IN4MATX 133: User Interface Software

Lecturer Mark S Baldwin
TA Cass Zegura
TA Yang Yue

Lecture 1:
Introduction & History

I am thrilled that you have decided to take this class and that I get it to teach you!

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…

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- 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](https://dl.acm.org/citation.cfm?id=3291126)

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 "computing"; 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”

Vanneaver 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)

Did you recognize any interactions that are commonly used today?

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

Did you recognize any interactions that are commonly used today?

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”
- Engelbart Won Turing Award in 1997

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Ubiquitous computing

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

Did you recognize any interactions that are commonly used today?

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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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"

Why are web tools now the standard for interface development?

One to many, synced over the cloud

One to many, 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?

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Course Overview

- Course staff introductions
- Administravia
- Topics covered
- A0 (due Monday)

Who we are

Lecturer Mark S Baldwin (he/his/him)

- Ph.D. Informatics,
  University of California, Irvine 2020
- Master of Human-Computer Interaction,
  Carnegie Mellon University 2013
- B.A. Computing,
  DePaul University 2012
- Joined UCI Informatics in 2020
- Industry work:
  Principal/Founder, Baldwin Technology Consulting, 2002-2012
  Manager/Web Developer, BBDS Advertising, 1998-2002

Who we are

Who we are

Yang Yue (he/his/him)

- 3rd year PhD in Software Engineering
- B.S. & M.S. in Software Engineering
- Researches human aspects of software engineering like individual development, diversity, and inclusion in OSS

Who we are

Cass Zegura (they/them)

- 1st year M.S in Informatics
- B.A. Modern Culture & Media, Brown University
- Interested in video games, game engines, queer theory.

The syllabus

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

Staying in touch

- Web: http://inf133-fa20.markbaldw.in/
- Email us: See Syllabus
- Slack: https://uci-inf133-fa1.slack.com/
  - Information will go out to Slack first!
- For the most part, Canvas will only be used for submission and grades.
- Think about your questions, if it is a personal matter, then reach out via email. Otherwise use slack #general/#random channels!

Staying in touch

- Office hours: on calendar
  - Instructor – I will be on Zoom every Thursday, by appointment
  - TA's by appointment
- Submission: clone starter code from GitHub Classroom
  - Zip up finished assignment, submit on Canvas
  - Unsure about Git or GitHub? Go to discussion on Monday!
- YuJa: All weekly lectures will be uploaded here every Monday.

Communication best practices

- Slack is best for assignment clarification and assistance
  - Please use the public channels to allow your peers to help
  - Direct messages to me are ok for now. But unless you ask a question during scheduled class hours, don’t expect an immediate response. (I am also reserving the right to change this practice if it becomes too unwieldy!)
  - Keep TA requests in public channels.
- Email is best for personal communication (absences, concerns, regrades)

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

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
- (The class webpage is a bad example, you will do better!)

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 Mobile App

- 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

No Exams!

- Final Project
- Midterm – Project Plan and Requirements Doc
- Only paired project (2-3)
- Build on A3/A4 or create your own app

Participation

- Socrative.com, create an account before the next class
- You must attend 5 out of the 8 sessions to receive full credit
  - If you attend all 8, you receive 1 extra credit.

- Will start Tuesday, October 6th
  - “Warm-up” next class

Participation

- The research is clear: attendance correlates with higher grades, improved learning and retention, and higher education satisfaction
- We need to socialize to stay healthy!

Participation

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

Grading

- Assignments: 60%
  - A0 (1%), A1 (14%), A2-A4 (15% each)
- Final Project: 35%
  - Midterm 5%
  - Final Project 30%
- Participation: 5% (up to 3% extra credit)

Discussion sections

- Are optional
- Are a great opportunity to get more depth on topics discussed in lecture
- Opportunity to engage live with TA’s

A0 due Tuesday!

- Introduce yourself!
  - Take a screen shot of your introduction and upload it to canvas A0 for credit.

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

- 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
- The more active you are the better the experience will be for everyone

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