

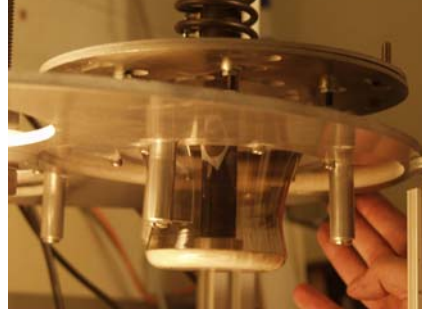
From Alzheimer's to physical disabilities case studies in context aware access

Ted Selker

Selker@media.mit.edu

Welcome to The Living Center, a place to explore, reminisce and relax.

Every object is an activity. Click object to enter.



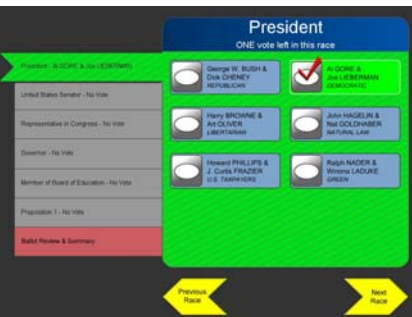
Context Aware Computing group

Ted Selker, Associate Professor MIT Media lab

Using Sensors and Virtual sensors
To understand and
respect human intention

Mentoring dozens of companies

#	Response	Subject	From	Outbox	Date
1		Re: [REDACTED]	richieb@comcast.com		24 Jun 2003
2		Re: [REDACTED]	richieb@comcast.com		24 Jun 2003
3		Re: [REDACTED]	laffer@digitalis.net		24 Jun 2003
4		Re: [REDACTED]	seppin@mit.edu		24 Jun 2003
5		Re: [REDACTED]	spat@mit.edu		24 Jun 2003
6		Custom Thesis Title	pts@mit.edu		24 Jun 2003
7		Re: [REDACTED]	lad@mit.edu		24 Jun 2003
8		U2Mail	brian@mit.edu		24 Jun 2003
9		New Business Cards Web Tool	pts@mit.edu		24 Jun 2003
10		Media for [REDACTED]	pts@mit.edu		24 Jun 2003
11		Re: [REDACTED]	laffer@digitalis.net		24 Jun 2003
12		Re: [REDACTED]	ben@mit.edu		24 Jun 2003



Context Aware Platforms

Demonstrations and
design tools for
recognizing and
respecting intention
across domains and
scenarios

Ted Selker
Selker@media.mit.edu

1. Annotated smart kitchen
 2. Alzheimer's Living Center
 3. Attention vending machine
 4. Audio interface tool
 5. Attention meter
 6. Bike alert
 7. Car coach
 8. Climbing interface
 9. Context builder
 10. Considerate thing
 11. Chameleon tables
 12. Digital cigarette
 13. Disruption manager
 14. Driftcatcher
 15. Dishmaker
 16. e-Bed
 17. e-Clay
 18. e-Floor
 19. e-Helmet
 20. e-Threshold
 21. EyeaRe
 22. Exercar
 23. Face Interface
 24. Gesture music ball
 25. Haptic tuner
 26. Interruption Manager
 27. Kitchen phone
 28. Invision
 29. Low Error Voting Interface
 30. Media jukebox
 31. Media windshield
 32. Minerva
 33. Mobile essence
 34. MrWeb,
 35. PlaceMap
 36. Power bra
 37. Secure Architecture For Voting Electronically
 38. SMS mediator
 39. Smart dice
 40. Smart spoon
 41. Smart sink
 42. Smart refrigerator
 43. Smart utensils
 44. Talking Trivet, e-sleeve, shoulder pet
 45. Thought for food
 46. USPS concept truck
 47. Voyager
 48. Wireless dashboard
- Recognizing and coaching activity in kitchen
Adaptive interface to support communication for people with dementia
Socially interpreted interactive media in a vending machine
Tool for exploring audio interface for voting and telephones
Camera input for interactive
Auto system for telling bike car door might open
Feedback to improve driving
Platform for museum interactive
Context aware application engine
Sensor/ electronics platform for making considerate things
Computer interactive tables with height control and sensing
Motivation and relationship building demonstration
Semantic based system to mediate desktop interactions
Socially aware email annotation interactive
Recycling kitchen manufacturing
Eye gesture based GUI
24 degree of freedom design input tool
Socially aware floor interactive
Wearable for mediating communication for bicyclist
Context aware receptionist
Glasses that can tell interest alertness
Pedaling accelerator improves acuity and reduces fatigue
Caricature teaching of facial gesture interface affordances
Instrument builds itself for you
Adaptive feedback to coordinate and improve peoples musical collaboration
GUI mediation for any platform
System to control and enhance grocery experiences
Eye gesture based preference system
New approach to ballot design for improved access and accuracy
Model and feedback smart interactive for selection of media
Augmented reality car
Viewing food to suggest recipes
Meeting collaboration support system
Collaborative web tools
Location aware engine
Power harvesting system collects 1 watt from breathing
New approach to reliability/security
No cell phone software meeting mediator
Progressive math teaching interactive
Sensors for teaching cooking
Sensing use of sink for ease and safety
Energy reducing, food improving preservation
Sensing to teach and coach food preparation
One sensor systems that react to intention
Systems to use common sense and feedback to interact with food and recipe
Annotation, location awareness support for commercial delivery, (8 demos)
Location aware system for interactive campus, grocery store, etc.
Harvested power for sensing and control

Care from others or care for ourselves?

- WOW ... you are an intimidating: for your abilities!
 - We want things to feel good about ourselves and impress others
 - What does it take to understand us enough to help?
 - LEARN, TRY, DO
-

- R & D
 - Voice robot at VA
 - TrackPoint..
 - OS/2 Special needs package
 - E-bed
 - Pedaling car
 - Voting audio improvements
 - Ballots for cognitive disabilities
 - Singing prosthetic
 - Autism teaching system

- For individuals
 - Tom Whitakers prosthetic
 - Car for 4 foot woman
 - house adaptations



Finger Control Everywhere!

In Keyboard Pointing

Remote Controls

Air Traffic Control

Surgical Instruments

Haptic pointer

Sightless Pointing

Prosthetics pointing

Steering

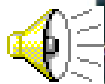
Two Handed

Industrial Controllers

Arcade Games

In Mouse Scrolled

TrackPoint

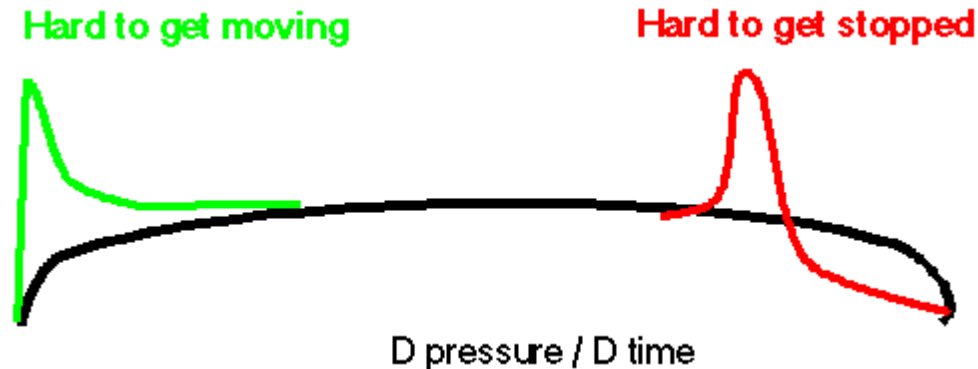


Trackpoint: Knee bars and race cars

- Knee bar better than mouse for novices ? Mouse takes 1.7 seconds to grab
- Joysticks have always had over-shoot problems
people want to drive a Ferrari .. but they crash it
- TrackPoint ; 10 years of human factors work
ergonomic, ambidextrous device
- Matching human visual and motor abilities

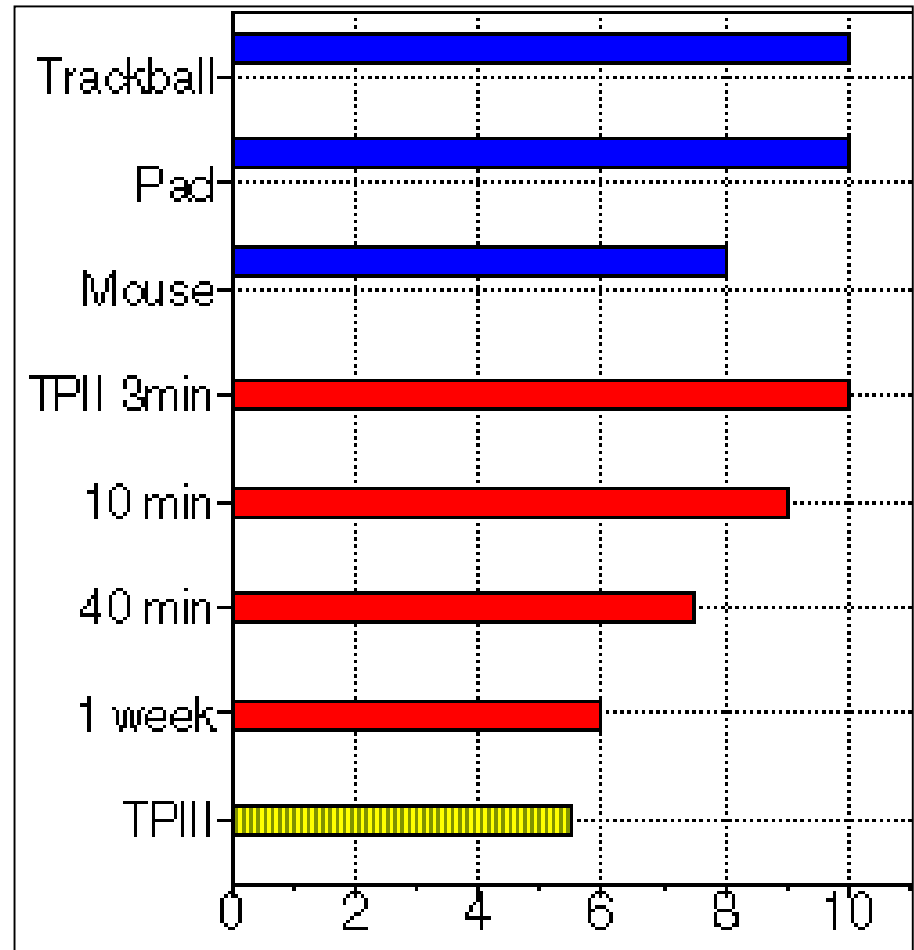
TrackPointIII

- Grippy Top
 - Consistent grippiness
- Drag Buttons
 - Aids to fine pixel manipulation
 - Aid to people with Special needs
- Negative Inertia
 - more precise
 - faster getting to object



● Towards a Behavioral Motor Match

- Placement
- Eye Tracking
- Wiggly Fingers
- Going Fast
- Movement Feedback
- Gripiness
- Mouse Lockout
- One handed use
 - Locking buttons
 - 3D TrackPoint



Select and Type

• Where We Use Computers



• Wishes from Eye Gestures

- Closed: going to sleep
- Open: no alarm
- Blinks: doesn't like something
- Wink: selection
- Stare: interest
- Gaze: thinking



Sleep With Your Computer?

MIT Researcher Computerizes Life

This bed, invented by an MIT scientist, has many high-tech features. (ABCNEWS.com)

April 10 — Imagine a bed that gently wakes you up at the crack of dawn and reminds you of your upcoming appointments.

- Activities to interact with people with dementia

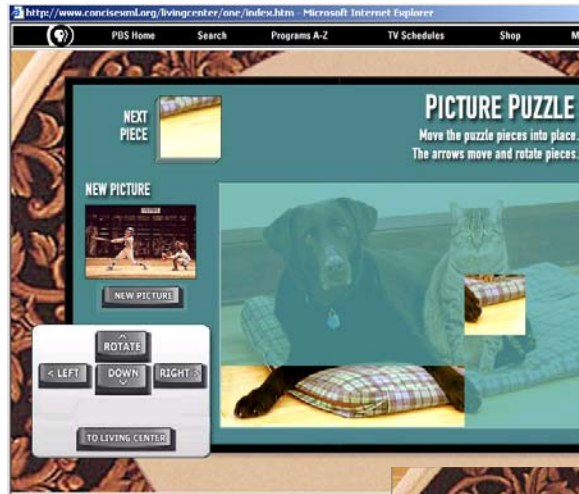
- Public Television Network :

Living Center interactive website: <http://www.pbs.org/theforgetting>



ALZ: Productively Challenged, Critically sophisticate

- Room
- Places
- Puzzle
- Arranging flowers
- Art
- Radio
- Catalog



VTP improving voting process

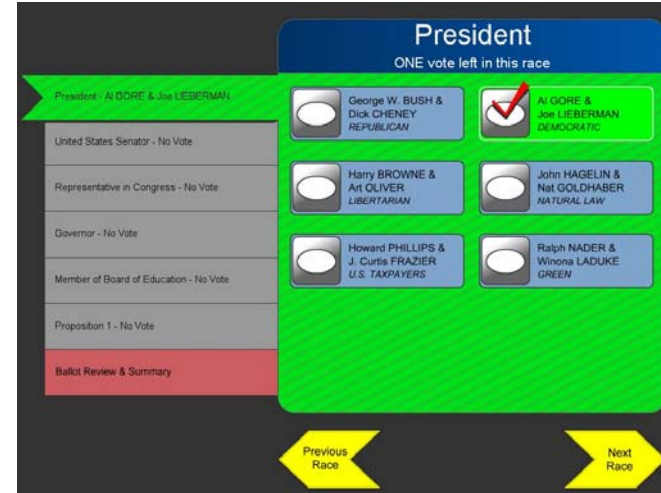
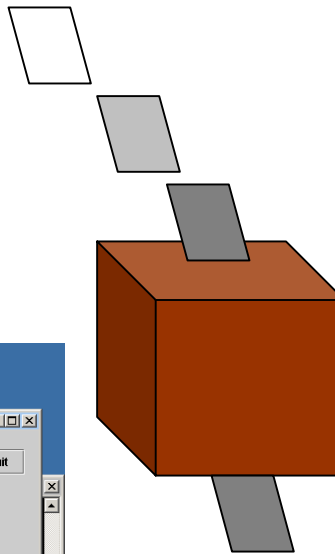
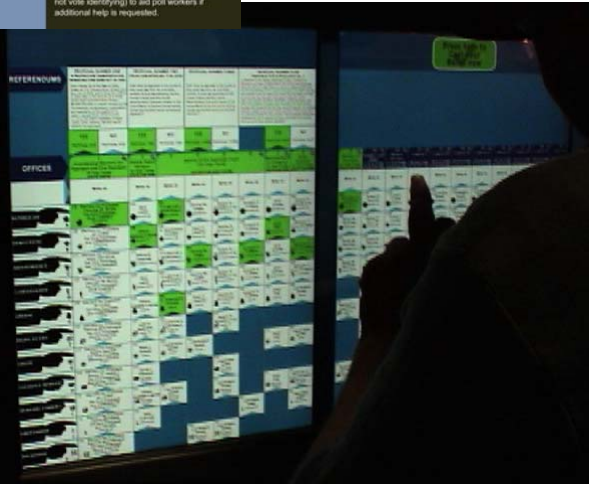
Profs: Ted Selker, Mike Alvarez, Ron Rivest, Charles Stewart, Steve Ansolabehere, Steve Graves, Dan Jackson, Michael Siegel, Jonathon Katz, ++

Soyini Liburd, Ben Adida, Joy Marie Forsythe, Bil Lewis, Sarah Sled, Jon Goler, Sharon Cohen, Betsy Sinclair, Gary Sivek, ++

LEVI Audio Ballot

The LEVI Audio Ballot seeks to explore issues in creating an effective audio ballot design for visually impaired voters.

You will notice on screen text and a controller. This test is designed primarily as a tool for sighted users to follow along. One possibility is to use this information (which is not vote identifying) to aid poll workers if additional help is requested.



```

C:\>java -cp "C:\Voting" VoteRecognizator
Starting up
Socket listening on Port 8002

C:\>java -cp "C:\Voting" VoteByClickingInCandidateBoxes
Starting up
Socket listening on Port 8002
Vote Recorded ---gore
Vote Recorded ---gore
Vote Recorded ---gore
Vote Recorded ---gore
Vote Recorded ---Bush
Vote Recorded ---gore
Vote Recorded ---Bush

C:\>java -cp "C:\Voting" voting.VoterApp
Write Vote

C:\>java -cp "C:\Voting" voting.VoterApp
Write Vote

C:\>java -cp "C:\Voting" voting.VoterApp
Write Vote

C:\>java -cp "C:\Voting" voting.VoterApp
Write Vote

C:\>java -cp "C:\Voting" voting.VoterApp
Write Vote

C:\>java -cp "C:\Voting" voting.VoterApp
Write Vote

C:\>java -cp "C:\Voting" voting.VoterApp
Write Vote
    
```



Reducing lost votes Universally

- Accessible voting places!
- People select at eye level
- Perceptual, Physical, Cognitive



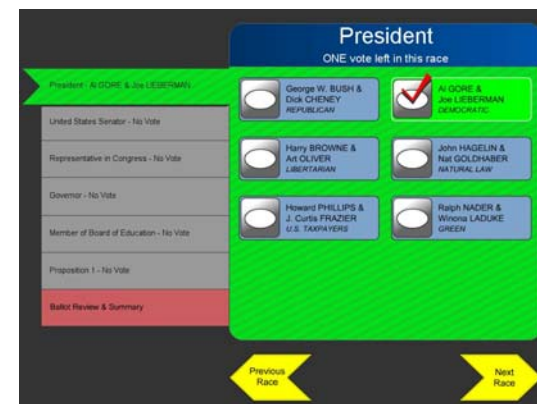
AAPD Thomas Paine award for voting 2006

Physically Accessible?



29/10/2004

Selection accessibility



- All voting technologies losing votes today
 - Typically 1 mistake in 30 selections
 - Easy to reduce by 50 to 80%
- Reading Disabilities 14%
 - Multiple times the errors of able bodied
- Short term memory problems 6.5%
- ...



Page 1 of 1

U.S. SENATOR
 You may vote for one (1) candidate in this race.

<input type="checkbox"/>	Russ LADZU	<input type="checkbox"/>	Murray RODHAM CLAYTON
<input type="checkbox"/>	Jeffrey E. GRAMMAS	<input type="checkbox"/>	Russ LADZU
<input type="checkbox"/>	Mark J. BUNNARD	<input type="checkbox"/>	James J. PRESSBRO
<input type="checkbox"/>	Murray RODHAM CLAYTON	<input type="checkbox"/>	John CLIFTON

SUPREME COURT JUSTICE
 You may vote for one (1) candidate in this race.

<input type="checkbox"/>	Francis J. MURPHY
<input type="checkbox"/>	Joseph M. SIKES
<input type="checkbox"/>	Stephen A. WHELAN
<input type="checkbox"/>	Joseph D. FORD
<input type="checkbox"/>	E. Jennifer COOPER
<input type="checkbox"/>	Paul V. GARRETT
<input type="checkbox"/>	Shawn A. DUFFALO
<input type="checkbox"/>	Joseph D. FORD

Next

Page 2 of 2

PRESIDENT OF THE U.S.
 James E. BARRER

U.S. SENATOR
 James J. PRESSBRO

SUPREME COURT JUSTICE
 Francis J. MURPHY
 Joseph M. SIKES
 Stephen A. WHELAN
 Joseph D. FORD
 E. Jennifer COOPER
 Paul V. GARRETT
 Shawn A. DUFFALO
 Joseph D. FORD

Back

Next

LEVI VS

Standard DRE

- 50% fewer errors
- Highly preferred

Page 1 of 1

U.S. SENATOR
 You may vote for one (1) candidate in this race.

<input type="checkbox"/>	Russ LADZU	<input type="checkbox"/>	Murray RODHAM CLAYTON
<input type="checkbox"/>	Jeffrey E. GRAMMAS	<input type="checkbox"/>	Russ LADZU
<input type="checkbox"/>	Mark J. BUNNARD	<input type="checkbox"/>	James J. PRESSBRO
<input type="checkbox"/>	Murray RODHAM CLAYTON	<input type="checkbox"/>	John CLIFTON

PREVIOUS PAGE

NEXT PAGE

Page 1 of 1

FAMILY COURT JUDGE
 You may vote for one (1) candidate in this race.

<input checked="" type="checkbox"/>	James H. BELLONZI
<input type="checkbox"/>	James H. BELLONZI

PREVIOUS PAGE

NEXT PAGE

Page 1 of 1

REVIEW AND SUBMIT BALLOT
 PLEASE SUBMIT BALLOT IF THE LIST BELOW IS YOUR COMPLETE LIST OF VOTES

<input type="checkbox"/>	U.S. SENATOR	NO VOTE
<input type="checkbox"/>	U.S. SENATOR	NO VOTE
<input type="checkbox"/>	SUPREME COURT JUSTICE	NO VOTE
<input type="checkbox"/>	SUPREME COURT JUSTICE	NO VOTE
<input type="checkbox"/>	U.S. REPRESENTATIVE	NO VOTE
<input type="checkbox"/>	U.S. REPRESENTATIVE	NO VOTE
<input type="checkbox"/>	STATE SENATOR	NO VOTE
<input type="checkbox"/>	STATE SENATOR	NO VOTE
<input type="checkbox"/>	ASSEMBLY MEMBER	NO VOTE
<input type="checkbox"/>	ASSEMBLY MEMBER	NO VOTE
<input type="checkbox"/>	FAMILY COURT JUDGE	NO VOTE
<input type="checkbox"/>	FAMILY COURT JUDGE	NO VOTE
<input type="checkbox"/>	DISTRICT ATTORNEY	NO VOTE
<input type="checkbox"/>	DISTRICT ATTORNEY	NO VOTE

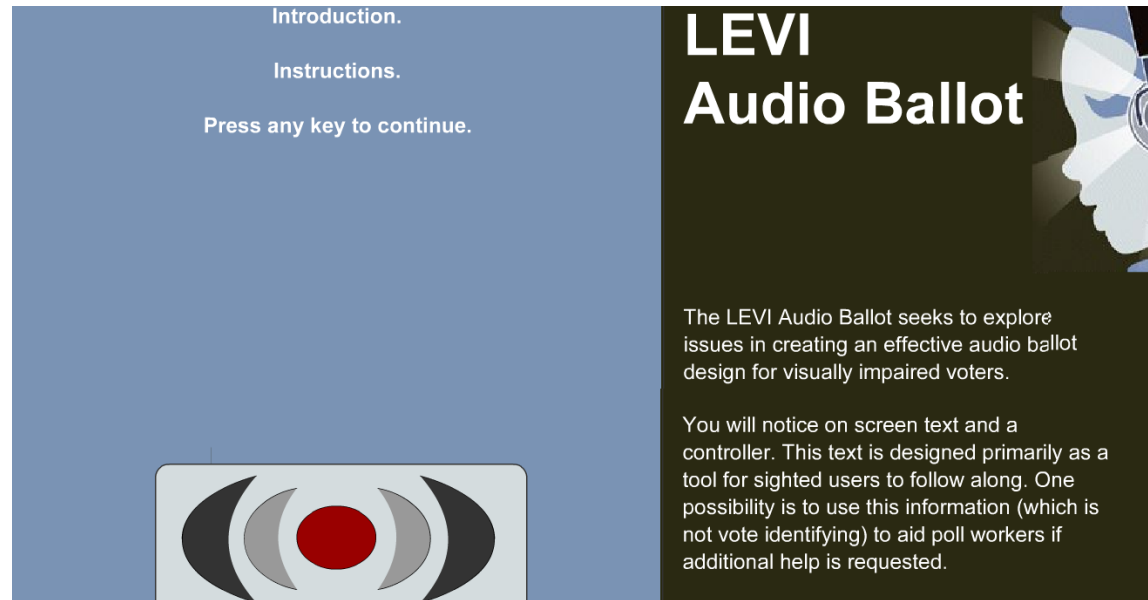
PREVIOUS PAGE

SUBMIT BALLOT

NEXT PAGE

Cognitive Science meet sightless voting shouldn't take 45 minutes

- Voices
- Voice changes
- Earcons
- Environmental sound
- 3D sound
- ...



Introduction.
Instructions.
Press any key to continue.

LEVI Audio Ballot

The LEVI Audio Ballot seeks to explore issues in creating an effective audio ballot design for visually impaired voters.

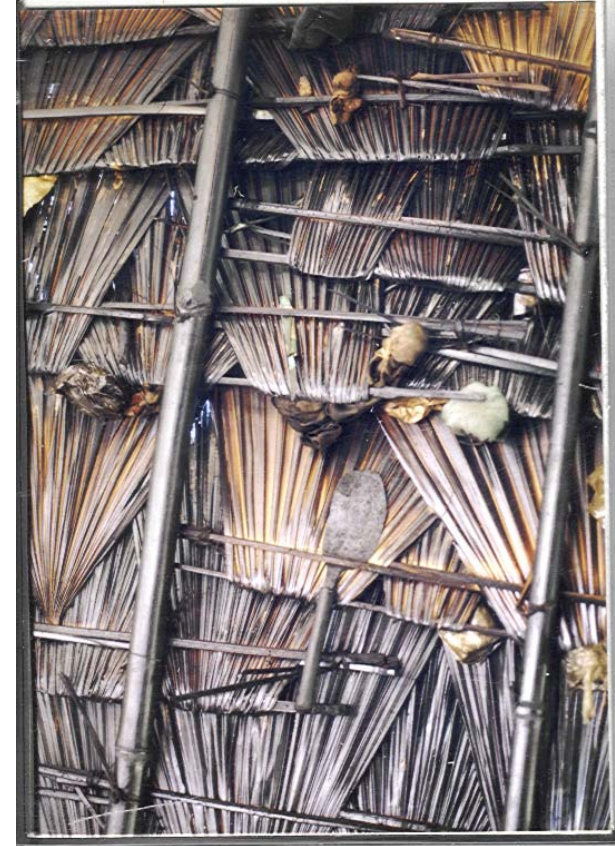
You will notice on screen text and a controller. This text is designed primarily as a tool for sighted users to follow along. One possibility is to use this information (which is not vote identifying) to aid poll workers if additional help is requested.

What does a designer do?



Necessity: mother of invention?

- Plan to create something?
- Limits to planning
 - Practice helps (chess)
- Empathy does it exist?
 - I *know* what the designer will do
 - I *know* what the engineer will need
 - I *know* how this will be used
- Assign a designer?
 - Domain, evaluation and technology matter



Camp Invent!

Ted Selker

Selker@media.mit.edu

- Invention
 - Things are made of other things by us
- Mechanical
 - Visible and understandable
- Electricity,
 - Invisible things can be understood
- Other things,
 - Taking apart, fixing and salvaging to learn
- Inventing
 - Defining problems,
 - Finding the things to realize them
 - modifying with what you find and learn



FREE THINKER TED SELKER HAS A SIMPLE PHILOSOPHY FOR INNOVATION: IT'S OK TO BEND THE RULES.

Invention: things are made from other things

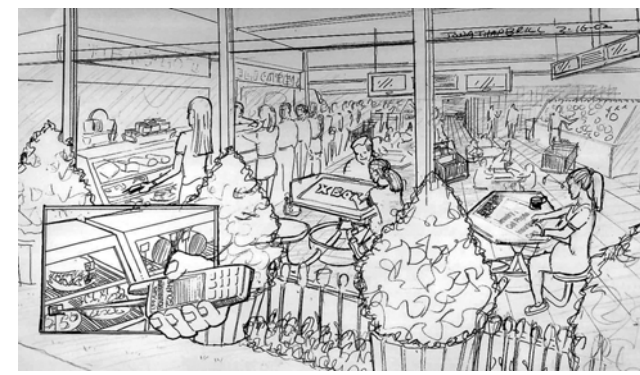
- Wizard of oz?
 - Imagine It exists
 - Make it a skit with props
 - Savor when the skit doesn't work
 - Gradually make the props more sophisticated
 - Even real products have props

- Problem: Mom's hands were burned
 - Open Fridge, drawers
 - Dial Phone
 - Care for and carry baby ...



Invention is a performance

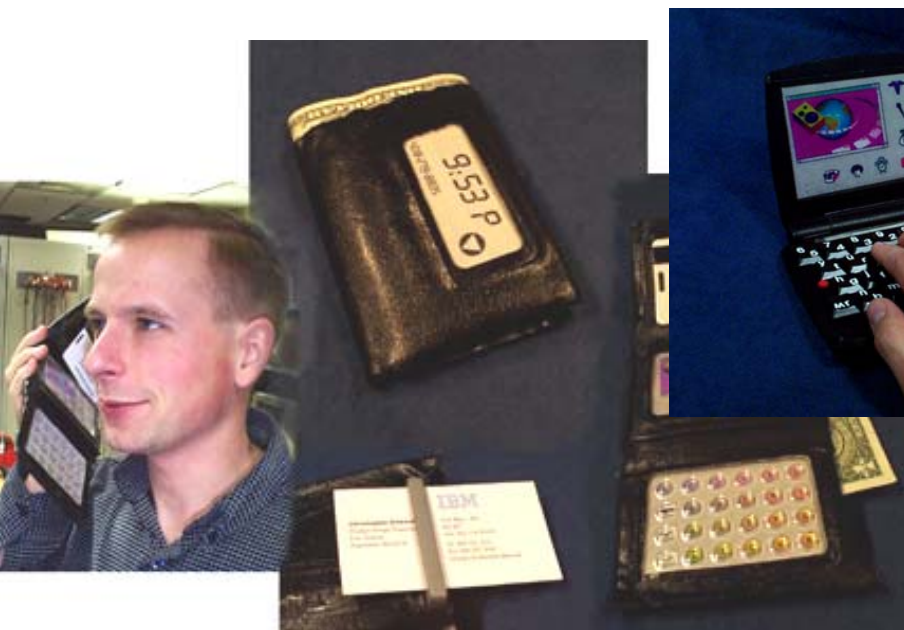
Personal credo



- Inventing is like an action movie
 - Grab for a branch, it brakes, land in the water and swim...
 - The way it doesn't moves you forward
- Audition Stories and roles
 - Think of many possible ways out
 - keep thinking about it
- All the world is a stage.
 - Slowly replace pantomime for real sets and actors
- Have things/ideas compete not people
- Pretend things are the way you want them
- Create it from anything
 - All tools are made of other tools
 - Prototype here and now

What do we want

- Congruence,
 - Personal comfort
 - Personal image
- Add things to use or carry?
- Reduce transcription



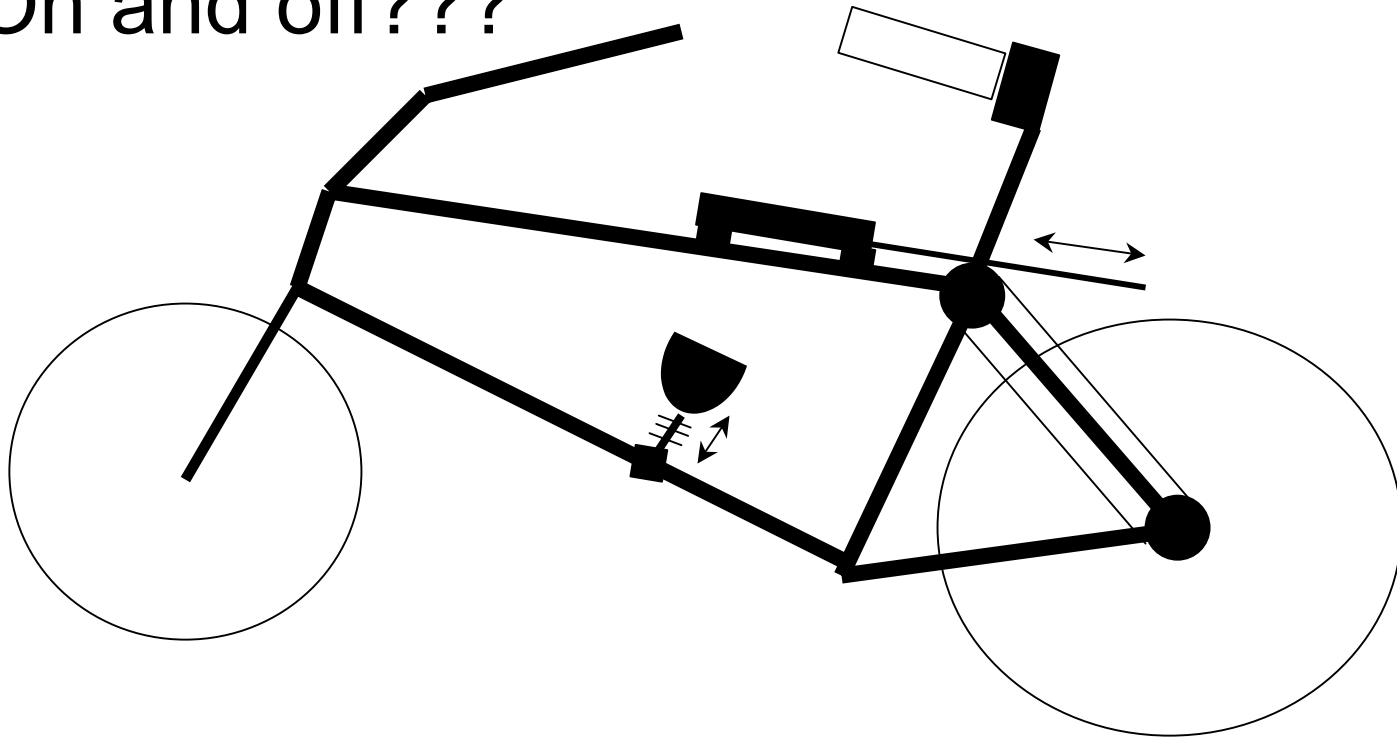
Wearable Technology not news

- Telemetry has been with us 40 year
 - Now cheap (\$35 temperature pill)
 - Enzymes on capacitor coming
- Telemedicine becoming common
 - 6 million web upgradeable pacemakers in use
- Hearing aids (three on plane)
- Patch drugs ubiquitous
- Tattoos are in (public key code ...)



Bike for amputees... to use back and thighs?

- Stump socket and upper chest holder
- Sliding seat power
- On and off???



• Future Feel of Tools

• Complete freedom

