


September, 8<sup>th</sup> Monday 2003 : "Physical interaction – Workshop on Real World User Interfaces"

Mobile HCI Conference 2003 in Udine

# Study of Tangible User Interface for handling tridimensional objects

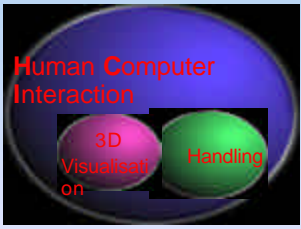
Ludovic GARREAU, Nadine COUTURE  
LIPSI-ESTIA (biarritz), LaBRI (bordeaux) France



TUI ESKUA Design

Sample

## Context



# Tangible User Interface

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## Outline

1. Presentation of TUI
2. Description of ESKUA
3. Specification and design
4. Example of theoretical ESKUA use

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## Tangible User Interface (1/3)

**Aim : provide control of digital information with real objects**

- Pioneers are Frazer 1983 and Aish 1979  
Aish R., "3D Input for CAAD Systems, Computer-Aided Design", 11 (2):66-70, Mar. 1979.
- MIT, tangible MediaLab  
B. A. Ullmer :Models and Mechanisms for Tangible User Interfaces, University of Illinois, 1995

Segal model : E. Sharlin et AL. 3D Computer interaction using physical objects: exploration of tangible user interfaces .Leonardo Electronic Almanac, 9, 7 (2001).

CADcast (MIT, 1999)

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## Tangible User Interface (2/3)

**Aim : provide control of digital information with real objects**

- exploit human sense of touch and kinesthesia
- Give physical form to digital information



- Choice of Artifact
- Link between action and result

Architectural Interpretation of 3D Models  
Anderson, D et AL. "Tangible Interactions and Graphical Interpretation: A New Approach to 3D Modeling", ACM SIGGRAPH, pps 383-402, July 2000


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# Tangible User Interface (3/3)

Aim : provide control of digital information with real objects



ActiveCube

Y. Kitamura and al : Real Time Interaction with ActiveCube, CHI 2001 Extended abstracts

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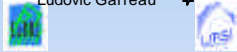
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# ESKUA Project

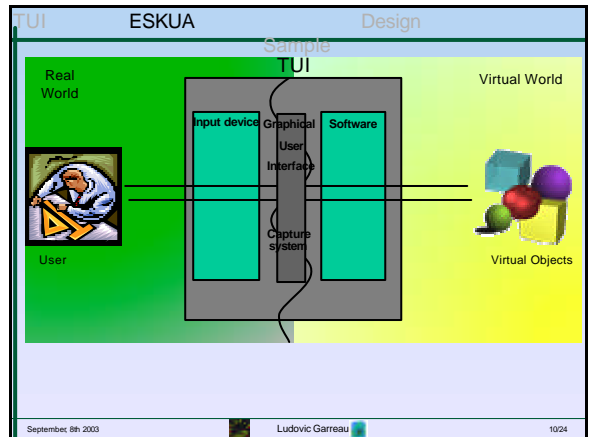
Pascal Guitton, Nadine Rouillon Couture, Jérémy Legardeur, Ludovic Garreau



Design and Create a **Tangible User Interface** to allow users to handle and assemble **virtual objects with real objects.**



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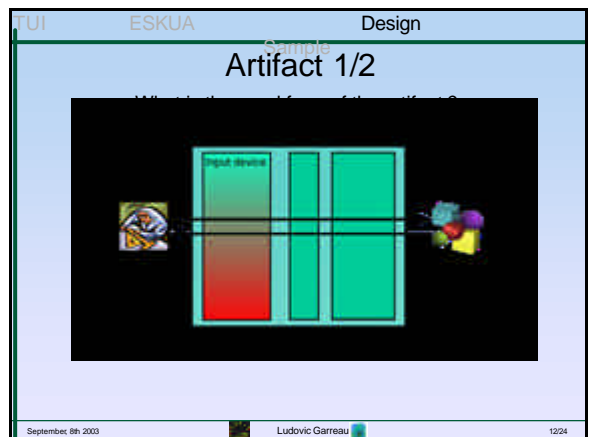
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## Artifact 2/2

Good form for handling and assemblage.

« Design for Assembly » (DFA)

J. Legardeur, A. C. F. and N. Couture.  
 Des interacteurs pour l'assemblage mécanique en CAO.  
 3rd International Conference Integrated Design and Production, CPI2003, Meknes, Maroc, 2003. - Block

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## Our Artifacts : "Interacteurs"

Interacteur ~ inter + to act on

### Typology interacteur

Size	Style	Material	Color/finish
Small (10mm)	1st serie	Alu.	Ch.
	2nd serie	Alu.	Ch.
	3rd serie	Alu.	Ch.
	4th serie	Alu.	Ch.
Medium (15mm)	1st serie	Alu.	Ch.
	2nd serie	Alu.	Ch.
	3rd serie	Alu.	Ch.
	4th serie	Alu.	Ch.
Large (20mm)	1st serie	Alu.	Ch.
	2nd serie	Alu.	Ch.
	3rd serie	Alu.	Ch.
	4th serie	Alu.	Ch.

### Fabrication process

- 1 Make plan with Catia (CAD software)
- 2 Machining with lathe
- 3 Machining with drilling machine

Large Medium Small

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## Link between real world and virtual

J. de la Rivière and P. Gaultier. Hand posture recognition in large display VR environments. In gesture Workshop, April 2003.

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## Software Architecture

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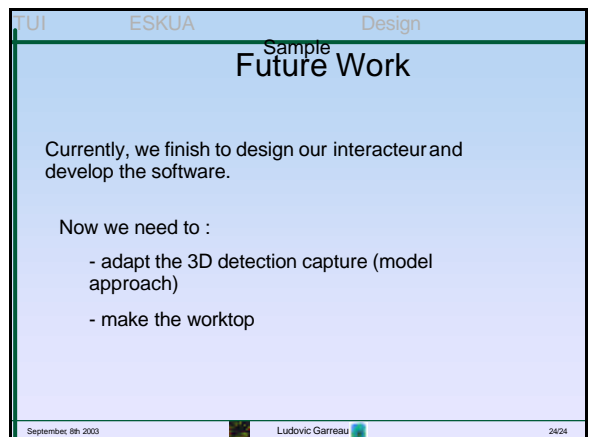
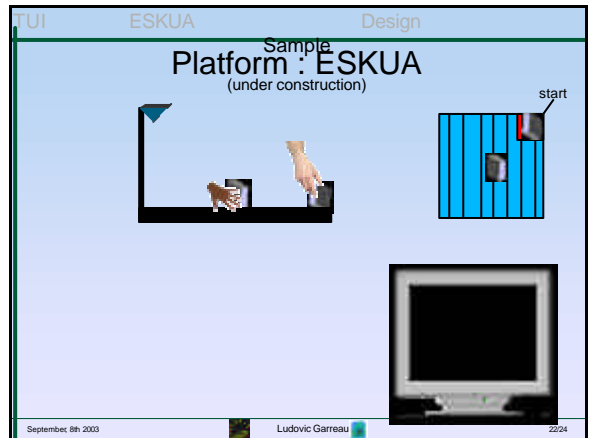
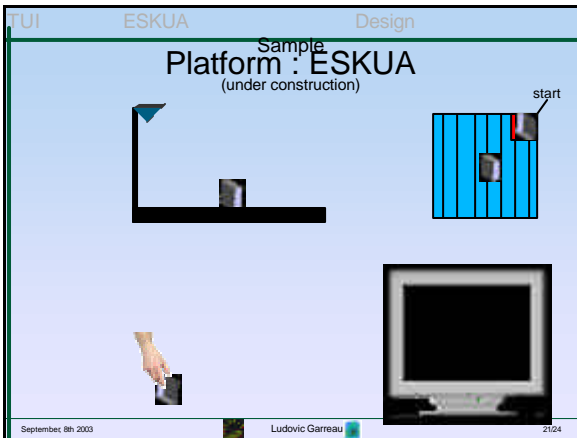
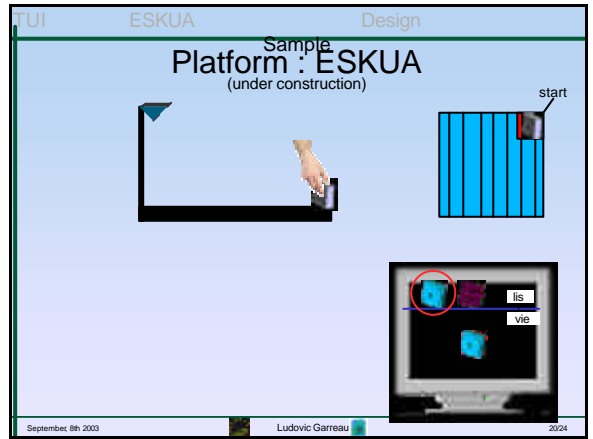
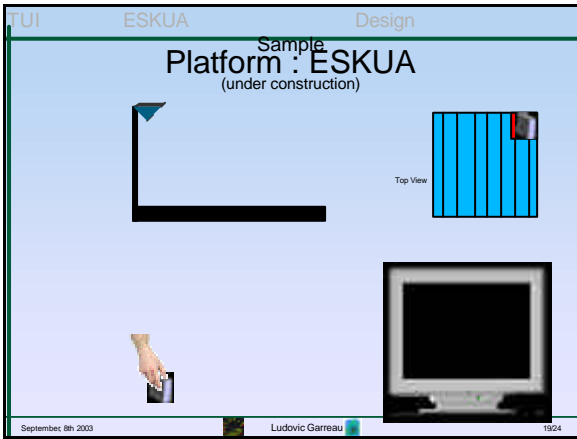
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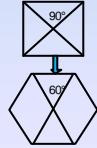
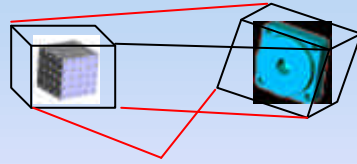
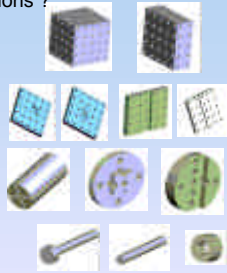
## Platform : ESKUA

(under construction)

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Questions ?



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### Sample Illustration

Logiciel de CAO

- Sélection avec la souris de S1
- Sélection avec la souris de S2
- Sélection avec la souris de l'action « coplanaire »
- Sélection avec la souris de S3
- Sélection avec la souris de S4
- Sélection avec la souris de l'action « coplanaire »
- Sélection avec la souris de S5
- Sélection avec la souris de S6
- Sélection avec la souris de l'action « jointes »

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