TANGIBLE, EMBODIED AND PERIPHERAL INTERACTION

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“Traditional” human-computer interfaces

Interaction with physical artefacts in everyday life
INTERACTION PARADIGMS INSPIRED BY INTERACTIONS IN THE PHYSICAL WORLD

➤ Inspired by physical movement and manipulation skills
  ➤ Graspable User Interfaces
  ➤ Tangible User Interfaces
  ➤ Tangible Interaction
  ➤ Embodied Interaction

➤ Inspired by attention management skills
  ➤ Calm technology
  ➤ Peripheral Interaction
GRASPABLE USER INTERFACES

➤ “Allow direct control of electronic or virtual objects through physical handles for control”


http://www.youtube.com/watch?v=V-TGEe-Imro
TANGIBLE USER INTERFACES


http://www.ikea.com/PIAimages/21167_PE106157_S5.jpg
TANGIBLE USER INTERFACES

TANGIBLE USER INTERFACES

“Give physical form to digital information, and employ physical artifacts both as representations and controls for computational media”

TANGIBLE USER INTERFACES

GUI (graphical user interface)

TANGIBLE USER INTERFACES

GUI (graphical user interface)

TUI (tangible user interface)

TANGIBLE USER INTERFACES

TANGIBLE USER INTERFACES

➤ 5 strengths of tangible interaction (Shaer & Hornecker, 2009)
  ➤ Collaboration
  ➤ Situatedness
  ➤ Tangible Thinking
  ➤ Space-Multiplexing and Directness of Interaction
  ➤ Strong-Specificness Enables Iconicity and Affordances

TANGIBLE USER INTERFACES

➤ Limitations of tangible interaction (Shaer & Hornecker, 2009)
  ➤ Scalability
  ➤ Risk of loosing objects
  ➤ Versatility & Malleability
  ➤ User fatigue
  ➤ ....

TANGIBLE USER INTERFACES

➤ Application domains

➤ Learning
➤ Problem solving and planning
➤ Information visualisation
➤ Tangible programming
➤ Entertainment, play and edutainment
➤ Music and performance
➤ Social communication
➤ Tangible reminders and tags

BEATBEARING

- Spatial
- Symbolic
- Dynamic binding
- Tangible Thinking
- Space-Multiplexing and Directness of Interaction


http://www.beatbearing.co.uk/

http://vimeo.com/19796259
TOPOBO

- Constructive
- Symbolic
- Collaboration
- Tangible Thinking
- Strong-Specificness Enables Iconicity and Affordances

TANGIBLE & EMBODIED INTERACTION

➤ Tangible interaction
  ➤ “Relies on tangibility and full body interaction and gives computational resources and data material form”

➤ Embodied interaction
  ➤ “The creation, manipulation and sharing of meaning through engaged interaction with physical artifacts”


SHAPE CHANGING INTERFACE

Exploring Interactions with Physically Dynamic Bar Charts

Faisal Taher 1
John Hardy 1
Abhijit Karnik 1
Christian Weichel 1
Yvonne Jansen 2
Kasper Hornbaek 2
Jason Alexander 1

1 Lancaster University, UK
2 University of Copenhagen, Denmark


https://www.youtube.com/watch?v=UC6l6dy04zI
WRAP-UP TANGIBLE & EMBODIED INTERACTION

- Inspired by human physical movement and manipulation skills
- Suitable in various application domains such as:
  - office work
  - education
  - musical performance
  - gaming
  - ....
INTERACTION PARADIGMS INSPIRED BY ATTENTION MANAGEMENT SKILLS

- Calm technology
- Peripheral interaction
Everyday activities take place in the *periphery* and in the *center* of attention.

Interactive devices are usually designed to be in the *center* of attention (i.e. ‘focused interaction’).

Can we design interactive systems such that they can also be used in the *periphery* of attention? (i.e. ‘peripheral interaction’).
a ‘predecessor’ of peripheral interaction

“Technology that engages both the center and periphery of our attention and in fact moves back and forth between the two”


Interaction with computing technology that takes place in the **periphery** of attention and **shifts** to the **center** of attention when relevant for or desired by the user.

Peripheral interaction encompassed both **perception** and **physical** interaction.
WHY PERIPHERAL INTERACTION NEXT TO FOCUSED INTERACTION?
WHY PERIPHERAL INTERACTION NEXT TO FOCUSED INTERACTION?

- Computing technology is becoming omnipresent in everyday life: we can impossibly interact with all these technologies through focused interaction.
- Inevitably, we will interact with many technologies in our periphery of attention.
- This can be anticipated in interaction design for everyday life.
- Peripheral interaction aim to fluently embed interactive technology in people’s everyday life routines.
EVERYDAY ACTIVITIES TAKE PLACE IN THE
PERIPHERY AND IN THE FOCUS OF ATTENTION

INTERACTIVE DEVICES ARE USUALLY DESIGNED
TO BE IN THE FOCUS OF ATTENTION ...
... OR, INTERACTIVE DEVICES ARE DESIGNED TO OPERATE OUTSIDE THE ATTENTIONAL FIELD OF THE USER
focused attention

outside attentional field
PERIPHERY OF ATTENTION
focused interaction
- center of attention
- conscious
- intentional
- direct precise control

peripheral interaction
- periphery of attention
- subconscious
- intentional
- direct imprecise control

implicit interaction
- outside attentional field
- subconscious
- unintentional
- no direct control
focused interaction
center of attention
conscious
intentional
direct precise control

peripheral interaction
periphery of attention
subconscious
intentional
direct imprecise control

implicit interaction
outside attentional field
subconscious
unintentional
no direct control
FIREFLIES
PERIPHERAL INTERACTION IN THE CLASSROOM
With: Pengcheng An, Berry Eggen, Elise van den Hoven, Ruurd Taconis

https://media.libelle.nl/m/n9p817riy2hk_home_landscape_to_p_article_1260x650.jpg
FIREFLIES
PERIPHERAL INTERACTION IN THE CLASSROOM
With: Pengcheng An, Berry Eggen, Elise van den Hoven, Ruurd Taconis
WRAP-UP PERIPHERAL INTERACTION

• Inspired by human attention management skills

• Suitable in various application domains such as:
  • Information display
  • Office work
  • Education
  • Smart homes
  • ....
THANK YOU FOR YOUR ATTENTION

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