IN4MATX 133: User Interface Software

Lecture 1:
Introduction & History

I’m thrilled that you have decided to take this class!

Product design process

Human-Centered Design, IDEO

Agile Development, Agile Manifesto

Product design process, simplified

User interface implementation

- Has the power to turn ideas into reality
- Often dictates design decisions and timelines, for better or for worse
- Either you will be implementing, or you will need to communicate with your colleagues who are

What is interface implementation today?

Often HTML, CSS, and JavaScript

There are lot of languages and development frameworks.

Why do most people use web tools?

Today's goals

By the end of today, you should be able to…

- Describe how society got to today's ubiquitous computing
- Hypothesize why web technology has become the de-facto tool for interface development
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The Computer for the 21st Century

- By Mark Weiser, Chief Scientist, Xerox Parc
- Published in Scientific American, 1991
- Coined “Ubiquitous Computing”
  - Reflective and speculative
- https://dl.acm.org/citation.cfm?id=329126

The Computer for the 21st Century

Specialized elements of hardware and software, connected by wires, radio waves and infrared, will be so ubiquitous that no one will notice their presence

by Mark Weiser

The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.

Consider writing, perhaps the first information technology. The ability to represent spoken language symbolically for long-term storage freed information from the limits of individual memory. Today this technology is ubiquitous in industrialized countries. Not only do books, magazines and newspapers convey written information, but so do street signs, billboards, shop signs and even graffiti. Candy wrappers are covered in writing. The constant background presence of these products of "literacy technology" does not require active attention, but the information to be transmitted is ready for use at a glance. It is difficult to imagine modern life otherwise.

Silicon-based information technology, in contrast, is far from having become part of the environment. More than 50 million personal computers have been sold, and the computer nonetheless remains largely in a world of its own. It is approachable only through complex jargon that has nothing to do with the tasks for which people use computers. The state of the art is perhaps analogous to the period when scribes had to know as much about making ink or baking clay as they did about writing.

The arcane aura that surrounds personal computers is not just a "user interface" problem. My colleagues and I at the Xerox Palo Alto Research Center think that the idea of a "personal" computer itself is misplaced and that the vision of laptop machines, dynabooks and "knowledge navigators" is only a transitional step toward achieving the real potential of information technology. Such machines cannot truly make computing an integral, invisible part of people's lives. We are therefore trying to conceive a new way of thinking about computers, one that takes into account the human world and allows the computers themselves to vanish into the background.

Such a disappearance is a fundamental consequence not of technology but of human psychology. Whenever people learn something sufficiently well, they cease to be aware of it. When you look at a street sign, for example, you absorb its information without consciously performing the act of reading. Computer scientist, economist and Nobelist Herbert A. Simon calls this phenomenon "comprehending"; philosopher Michael Polanyi calls it the "tacit dimension"; psychologist J. J. Gibson calls it "visual invariants"; philosophers Hans Georg Gadamer and Martin Heidegger call it the "horizon" and the "ready-to-hand"; John Seely Brown of PARC calls it the "periphery." All say, in essence, that only when things disappear in this way are we freed to use them without thinking and so to focus beyond them on new goals.

The idea of integrating computers seamlessly into the world at large runs counter to a number of present-day trends. "Ubiquitous computing" in this context does not mean just computers that can be carried to the beach, jungle or airport. Even the most powerful notebook computer, with access to a worldwide information network, still focuses attention on a single box. By analogy with writing, carrying a super-laptop is like owning just one very important book. Customizing this book, even writing millions of other books, does not begin to capture the real power of literacy.

Furthermore, although ubiquitous computers may use sound and video in addition to text and graphics, that does not make them "multimedia computers." Today's multimedia machine makes the computer screen into a demanding focus of attention rather than allowing it to fade into the background.

Perhaps most diametrically opposed to our vision is the notion of virtual reality, which attempts to make a world inside the computer. Users don special goggles that project an artificial scene onto their eyes; they wear gloves or even bodysuits that sense their motions and gestures so that they can move about and manipulate virtual objects. Although it may have its purpose in allowing people to explore realms otherwise inaccessible—the insides of cells, the surfaces of distant planets, the information web of data bases—virtual reality is only a map, not a territory. It excludes desks, offices, other people not wearing goggles and bodysuits, weather, trees, walks, chance encounters and, in general, the infinite richness of the universe. Virtual reality focuses an enormous apparatus on simulating the world rather than on invisibly enhancing the world that already exists.

Indeed, the opposition between the

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94 SCIENTIFIC AMERICAN September 1991

Three waves of computing

1

Mainframe computing

2

Personal computing

3

Ubiquitous computing

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Ubiquitous computing

First wave: mainframe computing

- Harvard Mark I
- Large (55 feet wide, 8 feet high,5 tons)
- Expensive (enclosure alone was $50,000 in 1945!)
- Used to calculate implosion during the Manhattan Project

The Harvard Mark I

First wave: mainframe computing

- Batch processing
  - Write your program on punch cards
  - Wait your turn for the computer
  - Run program, hope it works
  - If it doesn't, you'll have to fix it and wait for your next turn
  - Efficient use of resources, but poor interactivity

First wave: mainframe computing

“Many to one”

Vannevar Bush

- Faculty at MIT
- Oversaw National Defense Research Committee, which led the Manhattan Project
- Post-war, helped define mission of the National Science Foundation
  - Federal government funds universities
  - Universities do basic scientific research
  - Research helps economy and defense

As We May Think

- Published in Atlantic Monthly, 1945
- http://www.theatlantic.com/magazine/print/1945/07/as-we-may-think/3881/
- In part, set out to define a post-war scientific research agenda
  - Speculative, not reflective

Memex (1945 speculative design)

https://www.youtube.com/watch?v=c539cK58ees

(video from 1995 animation presented at SIGIR, not from 1945)

Memex (1945 speculative design)

- Linking information across devices and sources
  - Hypertext, the foundation of the web
- Pen-based annotation of primary sources

Command-Line interfaces (1960's)

- Originally used in a terminal connected to a mainframe
  - Was eventually integrated into personal computing (in Unix, etc.)
- A person could change execution based on output
- Enabled real-time debugging

Doug Engelbart's NLS (1968)

http://www.dougengelbart.org/firsts/1968-demo-interactive.html

Doug Engelbart's NLS (1968)

- First working hypertext system
- Invention of the mouse
- Simple graphics
  (earlier systems had this,
  but used in a full system here)

Doug Engelbart's NLS (1968)

- It introduced other ideas as well
  - A chording keyboard
  - Remote collaboration
- Some people thought he "faked it"
- Others thought it was irrelevant because "the terminal can do the same"
- Won Turing Award in 1997

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Second wave: personal computing

- First introduced by Xerox
- Xerox Alto, 1973
  - Mouse
  - Chording keyboard
- Xerox Star, 1981
- Xerox models
  were commercially unsuccessful
  - Still expensive, too few applications

Second wave: personal computing

Xerox Star (1981)

https://www.youtube.com/watch?v=ODZBL80JPqw

Second wave: personal computing

Xerox Star (1981)

- Software running in windows
- Desktop with icons for navigating between files and programs
- Super slow!

Second wave: personal computing

Macintosh (1984)

Second wave: personal computing

Windows 1.0 (1985)

Second wave: personal computing

Windows 3.0 & 3.1 (1990 & 1992)

- Windowing became primary
- Added games: Solitaire, Minesweeper, and FreeCell!
  - These were a trick to teach mouse skills

Second wave: personal computing

Mosaic Web Browser (1993)

- Originally for Unix systems, later ported to Mac and Windows
- “First” graphical web browser
- Microsoft IE came in 1995
- Apple didn’t make a browser until Safari in 2003

Second wave: personal computing

“One to one”

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Third wave: ubiquitous computing

- Weiser speculated people would interact with three types of computers
  - Tabs: inch-scale devices, like post-its
  - Pads: foot-scale devices, like paper
  - Boards: yard-scale devices, like whiteboards
- Speculated devices would have shared ownership

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94 SCIENTIFIC AMERICAN *September 1991*

Third wave: ubiquitous computing

Third wave: ubiquitous computing

- Lines up with what we use today, for the most part
  - Tabs = phones and watches
  - Pads = tablets and laptops
  - Boards = interactive projectors? smart TVs? augmented reality?
- Still a strong sense of device ownership

Third wave: ubiquitous computing

"One to many"

Three waves of computing

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"Many to one"

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"One to one"

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Ubiquitous computing

"One to many"

Think & Share:

Why are web tools now the standard for interface development?

One person, many devices, synced over the cloud

One person, many devices, synced over the cloud

- Use HTTP requests to send data to the cloud and receive data from it
  - JavaScript provided early tools to do this
- Render that data with HTML
- Style it with CSS

Ubiquitous computing is, in large part, why web tools are the current standard for interface development

Web tools as the standard

- Nearly every platform needs to communicate with a cloud system
- Most need a web browser so people can access sites
- Shared programming language and development environment enables efficient work
- Developers can write once, deploy to many platforms
  - Hopefully customize style and functionality to the device
- Other reasons?

Today's goals

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Course Overview

- Course staff introductions
- Administravia
- Topics covered

Who we are

Professor Daniel A. Epstein (he/his/him)

- Ph.D. Computer Science & Engineering, University of Washington, B.S. Computer Science, University of Virginia
- Joined UCI Informatics in 2018
- Internships at Microsoft & Adobe, collaborations with Snap(chat) and NAVER

Who we are

6.88 miles
Springfield half marathon: chapter 1
PHINNEY RIDGE
FREMONT
University of Washington
Interbay
EAST LAKE
MONTLAKE
QUEEN ANNE
CAPITOL HILL
Lower Queen Anne
E Madison St
BELLTOWN
MADRONA
TIME RUN
1:07
Total miles run: 43.0
Morning Run
6.88 miles

10,000
5,793 Steps
5,000
0

transport
running
cycling
walking
Number of trips
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.5-1 miles
1-3 miles
3-5 miles
5-10 miles
>10 miles
Trip length (miles)

Way to go! You averaged
8,427 steps on Thursdays!
Su M T W Th F Sa
Anne D. and 62,942 other Fitbit users
averaged about the same.

Who we are

TA Weijun Li (she/her/hers)

- 2nd year PhD in Informatics
- M.S. Design, Zhejiang University, B.S. Information Resource Management, Northeast Normal University (China)
- Research interests: Human-Computer Interaction, Personal Informatics
- Avid cycler

Who we are

TA Ziqi Yang (she/her/hers)

- 2nd year PhD in Informatics
- M.S. in Information Science, UMich, B.S. ECE, Shanghai Jiao Tong University (China)
- Interested in HCI, Women's Health, Health Informatics
- Enjoys travel, photography, and recently climbing

Who we are

Reader Kaylee Doliente (she/her/hers)

- 4th year BS in Informatics (HCI specialization)
- Likes bouldering and trying new food places

The syllabus

- Explains due dates/times, assignment policies, etc.
- It probably answers your question
  - Please check it before you ask us

Syllabus

Policies and background for IN4MATX 133, Fall 2025 Quarter. All syllabus content is subject to change, particularly prior to the start of the quarter.

Course Description

From the catalog:

> Introduction to human-computer interaction programming. Emphasis on current tools, standards, methodologies for implementing effective interaction designs. Widget toolkits, Web interface programming, geo-spatial and map interfaces, mobile phone interfaces.

In practice, every instructor takes a slightly different bend to these topics. I focus on covering modern technologies for web and mobile development and how device capabilities can impact interface design and software architecture.

All students must have taken I&C SCI 45J or I&C SCI 45C with a C or higher. This course will also assume students have mastered material in prior courses.

Learning Objectives

At the end of this course, students should be able to:

Course Format

- In-person, but recorded
  - In-person attendance will be required for participation credit
- In-person office hours, mostly held in DBH
  - Check the calendar for exact timing and location

Staying in touch

- Web: http://inf133-fa25.depstein.net/
- Email us: informatics-133-staff@uci.edu
- Slack: https://uci-inf-133-fa25.slack.com/
  - Information will go out to Slack first!
- For the most part, Canvas will only be used for submission and grades

Staying in touch

- Office hours: on calendar, start next week
  - Hours every day of the week, except Fridays where there are discussion
- Submission: clone starter code from GitHub Classroom
  - Zip up finished assignment, submit on Canvas
  - Unsure about Git or GitHub? Go to discussion on Friday!
- YuJa/Zoom: Automatically recorded, theoretically…

Communication best practices

- Slack is best for assignment clarification and assistance
  - Please use the public channels to allow your peers to help
  - We will not reply to direct messages; there are too many of you!
- Email is best for personal communication (absences, concerns)
  - Email the staff list (informatics-133-staff@uci.edu) rather than us individually
- Dedicated form for regrades, listed on the syllabus

Course goals

By the end of this course, you should be able to…

- Build webpages in HTML, CSS, and JavaScript
  which are sensitive to screen size and a person's abilities

- Build mobile apps in TypeScript frameworks, following design best practices

- Leverage external web APIs (databases, information sources) and
  device resources (photos, sensors) to lower development burden
  and enable new capabilities

- For a given design, choose appropriate devices to support
  and development frameworks to use

Assignments

- A1: Personal web portfolio
- A2: Programming on the web
- A3: Web frameworks
- A4: Mobile development
- A5: TBD

A1

Responsive Portfolio in HTML and CSS

- Learning goal: develop familiarity with HTML and CSS, which form the foundation of all web design

- Apply *responsive* design, or adapt to screen size and orientation

A2

Runkeeper Tweet Report in JavaScript and TypeScript

- Learning goal: become comfortable with JavaScript, a widely-used development language on the web
- Will learn to use JavaScript libraries for visualization and interaction

A3

Spotify Browser in Angular

- Learning goal: develop skills in web frameworks which separate interface from data and interaction (Model-View-Controller)

- Will make an interactive browser of Spotify's library

A4

Sleep Tracker in Ionic

- Learning goal: learn to leverage UI components in a mobile framework and align with principles of good mobile design

- Will implement an app to log daily sleep

A5

TBD

- Was previously an assignment moving beyond web & mobile, but API changes have made this more challenging

- May potentially become a GenAI assignment, but we're still exploring some ideas

Exams

- No exams!

Participation

- Survey question, think-share, discuss
  - Done via PollEV
- Opening other websites is a risk
  - Research suggests that students who use electronics during lecture take worse notes and perform worse on exams
  - Not much we can do about that, but aim to be mindful
- Will start Thursday, October 2nd
  - “Warm-up” next class

Participation

- Synchronous, in-person response is **required** to get credit
  - All questions graded on *completion*, not correctness
- Attendance correlates with higher grades, improved learning and retention, and higher education satisfaction
- You can miss 4 questions (~2 classes) without penalty

Participation

- Answer each other's questions on Slack!
  - You can also get participation credit this way
  - You can respond faster than we can
  - Often times, you've experienced the same pitfalls

Grading

- Assignments: 85%
  - 17% for each of five assignments
- Participation: 15% (up to 5% extra credit)
  - In-class survey participation (15%), Slack participation (5%)

Discussion sections

- Are optional
- Are a great opportunity to get more depth on topics discussed in lecture
- May occasionally be open office hours
- You can go to whatever session, but going to your own is better
- Friday: introduction to Git and GitHub
  - We won't cover them in lecture, so a great opportunity to learn the basics

Calendar overview

Calendar

Sep 21	Sep 22	Sep 23	Sep 24	Sep 25 **Introduction & History** 11:00-12:20 | ELH 100	Sep 26 **Git and GitHub Tutorial (TBD)** 4:00-4:50 | ALP 1300	Sep 27
Sep 28	Sep 29	Sep 30 **HTML & Accessibility** 11:00-12:20 | ELH 100	Oct 1	Oct 2 **CSS** 11:00-12:20 | ELH 100	Oct 3 **HTML & CSS Demo (TBD)** 4:00-4:50 | ALP 1300	Oct 4
Oct 5	Oct 6	Oct 7 **Responsive Design & Javascript 1** 11:00-12:20 | ELH 100	Oct 8	Oct 9 **JavaScript 2** 11:00-12:20 | ELH 100	Oct 10 **TA office hours (TBD)** 4:00-4:50 | ALP 1300	Oct 11
Oct 12	Oct 13 **Professor Epstein @ Ubicomp**	Oct 14 **Professor Epstein @ Ubicomp** **DOM Manipulation & Package Management** Pre-recorded	Oct 15 **Professor Epstein @ Ubicomp** **A1 Due** Responsive Portfolio in HTML and CSS	Oct 16 **Professor Epstein @ Ubicomp** **TypeScript & Data Visualization Tools** Pre-recorded	Oct 17 **Professor Epstein @ Ubicomp** **Javascript Demo (TBD)** 4:00-4:50 | ALP 1300	Oct 18
Oct 19	Oct 20	Oct 21 **AJAX, Fetch, & Promises** 11:00-12:20 | ELH 100	Oct 22	Oct 23 **Server-Side Development, Authentication, and Authorization** 11:00-12:20 | ELH 100	Oct 24 **Vega-Lite Demo (Ziqi)** 4:00-4:50 | ALP 1300	Oct 25

https://inf133-fa25.depstein.net/calendar

Travel & holidays

- I'm traveling a bit more this quarter than normal
- Plus, we're losing two days due to holidays (Veterans Day, Thanksgiving)
- I will pre-record the lectures which occur while I'm traveling
  - No synchronous or in-person class those days, still deciding how to deal with participation
  - The dates are on the calendar, and I'll try to remind you all

Flexibility

- We don’t know when your life is being disrupted
- Within reason, we will allow late assignment submissions without penalty if you email us at least 24 hours before the assignment deadline
  - Typically we’ll grant a few days for extension, up to a week
  - No late submissions for the last assignment
  - Treat extensions as a last resort, but it is an option

Reflection

- This is an applied course with a lot of programming.
  - About half of the class will cover implementation techniques
  - The other half is theoretical concepts which inform design and development
- We'll teach principles and languages at a high level,
  but you'll need to pick up the specifics of APIs, packages, etc. on your own.
  - We're happy to help, but we haven't used every aspect of every API

Reflection

You will learn a lot

"A LOT to learn for assignments. I will say that before I took the class, ***web development was something I had never even tried*** *and had always sworn off doing (seemed too intimidating!), but* ***now feel extremely confident with and have a huge interest in****. So props to the professor for completely turning me to a subject that I probably would have ignored for years more!"*

Reflection

But it will be hard

"*The assignments* ***were somewhat challenging*** *for those people who have never been exposed to JavaScript and app development, but* ***they are definitely helpful for us to understand the technology and skills*** *used in the trend of website/app development*"

"*A lot of students might think this course as something very challenging (and it is) but it was* ***really helpful in terms of implementing the ideas that we have learned in previous classes.***"

Reflection

- We have high expectations
  - We want you to make cool things
- But we also care and will listen
  - Let us know how things are going, ask questions
- Be “all in”
  - If you’re not ready to commit, please drop now
  - Someone else will be happy to take your spot

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