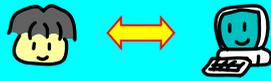


Interactive "Smart" Computers



Takeo Igarashi
(The University of Tokyo)

Outline

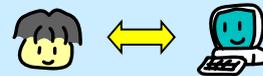
- Introduction
- Projects (demos!)
 - Pen Computing
 - Interactive 3D Graphics
 - Information Visualization
- Summary

Introduction



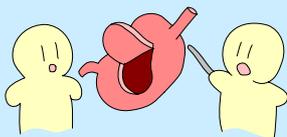
Mission

Make computers easier to use.



Mission

Enrich visual communication



Context

User Interface

Post-GUI,
Pen-based Computing

Computer Graphics

Non-photoreal Rendering

Problem

Current computers require explicit commands (menus & buttons)



Our Approach

Making computers "smart"

Understand/infer the user's need.
Aware of the context.
Share the "view" of the world.

Projects



Projects

1) Pen-based Computing

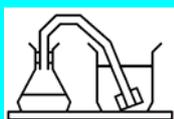


2) 3D Graphics for Novices



3) Misc. User Interface Topics

1) Pen-based Computing



Design user interfaces based on freeform strokes.

Motivation



Design interfaces for pen-based devices.

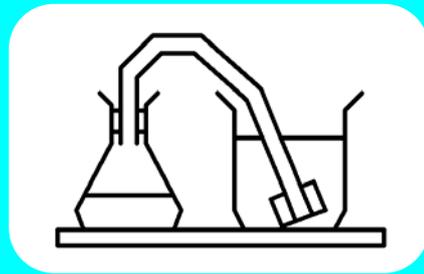
Pegasus: a Drawing Editor for Rapid Geometric Design

Appeared at
UIST'97 & CHI'98



Takeo Igarashi, Sachiko Kawachiya,
Satoshi Matusoka, Hidehiko Tanaka

Problem



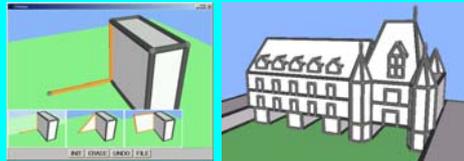
How do you draw this?

Live Demo!

[pegasus](#)

UIST 01

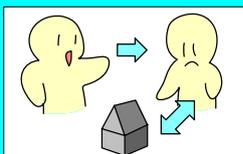
Chateau: a suggestive interface for 3D modeling



User interface using hints and suggestions

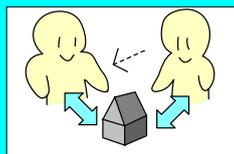
[Chateau](#)

UI Design Issue



Explicit commands

Typical user interfaces



Implicit Commands

Our proposal

Future Work

Other applications (e.g. PowerPoint)

SLEEP
EAT
PLAY
WORK



SLEEP
EAT
PLAY
WORK

SLEEP
EAT
PLAY
WORK

BEAR
RABBIT
MOUSE



BEAR
RABBIT
MOUSE

Appeared at
CHI'99



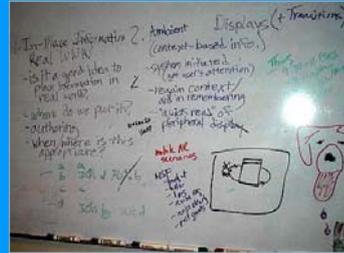
Flatland: New Dimensions in Office Whiteboards



Takeo Igarashi, Elizabeth D. Mynatt
(Univ. of Tokyo) (Georgia Tech.)

W. Keith Edwards, Anthony LaMarca
(Xerox PARC) (Xerox PARC)

Research Goal



Designing an augmented whiteboard
Designing a platform for pen-based apps.

Live Demo!



flatland

2) 3D Graphics for Everyone



Design easy-to-use interfaces

Background

3D Computer Graphics is now everywhere.
(movies, TVs, games, phones, etc.)



However, most people just *watch*,
rather than *create* them.



Goal

"3D Computer Graphics as a daily
communication tool for everyone."



Provide easy-to-use tools to achieve the goal.

Teddy: A Sketching Interface for 3D Freeform Design

SIGGRAPH 99
Impact paper

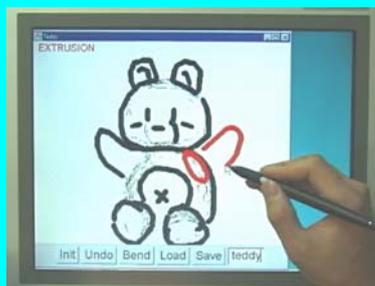
Takeo Igarashi
Satoshi Matsuoka
Hidehiko Tanaka



3D modeling is difficult



Sketching is easy!



Live Demo!

[teddy](#)

Possible applications

1. Non professionals (fun, education)
2. Rapid prototyping for design
3. Communication tool (doctor, teacher)



Products

PlayStation2



Nintendo GameCube

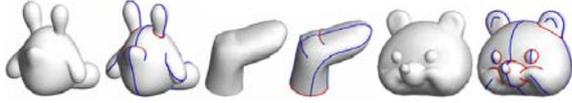


Package Software
for PCs



SIGGRAPH 2007

FiberMesh: An Interface for Designing Freeform Surfaces with 3D Curves

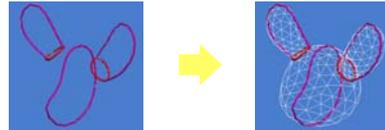


Nealen, Igarashi, Sorkine, Alexa

What is it?

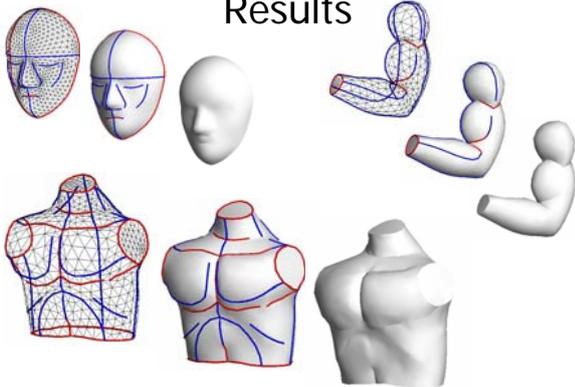
Teddy + More control

The user builds nets of curves by sketching and the system constructs a surface via optimization.



[fibermesh](#)

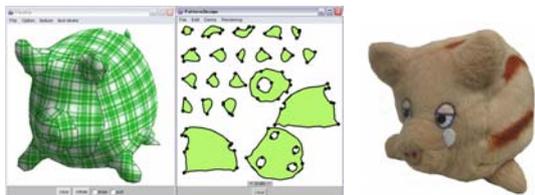
Results



SIGGRAPH 2007

Plushie: An Interactive Design System for Plush Toys

Yuki Mori, Takeo Igarashi



Sketch → 2D pattern → Simulation
→ Real Toy

[plushie](#)

UIST 02 Best Paper

Clothing Manipulation

*What do you want
to wear today?*



Takeo Igarashi
John F. Hughes

(Brown University)

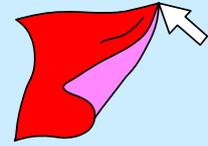
Problem

Cloth manipulation is difficult.

State of the Art

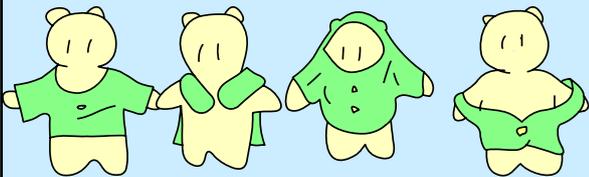


Drag rigid plates,
then start simulation



Drag a vertex with
real-time simulation

Targets



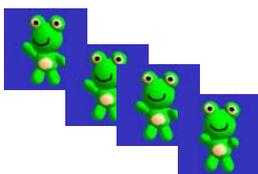
Putting cloth on characters in flexible ways.

DEMO!

[sweater](#)

Project Squirrel

Animation for everyone!



Motivation

Creation of character animation is tedious.

- Keyframe
- Motion capture
- Physics simulation
- Scripting



We want to "sketch" animations quickly.

Basic idea

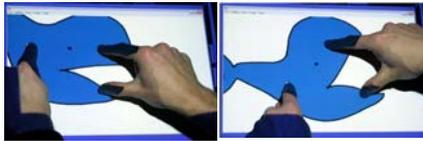


"To record the user's direct operations"

Demo



As-Rigid-As-Possible Shape Manipulation



Takeo Igarashi, Tomer Moscovich, John F. Hughes
The University of Tokyo / Brown University

Goal

Move and deform 2D shapes as if manipulating real objects



rigid

3) Miscellaneous UI topics



Zooming



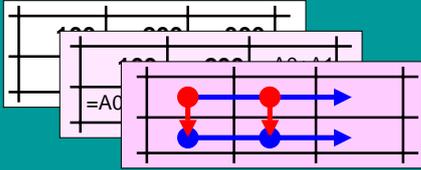
Voice

Visual Languages 98 (BEST PAPER)

Fluid Visualization of Spreadsheet Structures

Takeo Igarashi (Univ. of Tokyo)
Jock Mackinlay (Xerox PARC),
Bay-Wei Chang (Xerox PARC),
Polle Zellweger (Xerox PARC)

A spreadsheet has an underlying *dataflow graph* in addition to the surface numerical view.



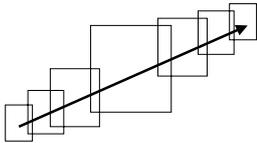
We visualize these structures using animation and interaction techniques.

Movie show!

fluid

Speed Dependent Automatic Zooming

UIST 00



Takeo Igarashi (Univ of Tokyo)
Ken Hinckley (Microsoft Research)

Demo

Bubble Clusters

An Interface for Manipulating Spatial
Aggregation of Graphical Objects

Nayuko Watanabe, Motoi Washida,
Takeo Igarashi
(The University of Tokyo)

Target Task



Object manipulation in spatial layouts

[bubble_ink](#)

Voice as Sound: Using Non-verbal Voice Input for Interactive Control

Takeo Igarashi
John F. Hughes
(Brown University)



Two Aspects of Voice

- Verbal information
 - ➔ Speech recognition
- Non-verbal information
(pitch, volume, speed, etc)
 - ➔ Voice as Sound techniques

VOICE

Summary

- Current Graphical User Interfaces
 - Explicit command via button, menu
 - ➔ Computer's response

Summary

- Current Graphical User Interfaces
 - Explicit command via button, menu
 - ➔ Computer's response
- Interactive "Smart" computers
 - User's natural activity (intuitive operation)
 - ➔ Computer's support



Thanks



Interactive "smart" computers

Abstract

Current user interfaces are not very "smart" in that computers dumbly do what the user explicitly commands it to do via buttons or menus. As the computers become more capable and applications become complicated, more "smart" user interfaces are desired. We are exploring possible "smart" user interfaces in the domain of pen-based computing and interactive 3D graphics. The idea is to allow the user to intuitively express his/her intention by combining sketching and direct manipulation, and have the computer take appropriate actions without explicit commands. This talk consists of many live demonstrations to illustrate the idea of interactive "smart" interfaces. I plan to show 2D geometric drawing program, electronic whiteboard system, sketch-based 3D modeling, automatic zooming, clothing manipulation interfaces, and other interesting systems.

Short Biography

Takeo Igarashi is an associate professor at CS department, the Univ of Tokyo. He was a post doctoral research associate at Brown University Computer Graphics Group during June 2000 - Feb 2002. He received PhD from Dept of Information Engineering, The University of Tokyo in 2000. He also worked at Xerox PARC, Microsoft Research, and CMU as a student intern. His research interest is in user interface in general and current focus is an interaction techniques for 3D graphics. He received The Significant New Researcher Award at SIGGRAPH 2006.

Visit <http://www-ui.is.s.u-tokyo.ac.jp/~takeo> for more info.