Educational Interfaces Beyond Traditional UIs

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www.embeddedinteractions.com 15.12.2017
Indian Institute of Technology (IIT) Guwahati
Human Computer Interaction (HCI)

- ICT for Development (ICTD)
- Virtual Reality
- Input interactions for flexible and deformative interactions

User group: Low educational & technology literacy; users of resource constrained regions
Embedded Interaction Lab
Embedded Interaction Lab

Empowering Maternal Healthcare

blood

1. Red blood that circulates through the body helps carry oxygen to the tissues of the body.

2. Symptoms of blood disorders:
   a. Fatigue
   b. Anemia
   c. Infections
   d. Risk of infections

3. They are your blood vessels would have frozen solid
Educational Interfaces Beyond Traditional UIs
- What and Why on Traditional UIs (in the context of education)

- Few projects exploring non-traditional user interactions

- Common characteristics of non-traditional user interactions
  - 5 characteristics that define interventions beyond traditional UIs
  - Principles those strengthen the characteristics and interventions

- Brief overview of the methodology
Traditional Screen User Interfaces (UIs)

Non-natural methods of input & user interactions

Often passive mode of learning and education

Limited to education and less significance in skill development

Non or less activity centered approach

*representative image of screen user interface
Aim is to educate about colours, shapes and basic structures
User group: differently abled children
Aim is to educate about basic financial transaction and monetary calculations
User group: differently abled children
Aim is to develop gross and fine motor skills
User group: differently abled children
Mobile-based user interactions in school education

Body-mediated
Cross-device interactions
Multi-device interactions
Magnet-based interactions
What are the common characteristics in these projects?
Digital – Physical Coupling

Physical representations are computationally coupled to underlying digital information

Coupling of physical representations to underlying digital information
Digital – Physical Embodiment

Physical representations are embodied with digital information

Embodiment of digital information to physical representation/representational objects
Embodiment of Physical Representations to Control

Physical representations embody mechanisms for interactive control

The physical representations of TUIs function as interactive physical control
Physical inputs & its relationship with others

Relationship between the sequence, adjacencies or other logical relationship between systems of physical objects are mapped and interpreted by computational system.

The position, sequence and orientation of the physical object play an important role to interpret the output mechanism from computational system.
Mechanism for Interactive Control

Embodiment of mechanism for interactive control with tangible representation

Actions supported by the objects are based on well understood actions related to the object. *e.g. if bottle is chosen, then opening a bottle with a cork is well understood action*
How to strengthen these characteristics & interventions?
Visibility indicates crucial distinctions, the mapping between intended actions and actual operations.
The term *affordance* refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used thus providing strong clues to the operations of things.
**Mapping** is a technical term meaning the relationship between two things, for our case between the controls and their movements and the results in the world.

Consider an example – You steer right, it moves *Left* and you steer left, it moves *Right*.

**Good mappings** – *determining legible* relationships between actions and results, between the controls and their effects, and between the system states and is visible.
Mapping

A  B  C  D
Constraints

The surest way to make something easy to use, with few errors, is to make it impossible to do otherwise - to constrain the choices.

Want to prevent people from inserting batteries or memory cards into their cameras the wrong way, thus possibly harming the electronics? Design them so that they fit only one way, or make it so they work perfectly regardless of how they were inserted.
Constraints
Constraints
3 stages of interactions

Defining Input interactions
- Choice of technology platform (e.g. interactive tabletop, standalone etc.)
- Choice of potential input device (e.g. cube, realistic objects such as toys etc.)
- Choice of interaction fidelity (e.g. realistic, magical etc.)

User interactions
- Interface component selection method (e.g. grab, point, presence etc.)
- Interface component manipulation method (e.g. rotate, drag-drop etc.)

User interfaces
- Choice of UI elements (e.g. system specific, module specific, content specific etc.)
- Placement and access of UI elements

Further process of UI design (information architecture, task flows, wireframes etc.)
Thank You