

# Human-Computer Interaction



Eric Paulos  
University of California, Berkeley  
EECS, Computer Science Division  
CS10, Spring 2013

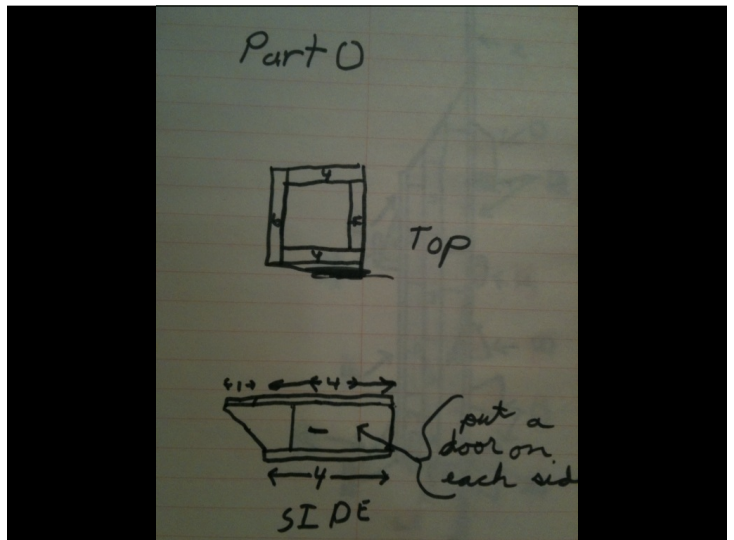
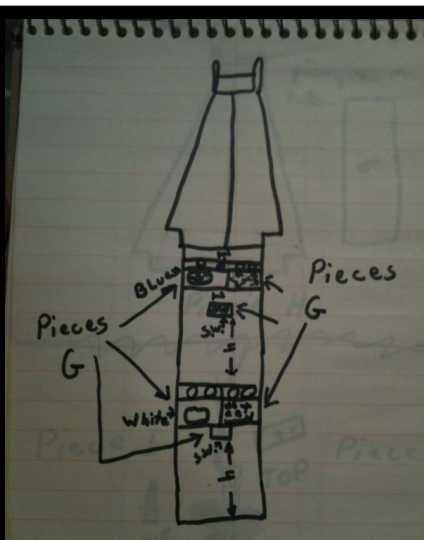
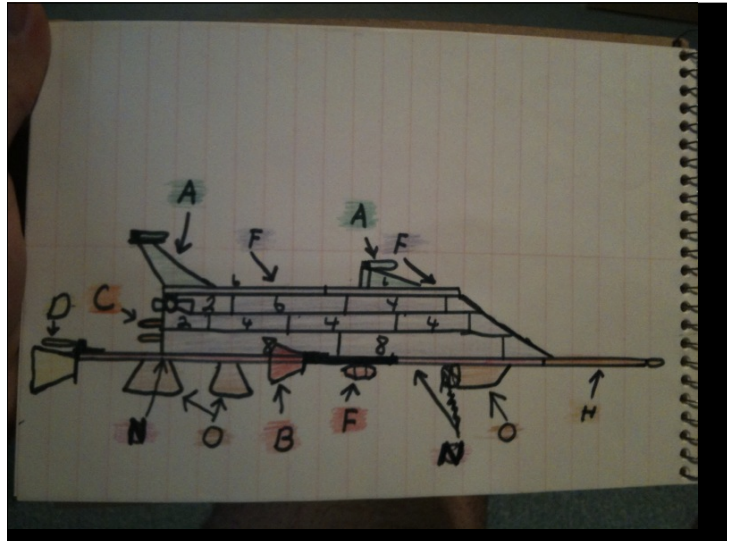
MY BACKGROUND • UCB • INTEL RESEARCH • CMU • UCB

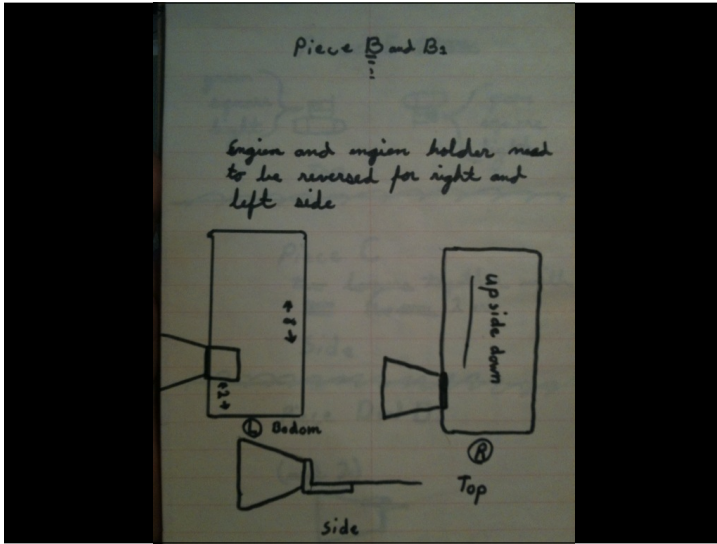


eric paulos


berkeley center for new media • electrical engineering and computer science • ucb

Top  
Secret  
ERIC'S  
Plans  
Do not  
open  
UNLESS  
AUTHORIZED





## PERSONAL TELEPRESENCE 1995




processor: **Intel Pentium (66 MHz)**

browser: **Mosaic**

search engine: **Alta Vista**

social networking: **The Well / Usenet**

mobile platform: **Palm Pilot**

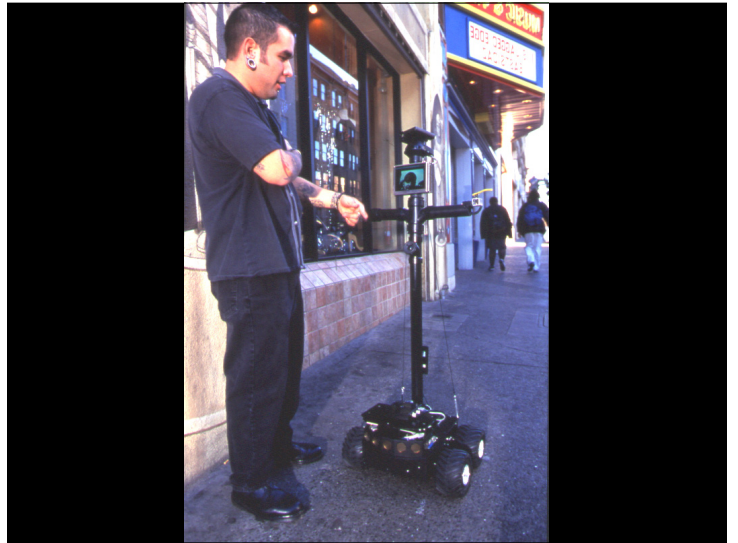
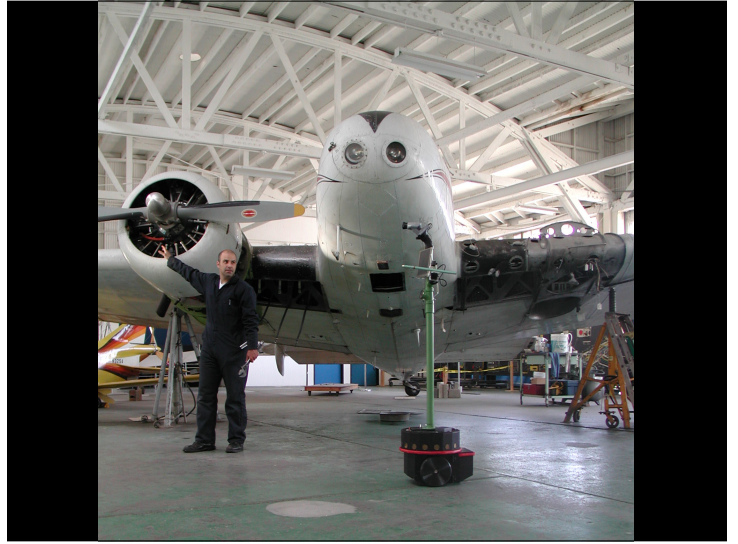
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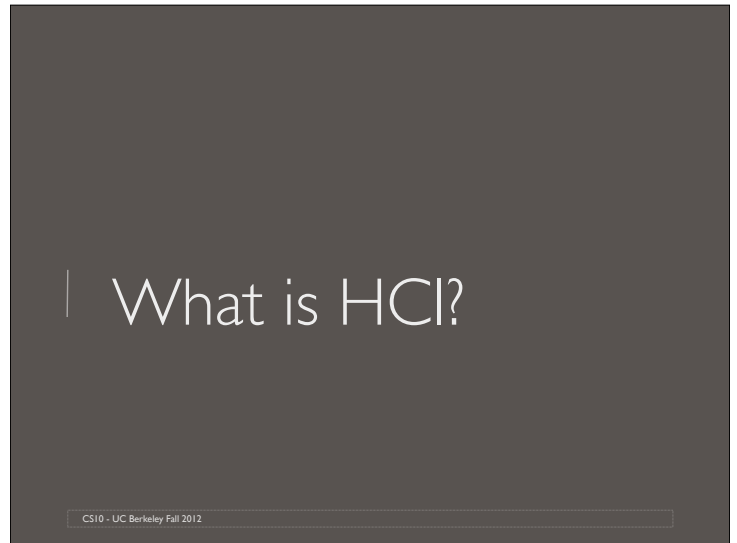
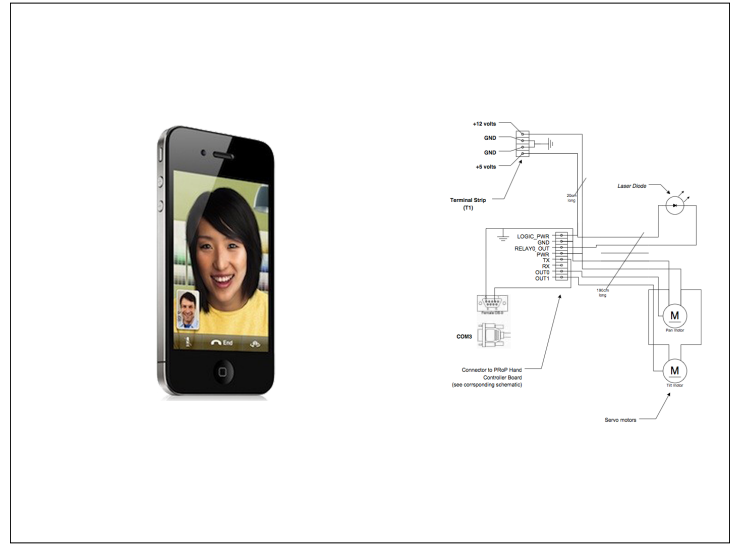
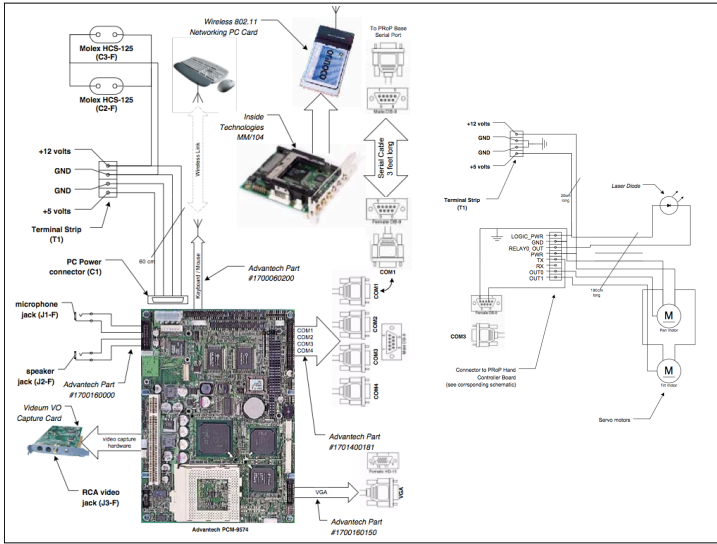
006f7 info-gsm at BEL_AUTHER-WDBLEY a fa.info-gsm 17-Jul-82 09:15:
006f8 Help with hard disk and CD eye fa.info-gsm 17-Jul-82 10:50:
006f9 Cursor movement fa.adit@p 17-Jul-82 10:42:
006fa Rings and food net.games.rogue 17-Jul-82 10:41:
006fb Super natural bug? net.games.rogue 17-Jul-82 10:37:
006fc VW joke net.aut.vw 17-Jul-82 11:56:
006fd Did you hear about net.jokes 17-Jul-82 12:29:
006fe Re: XMS DMS message lockout - i net.univmear 17-Jul-82 12:26:
006ff SP-LOVING Dipmat V6 #1? fa.#-lovere 17-Jul-82 13:13:
0070 12 1 net.ing 17-Jul-82 13:03:
0071 Public domain programs in commar fa.info-gsm 17-Jul-82 15:12:
0072 GSI simulation fa.info-gsm 17-Jul-82 15:10:
0073 Who's Craziest? (Take 2) net.mic 17-Jul-82 17:26:
0074 Rabelaisian and The Bradbury net.monica 17-Jul-82 17:20:
0075 bad saves net.games.rogue 17-Jul-82 18:20:
0076 CP/M ED.COM 1.4 fa.info-gsm 17-Jul-82 19:21:
0077 Number theory problem net.games.rogue 17-Jul-82 19:21:
0078 Side... net.jokes 17-Jul-82 19:18:
0079 CP/M ED 1.4 net.info-gsm 17-Jul-82 19:17:
007fa Tspan Modification net.micro 17-Jul-82 20:20:
007fb Newsline upgrade to BEL Indian RI net.news.newsite 17-Jul-82 21:02:
007fc *****...! Where did I go w i net.math 17-Jul-82 21:02:
007fd (Stover S. Hillar: Tspan Modific fa.info-gsm 17-Jul-82 21:01:
news

```









## Human-Computer Interaction (HCI)

**Human**

- End-user of program
- Others (friends, collaborators, coworkers)

**Computer**

- Machine program runs on
- Often split: clients & servers

**Interaction**

- User tells the computer what they want
- Computer communicates results

## User Interfaces (UIs)

Part of application that allows

- People to interact with computer
- Computer to communicate results

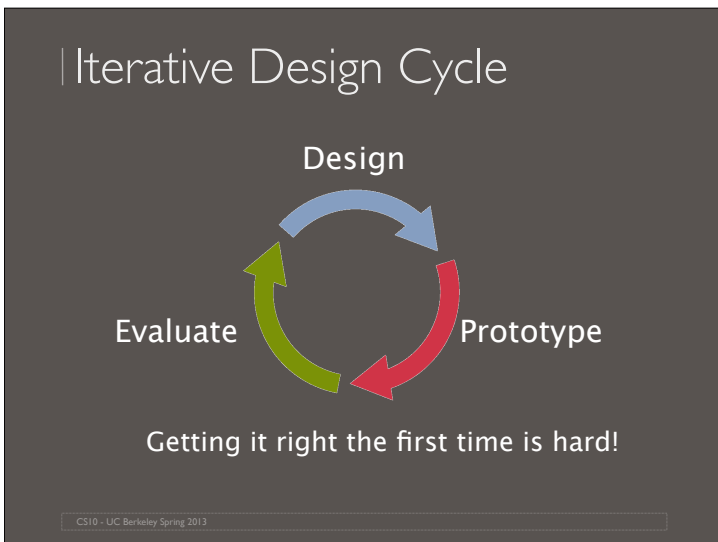
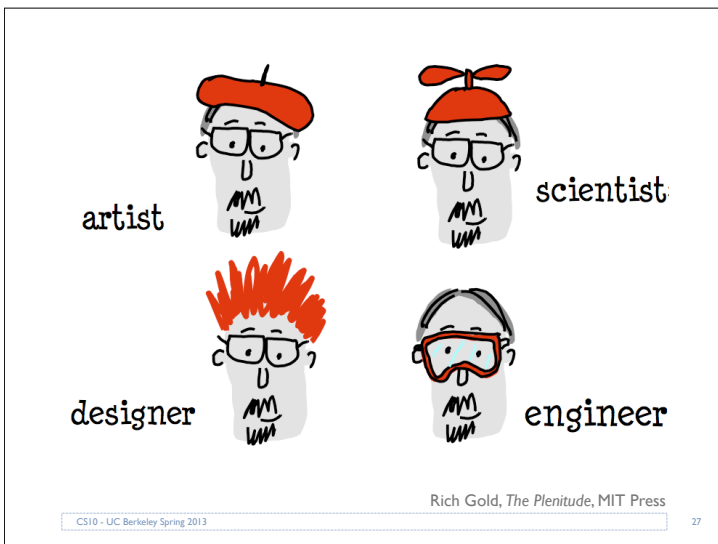
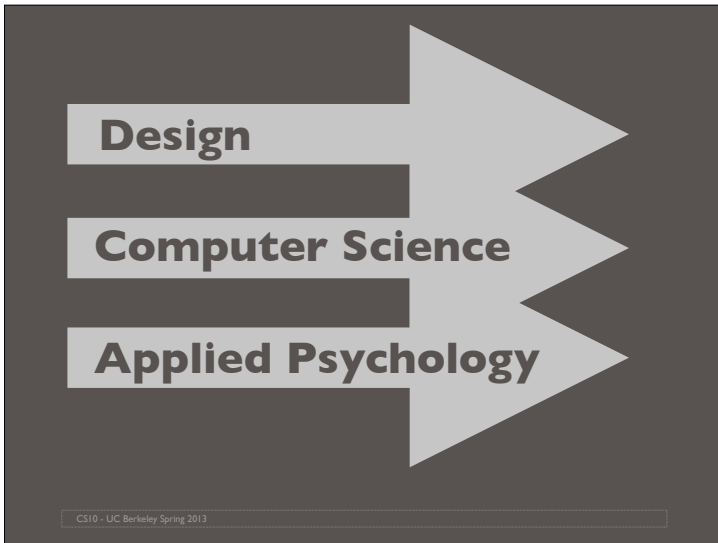
Can include hardware design

- Buttons, sliders, other sensors

**HCI = design, prototyping, implementation & evaluation of UIs**

<http://www.reactable.com>





### Understanding Users

- Observe existing practices
- Create scenarios of actual use
- Build models to gain insight into work processes

CS147, Stanford, 2006

<http://www-personal.umich.edu/~christlm2.html>

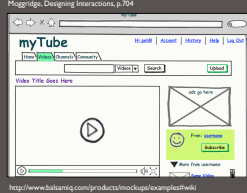
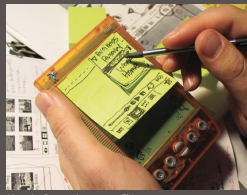
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# Prototyping Interfaces

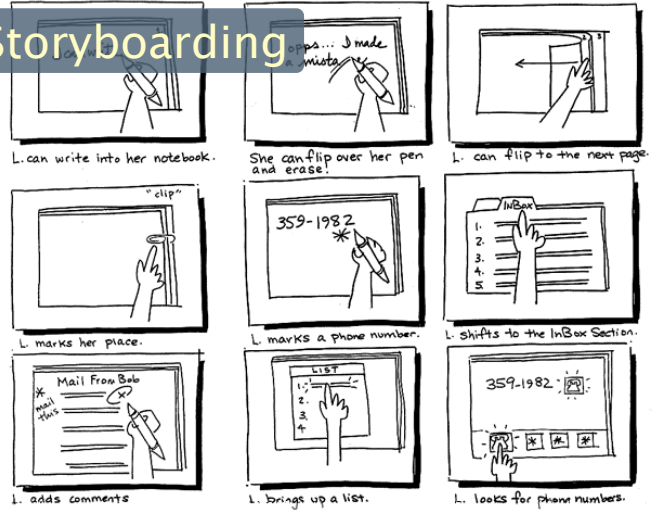
Rapidly build a mockup of your UI

Low-fidelity techniques:  
Paper prototyping  
Video prototypes

Interactive prototypes:  
HTML, Javascript, Flash, ...



# Storyboarding



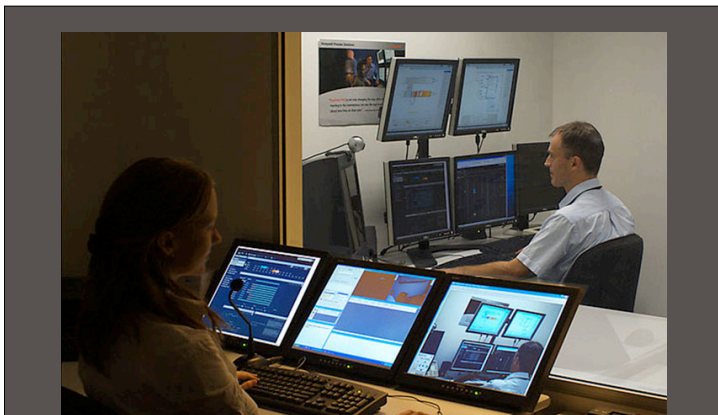
# Evaluation

## Formative

Are we building the right thing?  
What should be different in the next iteration?

## Summative

Does it work? Is it better than existing solutions?  
Can this teach us something about how people or the world work?



## Techniques

Analytically, expert walkthroughs, laboratory studies, ...

# Why study user interfaces?

How much of an application's source is devoted to user interface code?

- A. 10%
- B. 20%
- C. 35%
- D. 50%
- E. 75%



## | Why study user interfaces?

“The results show that in today's applications, an average of 48% of the code is devoted to the user interface portion.

The average time spent on the user interface portion is 45% during the design phase, 50% during the implementation phase, and 37% during the maintenance phase.”

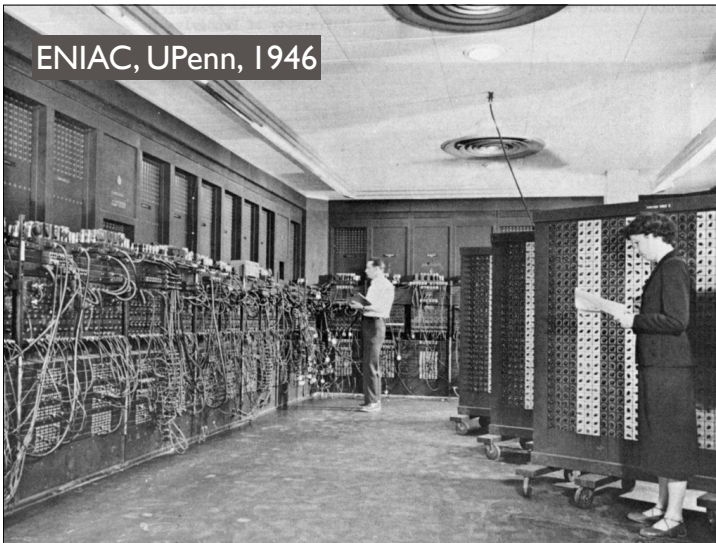
– Myers & Rosson, CHI'92

CS10 - UC Berkeley Fall 2012

## | History

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ENIAC, UPenn, 1946



## | When was the mouse invented?

- A. 1948
- B. 1963
- C. 1978
- D. 1984
- E. 1991



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Doug Engelbart &  
Bill English, SRI, 1963

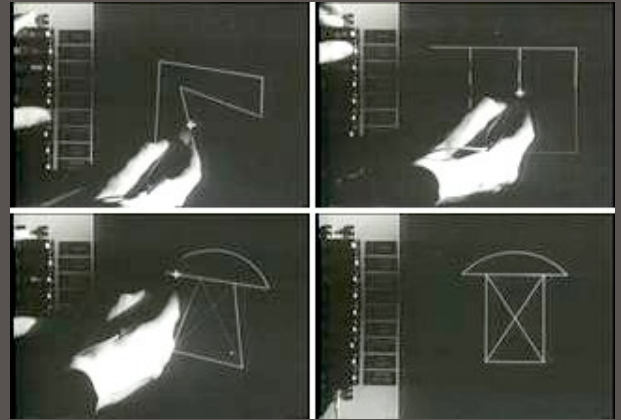


(cc) Flickr user John Chiang  
<http://www.flickr.com/photos/13184584@N08/1342760884/>

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When was pen input invented?

- A. 1964
- B. 1973
- C. 1986
- D. 1995
- E. 2001



Ivan Sutherland, Sketchpad, MIT, 1963/64

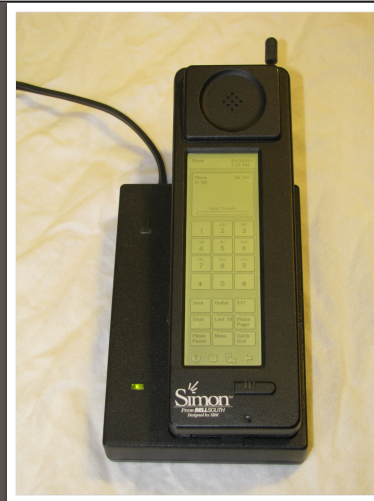


The new iPad



Which company introduced the touch screen phone?

- A. Nokia
- B. Apple
- C. Microsoft
- D. IBM
- E. Samsung

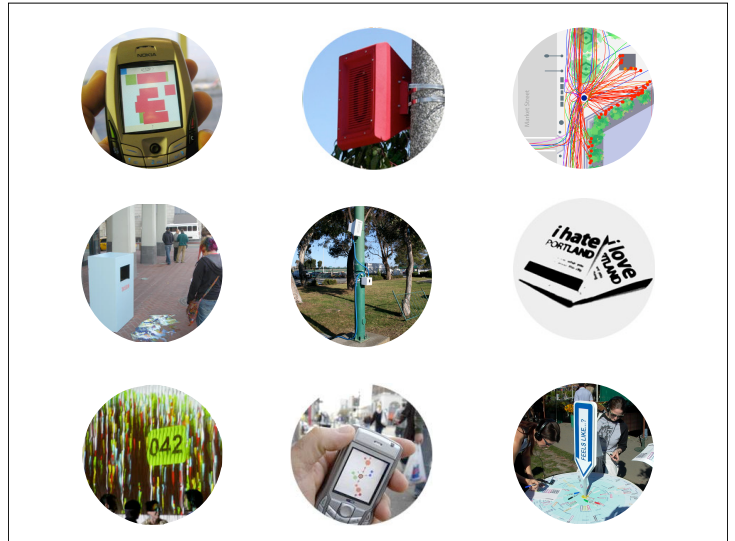


IBM Simon  
1992



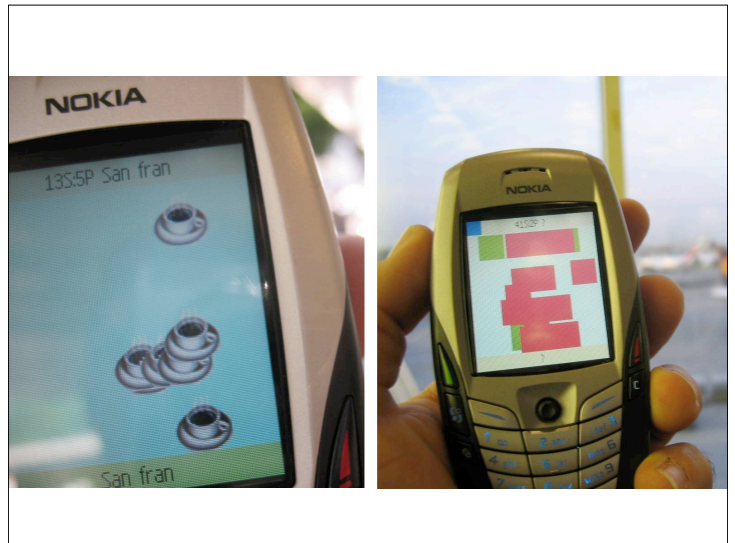
# URBAN ATMOSPHERES

Eric Paulos  
Chris Beckmann  
Elizabeth Goodman  
RJ Honicky  
Ben Hooker  
Tom Jenkins  
August Joki  
Chris Myers  
Ian Smith  
Parul Vora



## JABBERWOCKY encountering our familiar strangers

The Familiar Stranger: Anxiety, Comfort, and Play in Public Places, ACM SIGCHI 2004  
Eric Paulos and Elizabeth Goodman



Nokia Sensor

Options ▾ Standby

Google Latitude

facebook

Facebook Places  
Who. What. When. And now where.

foursquare

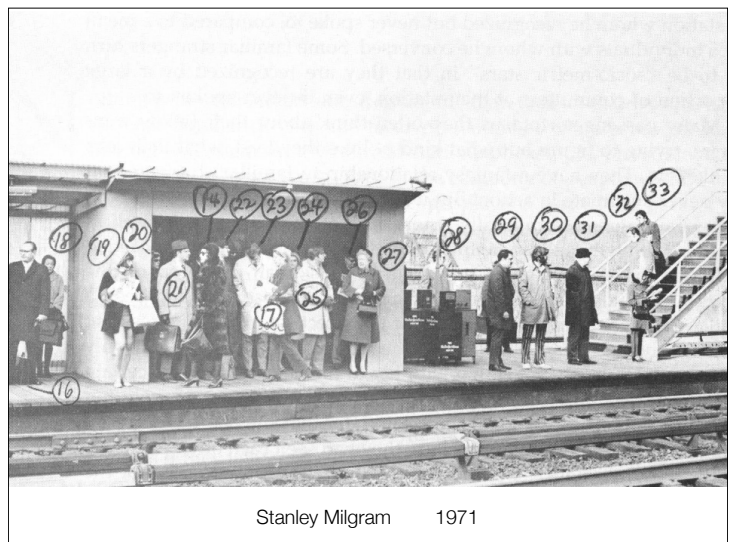
highlight

Sonar

Banjo

Gauss

Glancee



Stanley Milgram 1971



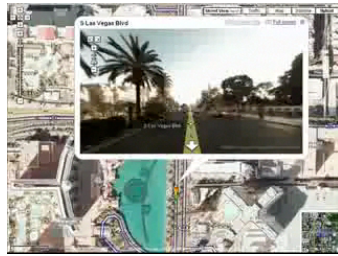
Vito Acconci Following Piece 1969



Sophie Calle Please Follow Me 1983



Aspen Movie Map  
Michael Naimark  
1978



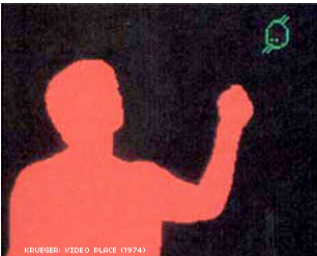
Street View  
Google  
2007



Aspen Movie Map  
1978-1980



Google StreetView  
2007



Video Place  
Myron Krueger  
1974



EyeToy  
Sony  
2003



Legible City  
Jeffrey Shaw  
1988



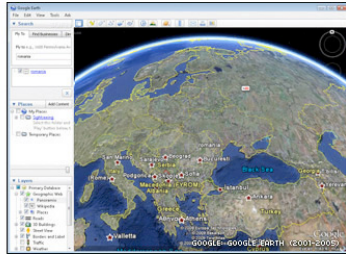
E-fitzone exercise equipment  
2008





GET+COM TERRAVISION (1996)

Terravision  
Art+Com  
1996



Google Earth  
2005



INSTITUTE FOR APPLIED AUTONOMY: GRAFFITIWRITER (1998)



INSTITUTE FOR APPLIED AUTONOMY: STREET WRITER (2001-4)

GraffitiWriter & Streetwriter  
Institute for Applied Autonomy  
1998-2004



NIKE CHALKBOT (2009)



Nike Chalkbot  
2009



The Telegarden  
Ken Goldberg  
1995



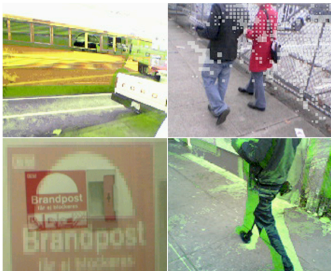
FarmVille  
Zynga  
2009



Graffiti Research Lab  
L.A.S.E.R. Tag  
2007



Graffiti by Agents of Change  
all natural Cola by Red Bull  
2009



Context Photography  
Maria Håkansson and Lars Erik Holmquist  
2003



Instagram  
2010



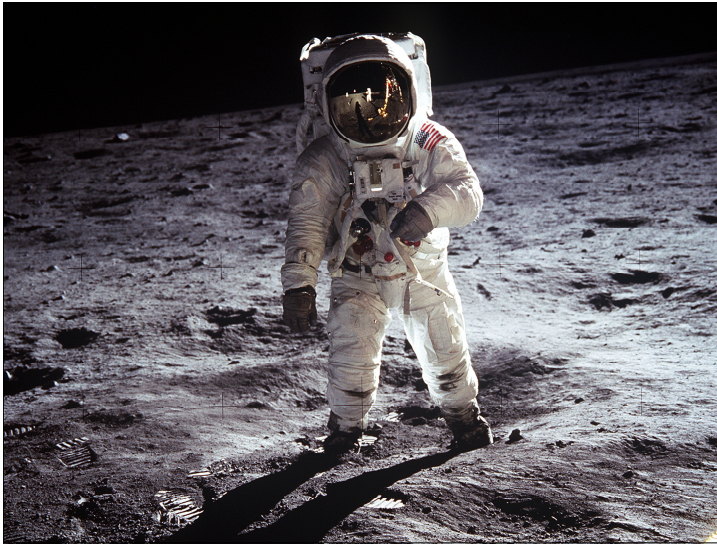
TXTmob  
"tw mor thn evr"  
www.txtmob.com

TXTMob  
Institute for Applied Autonomy  
2004




Twitter  
2006





**wicked problems**



*Dilemmas in a General Theory of Planning, 1973  
Horst Rittel and Melvin Webber*

**DESIGN RESEARCH** is an inquiry focused on producing a contribution of knowledge

**NOT** to directly inform the development of a commercial product

wicked problems



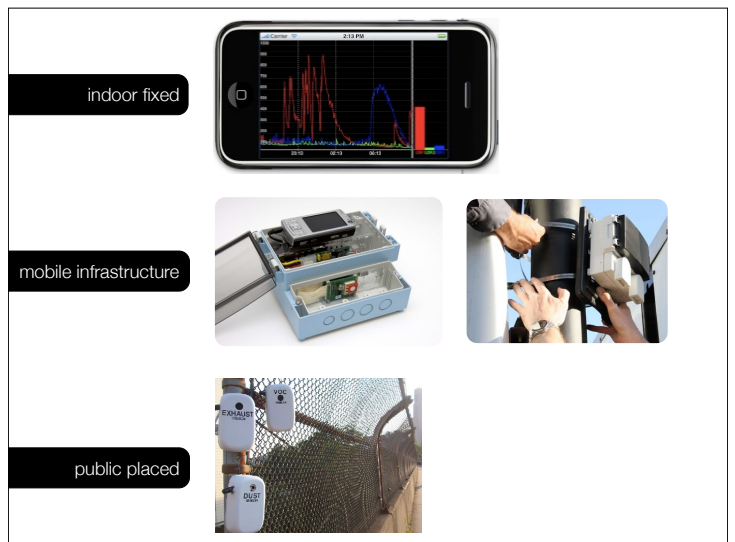
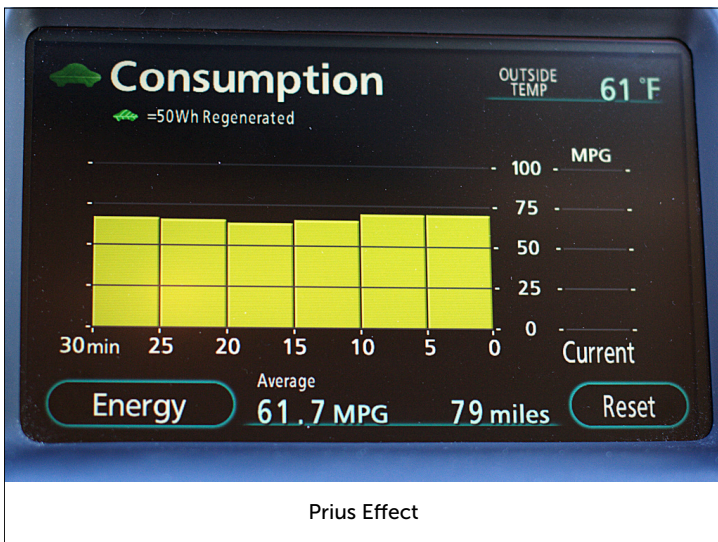
**street crime**

- disarm police?
- repeal laws that define crime?
- substitute ethical self-control for police and courts?
- shoot criminals and thus reduce the numbers who commit crimes?
- give away free loot to would-be-thieves to reduce incentive?



DESIGN	VS	DESIGN RESEARCH
affirmative		critical
problem solving		problem making
provides answers		asks questions
in the service of industry		in the service of society
for how the world is		for how the world could be
science-fiction		social-fiction
futures		parallel worlds
fictional functions		functional fictions
change the world to suit us		change us to suit the world
anti-art		applied art
research for design		research through design
applications		implications
design for production		design for debate
fun		satire
consumer		citizen
user		person
makes us buy		makes us think

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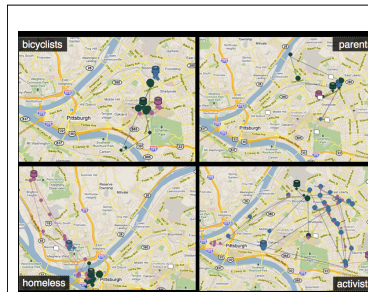
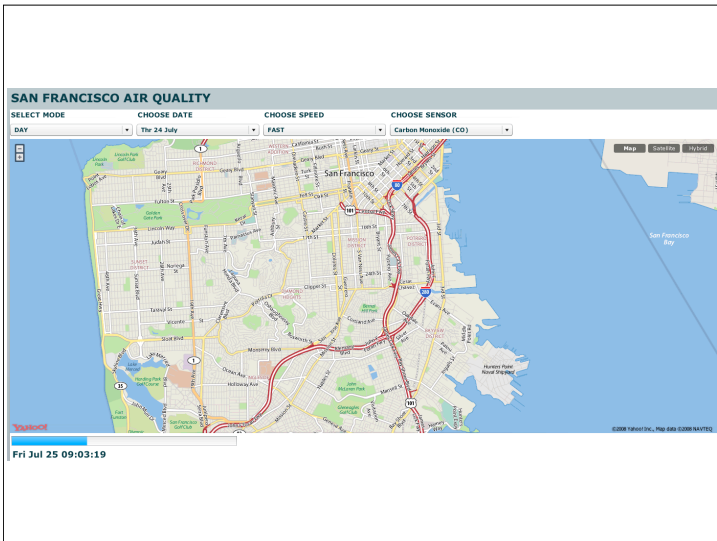
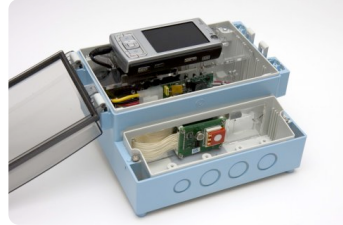




Eric Paulos  
Allison Woodruff  
Paul Aoki  
Alan Mainwaring  
RJ Honicky

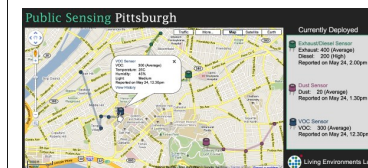
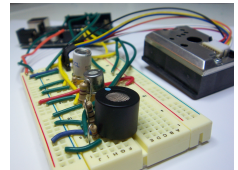


CO  
NOx  
Ozone  
Temperature  
Humidity  
Accelerometer

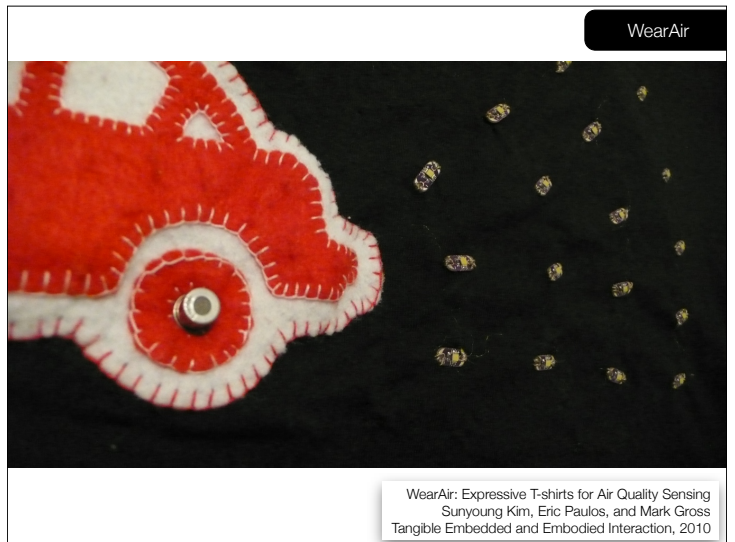
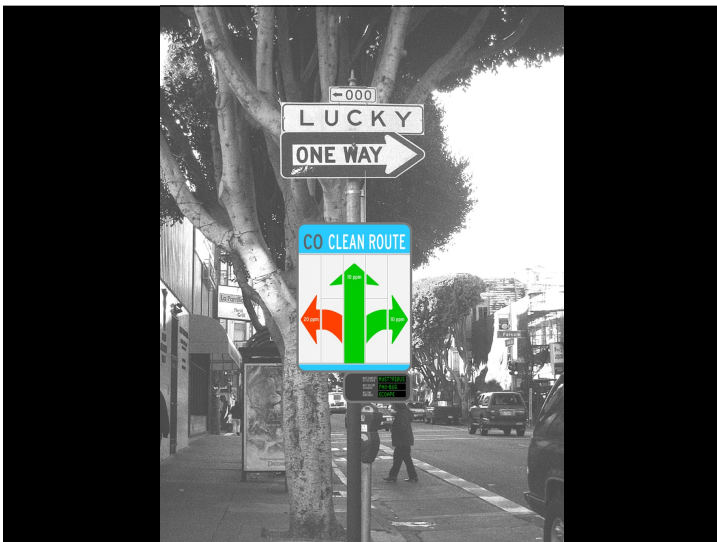


Community Sensing

Empowering civic engagement with place based community shared environmental sensors



Ceci N'est Pas Une Pipe Bombe: Challenges to Urban Authoring and Participatory Sensing  
Stacey Kuznetsov, George Noel Davis, Jian Chiu Cheung, and Eric Paulos, ACM SIGCHI, 2011



WearAir

WearAir: Expressive T-shirts for Air Quality Sensing  
Sunyoung Kim, Eric Paulos, and Mark Gross  
Tangible Embedded and Embodied Interaction, 2010



