Hacking & Prototyping

Press Play: Interactive Device Design | July 09, 2012

Homework Sharing

Discuss your schematics with your neighbor(s).

Re-design these parts for some other purpose.

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 infotech 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 bi-monthly 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 44234.

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 Broadview 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 Menalto 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 guidlines 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.□

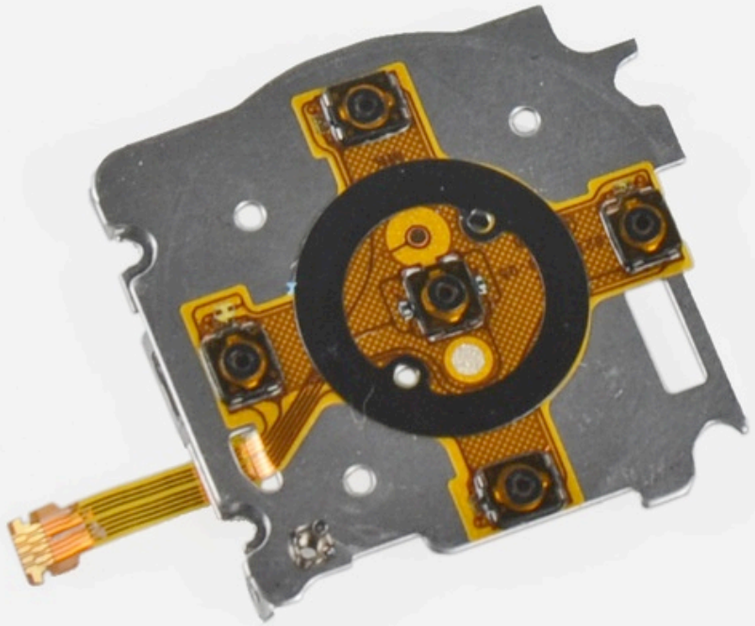
THE FIRST WEST COAST COMPUTER FAIRE

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



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Getting the Right Design

Image from NYT, http://www.nytimes.com/2007/06/03/nyregion/nyregionspecial2/03artswe.html

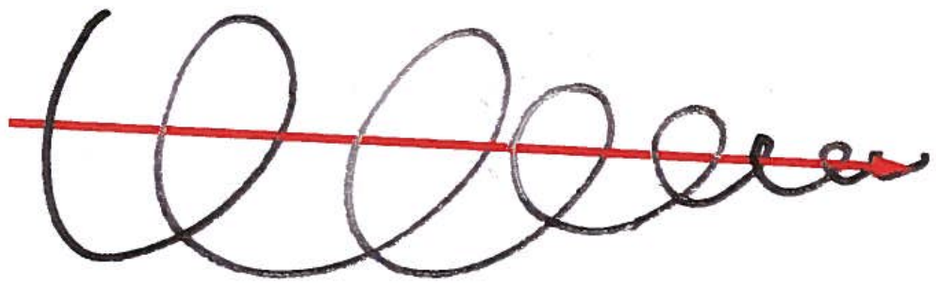


Figure 149: Prototyping as Iterative Incremental Refinement
In engineering, prototyping is like a spiral closing in along a single trajectory. Each prototype is a refinement of the previous one, and takes you one step closer to the final product. Iterative prototyping is a form of incremental refinement and validation, rather than a technique of exploration.

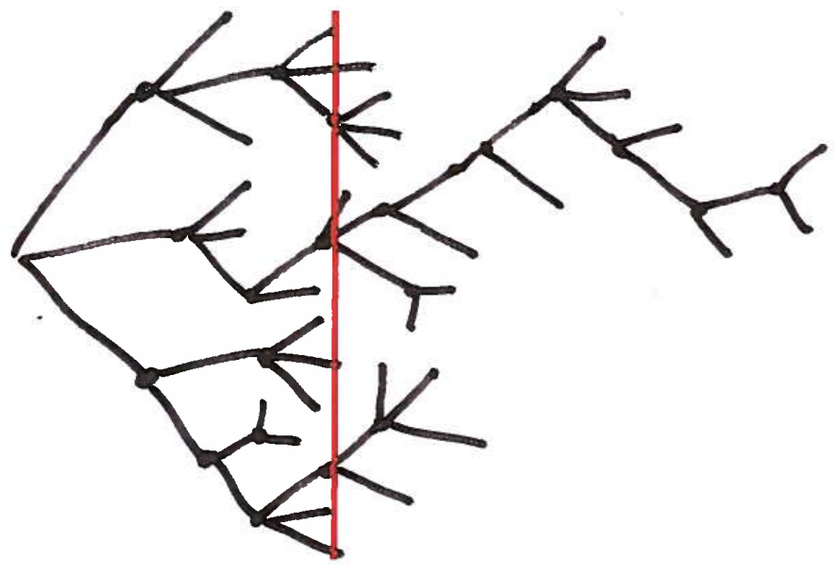


Figure 150: Design as Branching Exploration and Comparison
Design is about exploring and comparing the relative merits of alternatives. There is not just one path, and at any given time and for any given question, there may be numerous different alternatives being considered, only one of which will eventually find itself in the product.

Image from Buxton, Sketching User Experience

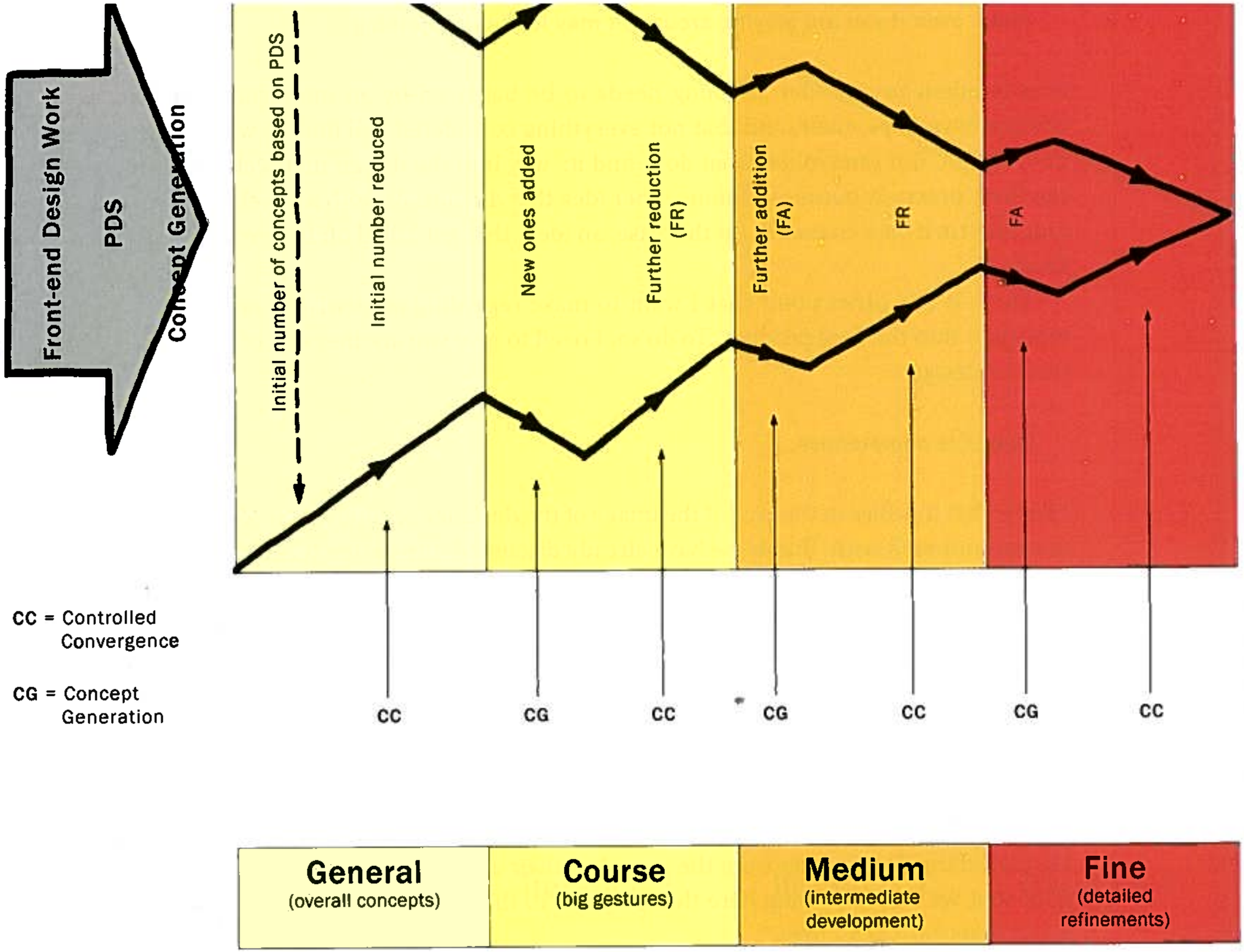


Image from Buxton, Sketching User Experience

Sketches vs. Prototypes

What's the Difference?

Sketches are:

- ☐ Quick
- ☐ Timely
- ☐ Inexpensive
- ☐ Disposable
- ☐ Plentiful
- ☐ Ambiguous
- ☐ For suggestion and exploration (vs. confirmation)

Prototypes:

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

Prototypes:

What is significant is not what media or tools were used to create them, but how they are used by a designer to explore or demonstrate some aspect of the future artifact.

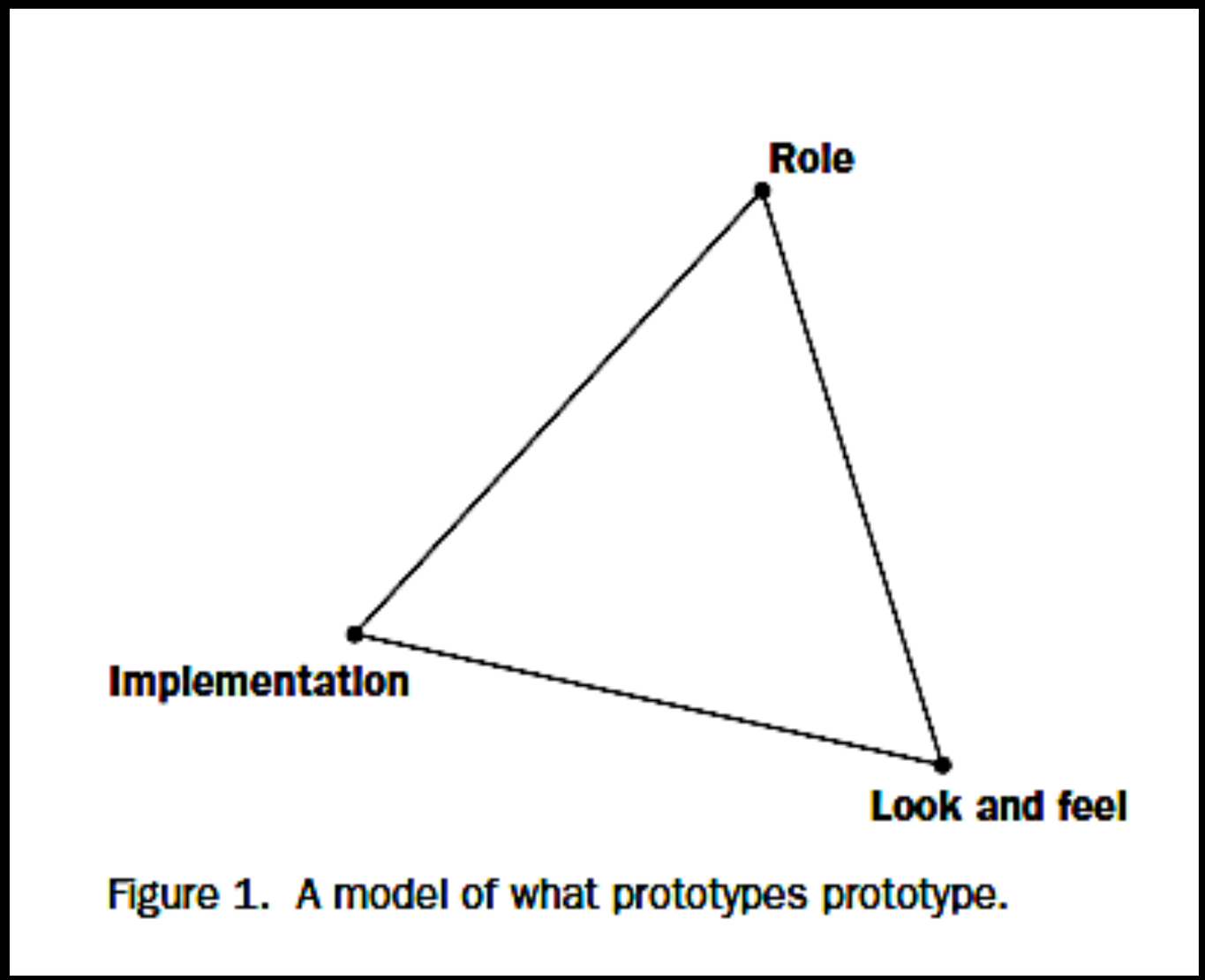
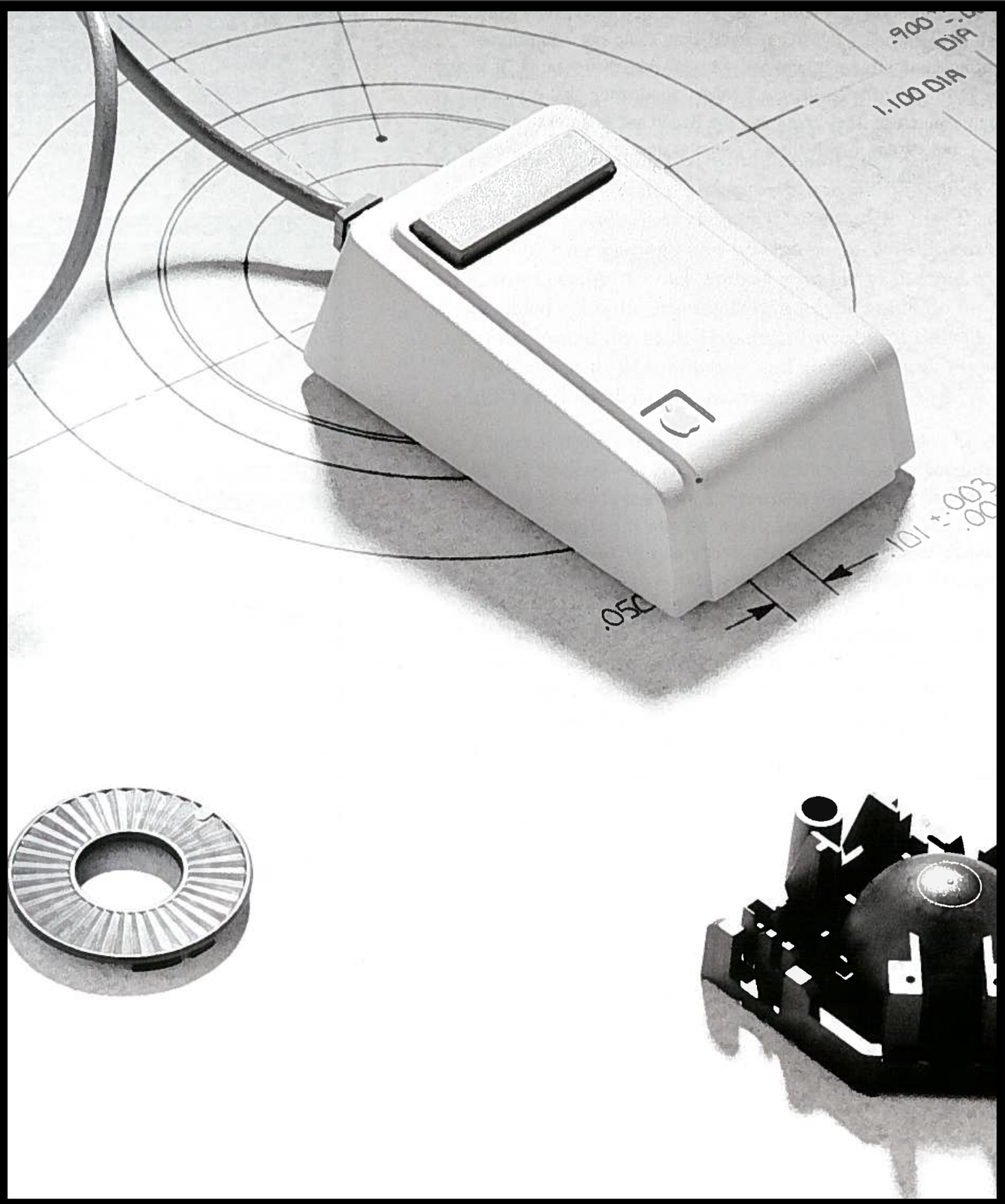


Figure 1. A model of what prototypes prototype.

Houde & Hill (1997) What do prototypes prototype? Handbook of Human-Computer Interactions, Elsevier.

Examples

Sketches, Prototypes, & How They Are Used



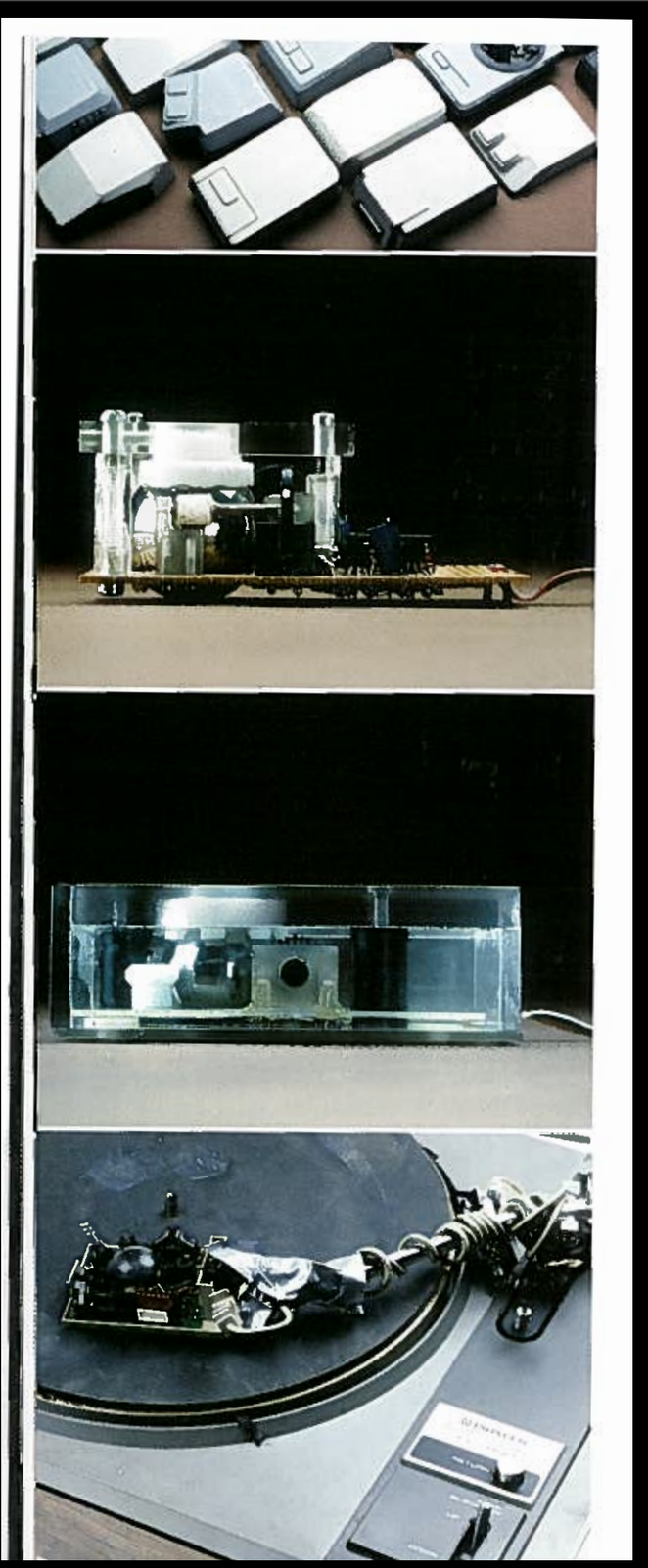
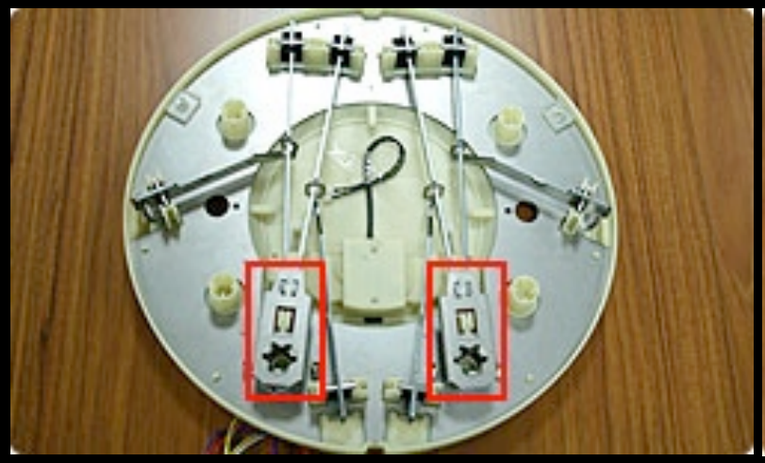


Image from Bill Moggridge, Designing Interactions (2006)

Image from Bill Moggridge, Designing Interactions (2006)

Wii Fit:

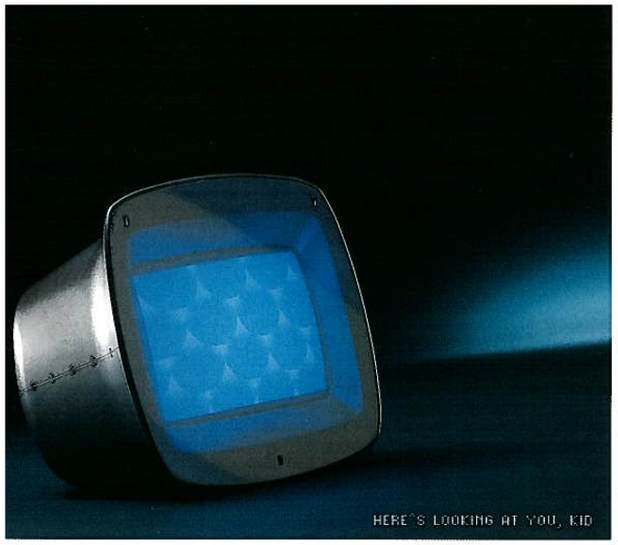


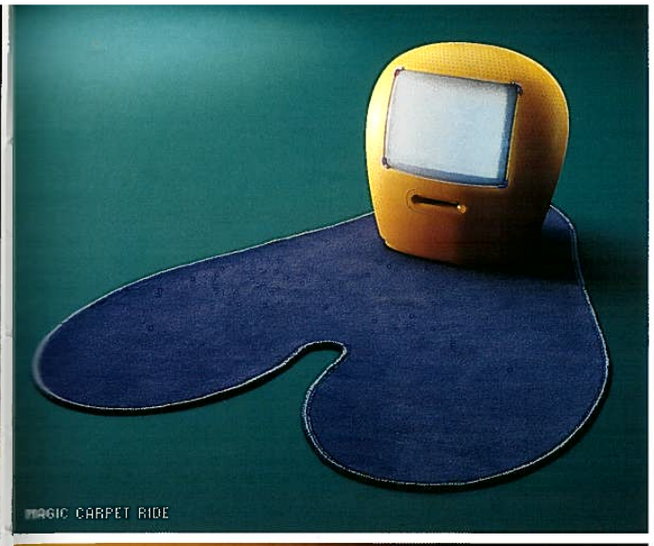


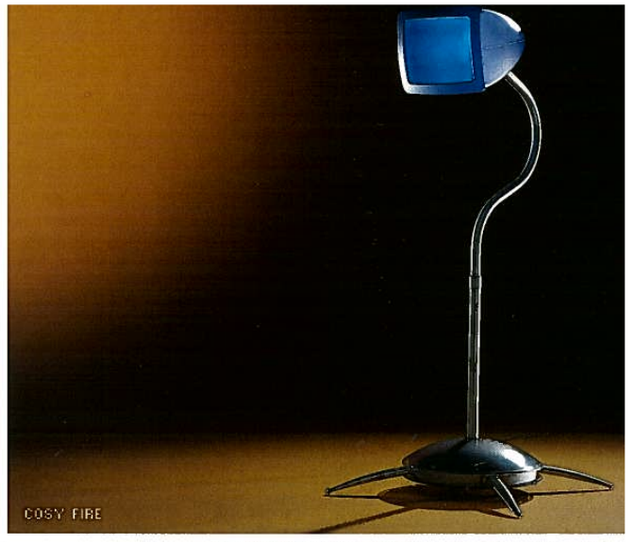

1 **Moby** – cordless dynamic speaker system.
2 **Hand-Powered Toys** – interactive storyteller and a projector using hand-generated energy.
3 **Game Board** – combining the traditional qualities of a game board with the dynamism of video games.
4 **Creativity Mat** – electronic paper to write and draw 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 **Biko Games** – detachable toys for communication, navigation or tracking.
8 **Kid Watch** – allows parents to monitor their children's safety wherever they are.
9 **Multimedia Tools** – a camera, a touch-screen display, a microphone, a pager and a loudspeaker.
10 **Ludic Robots** – unpredictable and friendly 'electronic pets'.
11 **Interactive Globe** – combines the attractive qualities of a traditional globe with an interactive multimedia display.
12 **Emotional Communicators** – paging devices for sending and receiving emotional messages.
13 **Storyteller** – by stringing different elements together, children can compose and listen to their own stories.
14 **Hansel & Gretel** – a homing device.
15 **Recharge Mats** – surfaces conducting power and signals to operate electronic toys.
16 **Kid's Projector** – LCD projector providing a flexible way of viewing films, animations and children's multimedia presentations.

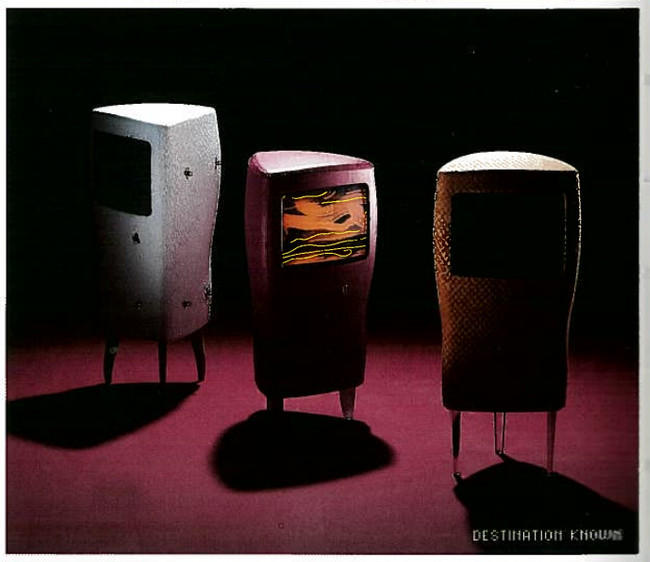
the electronic playground

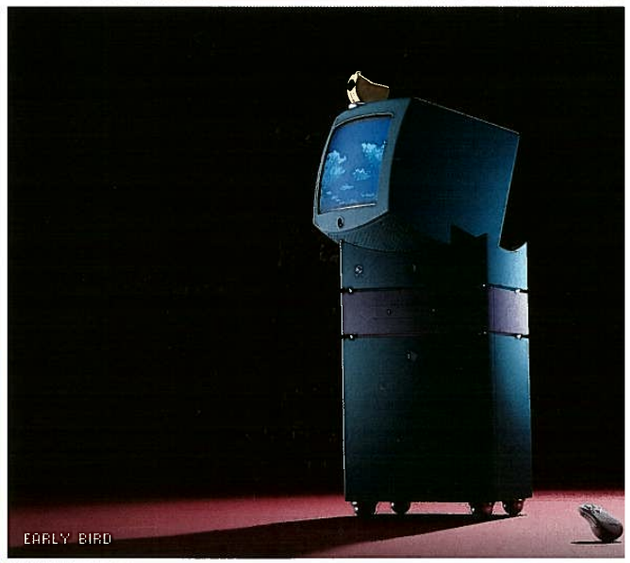
Image from Philips Design, Creating Value by Design











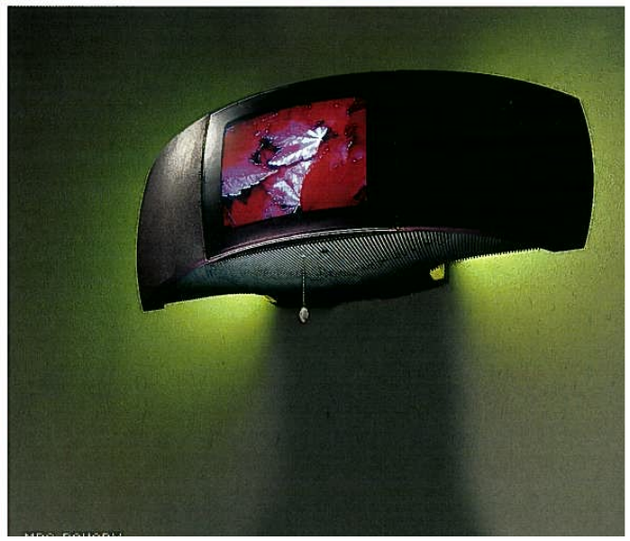
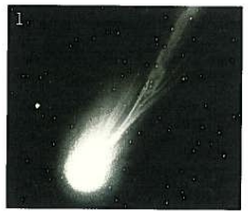


Image from Philips Design, Creating Value by Design

Image from SFO exhibit, From Prototype to Product, Danachis Flickr

Image from SFO exhibit, From Prototype to Product, Lunar Design Portfolio

Image from SFO exhibit, From Prototype to Product, Libraryman Flickr



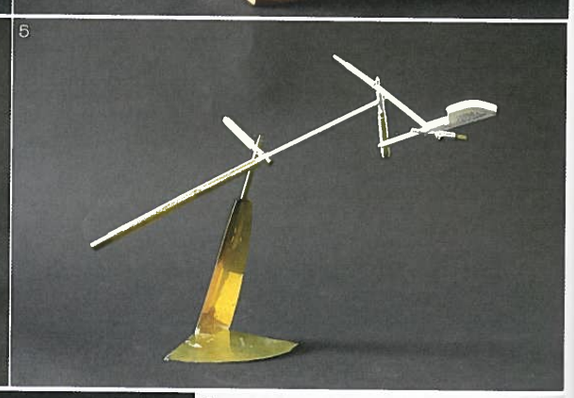
1. 'The lamp to me resembles a comet with its luminous head and tail,' says Sapper. 'I named it Halley in honour of the astronomer who discovered the comet that bears his name.' The chrome ball made Sapper think of the comet orbiting the earth.

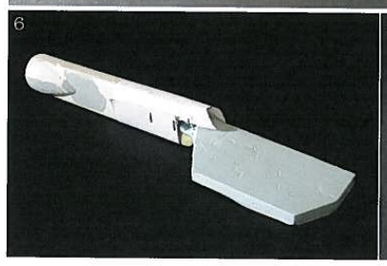
2. A system to cool the powerful LEDs was borrowed from laptop technology: the lights are mounted on a printed circuit board attached to a heat-absorbing aluminium plate. A copper tube containing a conducting liquid carries the heat to a miniature radiator, which is cooled by a fan. The fan is kept visible, becoming part of the light's aesthetics.

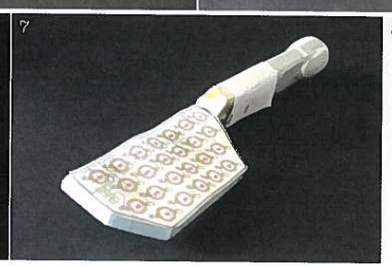
3–4. Sapper's first model, defining the articulated arm of Halley and the head with the 'tail' containing the concept for a cooling element (3) was sent to Lucesco along with a brass model of the base (4). The base was conceived to allow papers to slip on to its gently curving profile to save desk space.

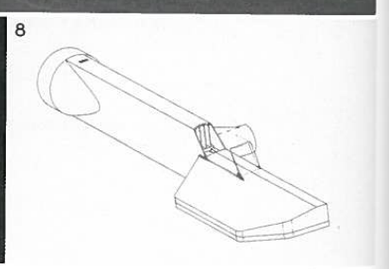
5. Lucesco produced their own model to check they agreed with Sapper's basic concept. The design was developed in an ongoing collaboration between Sapper and Lucesco's engineers in the form of sketches, models, emails and technical drawings.

6–8. First model of the head and fan made by Sapper in foam and paper showing the initial form of the cooling air intake (6–7). Lucesco examined the model and returned a technical drawing, which Sapper amended in pencil (8, amendment centre right) to improve the formal overlap of head and tail.







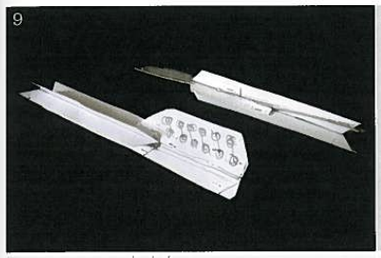


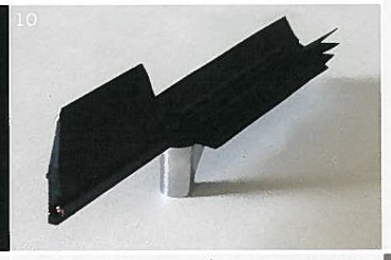
9–13. Models and drawings showing experiments for the cooling fins.

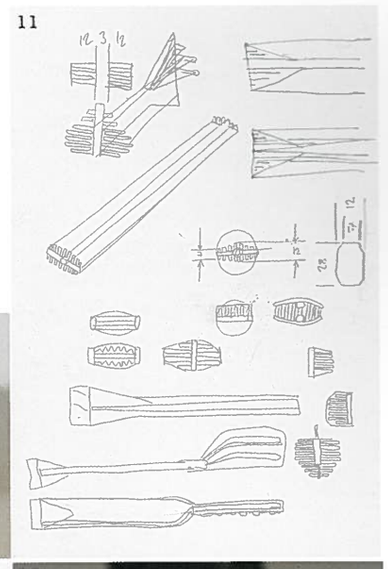
14. The cooling fins were designed to be contained in the radiator housing. The heat pipe can be clearly seen in the centre of the model.

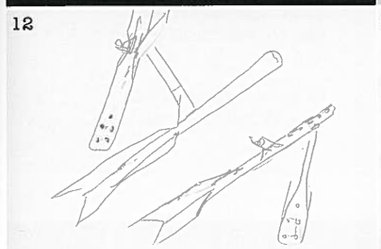
15–17. Various LED configurations were discussed between Lucesco and Sapper, and sketches, models and technical drawings produced.

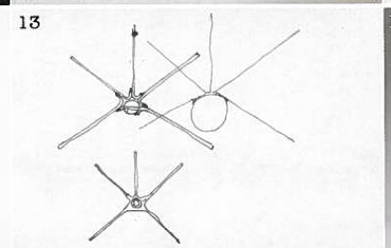
18. Alternative light sources. Two different kinds of LEDs (left and right) and halogen (centre) were also examined.

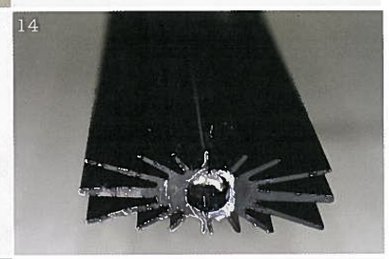


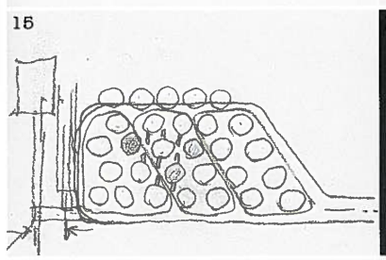


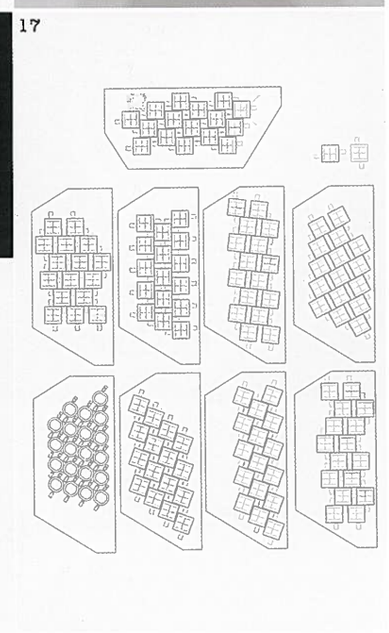


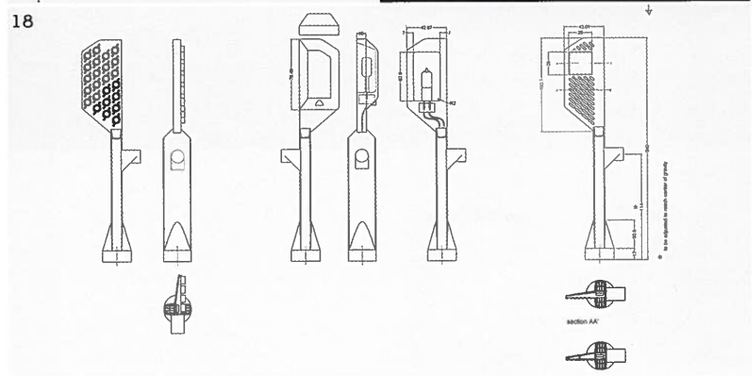












Images of Richard Sapper's Halley Lamp from Hudson's Process, 2008

Image from Buxton, Sketching User Experience

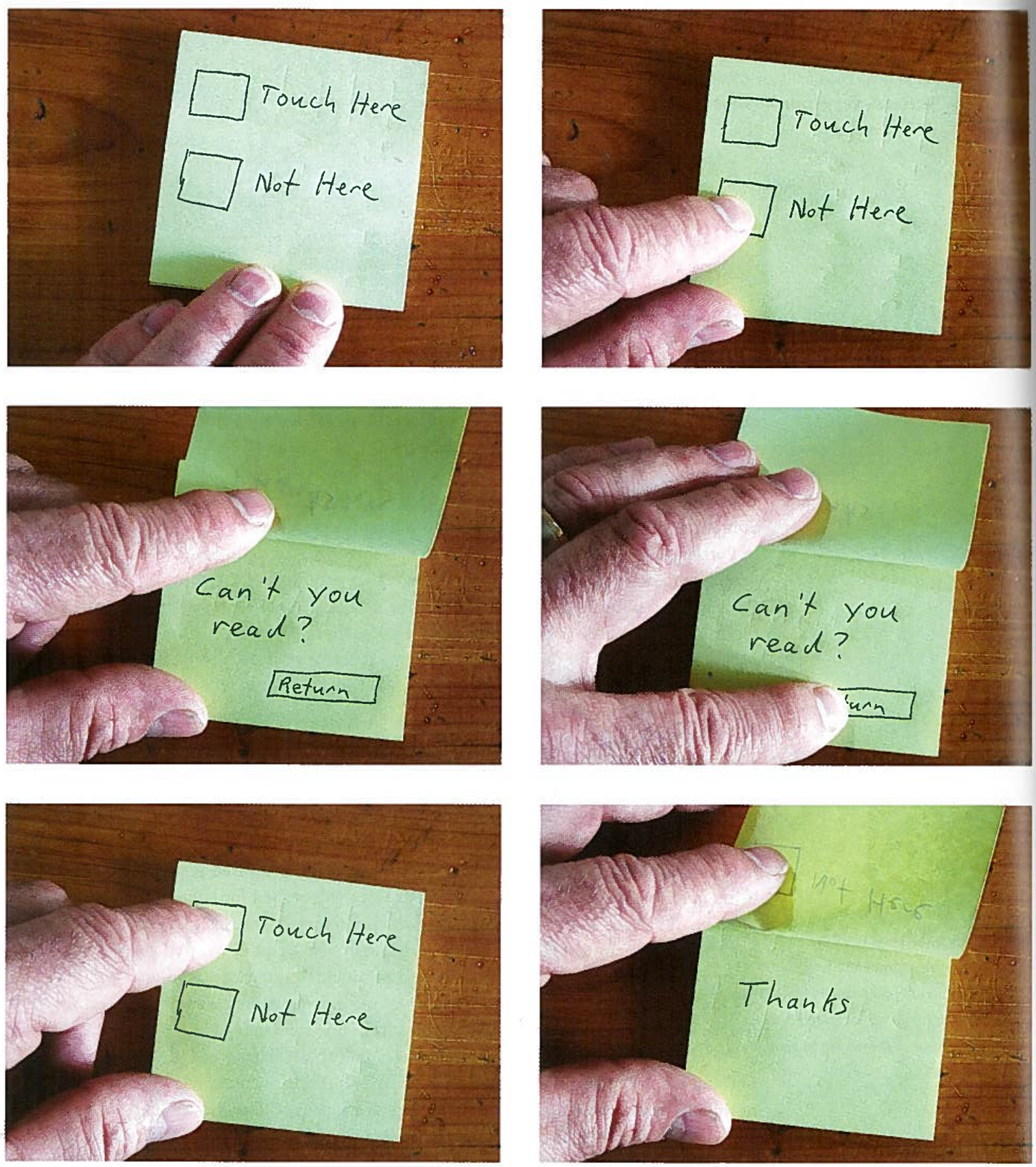


Figure 143: A Simple Finger Exercise

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

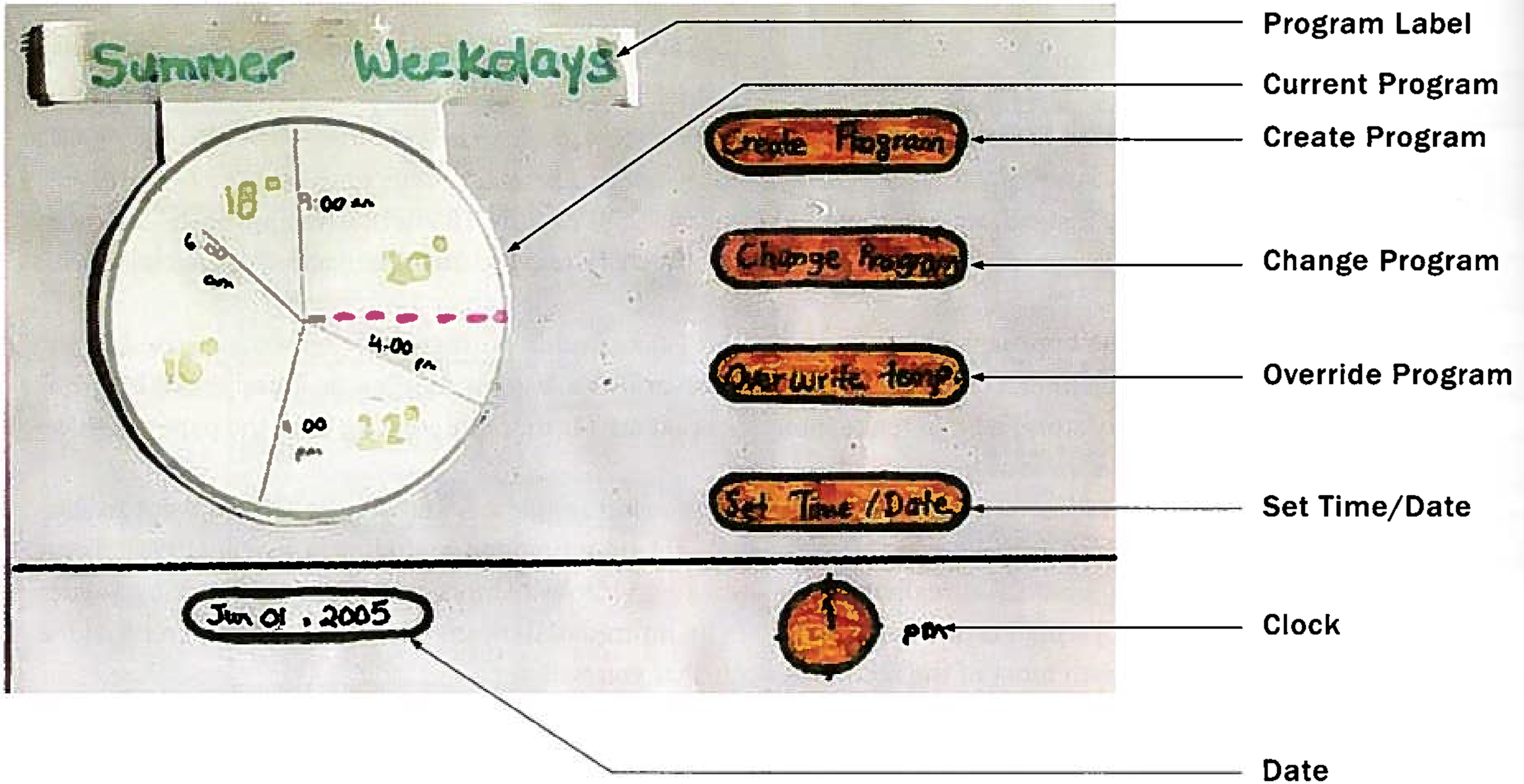


Figure 145: Paper Interface to a Programmable Climate Control System

The basic interface is made up of buttons and circular dials, and displays. The concept is that the user would interact directly on the screen by means of a touch screen.

Image from Buxton, Sketching User Experience

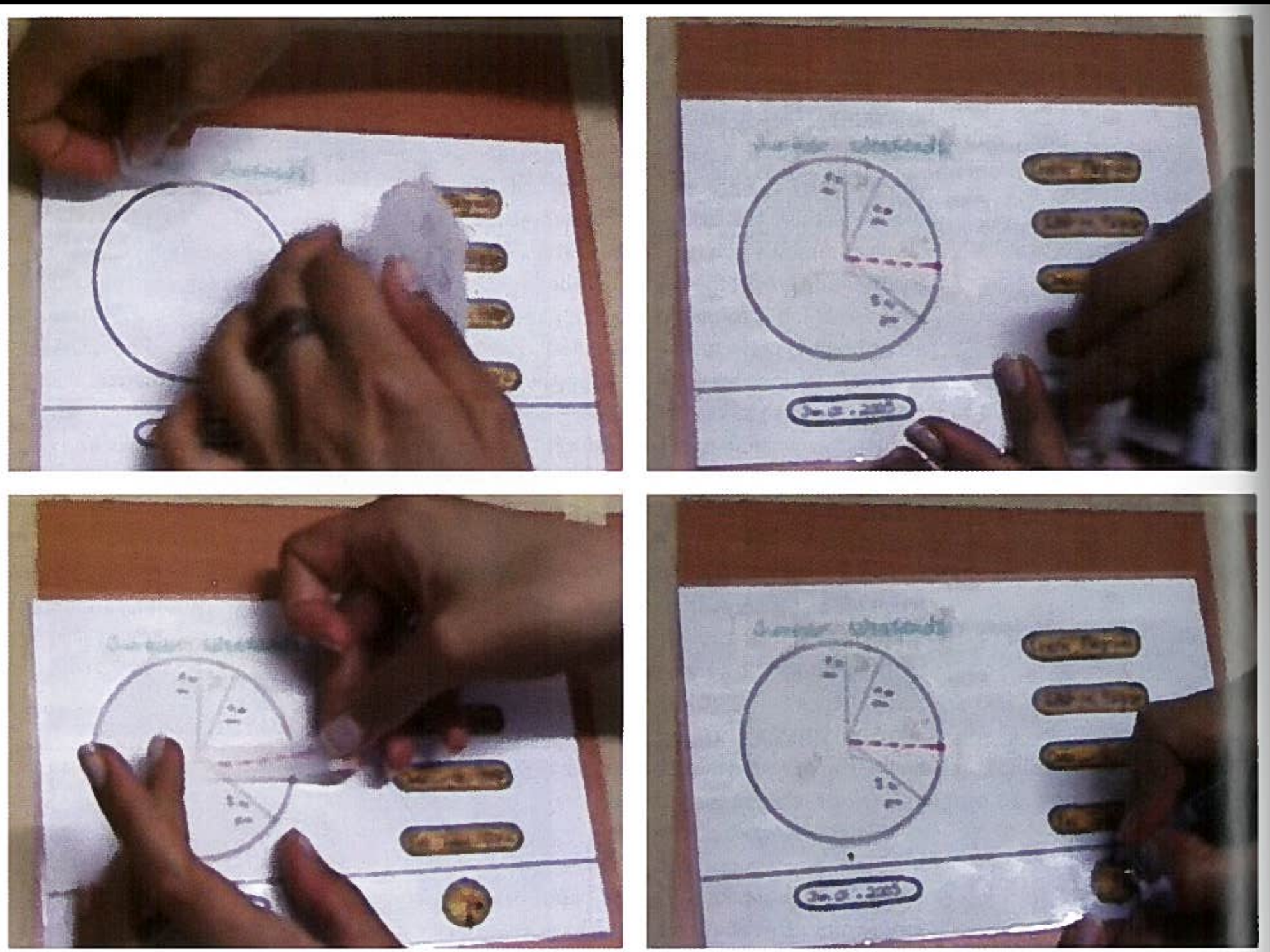


Figure 147: Changing the Display by Erasure and Writing

By covering the paper with plastic, one can write on it with a dry marker, and have what is written easily erased with a cloth when the information needs to be changed. Sometimes this is easier than having a stack of premade objects to stick down.

Image from Buxton, Sketching User Experience

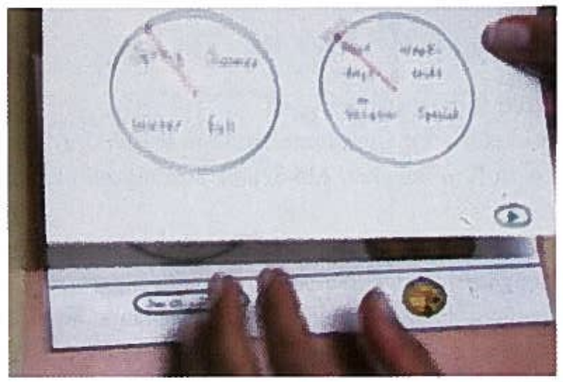
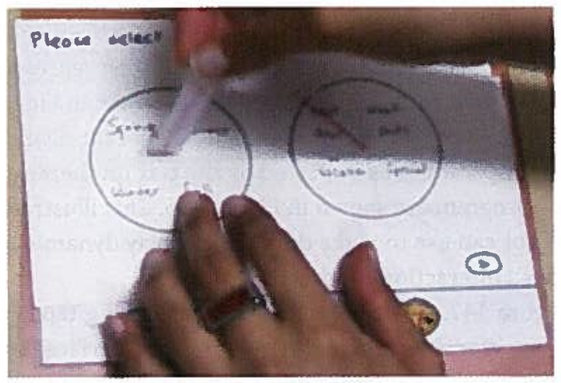
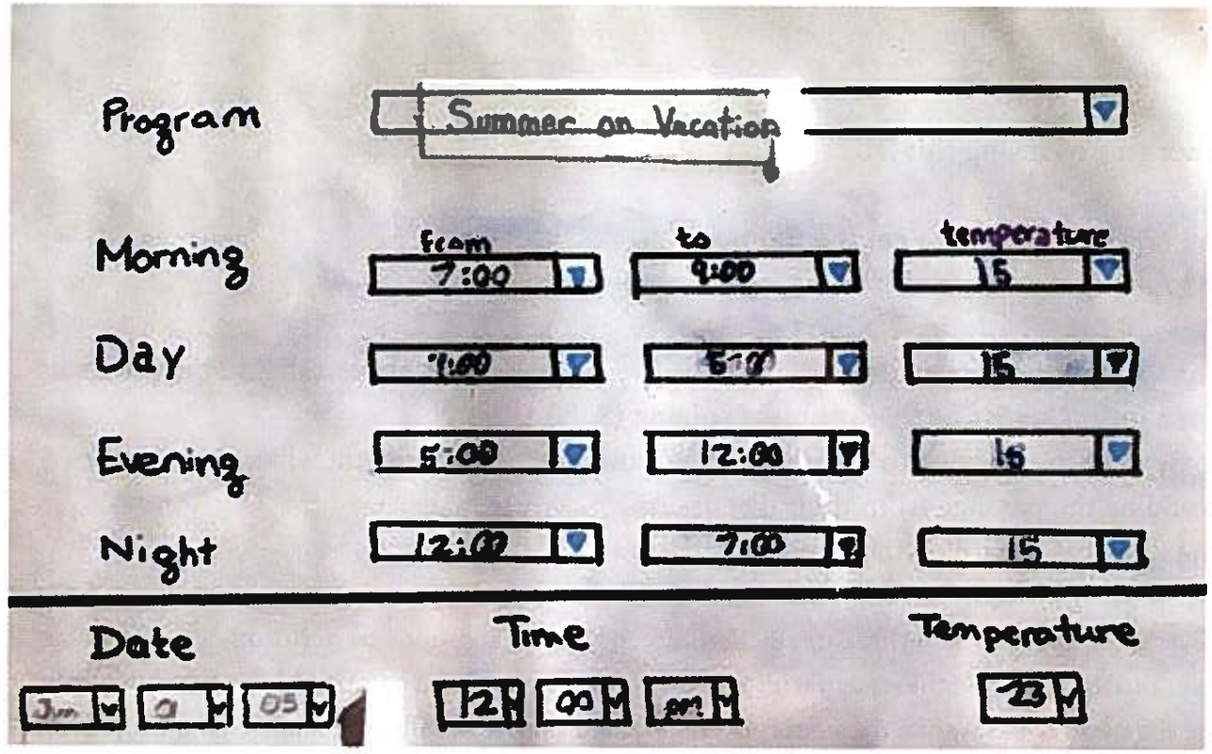
	If the user pushes the Create Program button, the main part of the display is replaced by two dials. The left one shows the four seasons, the right one four options: "Week Day", "Weekend", On Vacation", and "Special". The user selects the season and type of day by touching the appropriate "slice" of the display, or dragging the red dial indicator.
	The indicator is actually a piece of transparent tape that is stuck to the dial. The glue is like that on a Post-It. That is, it can be easily lifted up and stuck down in a new position. That is what the facilitator is doing in this image: moving the indicator to reflect the season chosen by the user.
	When the new program is set, the facilitator returns to the original screen, shown in Figure 66, and updates the Program Label.
	The "face" of the dial is also replaced with one that reflects the new program.

Figure 146: Creating a New Program

Image from Buxton, Sketching User Experience



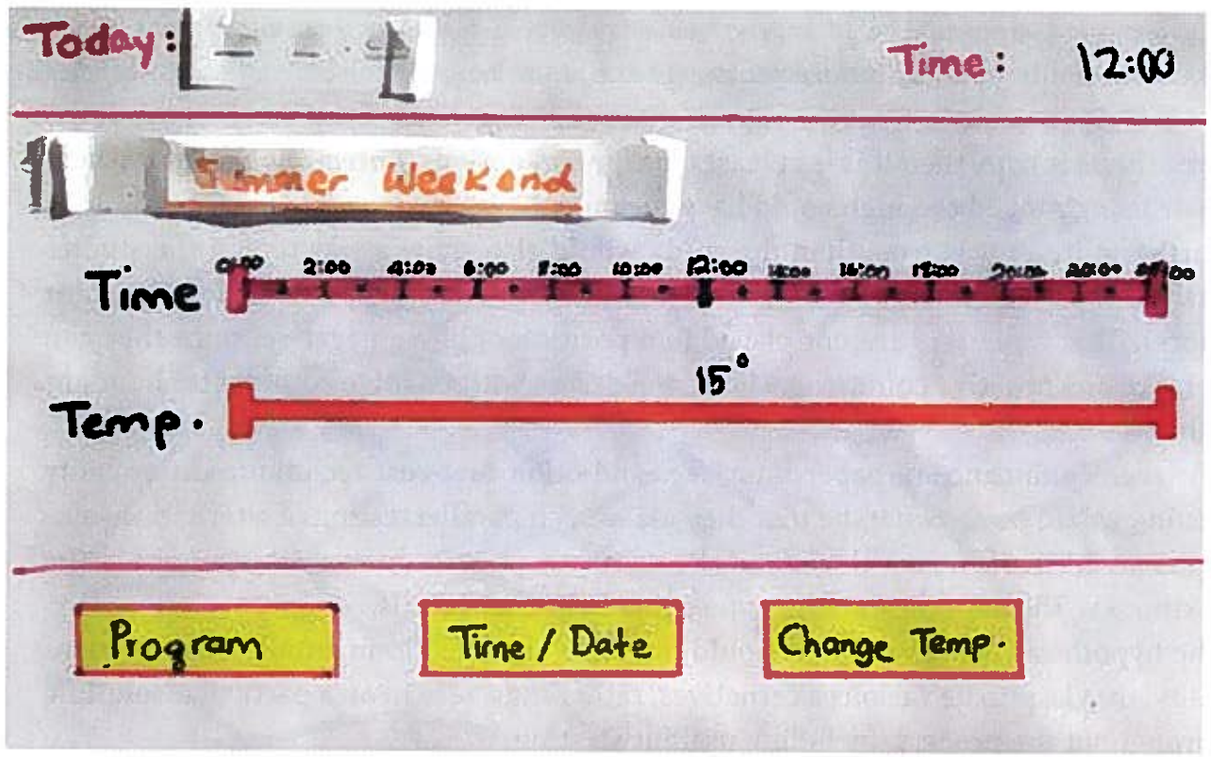


Image from Buxton, Sketching User Experience

Breadboarding:

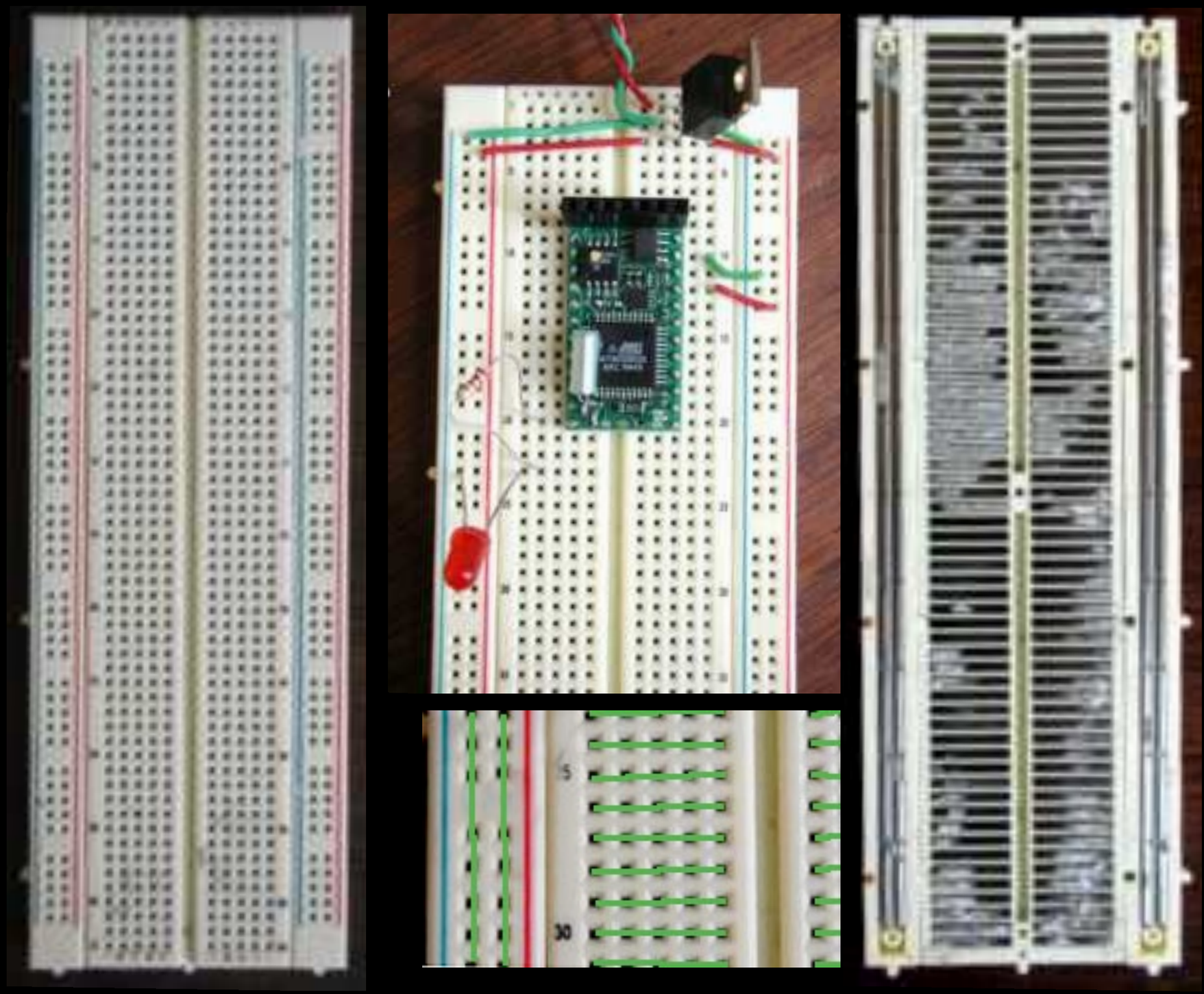


Image from Tom Igoe, http://www.tigoe.net/pcomp/code/understanding-electricity/breadboards

Protoboarding:

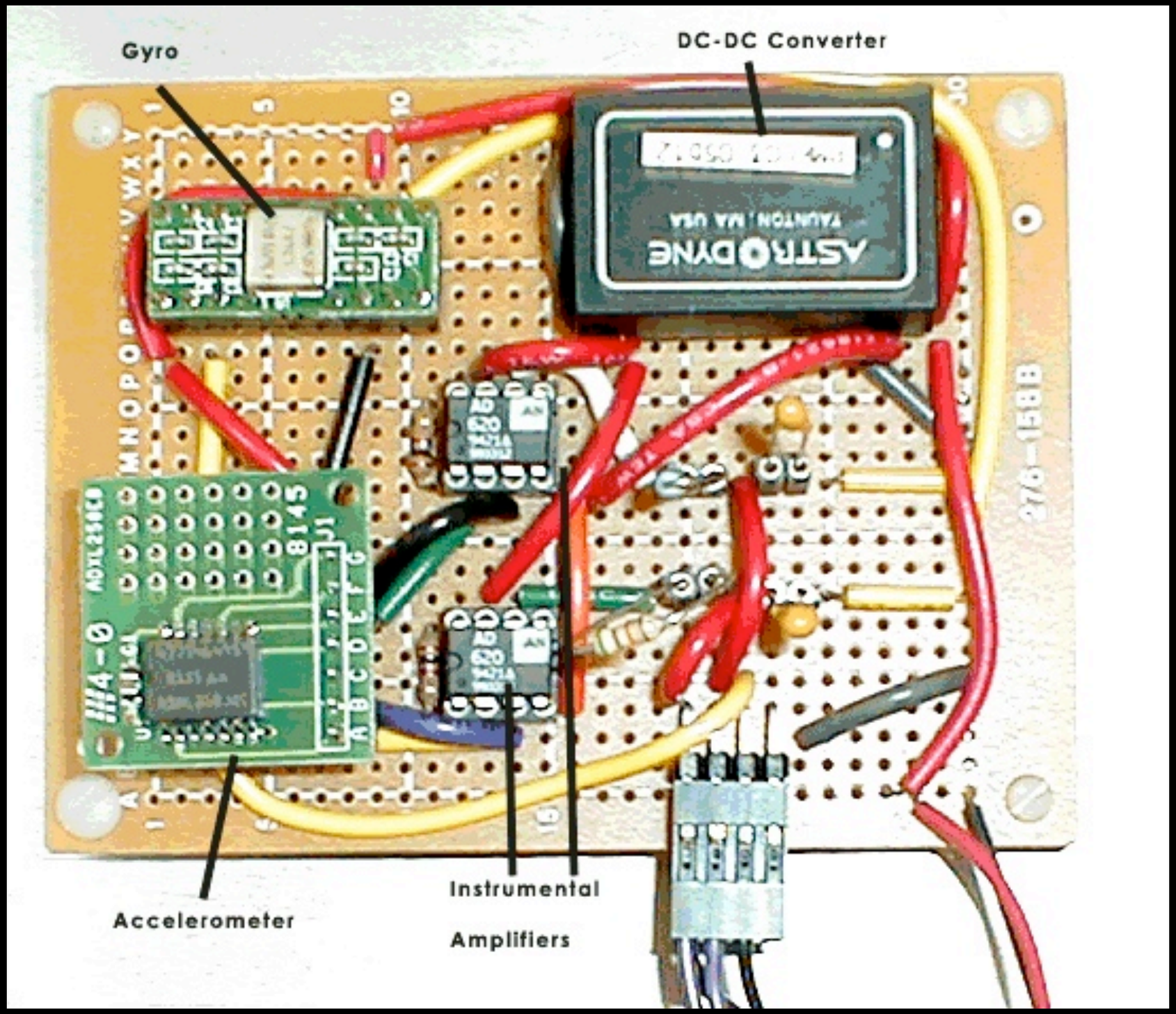


Image from http://coecsl.ece.uiuc.edu/ge423/spring04/group9/images/diagrams/protoboard2.gif

Sketching Activity

Boxes | 2-Point Perspective | People | Hands

Handouts in the “Sketching Tutorial” Folder