Models and Metaphors

Terry Winograd

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Computer Science Department

Stanford University

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Conceptual Models

• In interacting with any system (software or others), a person has a concept of what the system is: what its components are, what properties they have, and what interactions they can enter into. This conceptual model underlies the more specific aspects of interface, such as screen representations and command structures.
Metaphors

• A key issue in software design is to make the model as clear and comprehensible as possible, and to relate it appropriately to the person's models based on prior experience with other systems and aspects of ordinary life.

• Metaphors can help the designer communicate the mental model based on the user’s prior understanding.
Three Paradigms [Cooper]

• Technology paradigm
  – To use the device (or program) you need to understand the mechanism

• Metaphor paradigm
  – Let users apply what they know from some familiar part of life in understanding the interface

• Idiomatic Paradigm
  – Design simple interactions and imbue them with meaning
The Desktop Metaphor – Xerox Star, 1981
Icons for Familiar Office Objects
Notebook Metaphor – Penpoint, 1991

Contrary to popular belief, this is not a contract. It is a memo to Ms. Huerta, who designed the new bottle for New World.

1. You agree to supply design services and technical drawings to New World.

2. If your design proves to be inadequate to withstand the stresses, heat, and shock for which you have guaranteed it, you will complete a new design at no charge.

3. Your cost estimates must be submitted in advance every week and approved by Richard Hopkins before you continue work.

4. New World will pay each invoice from an approved estimate within thirty (30) days.

Please sign a copy of this agreement and fax it back to me.
Good evening.
Click on the door to sign in...
WindowsBella, to start a program just click on it.
To see the programs in this room, hold down the F1 key.

Other options
Setting up your e-mail address...

The first step is to subscribe to the Bob E-Mail service.

- How to subscribe to the service

The second step is to tell me your account info and e-mail address so I can pick up and deliver your e-mail.

- Tell me your e-mail information

Finally, if you have trouble sending or receiving e-mail messages, I can help you fix any problems.

- Troubleshoot e-mail problems

Cancel
Lava Lamp

Note: This is a decorative object. It does not start any programs or do anything special.
Virtual World metaphor

There.com
Secondlife.com
Bookshelf Metaphor
Physical Device Metaphors

Apple Quicktime 4.0

Figure 2-3: IBM’s RealPhone Application Interface
Conversational Agents
It looks like you're crafting a crude forgery.

Would you like help?

- Get Dan Rather's phone number
- See fonts that were available in 1973
- Grab a beer and some popcorn and watch the festivities on Democratic Underground.

Memo to File

SUBJECT: CYA

1. Staudt has obviously pressed Lodge more about interference
Three basic physical interaction metaphors

• Manipulation:
  – Desktop, notebook,…

• Navigation:
  – WWW, virtual spaces…

• Conversation:
  – Speech, agents…
Transporting metaphor vs. Familiarizing metaphor [Heckel and Clanton]

• Provide a structure that can be learned and that enables new kinds of applications
## Home Budget, 1979

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<th>Dec.</th>
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Map Metaphor(s)
Collaborative Tagging

All time most popular tags

amsterdam animal animals april architecture art australia baby barcelona beach berlin bird birthday black blackandwhite blue boston bridge building bw california cameraphone camping canada car cat cats chicago china christmas church city clouds color colorado concert day dc dog dogs england europe family festival fireworks florida flower flowers food france friends fun garden geotagged germany girl graduation graffiti green hawaii holiday home honeymoon house india ireland italy japan july june kids lake landscape light london losangeles macro march may me mexico moblog mountains museum music nature new newyork newyorkcity newzealand night nyc ocean orange oregon paris park party people phone photo pink portrait red reflection river roadtrip rock rome sanfrancisco school scotland sea seattle sign sky snow spain spring street summer sun sunset taiwan texas thailand tokyo toronto travel tree trees trip uk unfound urban usa vacation vancouver washington water wedding white winter yellow zoo
Three design aspects [Liddle]

- Conceptual model
- Information display
- Control mechanism
Conceptual Model

- User’s concept of (software) system she interacts with
  - Components, properties, interactions
- Goal in interaction design
  - Clear, comprehensible model
Three models of the same system

• Designer’s model
• User's model
• System image
Barehands: Implement-Free Interaction with a Wall-Mounted Display

Merrill English
Computer Science Department
Brown University
Providence, RI 02901
menglish@brown.edu

Henry Barr, Yuhui Jin, Terry Winograd
Computer Science Department
Stanford University
Stanford, CA 94305-9035
(barr@cs.stanford.edu)

We describe Barehands, a foundational computer interface, in which the user can control the movement of systems commands and state on a touch screen by moving a web drawn hand gesture - using infrared image-guided (IR) illumination and a wide camera with an IR filter, we enable a high-contrast 544x480 pixel (a common level 20" x 20" touch-screen display) to detect and acquire several distinct hand gestures. Barehands provides a novel, guided, implementor-absent method of accessing and using touch-screen interfaces. Barehands allows users to interact with large, well-calibrated touch-screen surfaces.

BACKGROUND
Infrared tracking, using graphics, hand gestures, airflow, image processing, speech processing, 544x480 pixel, Barehands Windows, touch screen, Barehands UI.

PROBLEM STATEMENT
As part of our project, we are developing a generic computer interface. We have created an interactive interface which augments a variety of devices, including laptops, PDAs, and large displays, with virtual hand gestures and infrared tracking. Our interface allows users to control applications which manipulate data and interact with the user. In this paper, we describe a method for implementing hand gesture commands on touch-screen interfaces.

Barehands addresses the issue of effective interaction with large, well-calibrated touch-screen surfaces by employing hand-gesture command techniques.

Henk Gabor
A large number of 3-D simulations on computer graphics and interactive devices in science.

Figure 1: Gesture, arrow, and typing applications are supported through interactive devices.
Barehands: Implement Free Interaction with a Wall-Mounted Display

Microsoft Word

Page and column margins

Section with 2 columns

Section with 2 columns

Section with 1 column
Barehands: Implement-Free Interaction with a Wall-Mounted Display

Jonah Hughes
Computer Science Department
Brown University
Providence, RI 02912
johughes@brown.edu

Henry Berg, Yuhan Jin, Terry Winograd
Computer Science Department
Stanford University
Stanford, CA 94305-9073
(berg, yjin, winograd)@cs.stanford.edu

ABSTRACT

We describe Barehands, a free-handed interaction technique, in which the user can control the actions of system commands and tools on a touch screen by touching it with distinct hand postures. Using board-marked infrared (IR) illumination and a video camera with an IR filter, we enable a back-projected SMARTBoard (a commercially available, 61” x 4” touch-screen display) to identify and respond to several distinct hand postures. Barehands provides a natural, quick, low-cost method of interacting with large, wall-mounted interactive surfaces.

Keywords

Interaction techniques, user interface, hand posture, infrared, image processing, vision-giving, SMARTBoard, Interactive Whiteboards, touch interaction, interaction tool.

INTRODUCTION

As part of our project to develop a pervasive computing environment [1], we have developed an interactive workspace which integrates a variety of devices, including laptops, PDAs, and large displays, both vertical (e.g., rear-projected) and horizontal (e.g., walls). Our research focuses on providing integration at both the system and non-transaction levels, so that information and interface can be co-located with a user and thus enhance interaction.

Some paragraphs

FIGURE 1: Projection, camera, and lighting setup, side view. The infrared LED arrays are placed in coordination with the camera cluster to illuminate the rear of the board, including objects that reflect light by being near to its front side. The camera records the image for analysis.
The Overface

A key design criterion for our environment is to provide support on a variety of devices for existing modes of operation. These include:

- Device augmentation (e.g., meta-screen)
- Multi-device interaction (e.g., wall-screen)
- Meta-screen interaction tool

ABSTRACT

We describe Barehands, interactive surfaces.

Keywords: Interaction technique, device augmentation ...

INTRODUCTION

As part of our project ...

FIGURE 1: Projection, analysis.
Barehands: Implement-Free Interaction with a Wall-Mounted Display

Meredith Regel
Computer Science Department
Brown University
Providence, R.I. 02912
and
Peter Pirolli
Computer Science Department
Stanford University
Stanford, CA 94305

Abstract

We describe Barehands, a 3-handed augmented interface, in which the user can control the actions of remote computers and such a web server by virtualizing a web-based hand gestures. Using software menus and gesture control, a user can navigate through web pages and select a 2D graphic or 2D graphic on a wall using 2D graphic. We enable a back-projected 566x288 (a commercially available, 566x288 graphics display) to identify and control a virtual display on a wall. Barehands provide a method for implementing virtual hands on a wall. We have implemented a virtual hand system using a virtual hand system to create virtual hands on a wall. We present the design of a virtual hand system using a virtual hand system to create virtual hands on a wall. We present the design of a virtual hand system using a virtual hand system to create virtual hands on a wall. We present the design of a virtual hand system using a virtual hand system to create virtual hands on a wall.

Introduction

As an example, we describe a 3-handed augmented interface, which augments a variety of devices, including 2D graphic, 2D graphic, and large displays, using virtual (self-evaluated) and virtual (self-evaluated) displays. Our research focuses on developing systems that augment the user's experience with augmented reality and virtual reality. This approach allows users to interact with virtual objects and real objects simultaneously and in ways that are not possible with traditional approaches.

Barehands address the issue of effective interaction with large graphics surface by employing large graphics surface and large graphics surface to create virtual hands on a wall. The design

A key design decision in our design is to generate a seamless and effective integration of virtual reality and augmented reality.
The Concept of “Paragraph”

- Non-computer: Semantic unit
  - One thought, start on new indented line with topic sentence
- Word: “the” building block of a document
  - Carries formatting, even used for figures, headers
- HTML: One building block of a document
  - Forces whitespace -> often misused for layout
- PowerPoint: not part of natural model (visuals+bulleted lists), added later from Word
The Concept of “Layout”

• Non-computer: Typographical-physical
  – Cut & Paste anywhere
• Word: Mostly typographical
  – Sections [with attributes like #columns], paragraphs [with attributes like indent.], inconsistent pictures model (added late), tables
• HTML: Sequential, but gone bad
  – Intended for simple sequential “scroll” rendering
  – But: tables used to create page layouts
  – “Don’t let HTML become the DOS of the WWW!” [Alan Kay, WWW3, 1995]
• PowerPoint: Graphical
  – Overlapping objects, no flow beyond page
Back to Metaphor

• A metaphor implies many elements of the model to a user who is familiar with the metaphorical object (e.g., a physical desktop)

• In general a model requires more learning without metaphors to which users can anchor it to their previous experience.

• There is a fine line between metaphor and non-metaphor (e.g., in natural language "The stock market is up")
Problems with metaphors

- Don’t scale well
- Too constraining
- Conflict with design principles
- Makes true functionality invisible
- Overly literal translations
- Can limit the designer's imagination
The Myth of Metaphor [Cooper]

• … basing a user interface design on a metaphor is not only unhelpful but can often be quite harmful. The idea that good user interface design is based on metaphors is one of the most insidious of the many myths that permeate the software community.

• Use 'em if you find 'em, but don't bend your interface to fit some arbitrary metaphoric standard. [Cooper]