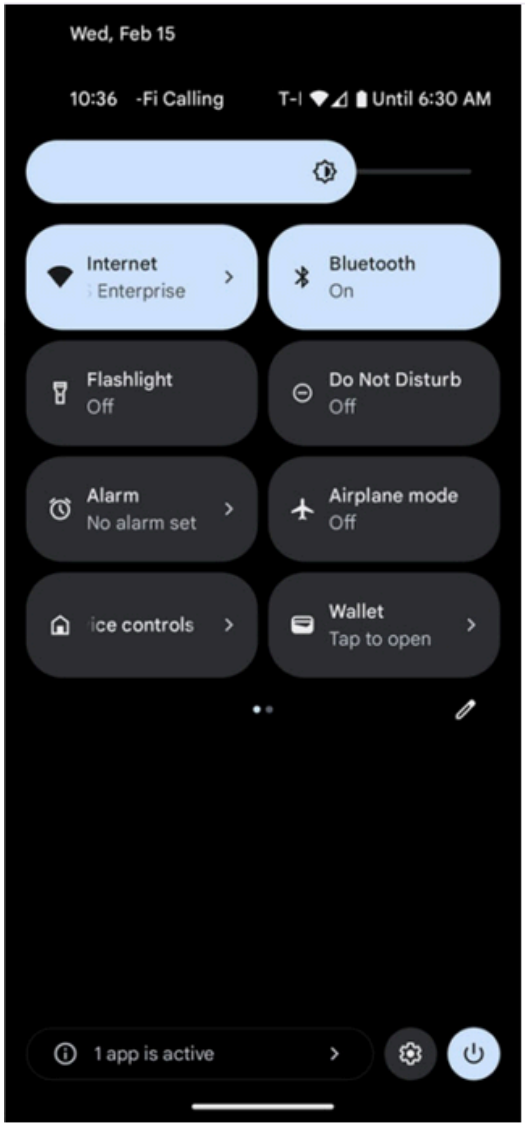
- Contingency plan if no internet access -- each aspect of userinyerface has been snipped to go over after the activity, we can pivot and give students some time to look at the snips and guess what might be wrong, will probably result in class ending about 10 min early, but could also use this time to go over the summative assessment in more detail and let them try userinyerface at home with maybe something like upload 5 aspects of the website that are examples of bad design and why.

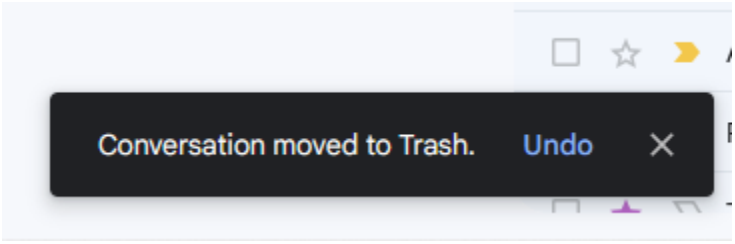
Formative and Summative Assessments

Formative Assessment 1 - Design Principles Quiz

- Quiz should take about 10-15 minutes
- LOs:
    - Remembering: State the 7 main principles of design
    - Remembering: State the 4 main types of interaction
    - Apply: Given an example application, label two design concepts and two interaction types.

1) Please find and label two (2) of the four types of interactions given the provided image
2) Please find and label two (2) of the 7 types of design





Accepted answers(always willing to be convinced for others):

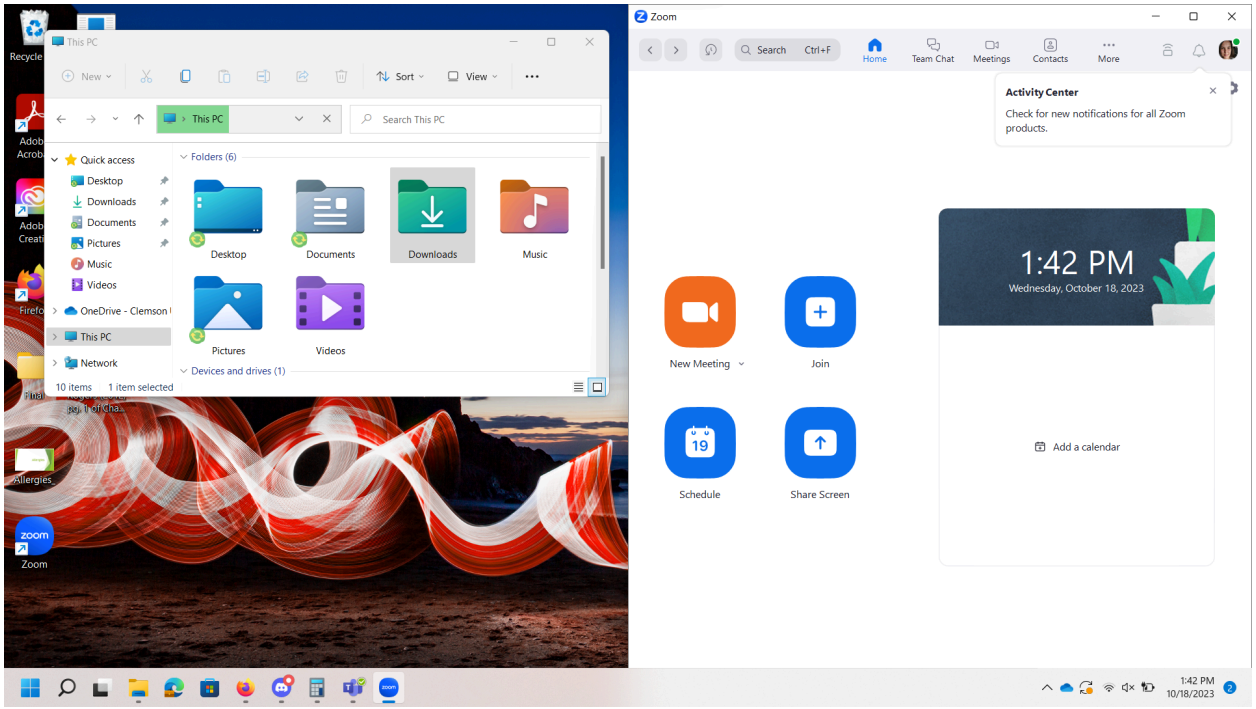
- affordance - slider bar with the larger bar and smaller bar being on the same plane, power button
- Signifier - the buttons being blue or not blue meaning they are active or inactive, the dots at the bottom signifying there is another page of options to pick from
- Mapping - pulling down on the phone will bring up the quick settings menu

- Feedback - on the second image the popup is feedback from an action that the user has done, it allows the user to undo the action they just did in case it was a mistake.
- Manipulation - users are able to move the slider back and forth on the volume, buttons are quick to be “undone”, buttons are uniform and are are representative of what the user might want to manipulate

Formative Assessment 2 - Label 5 Design Concepts

- Medium/long answer question that gives a user interface and students will be asked to label 7 design concepts
- Time to complete: 15 minutes
- LOs:
    - Remembering: State 7 types of design concepts in interaction design
    - Apply: Given an example application, label two design concepts and two interaction types.
    - Evaluate: Critique an example user interface using the 7 design concepts.
- Can be any of the 7 design concepts - discoverability, feedback, conceptual model, affordances, signifier, mapping, constraints

1) Please find and label 5 design concepts using the provided interface(s).
2) Using any of the design concepts state how they do or do not work well in this context and how you would change them.



As always -- willing to accept any answer with an explanation and these are not the only answers

- Conceptual model - file folders help create a conceptual model of where things are collected and stored
- Signifier - the magnifying glass communicates that searching is possible
- Mapping - the separate xs for closing the windows are contained within their own window -- pressing the x on one window will not close the other
- Feedback -- the green bar on the left window showing that it is loading the results in that file folder
- Discoverability - large icons with pictographs make it easy to understand what buttons do what

Summative Assessment (group)

- Students are given a scenario where they are asked to design an interface for a client
    - This assessment can be worked outside of class and should take students 2-3 hours to complete
- Group homework assignment
- Should take students approximately 2 hours to complete
- LOs:
    - Create: Conceptualize and create a prototype for how a user might interact with a given example user interface using interaction types.
- Supplies
    - pen/pencils/markers/paper
    - Online prototyping software like Adobe DX or Figma

Scenario: Designing a Task Management Mobile App

Goal: Sarah wants a task management app to help her manage her busy work schedule and personal life. She often juggles multiple projects and needs a user-friendly tool to keep track of her tasks, set deadlines, and share task lists with her team. She values a clean and intuitive user interface that doesn't add to her stress.

Problem Statement: Design an interface for a task management mobile app that improves task organization and productivity for users like Sarah. Address the challenge of making task management simple and intuitive while accommodating the needs of both personal and professional users.

Students will be asked to outline use cases (5) and constraints (2), as well as provide sketched prototypes of the design.

Example use cases:

- Create and organize tasks with due dates
- Create and organize tasks with priority
- Create and organize tasks into categories (work, personal, other)
- Share task lists with others

- Visualize task progress
- Visualize task deadlines
- Reminders and notifications

Example Constraints

- Ensure app is accessible to those with visual impairments
- Use a minimal color scheme to make a clean user experience

Sketch Example use cases (pen and paper or online software like Adobe DX or Figma)

Grading Rubric

Criteria	Ratings	Points	Notes
Use cases are well defined	10pts meets expectations - 5 or more use cases are provided 5 pts approaching expectations - 3-4 use cases are provided 0 below expectations - 0-2 use cases are provided		
Constrights are outlined with justifications	10pts meets expectations - 2 or more constraints provided 5 pts approaching expectations 0 below expectations		
Sketches are relevant to the use cases and constraints and well described	10pts meets expectations - stated use cases and constraints are sketched and labeled 5pts approaches expectations - some use cases and constraints are labeled 0 below expectations - few use cases and constraints are labeled		
Total Points		--/30	