

## ユーザインタフェース

~ 3D User Interfaces ~

( 第 6 回 )

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## Schedule

- 4/5 インTRODクシヨN
- 4/12 インタフェースデザイン・評価
- 4/19 Information Visualization
- 4/26 Programming by Example ( 課題出題 )
- 5/10 Pen computing
- 5/17 3D User Interfaces
- 5/24 Real world Computing ( 課題 切 )
- 5/31 課題講評

## 前回の内容

### Pen-based User Interfaces

- Devices
- Projects
  - Text input methods
  - Electric board
  - Support for creative activities
  - Drawing applications
- Discussion

## 今回の内容

### User Interfaces for 3D worlds

- World in miniature
- Doll Head for CT-scan, Voodoo dolls
- Through-the-lens
- 3D Widgets
- Interactive Shadow, Tricoder, StepWIM
- Sketch, Teddy, 3D curve, Harold
- Clothing Manipulation

## 今回の内容

### User Interfaces for 3D worlds

2Dデバイスで3Dを操作

Mouse, Pen, etc.

3D空間用の操作 ( 現実を超える )

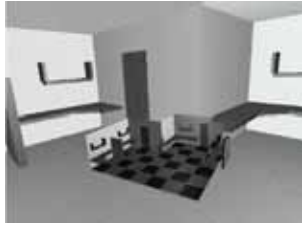
HMD, Cave, etc.

## CMU Stage3 group

Prof. Randy Pausch

## World in Miniature

[Stoakley 1995]



[.cmu.wmv](#)

## The Doll's Head

[Hinckley 1994]



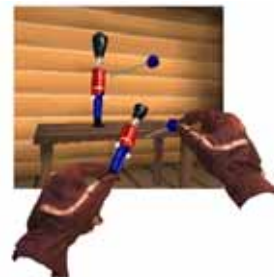
## Image plane interaction techniques

[Pierce 1997]



## VooDools

[Pierce 1999]

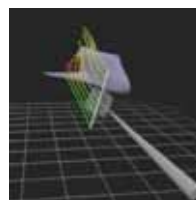


Brown Univ.  
Computer Graphics Group

Prof. Andy van Dam,  
Prof. John F. Hughes

## 3D widgets

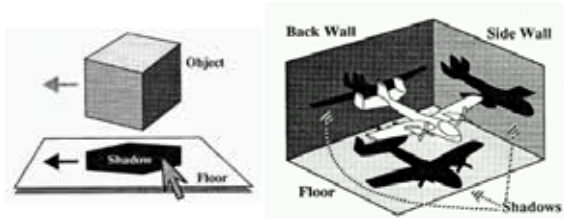
[Snibbe 1992]



[.brown.wmv](#)

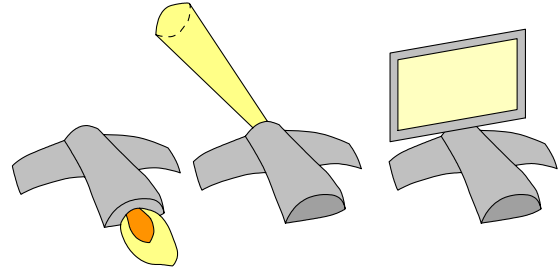
## Interactive Shadow

[Herndon 1992]



## Virtual Tricoder

[Wloka 1995]



## Step WIM

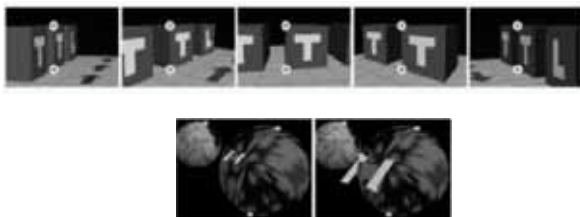
[Laviola 2001]



## Others

## Through-the-lens camera control

[Gleicher 1992]



## Go Go interaction

[Poupyrev 1996]

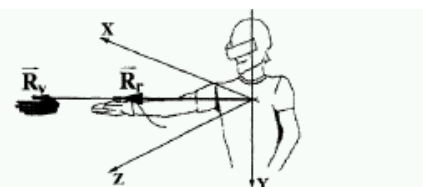
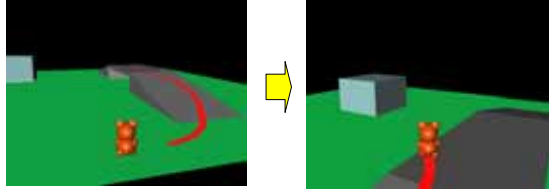


Fig. 1: Position of real hand is defined by vector  $\vec{R}_r$ ; position of virtual hand is defined by vector  $\vec{R}_v$ .

[..gogo.mpeg](http://gogo.mpeg)

## Path Drawing [Igarashi 98]

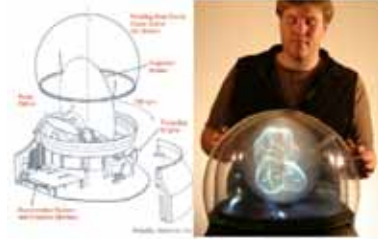


- 3D navigation by drawing the intended path

[..navi.mpg](#)

## 3-D Volumetric Displays

[Grossman 2004]

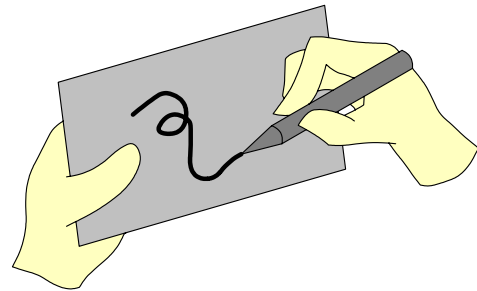


[volume.avi](#)

- 3D manipulation with both hands

## Sketching in 3D

## 3 - Draw [Saches 91]



## Freeform

[SensAble Tech.]

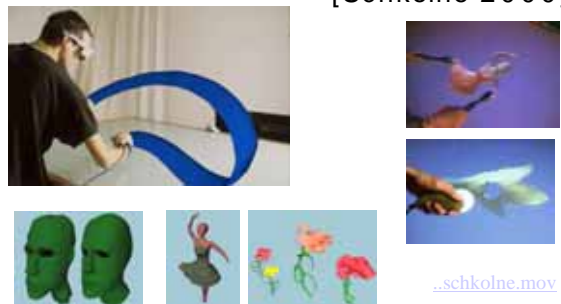


力学フィードバック付3次元入力デバイスでモデリング

[..paint.avi](#) [..smooth.avi](#)

## SurfaceDrawing

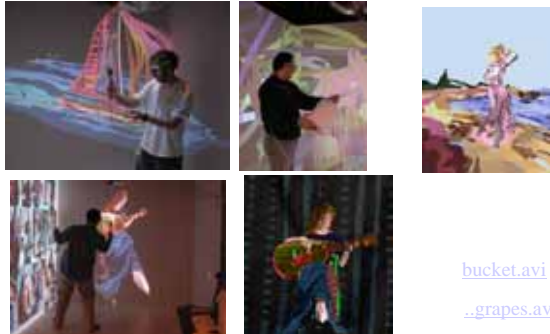
[Schkolne 2000]



[..schkolne.mov](#)

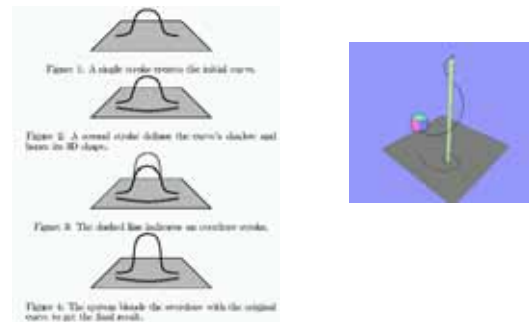
## CavePainting

[Keefe 2001]

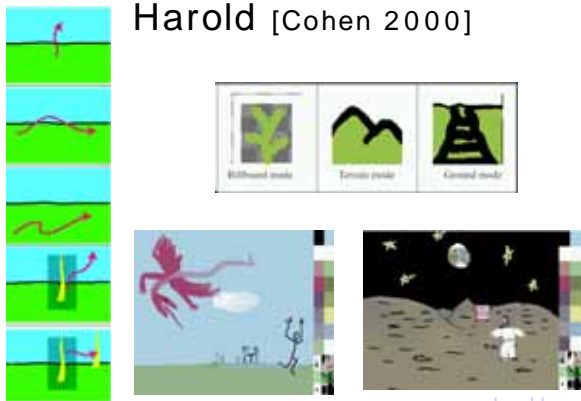


[bucket.avi](#)  
[\\_grapes.avi](#)

## 3D Curves [Cohen 99]

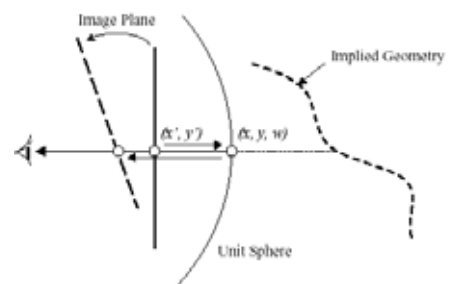


## Harold [Cohen 2000]



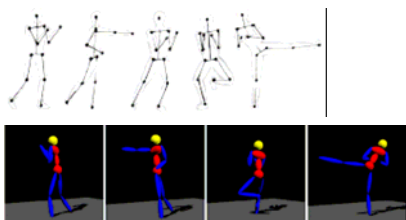
[\\_harold.mov](#)

## Projective Strokes [Tolba 99]



[\\_sketchapp-modified](#)

## Posing [Davis 03]



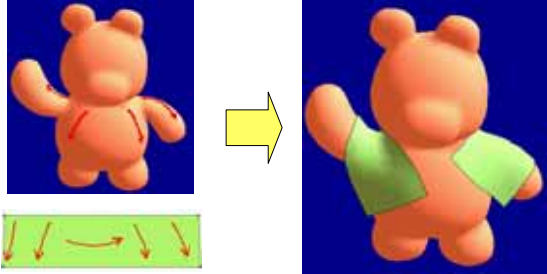
- 棒人間で3次元ポーズを指定する

[\\_Davis03.avi](#)

その他

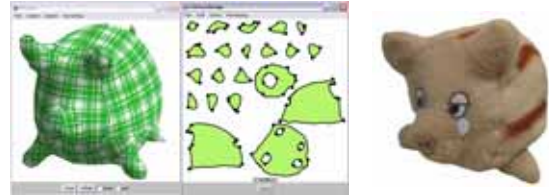
## Clothing Manipulation

[Igarashi 2002]



## Plush-toy Design

[Mori 2007]



..plushie.mp4

## Spatial Keyframing

[Igarashi 2005]



## 中身のつまった 3次元モデルの作成手法 [Owada 2004]



S. Owada, F. Nielsen, M. Okabe, T. Igarashi

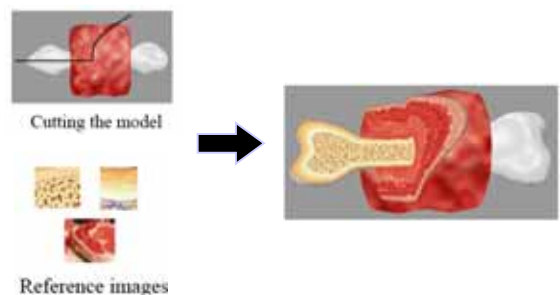
## やりたいこと



自由に切断できる3次元モデルを作りたい。

## 実現方法

断面の画像を毎回、計算で合成する。



..siggraph2004.mp4

## まとめ

3D用のインタラクションテクニックを紹介した。

現実をシミュレートすればよいわけではない。

計算機の機能を生かし、かつ人間の特性に  
あったようなインタラクションデザインが大切