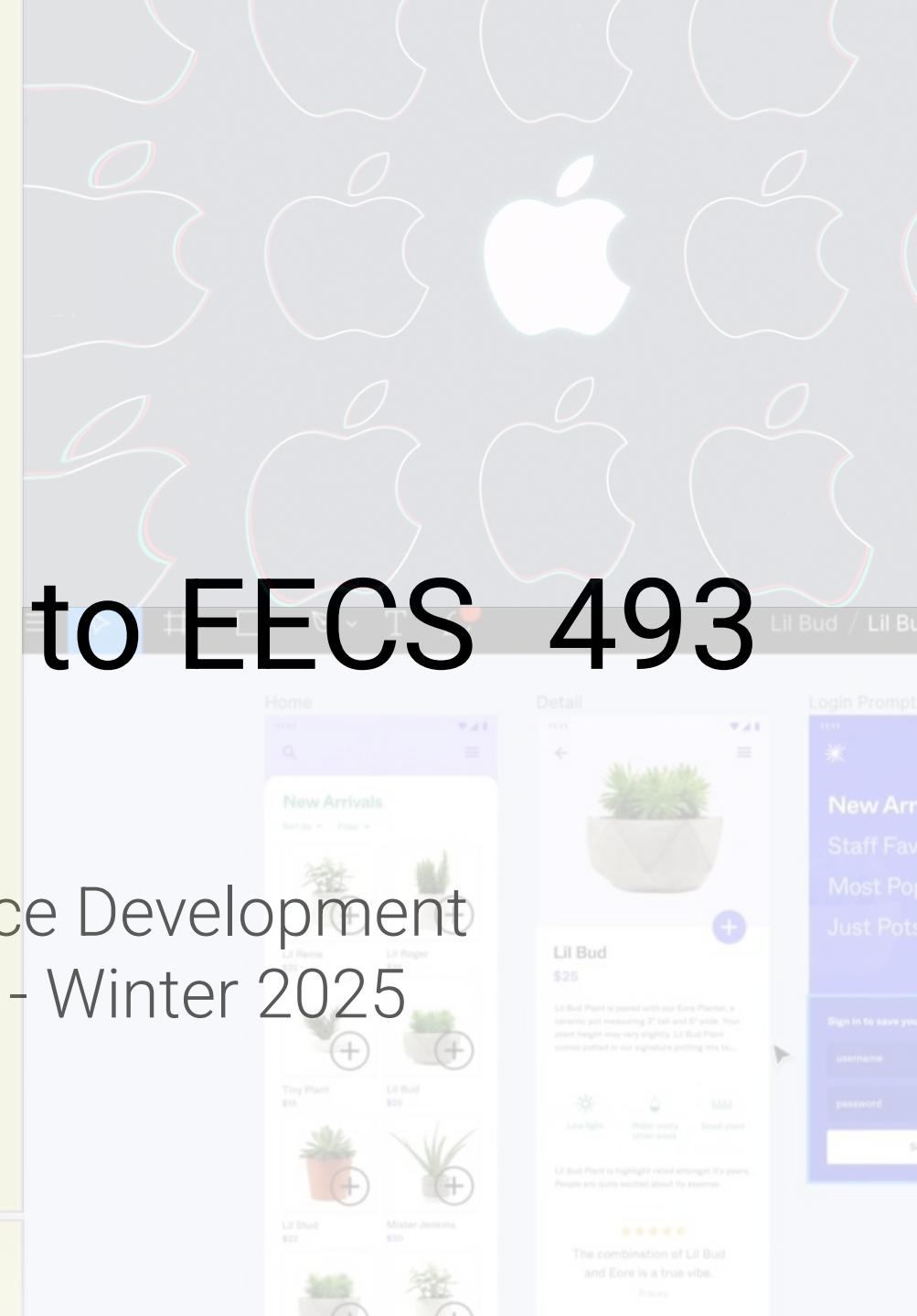


The DESIGN of EVERYDAY THINGS

Introduction to EECS 493

DON
NORMAN

User Interface Development
EECS 493 - Winter 2025



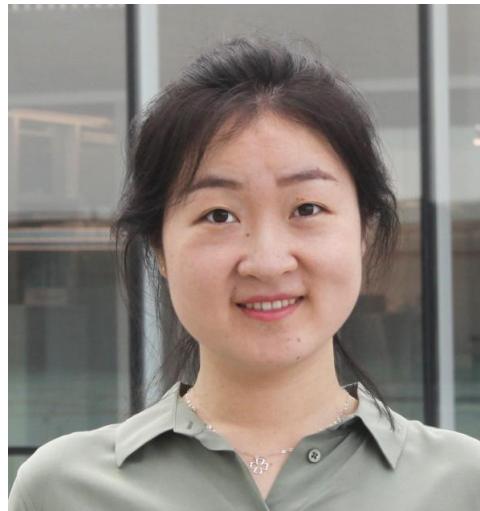
Two goals for today:

1. Course structure and overview
2. Why is user interface important? What is human-centered design?

Your Instructors



Mark Ackerman
ackerm@umich.edu



Xu Wang
xwanghci@umich.edu

We'll be co-teaching. Each instructor teaches some lectures for both sections. Both sections share this T/Th 3-4:30 lecture time, in this room.

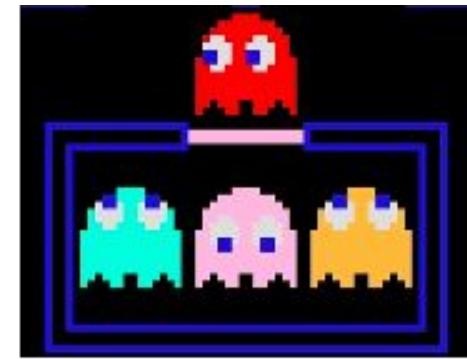
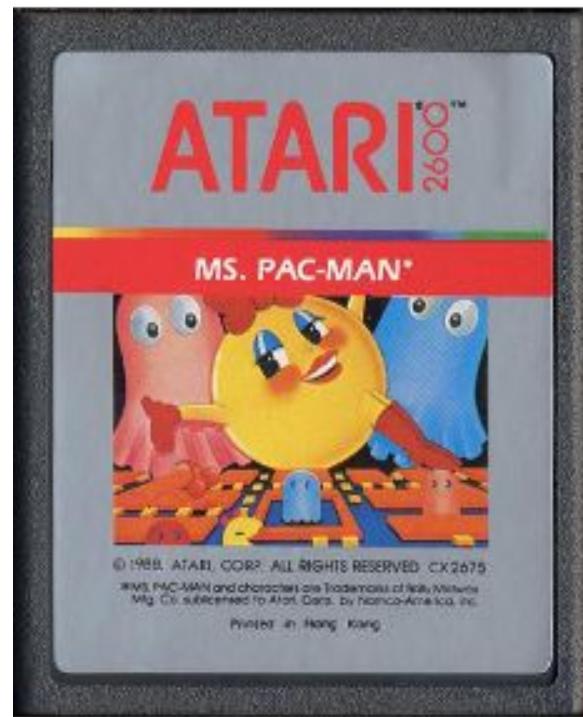
Mark Ackerman

- PhD, MIT
- HCI Fellow, ACM Fellow
- Research Area: Social Computing (aka Collaborative Systems), Socio-Technical
- Office Hour: TBD
- <http://socialworldsresearch.org>



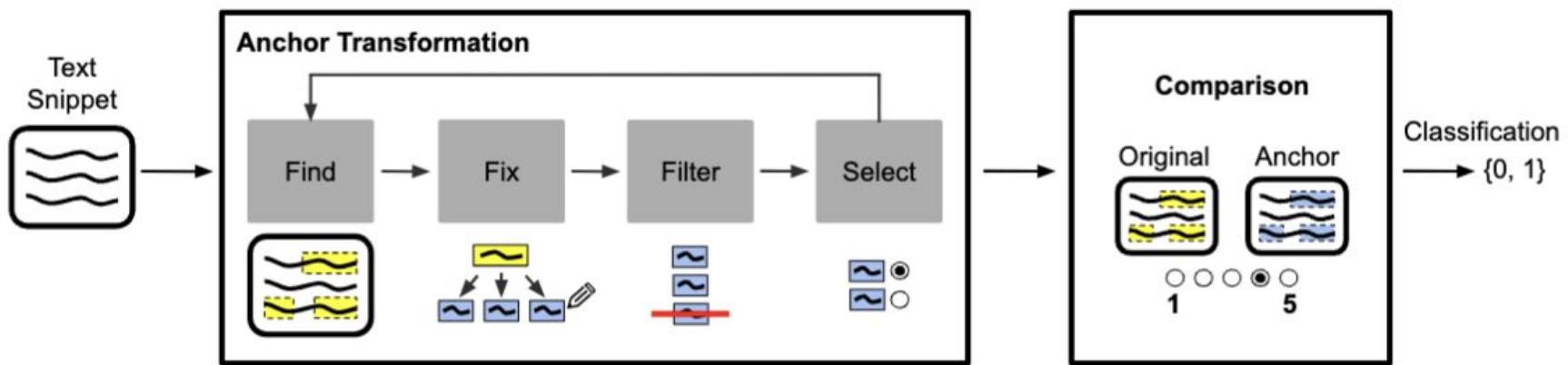
Street Cred

- 3 Billboard Top-10 Games



Two current projects

- Expertise sharing => the current Net
- First - finding gold standards for misinformation and racism detection



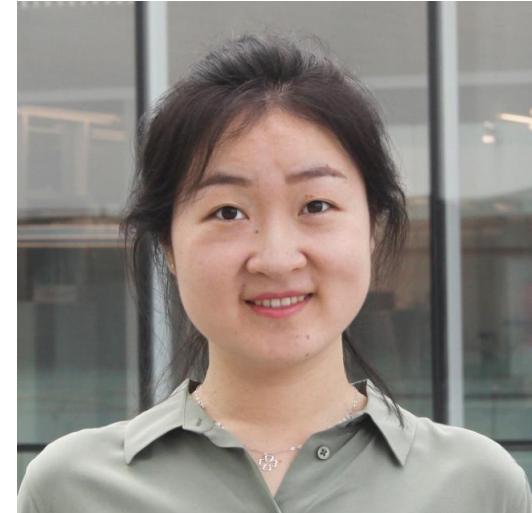
Two current projects

- Second - correcting misrepresentations in genAI
- Step 1 - looking at FB posts about misrepresentations in Mongolia
- Step 2 - building collaborative agents that can help users correct their images



Xu Wang

- Ph.D. in Human-Computer Interaction,
Carnegie Mellon University, 2020
- Research Area: Learning Technologies, AI
in Education, Human-Computer
Interaction
- Office Hour: Beyster 3737
- <https://web.eecs.umich.edu/~xwanghci/>



Recent Projects

Techniques to efficiently author intelligent tutoring systems

RQM | Seeing Beyond Expert Blind Spots: Online Learning Design for Scale and Quality

The screenshot shows the RQM interface with several highlighted features:

- User selections are highlighted**: A callout points to a section where user-selected text is highlighted.
- Navigation bar**: A callout points to the top navigation bar.
- Intent-triggered AI suggestions**: A callout points to a sidebar with AI-generated suggestions.
- Question authoring panel**: A callout points to the main editing area.
- More AI support**: A callout points to a row of AI-related icons.
- Mode switch**: A callout points to the mode switch button.
- Toggle to Plain Mode**: A callout points to the toggle button for plain mode.
- ABSTRACT**: A callout points to the abstract tab.
- Question review**: A callout points to the question review tab.

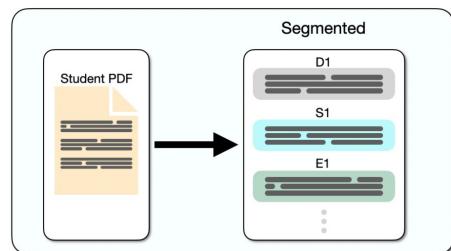
Annotations:

- a: Navigation bar
- b: User selections are highlighted
- c: Intent-triggered AI suggestions
- d: Mode switch
- e: Toggle to Plain Mode
- f: Question authoring panel
- g: More AI support

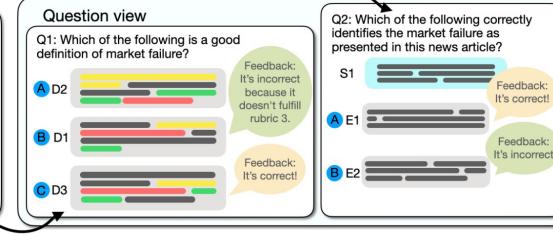
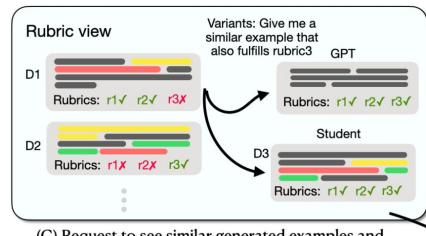
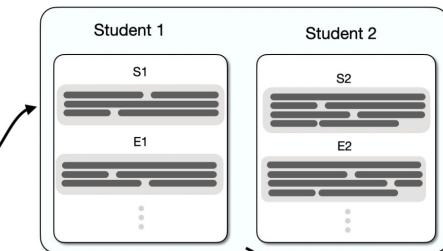
Text snippets from the interface:

- Seeing Beyond Expert Blind Spots: Online Learning Design for Scale and Quality
- Xu Wang, Computer Science and Engineering and University of Michigan, United States, xwanghci@umich.edu
- Carolyn Rose, Human-Computer Interaction Institute Carnegie Mellon University, United States, cprose@cs.cmu.edu
- Ken Koedinger, Human-Computer Interaction Institute, Carnegie Mellon University, Pennsylvania, United States, koedinger@cmu.edu
- DOI: <https://doi.org/10.1145/3411764.3445945>
- CHI '21: CHI Conference on Human Factors in Computing Systems, Yokohama, Japan, May 2021
- Navigation bar: We situate our study in the education of HCI methods, and provide suggestions to improve active learning within the HCI education community.
- After entity replacement: The authors situate the authors' study in the education of HCI methods, and provide suggestions to improve active learning within the HCI education community.
- After paraphrase: The authors give suggestions to improve active learning within the HCI education community.
- Intent-triggered AI suggestions: Interactive learning, Question-based assessment
- Question authoring panel: Notes: Question type: Multiple Choice Question, Question Stem: Neg, Question Option 1: Set this option as the correct answer
- More AI support: Open Transform Menu

(A) Preprocess the student submissions into digestible snippets



(B) Review and mix-match student answers to create questions



(C) Request to see similar generated examples and student examples to find contrasting cases

(D) Creating scaffolding questions using the examples

Recent Projects

Techniques to increase participation in online collaboration

Transcript (test01) Search

do spirit there. Doctor Colleen Carney is a psychologist and the director of the Sleep and Depression Lab at Ryerson University in Toronto

shuo 22:22:48 great

xinyuech 10:28:58

Sleep Medicine is a relatively new field, and studying sleep is kind of like peeling back the layers of an onion. There's always more to understand. Researchers like Doctor Carney are grappling with some really big puzzles like what is sleep?

Completed

xinyuech 10:29:28

The nerd answer is that we don't really know what sleep is and and you can think of sleep as more of an idea that changes based on how you measure it. Is that your Fitbit telling you that you are asleep? Is it your experience because people with chronic pain will tell us they're awake when we think they're asleep. So is it the EEG telling us that they're sleep? They're brain waves. So the idea of sleep is actually this incredible.

xinyuech 10:29:30

Mystery in a way.

Completed

xinyuech 10:30:02

We know that we need sleep, but we're still figuring out all the amazing things that does for us. We don't have a universally accepted explanation of what sleep really does. We know that it restores tissue, right? That's where we get most of our growth hormone released, so that makes good sense. And it helps us also when we're growing as kids, our brains do lots of organizing and maintenance work while we're sleeping. Sleep helps us learn and form new memories!

xinyuech 10:30:13

Completed

(a)

shuo (you) 10:31:14

And I was fair. I mean, it was in some ways it was easier for all of its 72 because I wasn't trying to figure out who I am in the person. I wasn't trying to decide if I wanted children or family or a white picket fence or where I wanted to live or what my career would be. I knew who I was and I was much clearer about that. And so falling in love was was very, very thrilling and

Submit Cancel

(b)

Which seemed to make perfect sense to my half sleep brain. So in my house, that's what we call this sleep stage. Stage two sleep is probably the stage we spend the most time in and you're going to be less aware of your surroundings during this one. But if you hear an alarm or your name or something meaningful, you can be roused out of it. In fact, we can actually see your brain responding to things in the environment even if you don't wake up, which is really kind of cool.

xinyuech 10:35:07

Three is deep sleep slow wave sleep.

(c)

shuo (you) 10:31:30

You want to say I'm the same person, but.

Comment...

(d)

xinyuech 10:35:35

Used to be called paradoxical sleep because it looks like wake.

xinyuech 10:35:57

And this is where most people are going to have an awareness of dreaming. And it's because transition sleep interspersed, so you you, you see some RAM activity and they see stage one all all around it and throughout it. And. And that's actually how you know you're dreaming is that awakenings either right after or throughout.

Tag List X

Completed

Good

Confusing

Not finished

Not good

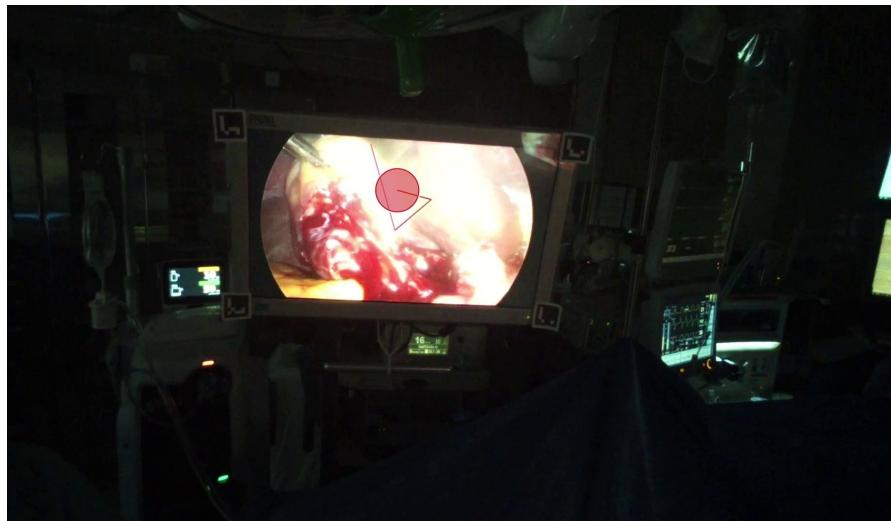
Clear

New Tag +

(e)

Recent Projects

Teaching and Learning in apprenticeship and mentoring, e.g., in medical instruction and surgery learning



Instructional Team, 2 GSI, 4 IAs

GSI - Zirui (Jerry) Zhao

- 2nd year Masters in CSE
- Hobbies: Watching movies & TV shows
- Ask me about:
 - How to do well in EECS 493
 - Upper level EECS courses recommendations



Instructional Team, 2 GSI, 4 IAs

GSI - Natalia Maxham

- 1st Year Masters in CSE
- Hobbies: Climbing, skiing/snowboarding, baking
- Ask me about:
 - EECS 493!
 - My favorite Ann Arbor coffee shop



📍 Whistler Blackcomb, Canada

Instructional Team, 2 GSIs, 4 IAs

IA

Ruiqi He (ruiqih)

- Senior in CS
- Hobbies: traveling, collecting pins
- Ask me about:
 - Tips for EECS 493



Instructional Team, 2 GSI, 4 IAs

IA - Russell Kobelsky

- Senior in CS
- Hobbies: Video games, lifting, sports (NFL + NBA)
- Ask me about:
 - Any 493 topic
 - Fitness advice
 - Career / professional development!



Instructional Team, 2 GSIs, 4 IAs

IA - Jiarui Zhang

Go By: Kenneth Zhang

- Senior in CS
- Hobbies:

Video Games (League of Legends, Valorant)

- Favorite Courses Here:

EECS 493

EECS 370

- If you have any questions, just feel free to

Email me at zjrkenn@umich.edu to schedule a meeting :)

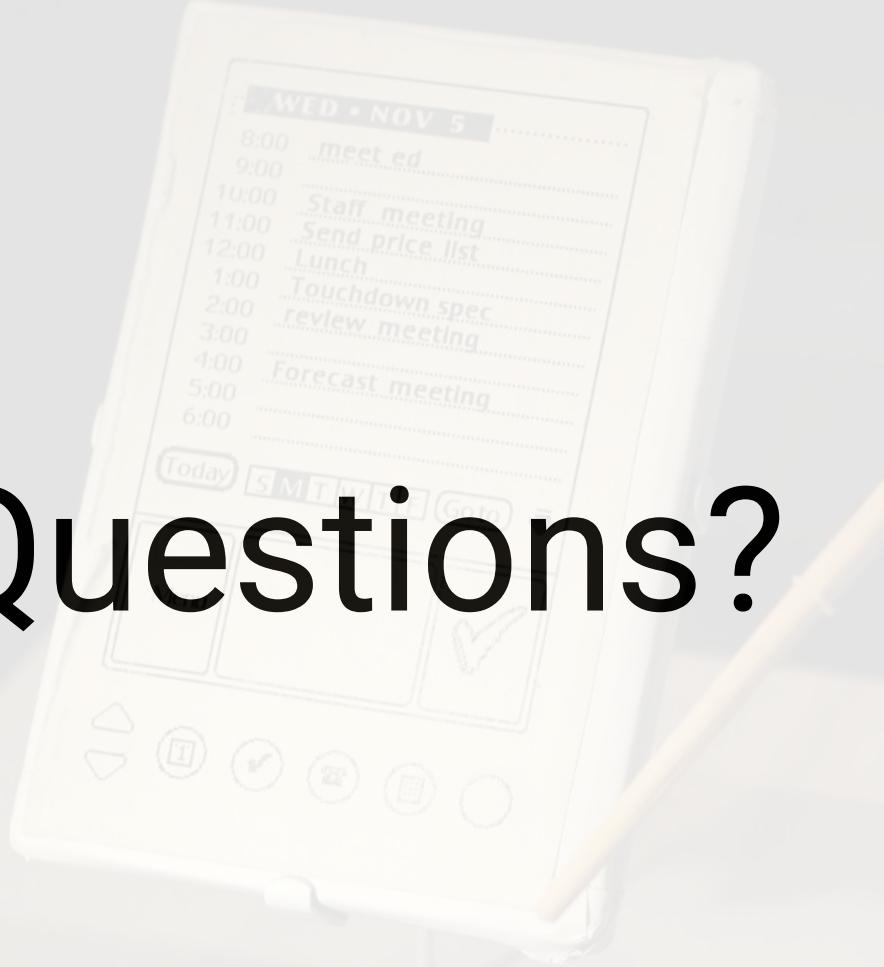


Instructional Team, 2 GSI, 4 IAs

IA

Tianrui Fang

Questions?



PalmPilot wooden model, Jeff Hawkins, 1995

Jeff Hawkins tested the PalmPilot's design with this model, using a chopstick for a stylus. He took pretend notes in meetings, and counted the steps it took to perform common tasks.

Gift of Jeff Hawkins, 10261907.

FAQ

Q: Can I attend any lecture, and any discussion section?

A: Yes.

Note both lecture sections share the T/Th 3-4:30 lecture time, in this room

Sections

Section	Component	Enrollment	Room	Meeting Pattern
001	LEC	140	1670 BEYSTER	03:00 PM - 04:30 PM Tu/Th
002	LEC	74	ARR	01:00 AM - 01:00 AM
011	DIS	46	2166 DOW	06:30 PM - 07:30 PM Tu
012	DIS	40	1024 FXB	01:30 PM - 02:30 PM F
013	DIS	20	1024 FXB	12:00 PM - 01:00 PM F
014	DIS	28	1690 BEYSTER	11:30 AM - 12:30 PM F
015	DIS	40	2166 DOW	12:30 PM - 01:30 PM M
016	DIS	40	1680 IOE	04:30 PM - 05:30 PM M

FAQ

Q: When do discussions begin?

A: There are no discussions this week. Discussions will begin 1/17 (Friday). We will do a Friday-Tuesday model.

Sections

Section	Component	Enrollment	Room	Meeting Pattern
001	LEC	140	1670 BEYSTER	03:00 PM - 04:30 PM Tu/Th
002	LEC	74	ARR	01:00 AM - 01:00 AM
011	DIS	46	2166 DOW	06:30 PM - 07:30 PM Tu
012	DIS	40	1024 FXB	01:30 PM - 02:30 PM F
013	DIS	20	1024 FXB	12:00 PM - 01:00 PM F
014	DIS	28	1690 BEYSTER	11:30 AM - 12:30 PM F
015	DIS	40	2166 DOW	12:30 PM - 01:30 PM M
016	DIS	40	1680 IOE	04:30 PM - 05:30 PM M

Q: Is in-person attendance required?

A: It is strongly encouraged but not required. For most lectures and discussions, you can watch the recordings within a time window and answer several in-class surveys. We use the survey to count attendance.

For lectures, the survey will be open 24 hours after the lecture (4:30pm the next day). For discussions, the survey will be open from Friday to the following Wednesday 7:30pm.

There will be 3-4 lectures that we **require** in-person attendance, including project bake-offs, final presentations, practitioner's panel.

Exams are in-person only. There'll be alternative times offered (in-person).

Q: I'm currently on the waitlist, what can I do?

A: The undergraduate advising office manages overrides and enrollment. Please email the staff mailing list eeecs493-w25-staff@umich.edu, **with EECS493 in the email title** to be added to Canvas.

The workload of 493 is much higher than 3% as rated on Atlas.

The Atlas rating (collected for the past 10 years?) does not reflect the current workload of the class. This class has been evolving in the past three years, with new homework assignments, and updated projects.

We received many course evaluations that 3% was a wrong assessment. Some said this was ~30%. Students regretted pairing 493 with a difficult class.

Please expect to spend ~12 hours a week on this class, as reflected in the credit.

EECS 493 Assignment and Grading Structure

- [Lecture 7%] Answer in-class surveys. The in-class surveys are designed to enhance understanding.
- [Discussion 3%] Answer in-class surveys.
- [Quiz 10%] 8 quizzes (drop 1) on Canvas
 - Everyone has a second attempt
- [Midterm 15%] 1 mid-term
- [Final 15%] 1 final exam
- [Individual Assignments 25%]
 - A1 (PEERRS training): 2%
 - A2 (HTML/CSS): 5%
 - A3 (Javascript): 6%
 - A4 (Figma): 6%
 - A5 (Vue): 6%
- [Team Project 25%]
 - Milestone 0: Team formation (1%)
 - Milestone 1: User needs (2%)
 - Milestone 2: Storyboard (2%); Speed dating (2%); Bakeoff (1%)
 - Milestone 3: Prototype V1 (2%); User testing (3%); Study analysis (1%)
 - Milestone 4: Prototype V2 (3%); User testing (3%); Study analysis (1%); Bakeoff (1%)
 - Final presentation (3%)

EECS 493 Assignment and Grading Structure

- [Lecture 7%] Answer in-class surveys. The in-class surveys are designed to enhance understanding.
- [Discussion 3%] Answer in-class surveys.
- [Quiz 10%] 8 quizzes (drop 1) on Canvas
 - Everyone has a second attempt
- [Midterm 15%] 1 mid-term
- [Final 15%] 1 final exam
- [Individual Assignments 25%]
 - A1 (PEERRS training): 2%
 - A2 (HTML/CSS): 5%
 - A3 (Javascript): 6%
 - A4 (Figma): 6%
 - A5 (Vue): 6%
- [Team Project 25%]
 - Milestone 0: Team formation (1%)
 - Milestone 1: User needs (2%)
 - Milestone 2: Storyboard (2%); Speed dating (2%); Bakeoff (1%)
 - Milestone 3: Prototype V1 (2%); User testing (3%); Study analysis (1%)
 - Milestone 4: Prototype V2 (3%); User testing (3%); Study analysis (1%); Bakeoff (1%)
 - Final presentation (3%)

User research
User-centered design
Iterative

EECS 493 Assignment and Grading Structure

- [Lecture 7%] Answer in-class surveys. The in-class surveys are designed to enhance understanding.
 - [Discussion 3%] Answer in-class surveys.
 - [Quiz 10%] 8 quizzes (drop 1) on Canvas
 - Everyone has a second attempt
 - [Midterm 15%] 1 mid-term
 - [Final 15%] 1 final exam
 - [Individual Assignments 25%]
 - A1 (PEERRS training): 2%
 - A2 (HTML/CSS): 5%
 - A3 (Javascript): 6%
 - A4 (Figma): 6%
 - A5 (Vue): 6%
 - [Team Project 25%]
 - Milestone 0: Team formation (1%)
 - Milestone 1: User needs (2%)
 - Milestone 2: Storyboard (2%); Speed dating (2%); **Bakeoff (1%)**
 - Milestone 3: Prototype V1 (2%); User testing (3%); Study analysis (1%)
 - Milestone 4: Prototype V2 (3%); User testing (3%); Study analysis (1%); **Bakeoff (1%)**
 - Final presentation (3%)
- Community building
Sharing
Peer learning

Important: Come to Class and Participate

- Active learning is better than passive
 - Ask and answer questions
 - Answer in-class surveys
 - Discuss with your peers
 - Etc
- Peer learning is effective
 - You learn more from your peers than from the lectures itself
 - Participate in piazza discussions
 - Etc

Chi, M. T., & Wylie, R. (2014). The ICAP framework: Linking cognitive engagement to active learning outcomes. *Educational psychologist, 49*(4), 219-243.

Dillenbourg, P. (2002). Over-scripting CSCL: The risks of blending collaborative learning with instructional design. *Three worlds of CSCL. Can we support CSCL, 6*1491.

Class Materials

- Canvas published now
 - If you are on the waitlist, and wish to be added to Canvas, please email
eeecs493-w25-staff@umich.edu
- Syllabus is posted on website:
 - <https://eeecs493staff.github.io/eeecs493.org/>
- Slides will be uploaded to Canvas before class
- Video recordings on Canvas after class.
- Assignments to be progressively released.

Communication

- All logistics-related business: email
eeecs493-w25-staff@umich.edu, **with EECS493 in the title.**
 - Late submission
 - Regrade request
 - Exam conflict
 - We don't deal with logistics on Piazza
- Piazza is for content-related questions
 - Questions on assignment 2
 - Questions on lecture 5
 - ...

Topic Outline (three pillars)

- User-centered research and design methods
 - Interviews and observations
 - Methods to analyze qualitative data
 - Storyboarding
 - User-testing
- Prototyping
 - Low-fidelity wireframes
 - High-fidelity prototyping: Figma
 - Prototyping with AI (wizard-of-oz)
- Web-programming
 - Javascript/HTML/CSS
 - jQuery
 - MVC framework
 - Vue framework

Topic Outline (additional topics)

- How to design user interactions powered by AI (with more uncertainty)?
- Human-AI collaborative systems
- Designing for people with diverse abilities
- Human-Computer Interaction research
- Practitioners' panel (UX researchers, designers, prototypers, product managers working in industry)
 - What do careers paths in UX look like?

Building a Community

- Respect the opinion of others
- Create an environment where everyone can share their thoughts and experiences without fear of being judged in or outside of class
- Take active learning opportunities seriously

Questions?



PalmPilot wooden model, Jeff Hawkins, 1995

Jeff Hawkins tested the PalmPilot's design with this model, using a chopstick for a stylus. He took pretend notes in meetings, and counted the steps it took to perform common tasks.

Gift of Jeff Hawkins, 10261907.

Discuss with your peer

A History of Interfaces

PalmPilot wooden model, Jeff Hawkins, 1995

Jeff Hawkins tested the PalmPilot's design with this model, using a chopstick for a stylus. He took pretend notes in meetings, and counted the steps it took to perform common tasks.

Gift of Jeff Hawkins, 10261907.



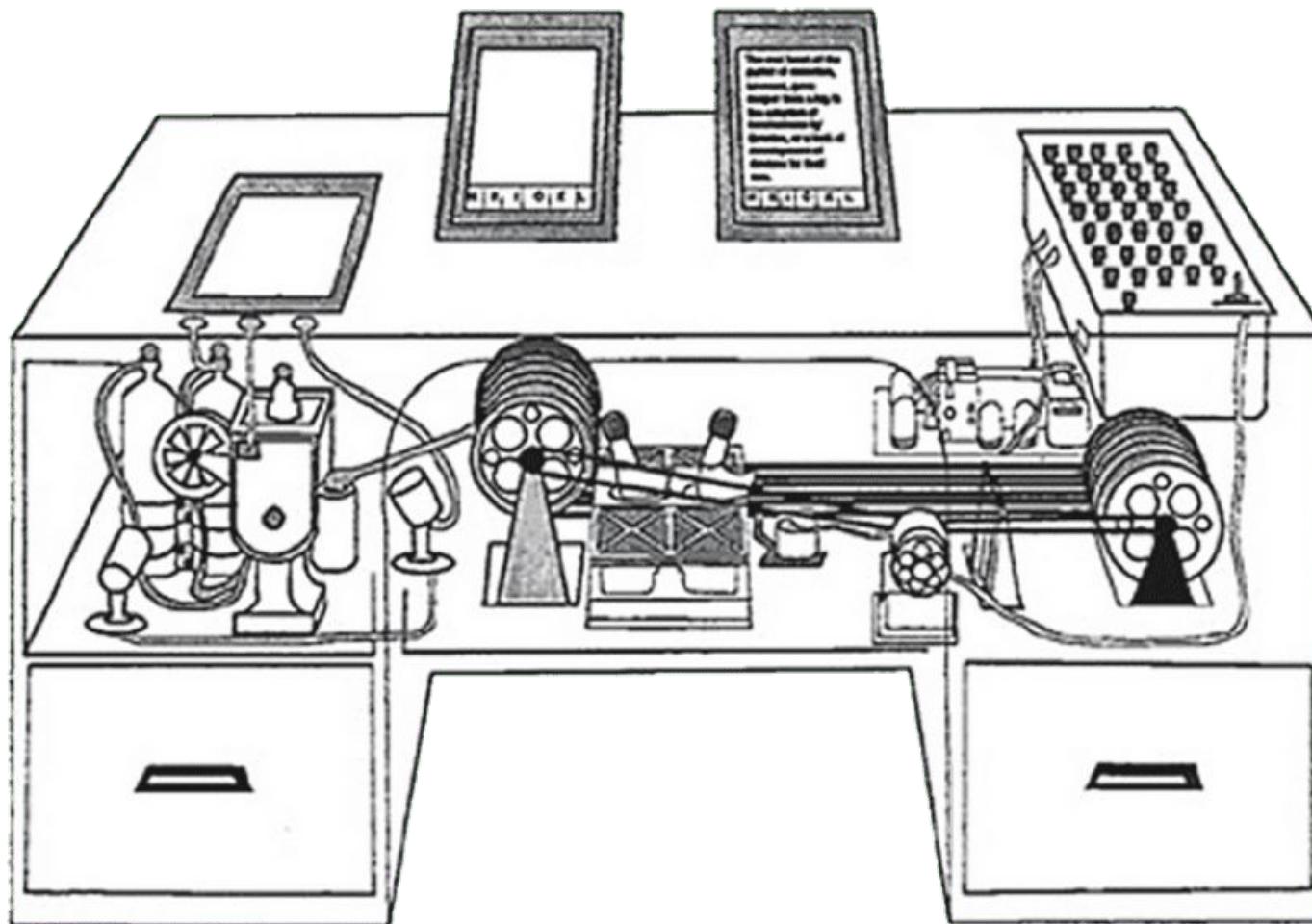
Introduction to Human-Computer Interaction: A History of Interfaces



Ada Lovelace wrote an algorithm for this machine. **She is believed by many to be the first computer programmer.**

In early 19th century, “Analytical Engine” was developed. People can use punch cards to tell a mechanical engine to compute math formulas.

Memex (1945): enlarged intimate supplement to one's memory



A draft of Memex: in which could store all of their information, including books, records, and communications, and access them with speed and flexibility. — Vannevar Bush (1945)

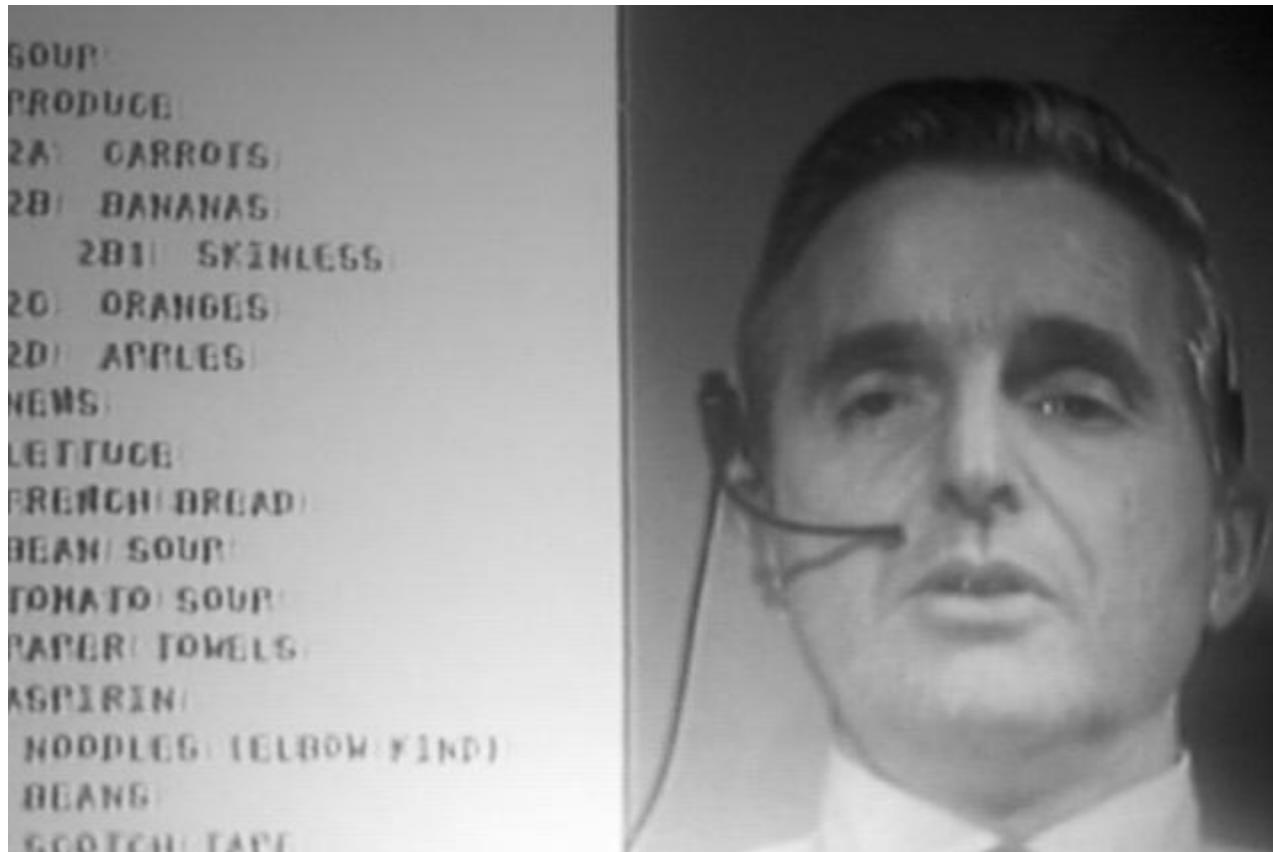
Sketchpad (1963): the first demonstrations of an interactive interface (Ivan Sutherland)



https://youtu.be/6orsmFndx_o

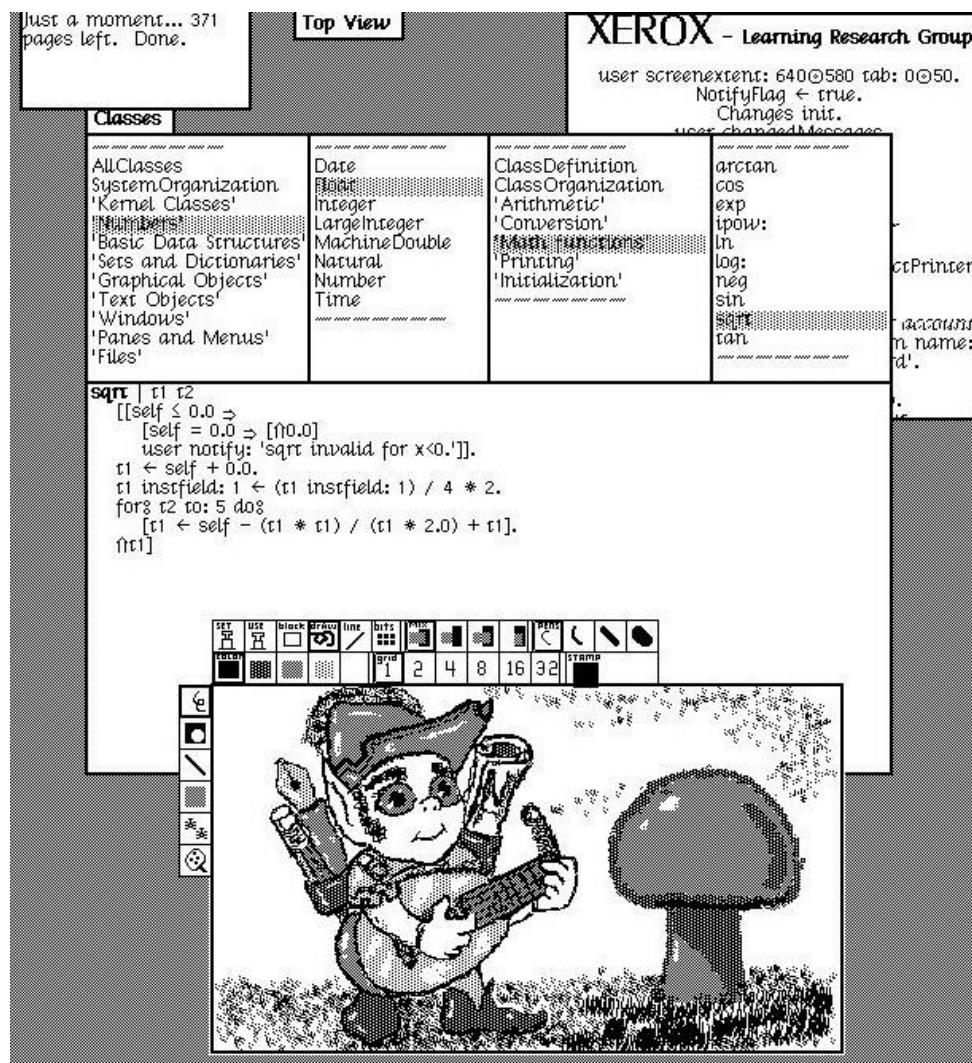
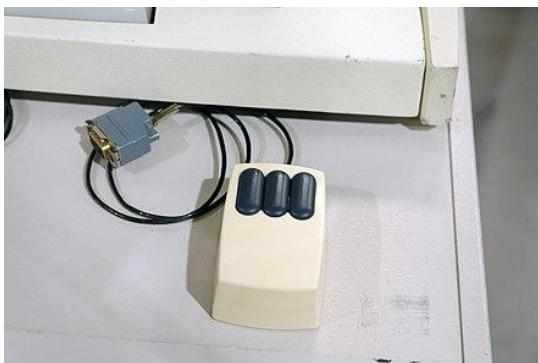
(starting from 4:30ish)

oN-Line System (1968): networking, windows, hypertext, graphics, word processing, video conferencing, etc.
(Douglas Engelbart)



The first live demo

Xerox Alto (1973): the first operating system based on a graphical user interface (Alan Kay from Xerox PARC)



Apple's Macintosh (1984): the first mass-market graphical user interfaces.

Steve Jobs visits Xerox PARC and saw Alto (start at 6:38):

<https://youtu.be/J33pVRdxWbw?t=6m38s>

Apple Macintosh's first commercial:

<https://www.youtube.com/watch?v=VtvjbmoDx-I>

It positioned the Macintosh as a tool of liberation and creativity in the face of a monotonous and oppressive computing environment

This is what that looked like in the Xerox Alto system

- [https://squeak.js.org/demo/simple.html#full
screen](https://squeak.js.org/demo/simple.html#full-screen) (<https://www.yellkey.com/share>)
- How is this different from modern UIs?
- Things to look for:
 - Where the scrollbars are, and when are they visible?
 - How are windows collapsed and resized, and what happens to the contents?
 - How cursors change?

Discuss with your peer

What happened when windows were resized in the Alto system? *

- Elements were resized dynamically
- Elements were cut off (cropped) as the window moved
- Only a frame moved until the user stopped resizing, and then everything got redrawn

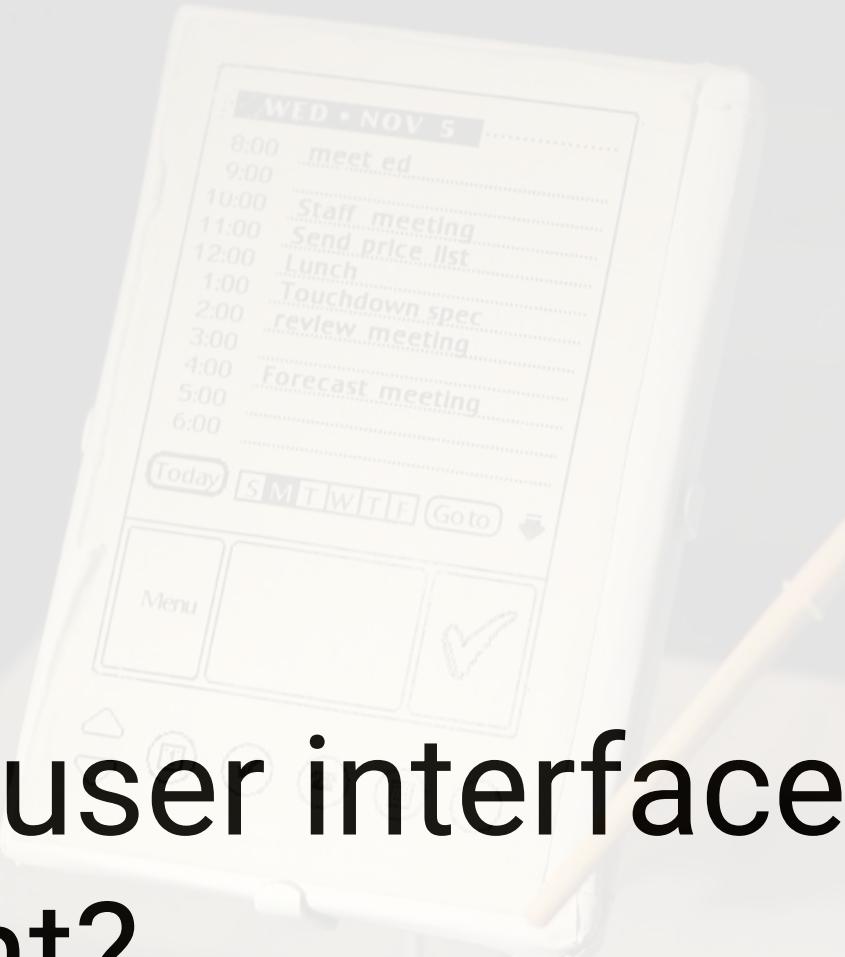
Scrollbars in the Alto system *

- Popped up on the left, because English is read left-to-right
- Popped up on the right, so they wouldn't distract until you got to the end of a line
- Were always visible

Windows, menus, scrollbars, mouse are not “givens”.

The graphical user interface and operating system we have today is based on decades of research in Human-Computer Interaction and User Interface.

Why are user interfaces important?



PalmPilot wooden model, Jeff Hawkins, 1995

Jeff Hawkins tested the PalmPilot's design with this model, using a chopstick for a stylus. He took pretend notes in meetings, and counted the steps it took to perform common tasks.

Gift of Jeff Hawkins, 10261902.

Good user interfaces have a tremendous impact on individuals' ability to accomplish things and on our society as a whole!

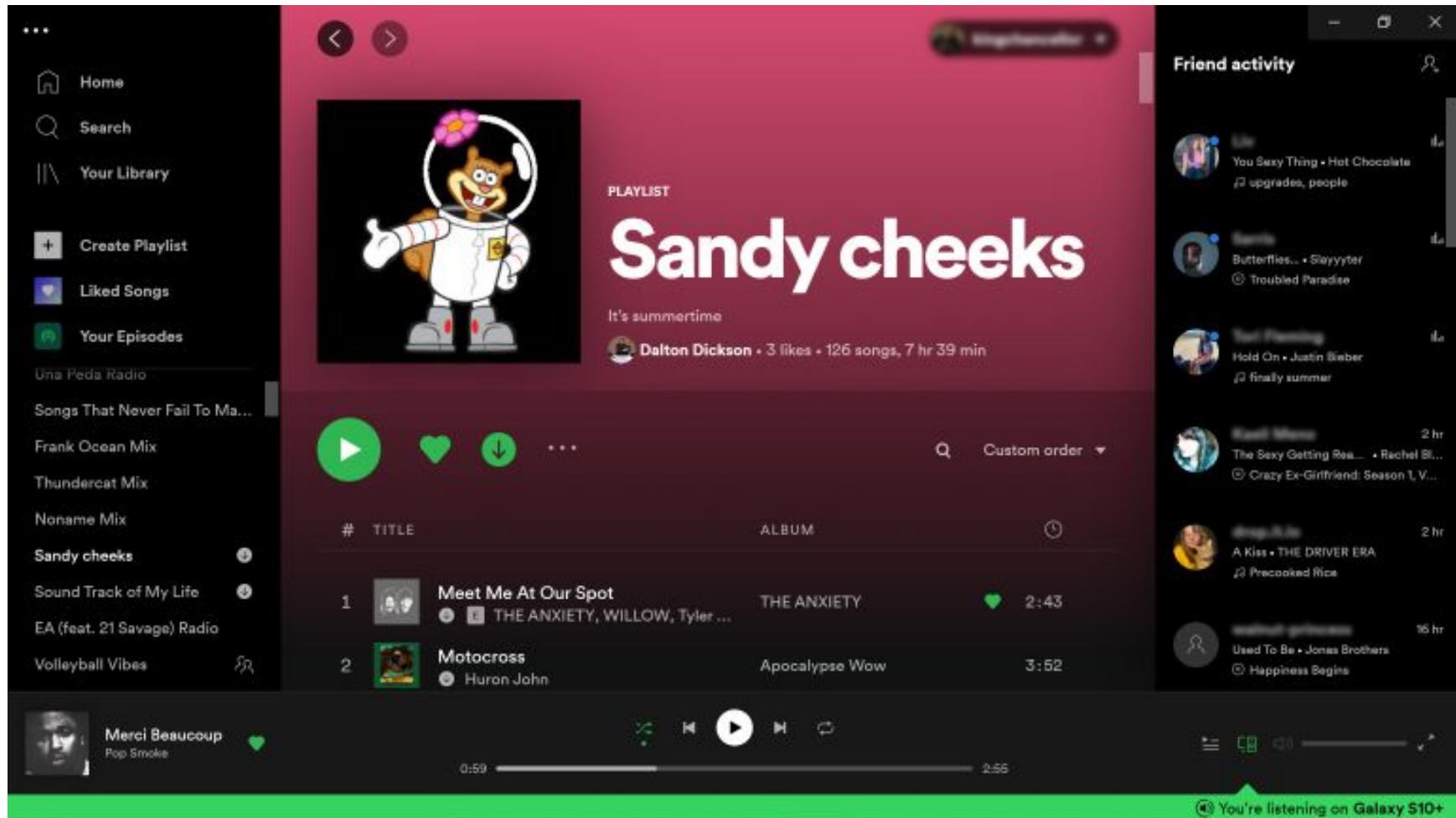
The screenshot shows a Google Sheets document titled "Business Plan". The interface includes a header bar with file, search, and sharing options, and a toolbar with various tools like text, bold, italic, and tables. The main content area displays a table and a "Next steps" section.

Name	Creator	Files	Votes
[Redacted]	@mention a person	[File icon]	+ 0
[Redacted]	@mention a person	[File icon]	+ 0
	@mention a person	[File icon]	+ 0

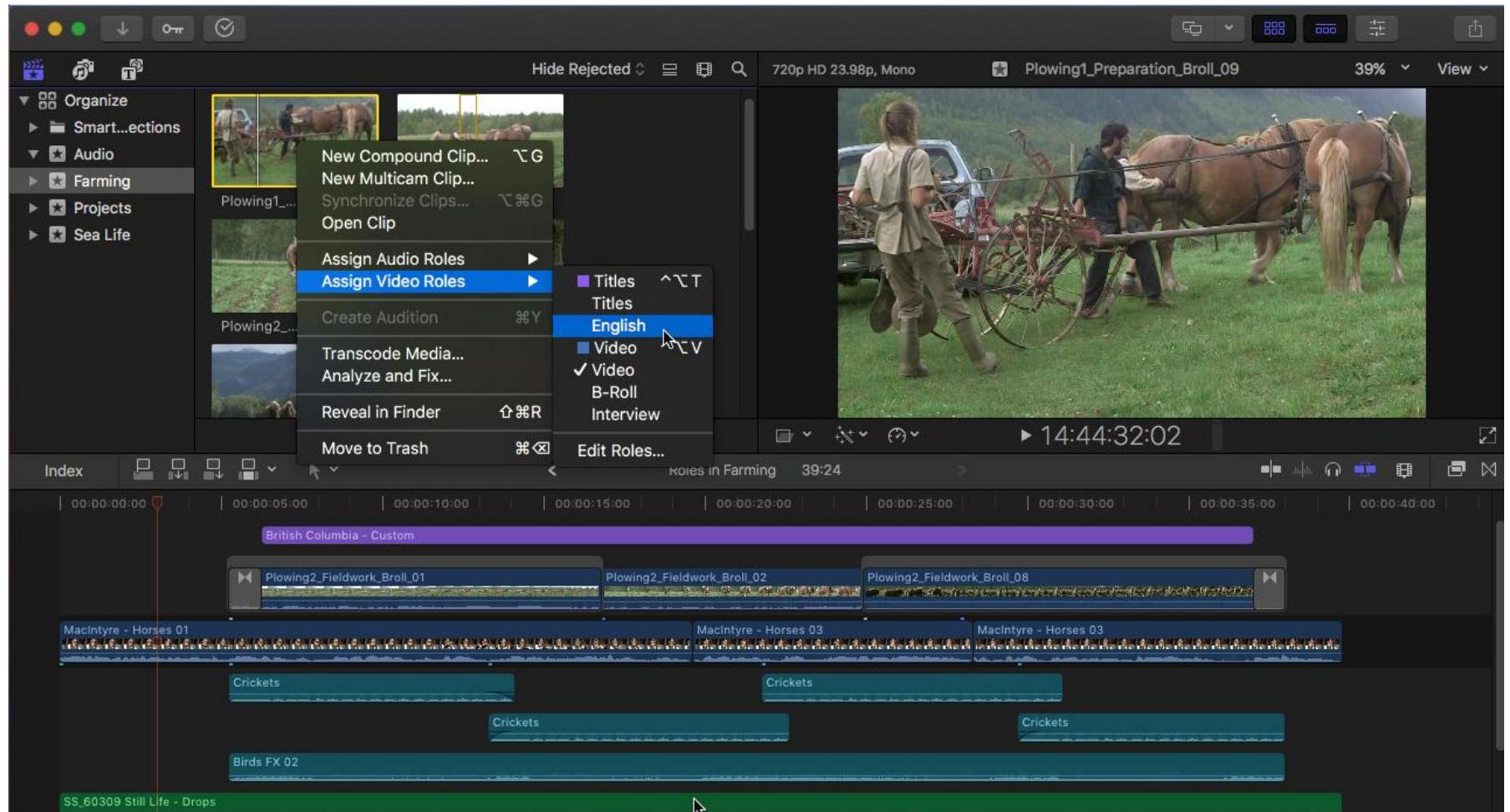
Next steps

-
- [Redacted]
- [Redacted]

Good user interfaces have a tremendous impact on individuals' ability to accomplish things and on our society as a whole!



Good user interfaces have a tremendous impact on individuals' ability to accomplish things and on our society as a whole!



Bad designs can cost people's lives



Emergency telephone where you're supposed to dial 999. However, the physical telephone itself only has the numbers 1, 2, 3.

Bad designs can cost people's lives



THERAC-25 (A medical equipment giving patients radiation)

- At least 6 injuries/deaths
- Poor design (mismatch between the user interface and the backend)
- When the operator made a mistake and rectified, the UI tells everything is fine, though the patient is receiving 125 times more radiation than shown on the UI.

How to design good interfaces?



PalmPilot wooden model, Jeff Hawkins, 1995

Jeff Hawkins tested the PalmPilot's design with this model, using a chopstick for a stylus. He took pretend notes in meetings, and counted the steps it took to perform common tasks.

Gift of Jeff Hawkins, 10261907.

How to design good user interfaces?

- Guiding theories and principles
 - E.g., visible to users, etc.
- **Prototype and iterate**
- **Get feedback from real users**

The power of prototyping



An initial prototype for the first consumer digital camera

The power of prototyping



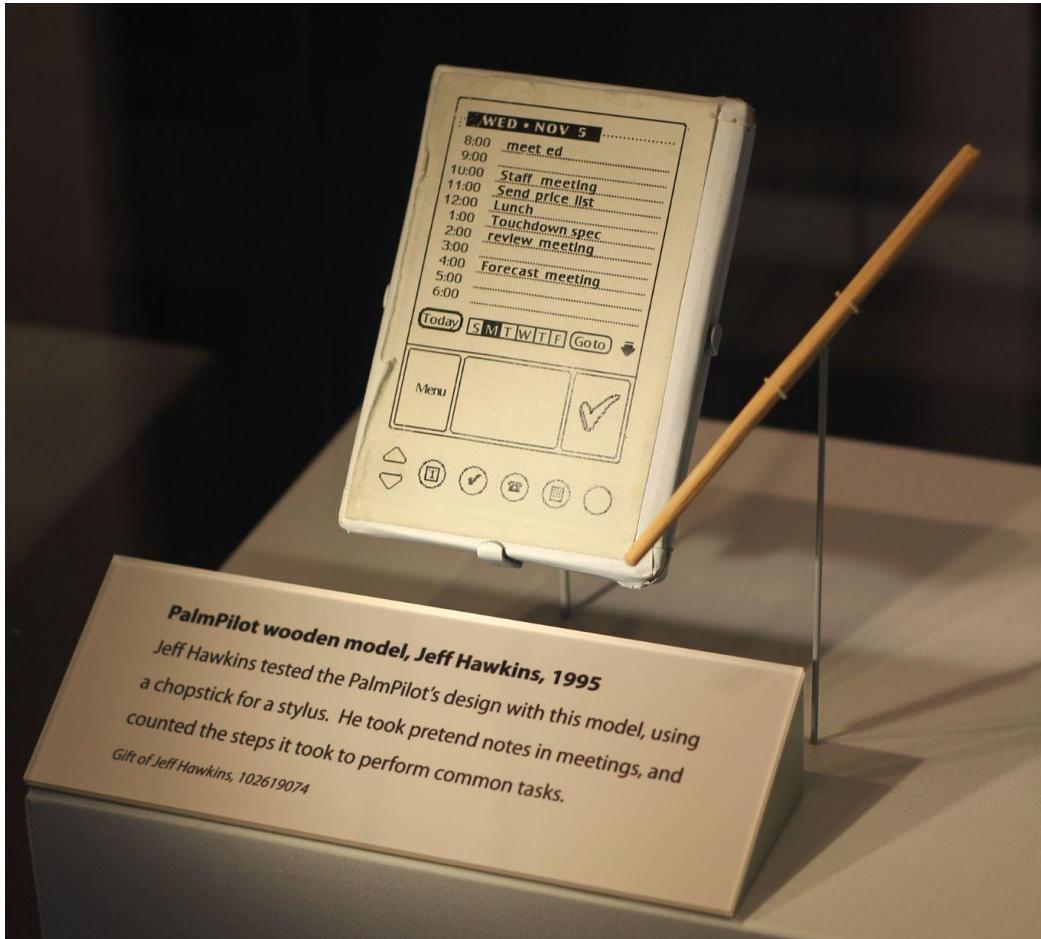
- It's not in the intended size (much bigger)
- It doesn't have the camera lens, or anything
- But it gives the development team valuable feedback on the application logic. What do users want?

The power of prototyping



In 2000, Palm sold nearly 8 million units and had a 76% share of the PDA (personal digital assistant) market.

The power of prototyping



Displayed in the Computer History Museum in Mountain View

It started as a piece of wood.

Jeff Hawkins, the designer carried a piece of wood with him.

So, want to check what's on your calendar? No problem, pull out your block of wood.

This enables him to answer **“what are the tasks that you would actually use this for?”**

Get feedback from real users

At what stage do we need feedback?

- Understand user need
 - Do they need this? What are the biggest challenges they're having?
- Potential ideas/solutions
 - Which one is the most promising? Which one would my users like the most?
- Prototypes
 - Is this prototype usable enough? Can this help the user achieve their tasks successfully?

Discuss with your peer

Lecture 1 - Survey 3

Which are correct about good practices in designing user interfaces *

- Create prototypes and get frequent user feedback
- I will wait until I'm certain about my product to test with users
- Prototypes can be incomplete and very different from the final product.
- When talking to users, I will directly ask them what they want

EECS 493 Assignment and Grading Structure

- [Lecture 7%] Attend the lectures in person, in-class surveys to help you practice
- [Discussion 3%] Attend the discussion sections in person, in-class surveys and activities to help you practice
- [Quiz 10%] 8 quizzes (drop 1) on Canvas
 - Everyone has a second attempt
- [Midterm 15%] 1 mid-term
- [Final 15%] 1 final exam
- [Individual Assignments 25%]
 - A1 (PEERRS training): 2%
 - A2 (Affinity diagram): 5%
 - A3 (Javascript): 6%
 - A4 (Figma): 6%
 - A5 (Vue): 6%
- [Team Project 25%]
 - Milestone 1: Team formation (1%); Need finding (2%)
 - Milestone 2: Storyboard (2%); Speed dating (2%); Bakeoff (1%)
 - Milestone 3: Prototype V1 (2%); User testing (3%); Study analysis (1%)
 - Milestone 4: Prototype V2 (3%); User testing (3%); Study analysis (1%); Bakeoff (1%)
 - Milestone 5: Final presentation (3%)

User research
User-centered design
Iterative

Talk to your users in the right way is important!!

Assignment 1: PEERRS training (due in two weeks)

Talk to your users in the right way is important!!

Assignment 1: PEERRS training (due next Sunday)

****Read the syllabus!!**

Summary of Lecture 1

- Course structure and overview
- A history of interfaces
- Why are user interfaces important?
- How to design good interfaces?