mixed reality
&
(tactile and) tangible interaction

Anastasia Bezerianos
&
Jeanne Vezien

about me

- Professor in Paris-Saclay
  - contact: anastasia.bezerianos@universite-paris-saclay.fr
  - web www.lri.fr/~anab
- Research
  - novel technologies
    - very large displays, very small displays, their combinations
    - touch and tangible interaction
    - augmented reality
  - collaboration using these technologies
  - information visualization in these environments

class housekeeping

material & contact

Class material & assignments in **e-campus**

- To register, go to https://ecampus.paris-saclay.fr/
  at the bottom is a search bar “Rechercher des cours”
- search **2024 [HCI/HCID] Mixed Reality and Tangible Interaction**
- one of the results should be our class and its description
- click on the class name, you can register to it, using the button “M'inscrire"at the bottom of the page
- https://ecampus.paris-saclay.fr/course/view.php?id=155375

How to contact Anastasia & Jeanne

- e-campus Open Forum (under General Info)
- email: in the subject add **[MR+TI]**, allow 24-48h

class evaluation

- group project combining both AR+TUI
  - presentation / demo
  - mini report (2 pages) + image
  - video
- class participation
  - 1 paper presentation
  - Peer-feedback for final project presentations

Paper Presentation

In groups of 2 (or alone), you will present 1 research paper in the fields of **AR, TUI, Touch, Fabrication for TUI** or **UbiComp** from this list.
https://tinyurl.com/467w7jem

Please take some time in the break to read the titles of the papers and volunteer.

Presentations will happen between week 2-6, with 3 presentations per week max (if all spots are taken for the week you want, take another).

Volunteers for next week ???

Paper Presentation Evaluation

Presentations should be **10min long (+ 5min on questions)**
We'll be looking for the quality of:

- Explanation of the motivation behind the work
- Explanation of approach taken (details)
- Description of how the work was evaluated/validated (if applicable). If one does not exist, comment on what could serve as an evaluation/validation.
- Your personal critique of the work (+/-)
- Preparation (on time, slide quality, clarity, question answering, etc)

Some polls / questions

Do you have a recent (<5 years) smart phone with a touch screen and camera?

Do you have a desktop with an external camera that can be moved around?

Do you not have any of the above?

(Project) more info soon

2 people (if needed 3)

Combine

tangible objects and physical interaction

augmented views on real life

On week 3 - **19/11** you will upload a brief description of your pitch / what you plan to do (Project proposal) and we will give you feedback

Due on week 7 - **17/12/2024**

(demo + minireport + video)

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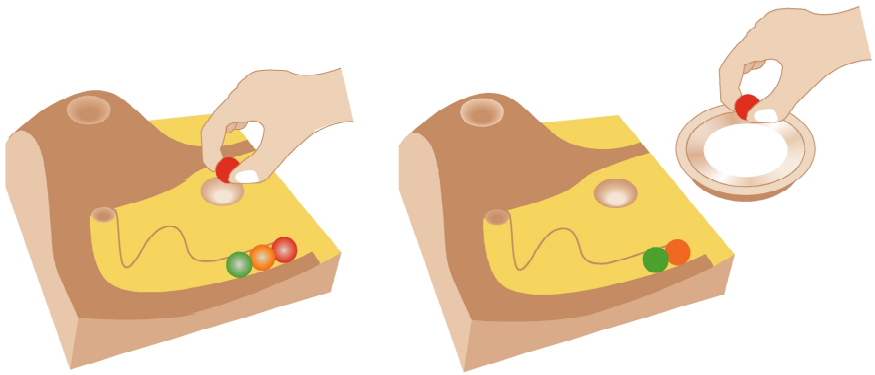
TUI & AR distinction?

tangible interaction

- input
- real objects a *medium* to interact with digital

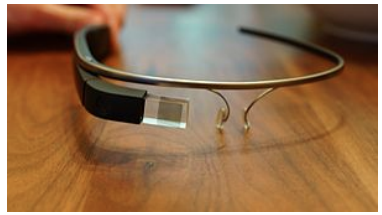


[Bishop, 1992]

augmented reality

- output
- real-life *view* augmented with digital channels

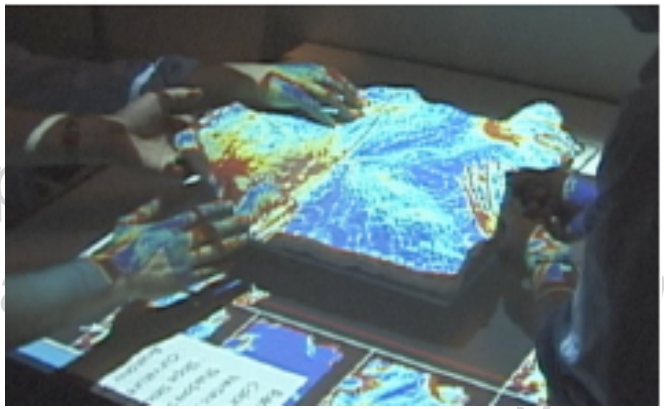
[Wikitude, 2008]



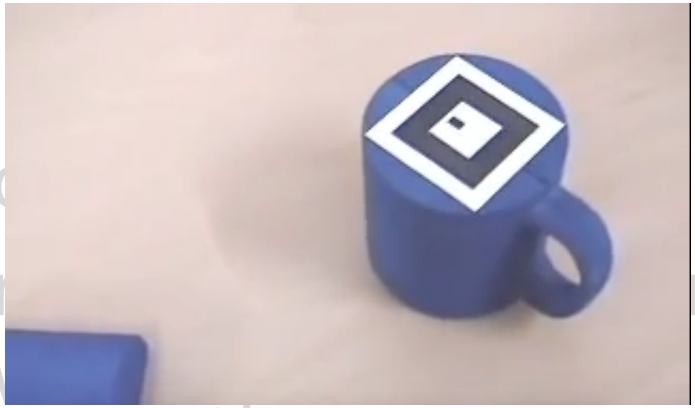
[GoogleGralss, 2011]

[Meta, 2024]

TUI & AR distinction?



[Illuminated Clay, 2002
http://youtu.be/tL449hP_H6A



[Augmented Foam, 2010]
http://youtu.be/Ym1vk0PV4Sw

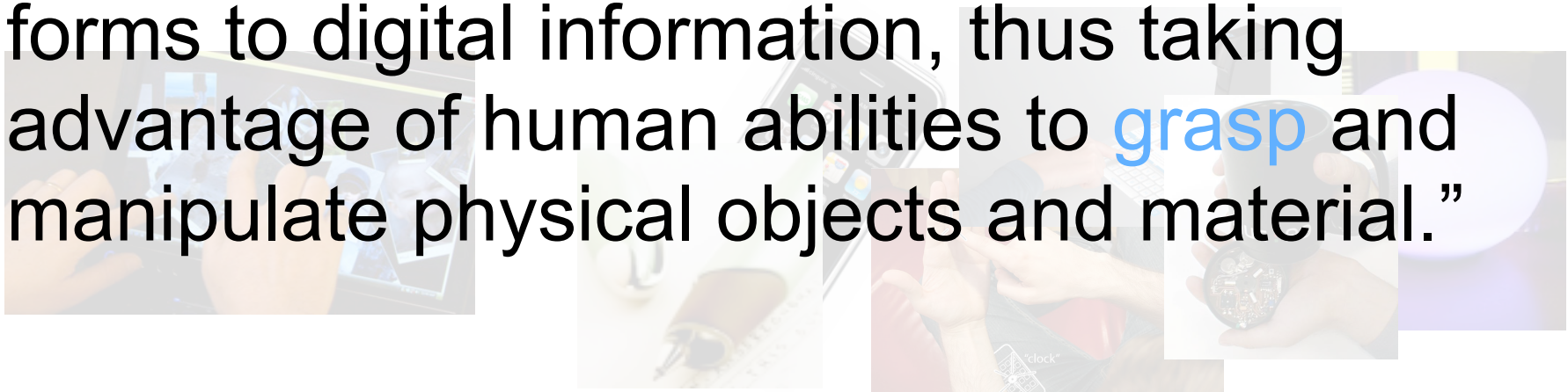
[Augmented Surfaces, 1999]
http://youtu.be/M-G3CeIlGs4

tangible interaction

tangible interaction

“A tangible user interface TUI is a user interface where users interact with digital information through the physical environment. [...]

The purpose of TUI development is to empower collaboration, learning and design by giving forms to digital information, thus taking advantage of human abilities to grasp and manipulate physical objects and material.”



WIKIPEDIA (01/2015) & I. ISHII, TANGIBLE BITS: BEYOND PIXELS. IN PROC. OF TEI ’08, 2008.

[Bishop, 1992]

http://vimeo.com/19930744

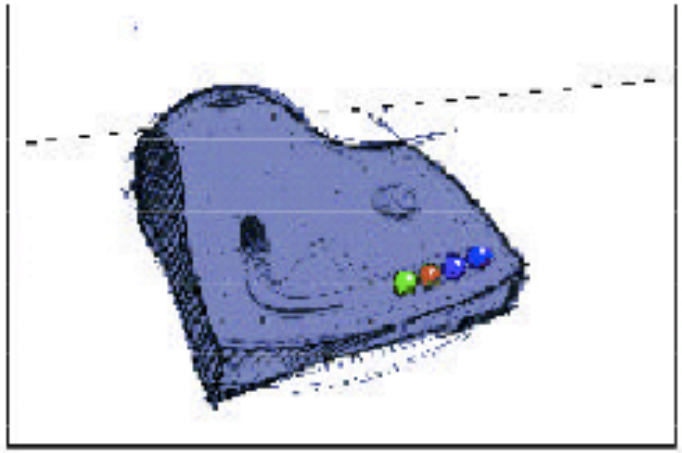
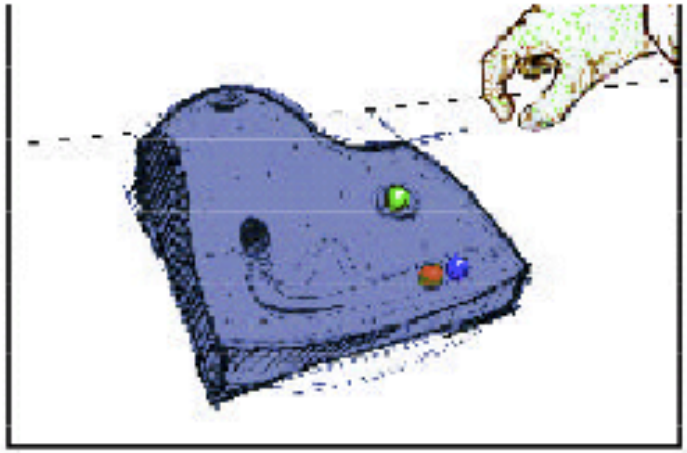


Figure 6.i Incoming messages await...



The user listens to a message... Figure 6.ii

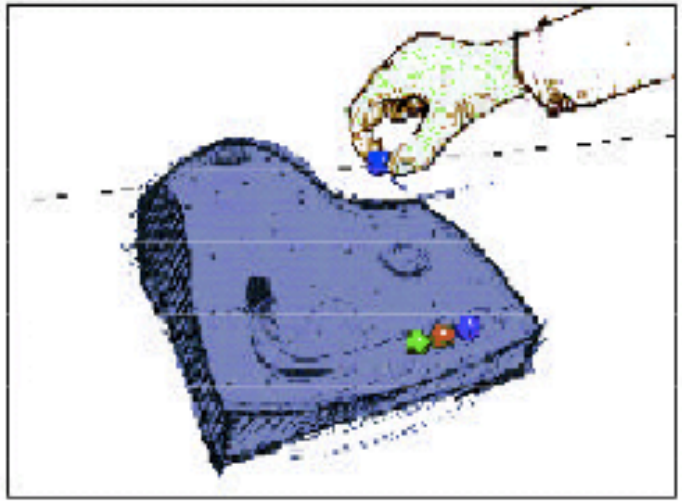
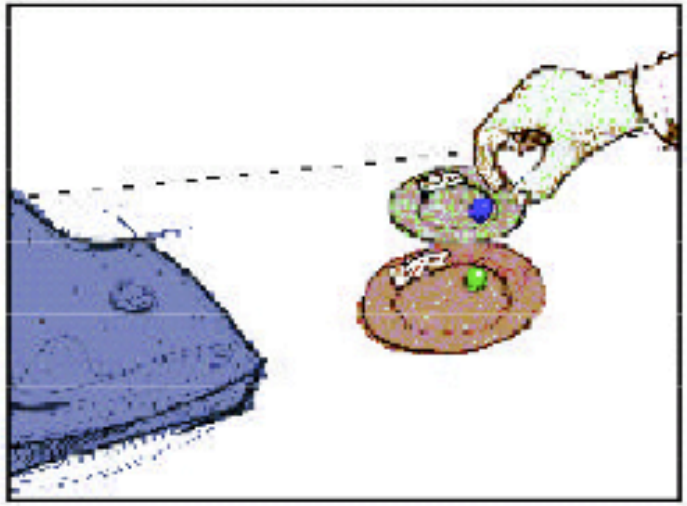
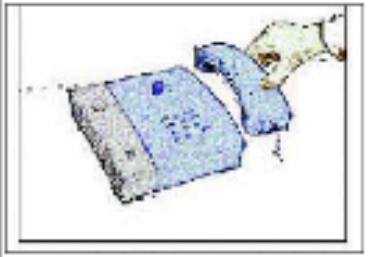


Figure 6.iii ...the user moves the message



...to each roommate's in-tray. Figure 6.iv

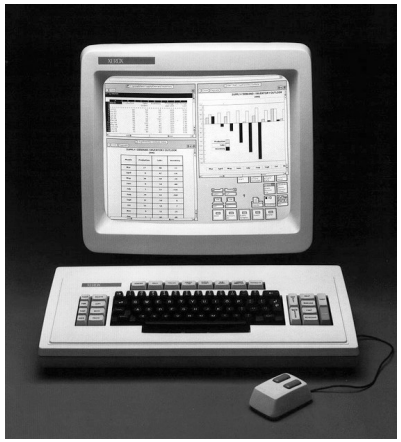


The answering machine physically instantiated incoming voice messages with marbles, which can then be selected and played back in any order. To listen to a message the user picks up a marble and adds it to a special play indentation on the machine. To call back to the person that left the message, the user picks up the marble and places it in a call back indentation on an augmented telephone. Then, the message can be deleted or the user can also choose to store messages, outside of the machine in a receptacle. In this way the user can categorize or organize messages for various people.

GUI vs. TUI [Ishii 2006]

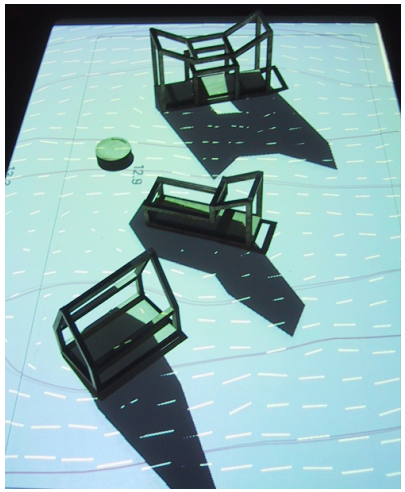
Tangible User Interface

- Tangible representation as interactive control to manipulate the information and computation
- Continuity between physical and digital representation in design



Xerox Star

vs



Sensetable

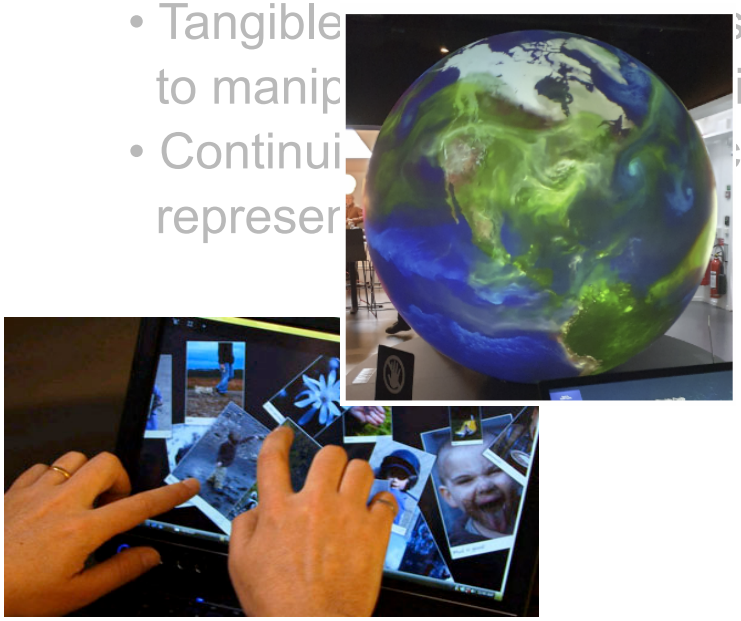
Graphical User Interface

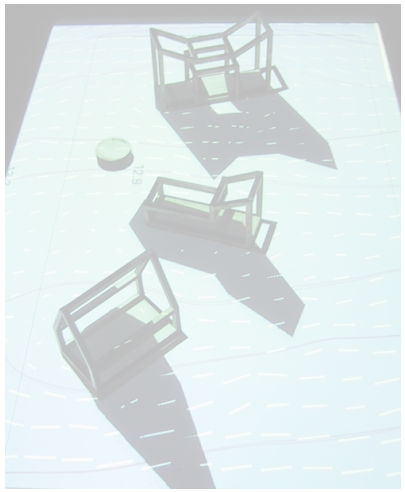
- Intangible representation (pixels on a screen)
- Generic input devices as “remote-controllers”

GUI vs. TUI [Ishii 2006]

Tangible User Interface

- Tangible … s interactive control to manip … ion and computation
- Continui … cal and digital represer …





Sensetable

Xerox Star

Graphical User Interface

- Intangible representation (pixels on a screen)
- Generic input devices as “remote-controllers”

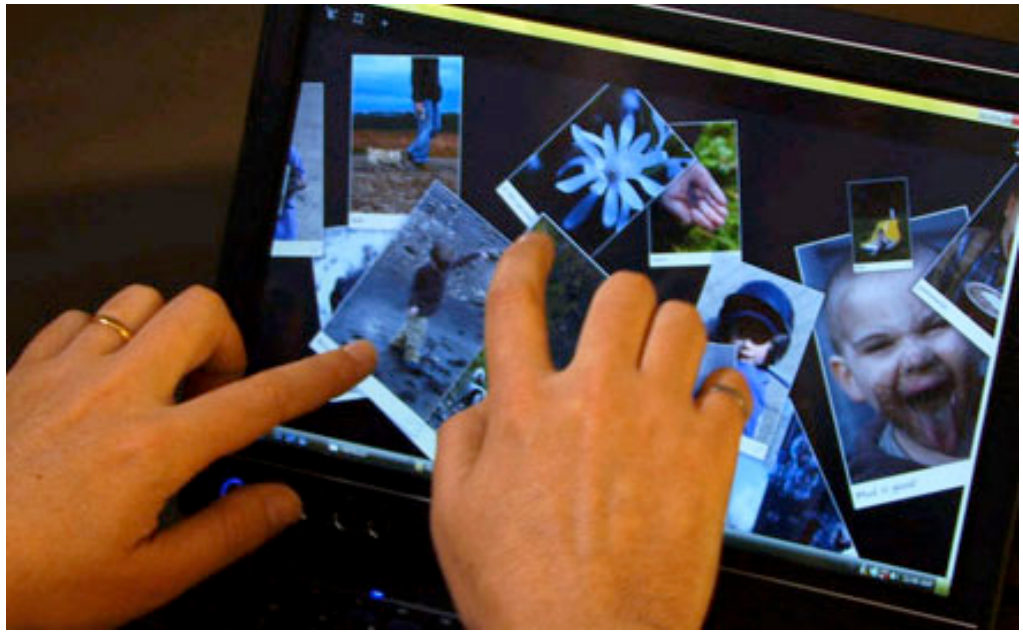
tangible interaction

physical objects & physical space

tangible interaction

physical objects & physical space

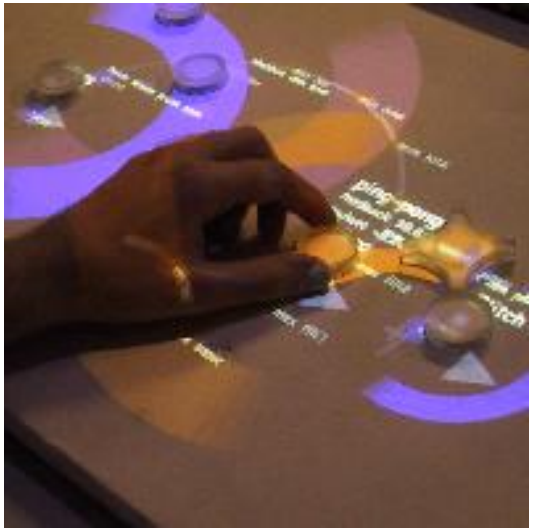
touch screens



tangible interaction

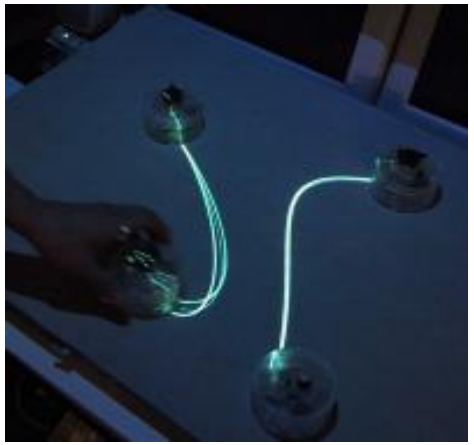
physical objects & physical space

tangible bits



Audiopad (James Patton)

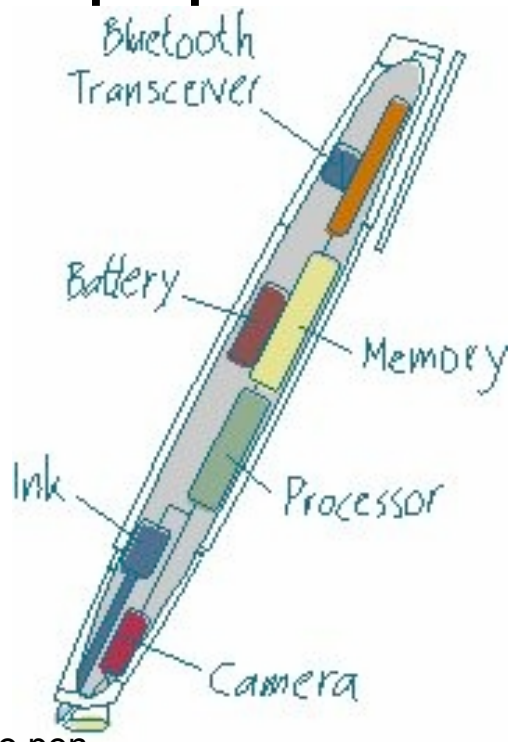
Sensetable (James Patton)



tangible interaction

physical objects & physical space

digital paper and augment paper

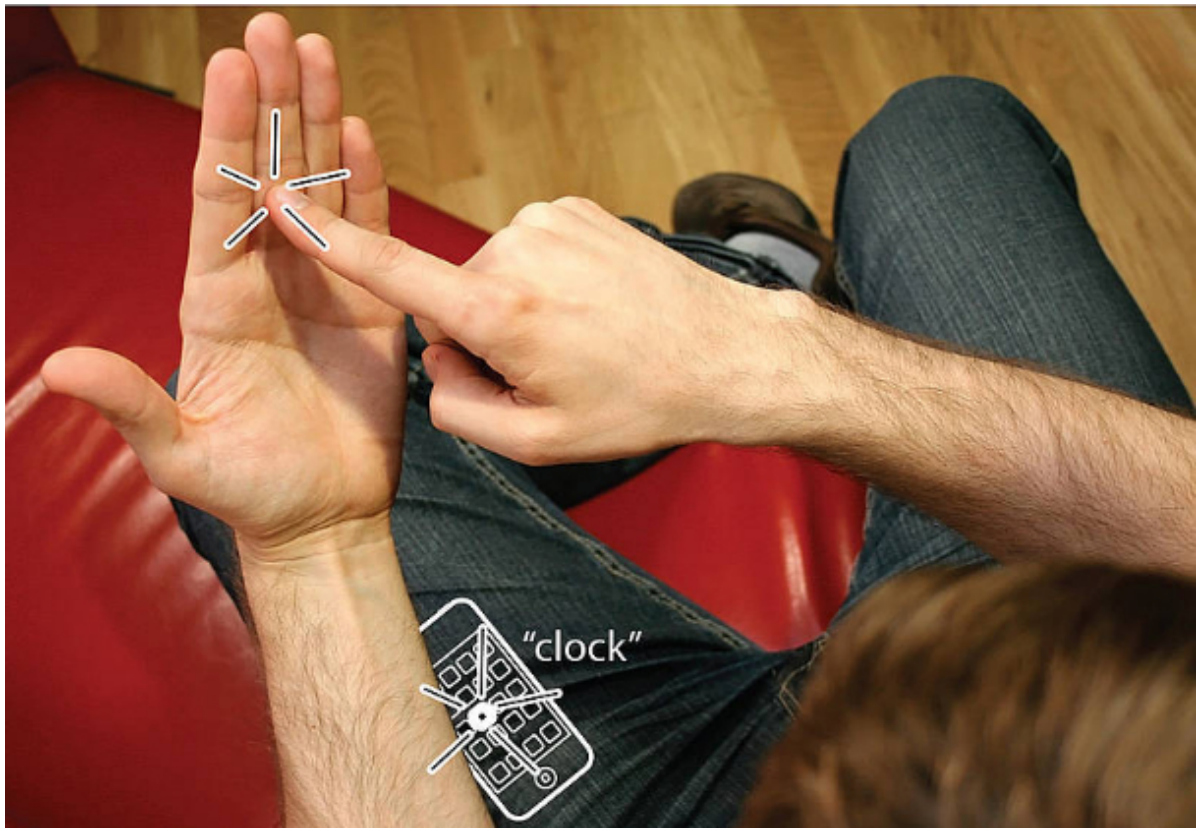


Anoto pen

tangible interaction

physical objects & physical space

on body



Sean Gustafson et al.

tangible interaction

physical objects & physical space

network of things (internet of things)

everything (Ubicomp)

UFO (concept) [© Yankodesign, 12]

The MediaCup [Gellersen et al., 99]

tangible interaction

physical objects & physical space

subtle (?) and around us

ambient

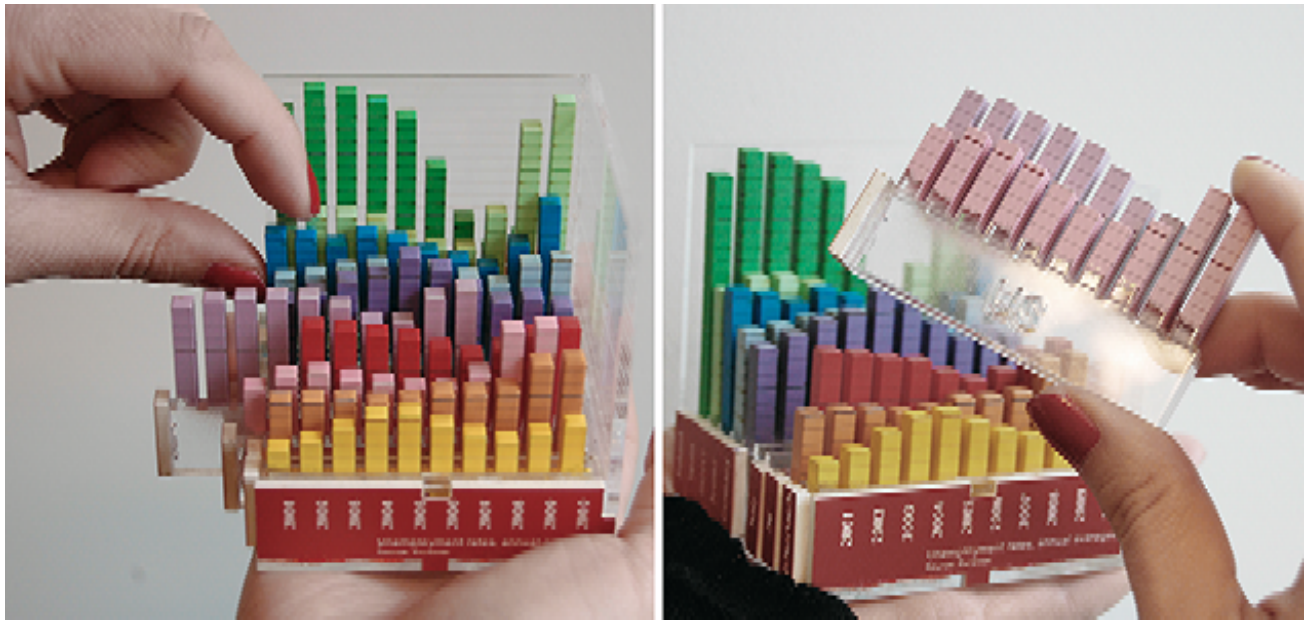
Ambient Orb - Stock Orb

Outdoor LED Cube HSC

tangible interaction

physical objects & physical space

fabrication



Yvonne Jansen et al.

tangible interaction

class goal

overview of the field (we will try ☺ …)

touch, tangibles, fab, ambient displays, UbiComp

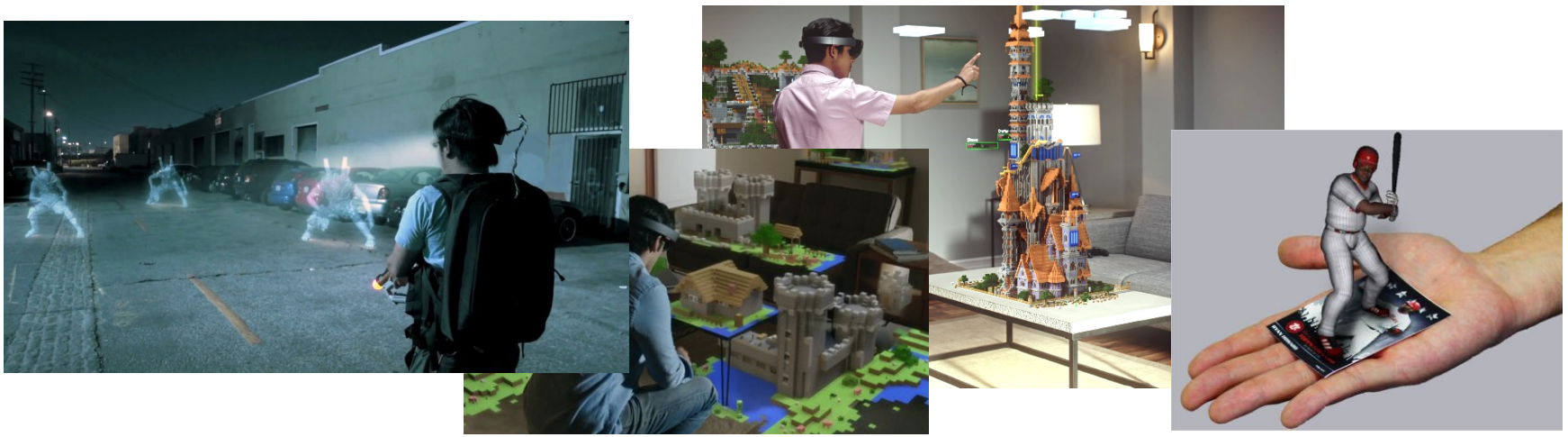
technology + interaction design

challenges

mixed reality reality

class goal

- Real/Virtual continuum
- 3D environment analysis & user capture
- Virtual content creation
- Challenges and technologies



class plan

Class intro and Tangible Interaction (week 1)
Technology for projects (week 2)
Tangible Interaction cont'd (week 3)
YOUR project description is due (week 3)
Augmented Reality Animé (week 4)
Tangibles / Ambient Displays / Fabrication (week 5)
Augmented Reality 3D (week 6)
Project presentations (week 7)