

# Physical Prototyping

February 15 & 22, 2018

# Hacking

Culture | Understanding how things work

Being rough and ready

Hacker:  
[a] person who  
delights in having an  
intimate  
understanding of the  
internal workings of a  
system, computers  
and computer  
networks in particular



# Homebrew: Several very high- profile Silicon Valley hackers and IT entrepreneurs emerged from the DIY computer movement of the mid 1970's.

**NEWSLETTER**

**Homebrew Computer Club**

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Typesetting, graphics and editorial services donated by Laurel Publications, 17235 Laurel Rd., Los Gatos, CA 95030 (408) 353-3609

RANDOM DATA  
*By Robert Reiling*

Computer clubs continue to form around the country...E. Brooner would like to have material to help him get started with the "Flathead Computer Society" in the Kalispell area. His Address is P.O. Box 236, Lakeside, Montana 59922.

Did you see the SOL terminal demonstrated by Bob Marsh at the Sept. 1st meeting? An excellent design that will interest hobbyists and commercial users alike. It's available from Processor Technology, 6200 Hollis St., Emeryville, CA 94608. Write them for prices and specifications.

The OSI Systems Journal has been sent to all OSI customers (free—at least for the time being). It's a bimonthly magazine with plans to go monthly in the future. There are 28 pages in the first issue (August 1976, Vol. 1, No. 1) with a hardware feature covering the OSI 440 Video Graphics System and software, features concerning Tiny BASIC for the 6800 and a Graphics Editor for the 6502. It also includes OSI product and software catalog data. The BASIC is, of course, the 2K Tiny BASIC developed by Tom Pittman. Many of you have met Tom at the Homebrew computer Club meetings. The OSI Systems Journal is a good way to learn more about the OSI computer hardware and software along with helpful user information. The contact address is: The OSI Systems Journal, P.O. Box 134, Hiram, Ohio 44124.

KIM-1 users now have a newsletter. Eric Rehnke is producing the newsletter every 5-8 weeks, MOS Technology, Inc. helped get it started by sending copies to all known KIM owners. The user group, however, is independent of MOS Technology, Inc. The newsletter is devoted to KIM-1 support. Subscriptions are \$5.00 for the next six issues. Contact "KIM-1 User Notes," c/o Eric C. Rehnke, Apt. 207, 7656 Broadway Rd., Parma, Ohio 44134.

The BAMUG club has a new contact address. It is BAMUG, c/o Timothy O'Hare, 1211 Santa Clara Ave., Alameda, CA 94501. Write Timothy for club information. I suggest you include a stamped, self-addressed envelope.

Beware of board snatchers! Glenn Ewing reports 11 boards were taken out of his IMSAI computer. The boards are: MPU, 4 RAM-4's, SIO-2, P10-4, PIC-8, PROM-4, IFM and FIB. Glenn suggests you consider providing good security for your computer and associated equipment. In his case the computer was in a locked office which was burglarized. In the event you have information on the above boards, write Lt. Glenn Ewing, Code 62EI, Naval Post Graduate School, Monterey, CA 93940.

For family and friends of people who always wanted to know about computers, but didn't want to ask them, four easy-going classes are available starting Oct. 19th on Tuesdays from 7 to 9 p.m. You can learn how computers work and what they can and can't do. You will also have some of the jargon deciphered, see what you can do with a computer, play some games and learn to program. The cost is \$25. Contact the Community Computer Center, 1919 Menlo Ave., Menlo Park, CA 94025, phone (415) 325-4444.

A call for papers in personal computing has been issued by the 1977 National Computer Conference. The conference is scheduled for June 13-16, 1977. I have a few copies of the guidelines if you would like to submit a paper.

The First West Coast Computer Faire will be held April 16 and 17, 1977 at the San Francisco Civic Auditorium. This faire is shaping up rapidly. If you would like to lead a conference or participate in a conference session, please contact me. More information about the Faire is in the accompanying article.□

**THE FIRST WEST COAST COMPUTER FAIRE**  
*A Call For Papers And Participation*

The San Francisco Bay Area is finally going to have a major conference and exhibition exclusively concerned with personal and home computing—The First West Coast Computer Faire. And, it promises to be a massive one! It will take place in the largest convention facility in Northern California: The Civic Auditorium in San Francisco. It will be a two-and-a-half day affair, starting on Friday evening and running through Sunday evening, April 15-17.

It is being sponsored by a number of local and regional hobbyist clubs, educational organizations and professional groups. These include:

- The two largest amateur computer organizations in the United States—the Homebrew Computer Club and the Southern California Computer Society
- Both of the Bay Area chapters of the Association Of Computing Machinery—the San Francisco Chapter and the Golden Gate Chapter
- Stanford University's Electrical Engineering Department

I



*ifixit*

HOW CAN WE  
HELP OUR STUDENTS  
MAKE SENSE +  
FIND OPPORTUNITY  
IN THE STUFF  
THAT SURROUNDS  
US ALL?



Electronics to Hack (DC powered only!)



Photo from articulate.com



Photo from Ambidextrous Mag



Photo from photobucket: pacapo



Photo from Bunnie Studios

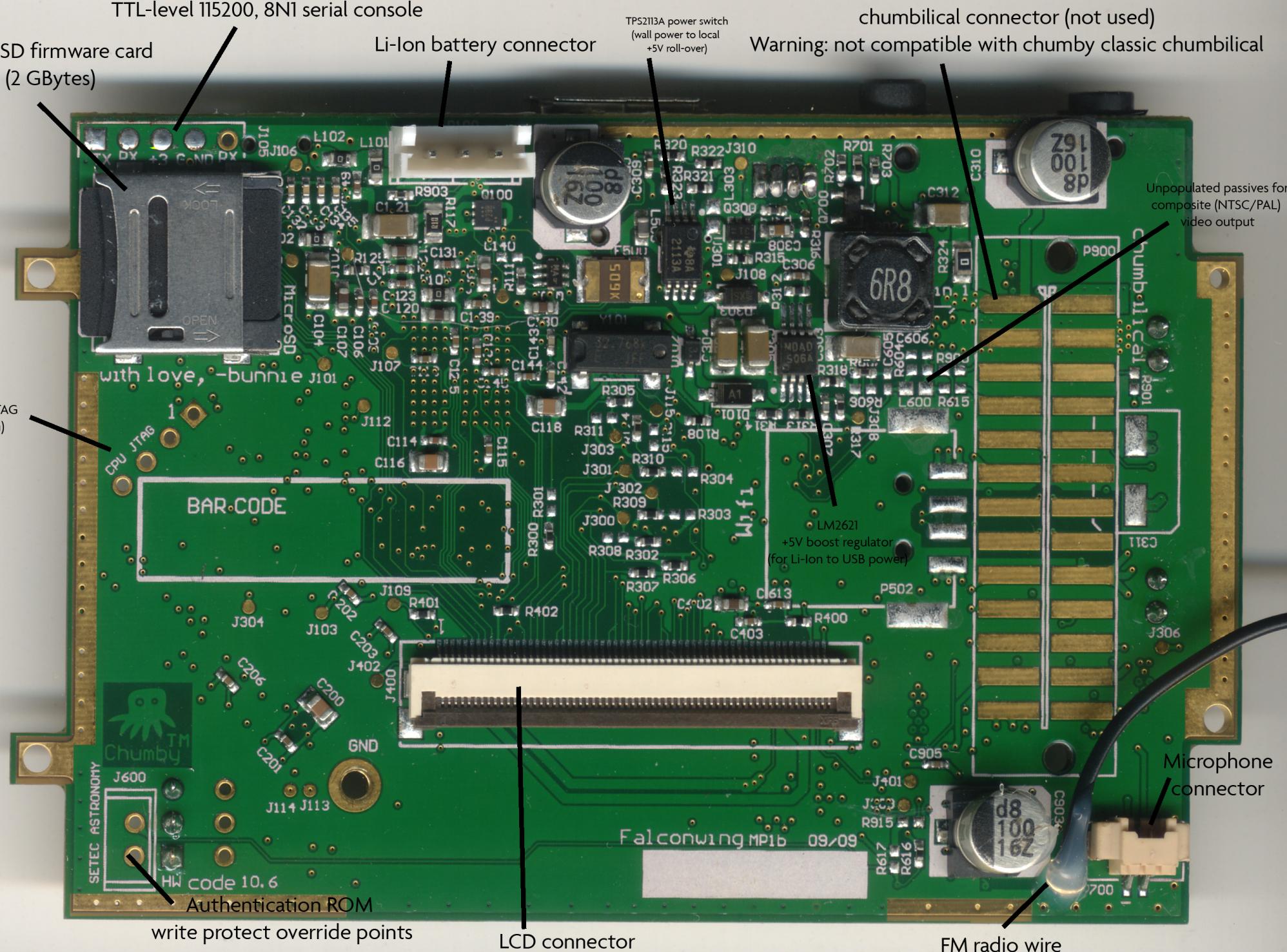


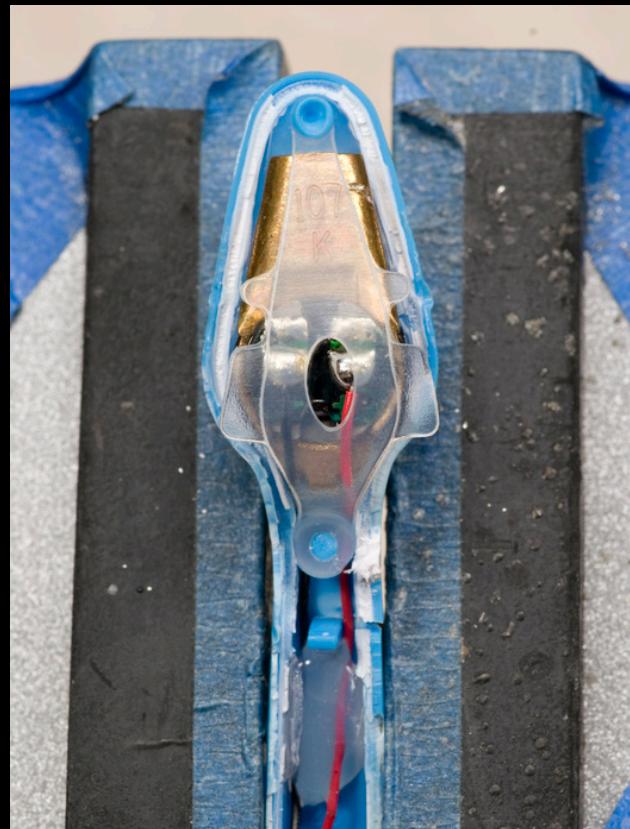
Photo from Bunnie Studios



**FM Receiver On-A-Chip**

**11.95**

TDA7000. Combines RF, mixer, IF and demodulator stages in one monolithic IC! Mute circuit reduces spurious reception. Frequency-locked-loop system with non critical 70 KHz IF. With data. 276-1304 .11.95



An  
inflatable  
corset



# Demonstrations

Tape

Glue

Solder

Wiring

Crimping

Cutting

# Prototyping: Getting the Design Right vs. Getting the Right Design

## Prototypes:

- Describe
- Specify
- Refine
- Depict
- Answer
- Test
- Resolve



*image from NYT, <http://www.nytimes.com/2007/06/03/nyregion/nyregionspecial2/03artswe.html>*



Figure 149: Prototyping as Iterative Incremental Refinement

In engineering, prototyping is like a spiral closing in along a single trajectory. Each prototype is a refinement of the previous one, and takes you one step closer to the final product. Iterative prototyping is a form of incremental refinement and validation, rather than a technique of exploration.

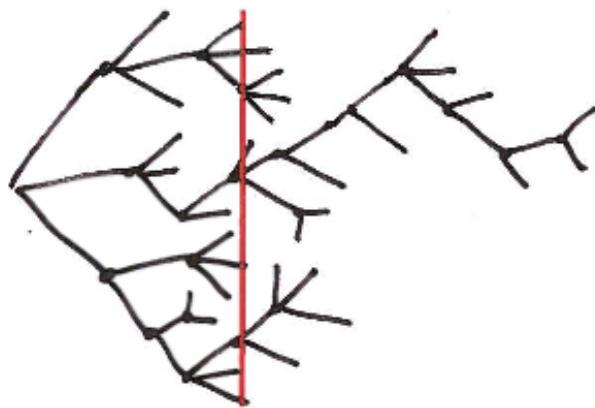
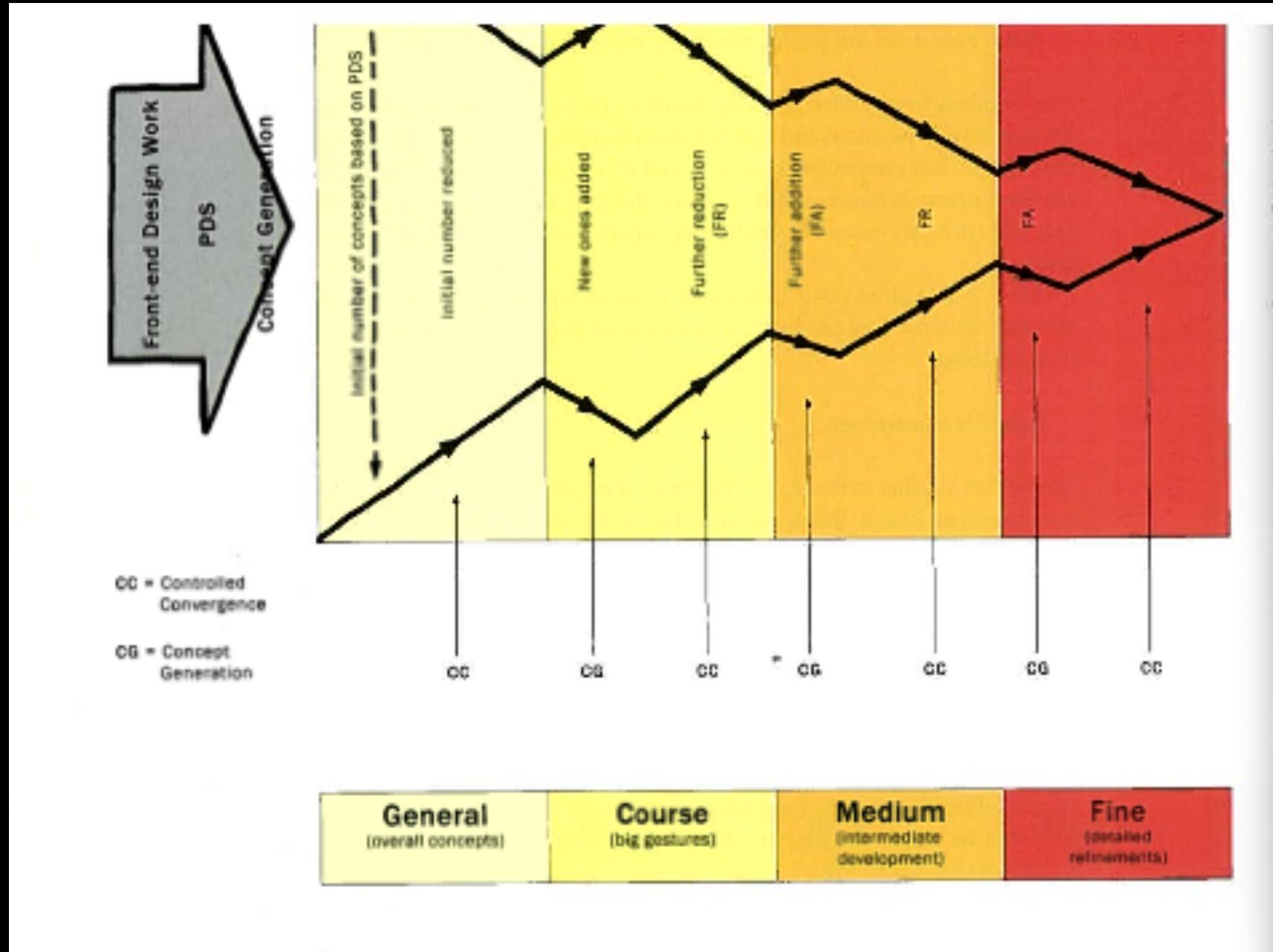


Figure 150: Design as Branching Exploration and Comparison

Design is about exploring and comparing the relative merits of alternatives. There is not just one path, and at any given time and for any given question, there may be numerous different alternatives being considered, only one of which will eventually find itself in the product.

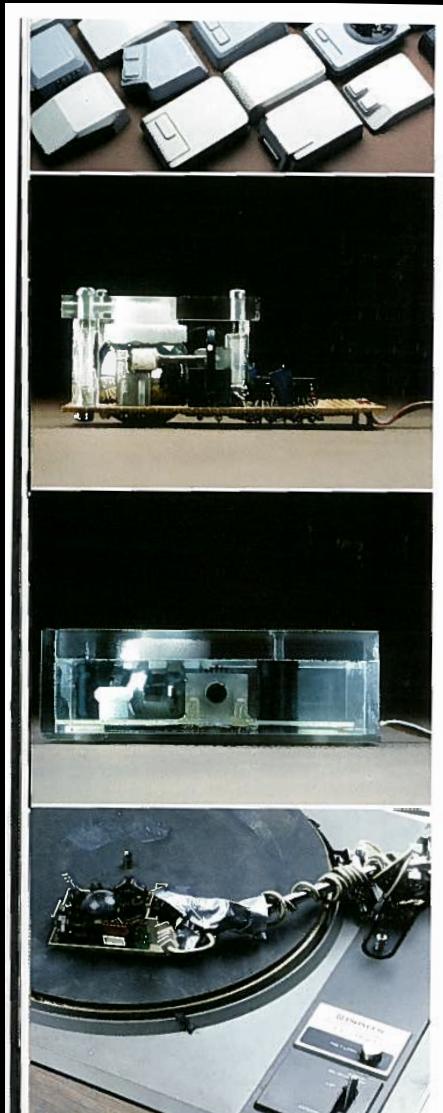
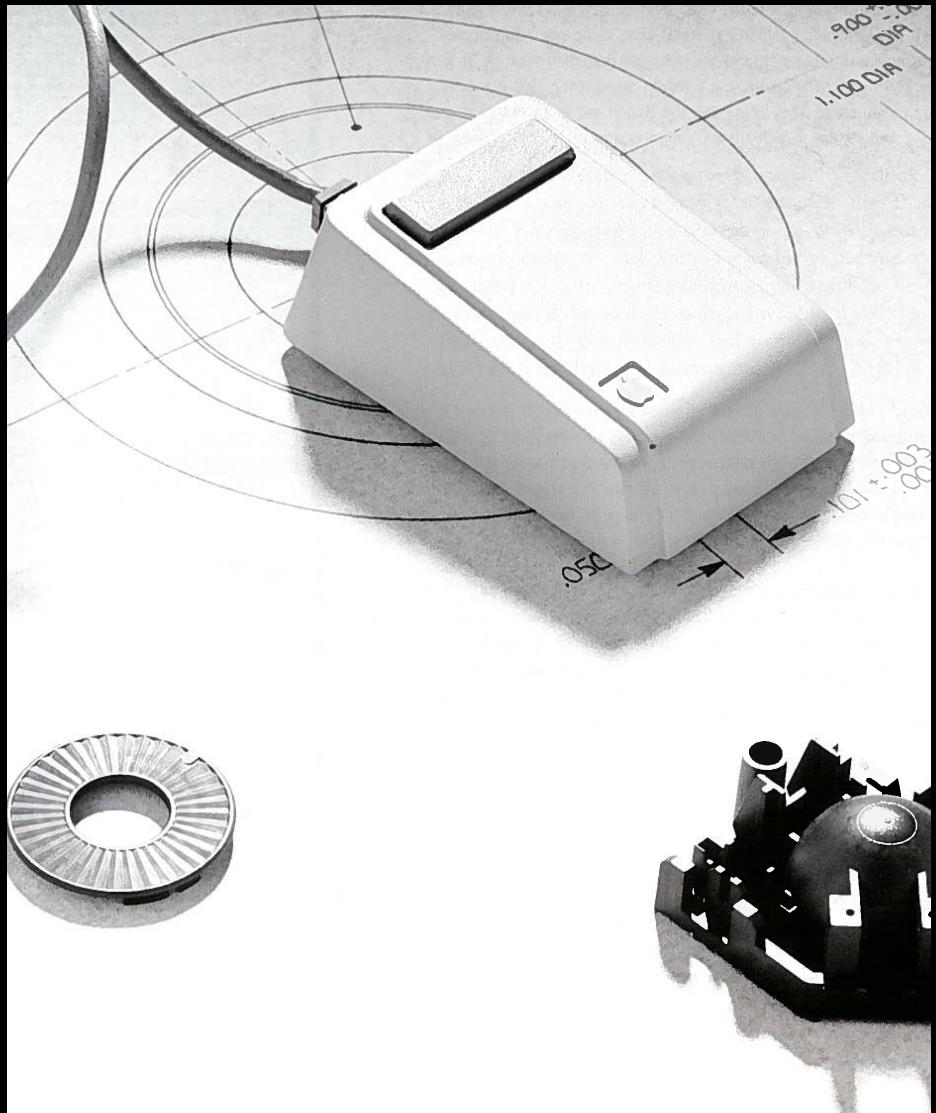
*images from Buxton, Sketching User Experiences*



*images from Buxton, Sketching User Experiences*

# Examples

Sketches, Prototypes, & How they are used

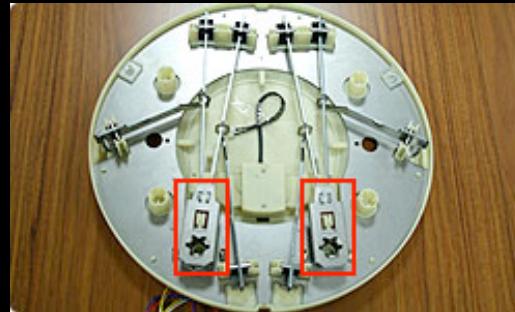


*image from Bill Moggridge, Designing Interactions (2006)*



*image from Bill Moggridge, Designing Interactions (2006)*

# Wii Fit





**1 Moby** – cordless dynamic speaker system.  
**2 Hand-Powered Toys** – interactive storyteller and a projector using hand-generated energy.  
**3 Game Board** – combining the traditional qualities of a game board with the dynamism of video games.  
**4 Creativity Mat** – electronic paper to write and draw on with a network link to friends.  
**5 Mumbo** – sound manipulator and music mixer.  
**6 Mimic World** – intuitive physical participation in a virtual experience.  
**7 Bike Games** – detachable toys for communication, navigation or tracking.



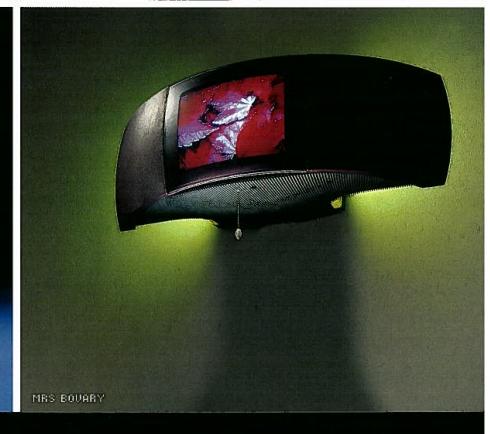
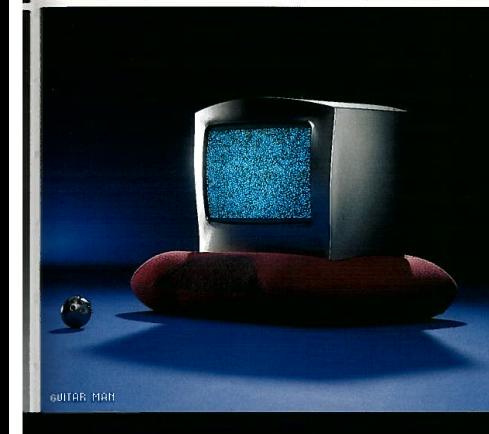
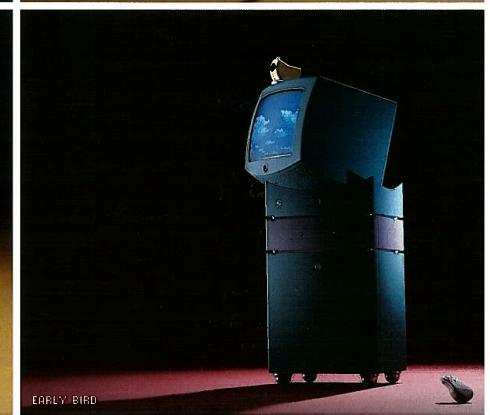
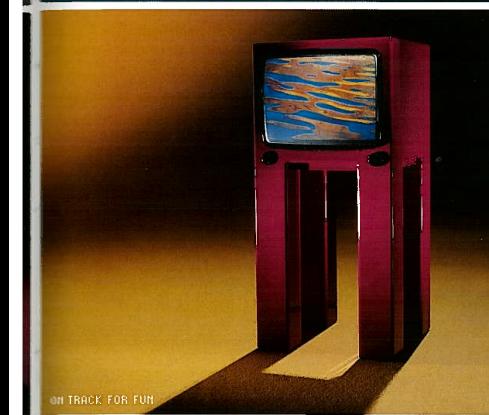
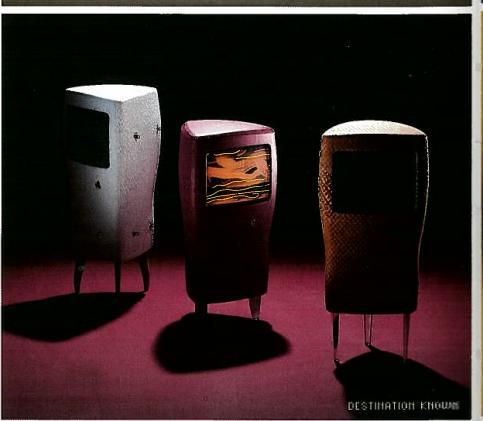
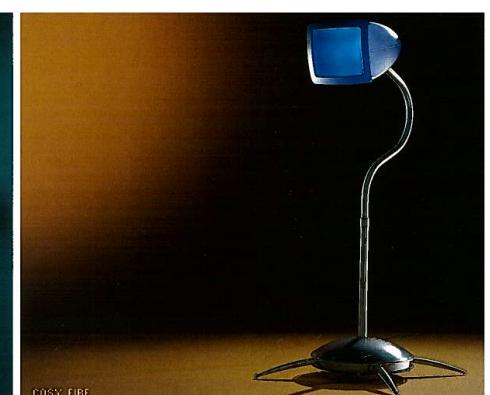
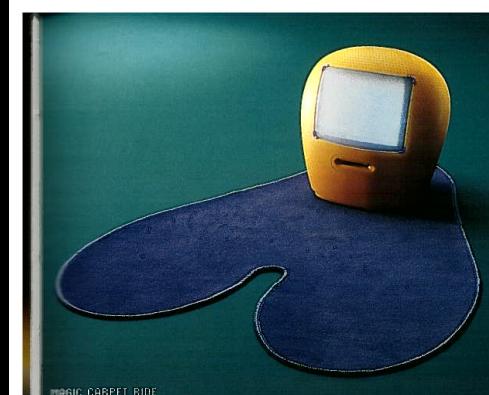
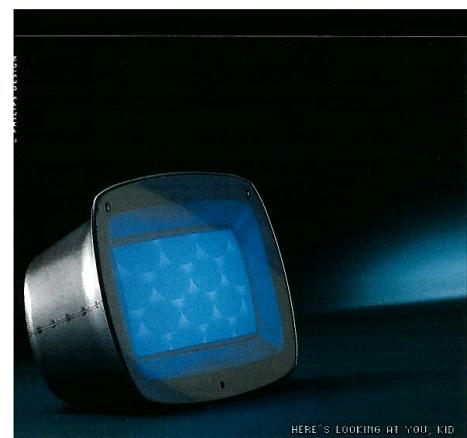
### the electronic playground



1996-1997 visions of the future, projects

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*image from Philips Design, Creating Value by Design*



*image from Philips Design, Creating Value by Design*



*image from Buxton, Sketching User Experience*

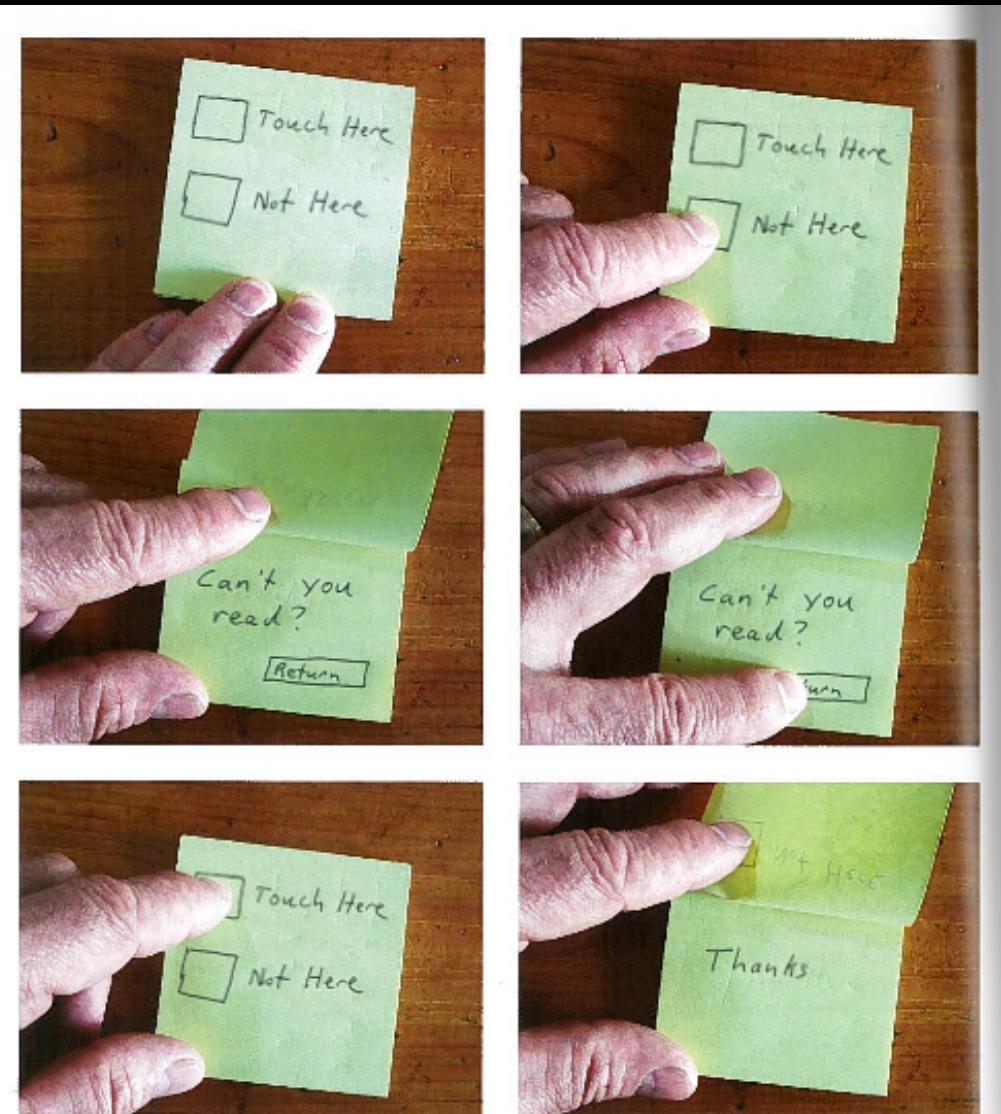
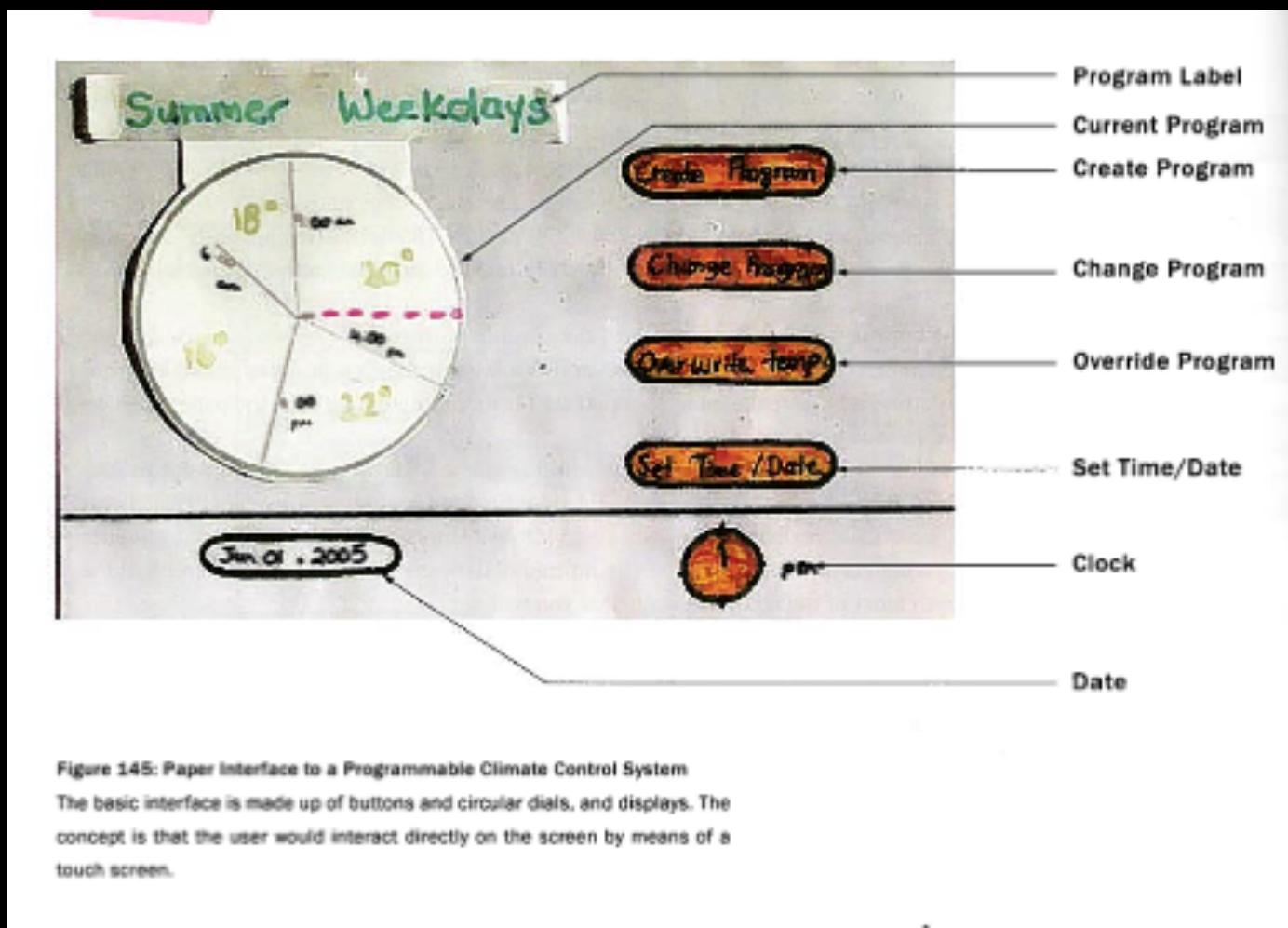


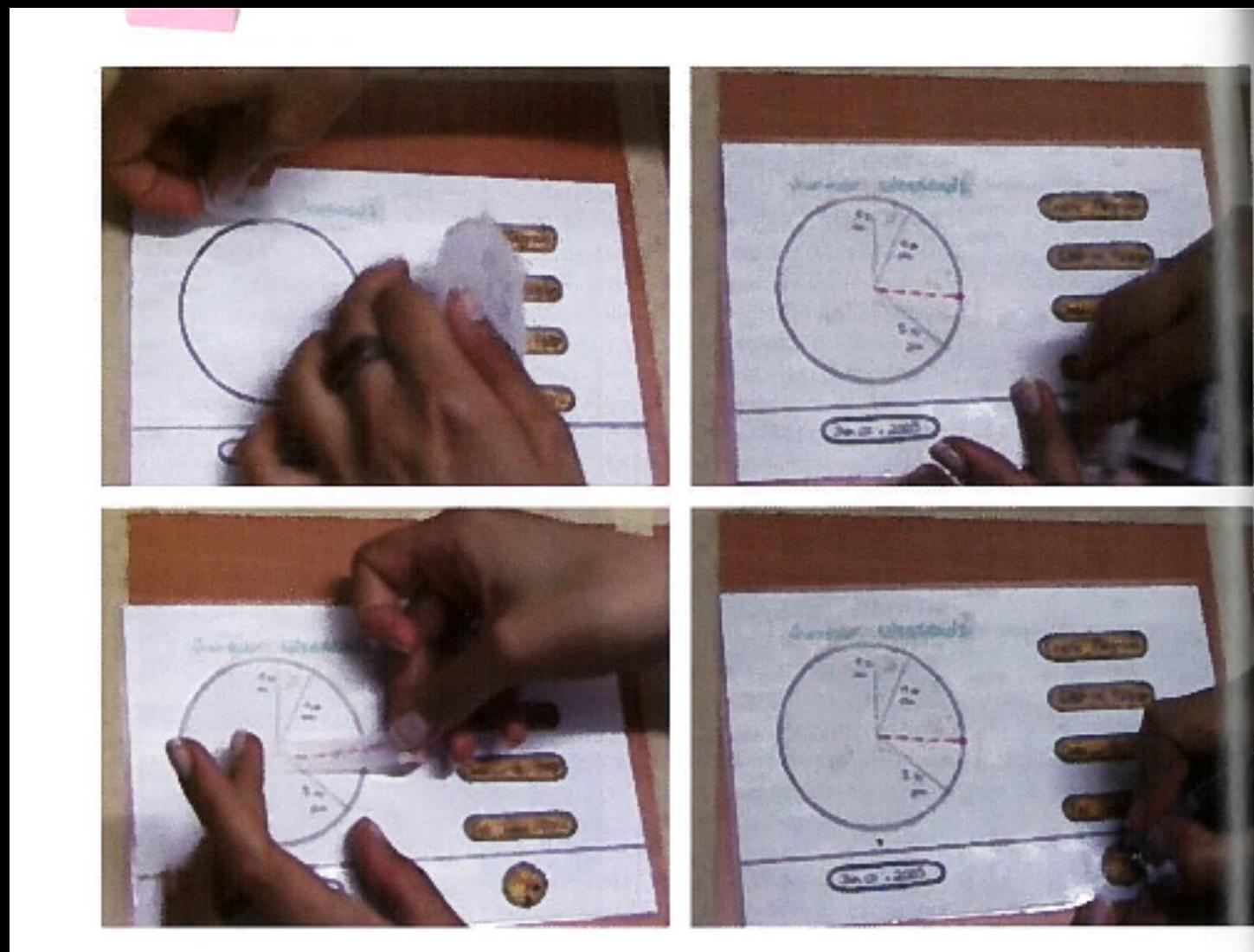
Figure 143: A Simple Finger Exercise

One can create and experience an interactive paper interface in two minutes with nothing more than Post-it notes and a pen. Push a button to go to a particular page. Push the wrong button and return to the first page.

*image from Buxton, Sketching User Experience*



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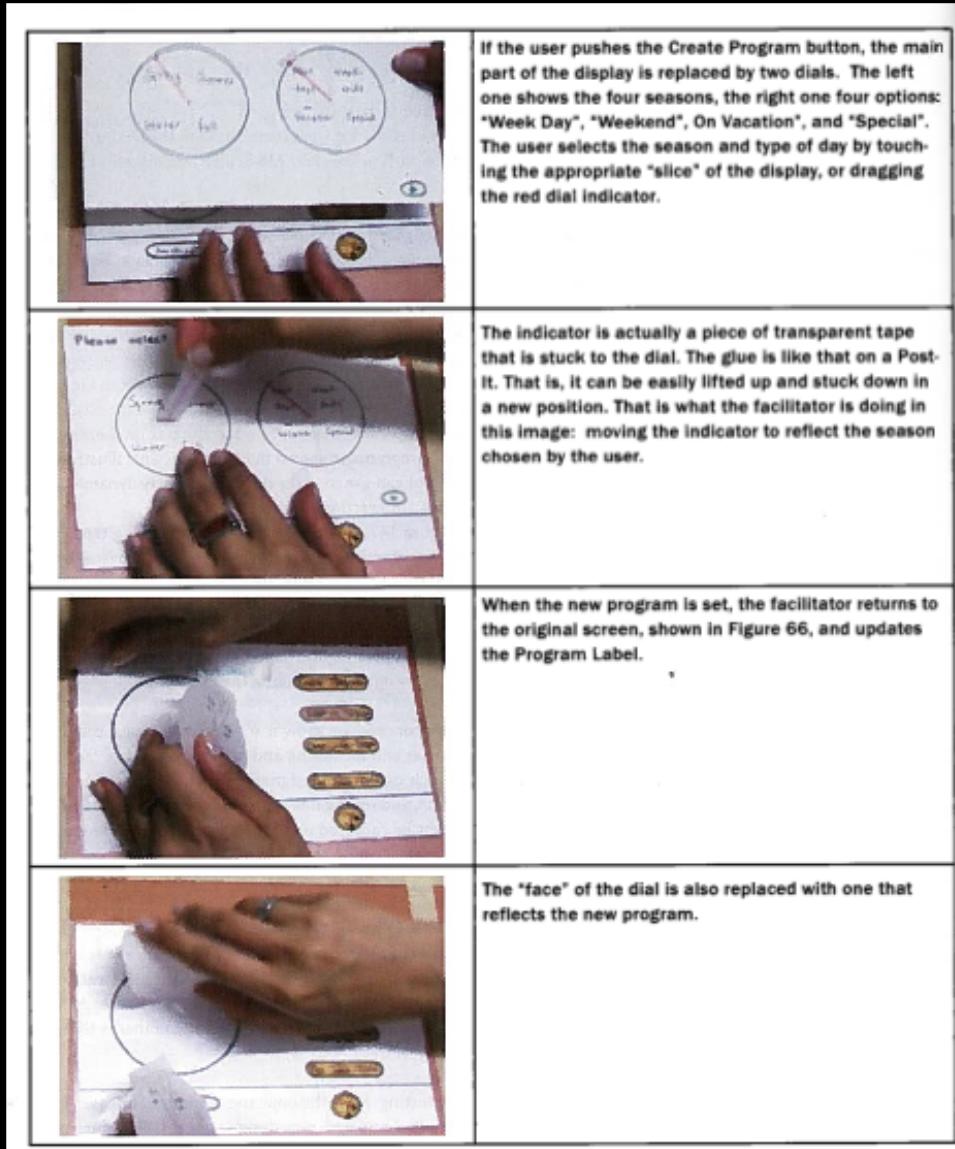
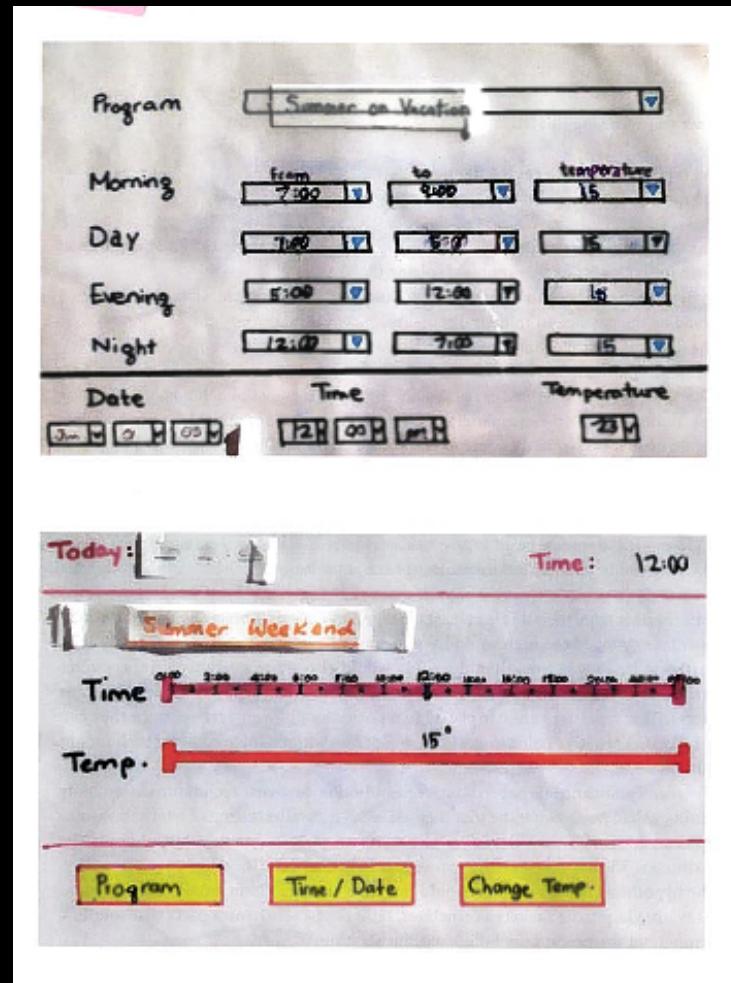
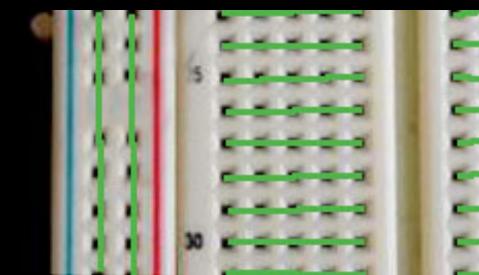
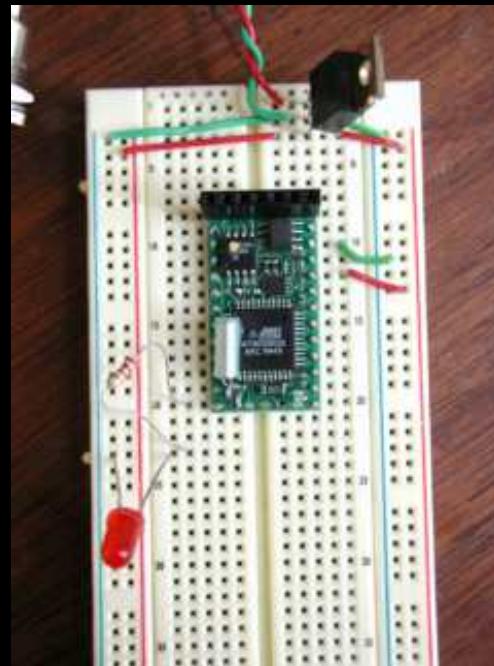
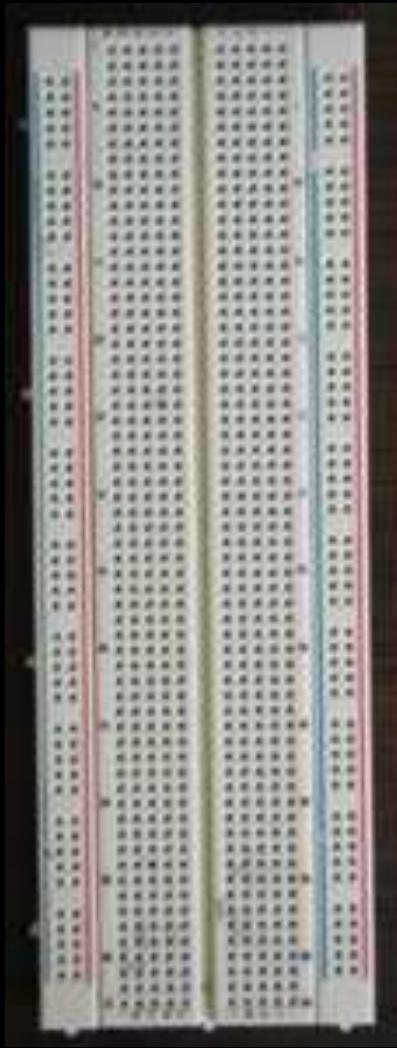


Figure 146: Creating a New Program



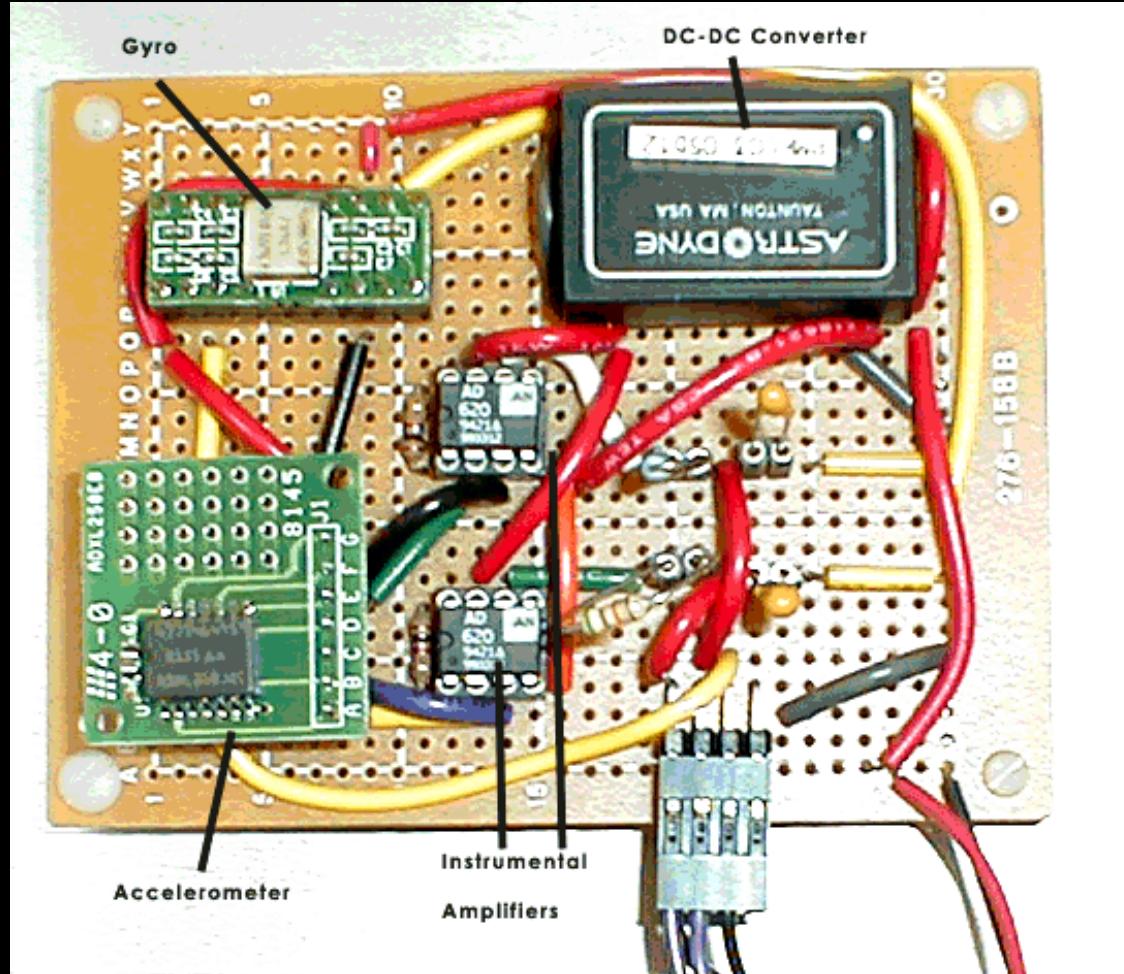
*image from Buxton, Sketching User Experience*

## Breadboarding:



*image from Tom Igoe, <http://www.tigoe.net/pcomp/code/understanding-electricity/breadboards>*

# Protoboard:



*image from <http://coecsl.ece.uiuc.edu/ge423/spring04/group9/images/>  
diagrams/protoboard2.gif*