

Great leaps in HCI

CSE 510
Anderson, Fishkin
(with help from James Landay at UC Berkeley)

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Administrivia #1

- Sign up for the mailing list: Send mail to cse510-request@cs.washington.edu With the subject "Subscribe"

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Administrivia #2

- Revised course schedule and syllabus is up. Highlights:
 - Extra class on 1/17
 - No class on 1/20 (MLK)
 - 1/29 project proposals due
 - No class 2/17 (Presidents)
 - No class 3/3 (Eritrea)
 - Extra class 3/14
 - Proposal presentations

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Talk Outline

- Let's look at some influential visions in HCI
 - 1 from 1945
 - 1 from 1968
 - 1 from 1974
 - (we'll look at ones from 1990 and 2002 later in the course)

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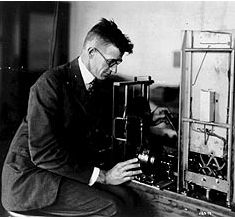
Why Study This?

- Partly to trace the evolution of HCI
 - Need two points to make a line
 - Amaze your friends at cocktail parties!
- Mostly as case studies in ways research can be done and presented
 - This is a grad course, we want to try to help you become researchers. One way to do that is via "case studies"
 - You can also help me become a better lecturer!

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Bush, 1945


- Vannevar (rhymes with "Clever")
- Long History in Computing
 - 1927 - Intergraph
- MIT Faculty Member
- 1st dean of engineering



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Bush, 1945


- Head of DARPA predecessor in WWII
 - Was at Alamogordo
 - Other person is James Conant.



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Bush, 1945


- Writing in "The Atlantic" in 1945



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Bush – context

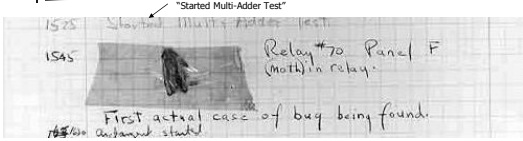
- Computing at nearby Harvard
 - 55 ft long, 5 ft high, 8 tons
- Physical switches
- Paper tape
- Main use: ballistics calculations
- 1/3 of a Hertz.



Source: www.maxmon.com/1939ad.htm

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Digression



- Working on Mark II, we have the first computer bug
- NOT the first use of 'bug' to mean a technical problem. (Smithsonian: "American engineers have been calling small flaws in machines "bugs" for over a century. Thomas Edison talked about bugs in electrical circuits in the 1870s. ")

<http://www.lewhill.com/firstcomputerbug.html>

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As We May Think – Two Changes

- Microfilm would get much, much better
 - Wrong, but besides the point, what mattered was concept of lots of storage. Nobody's perfect
 - Considers disc storage: "The whole record on the card may be made by magnetic dots on a steel sheet if desired, instead of dots to be observed optically"
- Computers will get *thirty million* times faster (up to 10 Mhz!)

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Envisioned Changes

- OCR
- Text-to-speech
- Speech recognition
- Theorem proving

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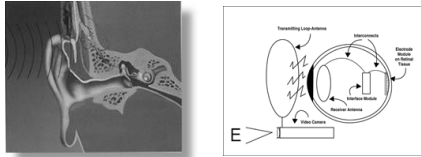
And More...

- Wearable "computers"
- Augmented Reality
- Database querying
- ATM Card, bar codes (via punched cards)

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And More...

- Computer I/O via nerve endings
- Know any other research proposals that are still viable and active, 50+ years later?



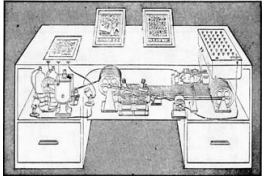
http://hsc.virginia.edu/otolaryngology/patient_cochlear.html

(<http://www.sandia.gov/news-center/news-releases/2002/mat-chem/blindsec.html>)

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The Memex

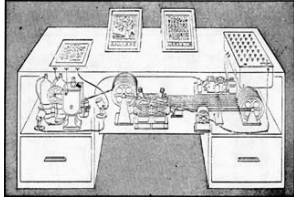
- WWII was fought using the same information technology as WWI – can this be addressed?
- Will have masses of information at your fingertips
- Need a way to make sense of it. Data != Facts.



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The Memex

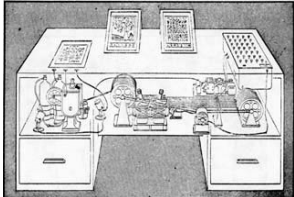
- You can view a document by "tap[ping] its code on the keyboard"



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The Memex

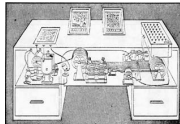
- Can view two documents at once (windowed)
- And annotate with a stylus



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The Memex

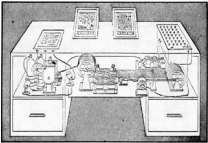
- "any item may be caused at will to select immediately and automatically another. This is the essential feature of the memex. The process of tying two things together is the important thing"



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The Memex

- "wholly new forms of encyclopedias will appear, ready made with a mesh of associative trails running through them, ready to be dropped into the memex and there amplified"



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Summary

- Bush:
 - OCR
 - Text-to-speech
 - Speech Recognition
 - Theorem Proving
 - Wearable computers
 - Augmented reality
 - Database querying
 - ATM card, bar codes
 - URLs
 - Hyperlinks
 - Multi-window system
- WOW!

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But...

- One [computer] will take instructions and data from a whole roomful of girls armed with simple key board punches, and will deliver sheets of computed results every few minutes"
 - Not as prescient on societal changes
 - Oddly contradictory to rest of text

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Discussion

- Which prediction did you find most surprising/interesting?
- Were all these predictions good ideas?
- What blind spots were there?

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Leaper #2 - Engelbart

- BS EE (Berkeley)
- Industrial Researcher: NASA Ames, SRI




(<http://sloan.stanford.edu/MouseSite/gallery/photos/portraits3.html>)

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Engelbart – context

- Computers the size of SUVs
- Input via punched card or teletype
- Output via printer
- Almost everything batch, shared
- IBM 360/30: 1.33 Mhz, 64K Ram



(<http://ed-thelen.org/comp-hist/ibm-360-30.html>)

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Engelbart – Envisioned Changes

- Reads Bush's paper. Thinks:
 - "What if the Memex were real?? - How would I want to interact with it?"
- Years of struggle to get people to fund work
- Worked up a prototype system, showed it at a 1968 computer conference...

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Engelbart demo

- "if you had a workstation at your disposal all day that was perfectly responsive"
- [[clip #2]

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Engelbart demo

- Mouse
 - [clip #12]

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Engelbart demo

- Word processing, hierarchical, bookmarks
 - [clip #7]

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Engelbart demo

- Multimedia, multiwindow, hyperlinks
 - [clip #10]

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Engelbart demo

- Email, grep, CSCW
 - [clip #23]

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Engelbart – Summary

- Mouse
- Hypertext (from Bush)
- Word processing
- WYSIWYG
- Multi-windows
- Version control
- Formatting directives
- Context-sensitive help
- Collaborative annotation

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Engelbart Discussion

- Any questions? Care to review any videos again?

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Leaper #3 – Alan Kay

- PhD (Utah)
- Was in the audience at Engelbart's talk
- Went on to PC project at Xerox PARC



(<http://ci.cs.vt.edu/~history/GASCH.KAY.HTML>)

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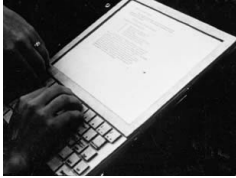
Kay focus

- *"What if Engelbart's system were truly personal"?*
- *"And what if the users were kids?"*
- *And what if computers ran at 10 Mhz?*

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Dynabook

- Should be small and portable – "the size of a large notebook", with "flat-screened mosaics that reflect light as liquid-crystal watch displays do"



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Kay focus

- Multimedia as a 1st class citizen – animations, drawings, images, music, etc.

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Kay oops

- Misses notion of canned software: "the central problem of personal computing is that nonexperts will almost certainly have to do some programming..."
- Remember Software was highly devalued at the time
- Hence Smalltalk, emphasis on languages for kids (Logo). Also kids provide a focus to the design.

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More Kay

- Has multi-windows, and WYSIWYG, much smoother than Engelbart's.
- Invents Icons, Joystick: we now have WIMP interfaces.

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By the way

- The goal was the laptop – the WIMP desktop was only "the best achievable" approximation.
- But would kids want a \$16,000 computer the size of a dorm fridge?



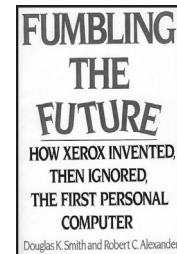
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So then what happened

- "fumbling the future" – Xerox introduced a GUI PC which bombed.



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Apple picks up the ball

- **Steve Jobs visited PARC and got a demo:** "I was so blinded by the first thing they showed me which was the graphical user interface. I thought it was the best thing I'd ever seen in my life... within you know ten minutes it was obvious to me that all computers would work like this some day."
- **Had either huge or small impact on Mac, depending on who you ask**



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A Digression

- Focusing on these 3, don't mean to imply that they were in isolation. Three examples:

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Licklider

- J.C.R. Licklider (1960-1965). Bush' successor, pushed notion of real-time, interactive, networked computing.



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Sutherland

- Ivan Sutherland (1963) – invents GUI, constraints, inheritance, direct manipulation – the Englebart of Computer Graphics
- Bush → Sutherland → Borning



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PARC (1970s) – lots of others!



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Project Idea

- You are the head of DARPA. Write a Bush-style manifesto. What changes do you foresee? What needs will they create? What solutions will they allow?
 - *Justify* your changes
- (We will see two such manifestos later in the course).

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Project Idea: Engelbart

- If Engelbart's demo was so compelling, why did it take so long to succeed? Investigate the post-1968 years and analyze why Engelbart's vision didn't take hold sooner.

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Homework(1)

- "The owner of the memex, let us say, is interested in the origin and properties of the bow and arrow. Specifically he is studying why the short Turkish bow was apparently superior to the English long bow in the skirmishes of the Crusades"
- Using the WWW, study this question.
- Write your answer. At least 2 sentences, at most 1 para.
- Spend no more than 60 minutes on the web.
- Count how many links you visited

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Project Idea

- What was hard to do in this homework assignment? How could the web be improved to make that easier? Add such an enhancement to a web browser, and test it.
- Keep this in the back of your mind as you do the homework.

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Homework (2)

- It is January 27, 1986, 5:35 PM (Mountain Time). You are a rocket scientist working at Morton Thiokol. You have just persuaded the others at Thiokol that the launch of the space shuttle "Challenger", scheduled for January 28th, should be postponed. You believe that the O-rings might fail in such cold weather (estimated 29 degrees at launch).

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Your task

- You have 90 minutes to prepare charts supporting your position before a conference call with NASA starts. Using the data at <http://seattleweb.intel-research.net/people/fishkin/CSE510/CS E510.html>, make your charts. You should take no more than 90 minutes.

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Faxing

- Fax your answer to 206-633-6504 by 8 AM Monday, 1/13.
- (Be careful about use of color)

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