Designing Interactive Kinetic Surface for Everyday Objects and Environments

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1 Background
Background

Contemporary Objects and Spaces

Cloaked in surfaces where the *physical* and *virtual*, the real and the imagined, collide (Lupton 2002).
Ubiquitous computing (Weiser 1991)

Digital technology will eventually be woven into our environment seamlessly.

Organic Interaction Technologies: From Stone to Skin (Rekimoto 2008)

The surface of any object potentially provides interactivity.
Interactive Kinetic Surface

Integrate the *physical* and the *virtual* world more closely so that digital information can be offered *naturally* to us when we interact with a physical object or an environment.
2 Aims
Aims

1. **Definition & Model** for I.K.S.

2. **Requirements & Guidelines** for applying I.K.S. to everyday objects & spaces

3. **Design & Construct** Research Prototypes

4. **Explore Possible Interactions & Application Scenarios**

5. **Evaluation**
3 Approach
Research through Design (Frayling, 1993)

Research Artifacts (Zimmerman et al. 2007)

- Artifacts that provide concrete *embodiments* of *theory* and *technical opportunities*
- Produce *knowledge* for the design & HCI research and practice communities
- For the understanding of *Interactive Kinetic Surface as new design medium* for enhancing interaction between human and the artifacts
Interactive Kinetic Surface

What is it?
Interactive Kinetic Surface

- A surface that embodies *kinetic interactions*
- Translates embedded information into
  1) *physical* or
  2) *virtual* kinetic motion

  Physical Kinetic Surface
  Virtual Kinetic Surface
Interactive Kinetic Surface

Physical Kinetic Surface  Virtual Kinetic Surface

Examples Physical Kinetic Surface
Examples Virtual Kinetic Surface

[Images of various tools and interfaces demonstrating virtual kinetic surface technology]
Interactive Kinetic Surface

Why do we need it?
Motivation

More *Interactivity* with Less Complexity

More Space for *Design Expression*

Natural Interaction

Multi-Modalities for Interaction

More *engaging relationship* between people and the objects
Interactive Kinetic Surface

How can we utilize it for everyday objects and spaces?
Case study

Interactive Kinetic Surface

Physical Kinetic Surface

Virtual Kinetic Surface

- Modular construction units of Interactive Kinetic Surfaces
- Research tools to explore possible interactions and application scenarios of Interactive Kinetic Surface
- Design materials for everyday objects and environments
Case study  Kinetic Tiles

- Complex and massive *structure*
- Requires considerable *energy*
- Use of expensive and experimental actuators or surface *material*

**Simple & Flat**
Form Factor

**Energy Reducing**
Mechanism

**Cheap &**
Non-experimental
Material
Case study  Kinetic Tiles

Simple & Flat Form Factor

- Separating the surface material from the actuation part
- Actuators can be concealed behind the wall or other surface of objects

Energy Reducing Mechanism

- Bi-stable mechanism: actuators maintain the position without electricity

Cheap & Non-experimental Material

- Spandex & electromagnets
How to evaluate new interactions and interfaces which are not necessarily related to efficiency but rather related to emotional qualities, to experiential qualities, and to aesthetic qualities (Petersen, Hallnäs, & Jacob)
References

Books

Journal articles

Conference papers
References


Web pages