Lec 15

Interfaces

Interface Types, Natural User Interfaces, Choosing an Interface

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Talking Shoes

Let's build an app

Let's build a app

THE BEST INTERFACE IS
NO INTERFACE

BY

GOLDEN KRISHNA

https://www.youtube.com/watch?v=yQ4L7zCTG-M

What is an interface?

interface

/ˈɪntəfeɪs/

noun

1. a point where two systems, subjects, organizations, etc. meet and interact.
   "the **interface between** accountancy and the law"

2. **COMPUTING**
   a device or program enabling a user to communicate with a computer.
   "a graphical user interface"

User interfaces are the access points where users interact with designs

	Input		Output
device	microphone kb scanner	touch screen printer	
software	forms camera apps	word/excel notes	media players
modality	voice text sight gesturse		odor touch

Design an interface of a digital system that

Helps people keep track of their tasks

Using one of the following interfaces
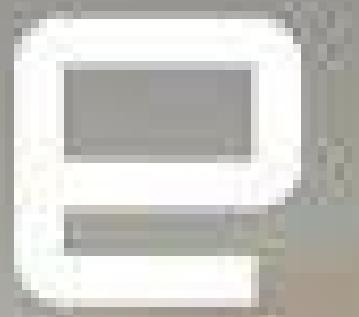
Command-line

~~CUI~~

Multimedia

VR

~~Website~~

~~Mobile Device~~

Appliance

Voice

Smart Pen

~~Touchscreen~~

Touchless

Haptic

Multimodal

Sharable

Tangible

AR

Wearables

Robots & Drones

Brain-Computer

Shape Changing

Holographic

"The Mother of All Demos"

Command Line
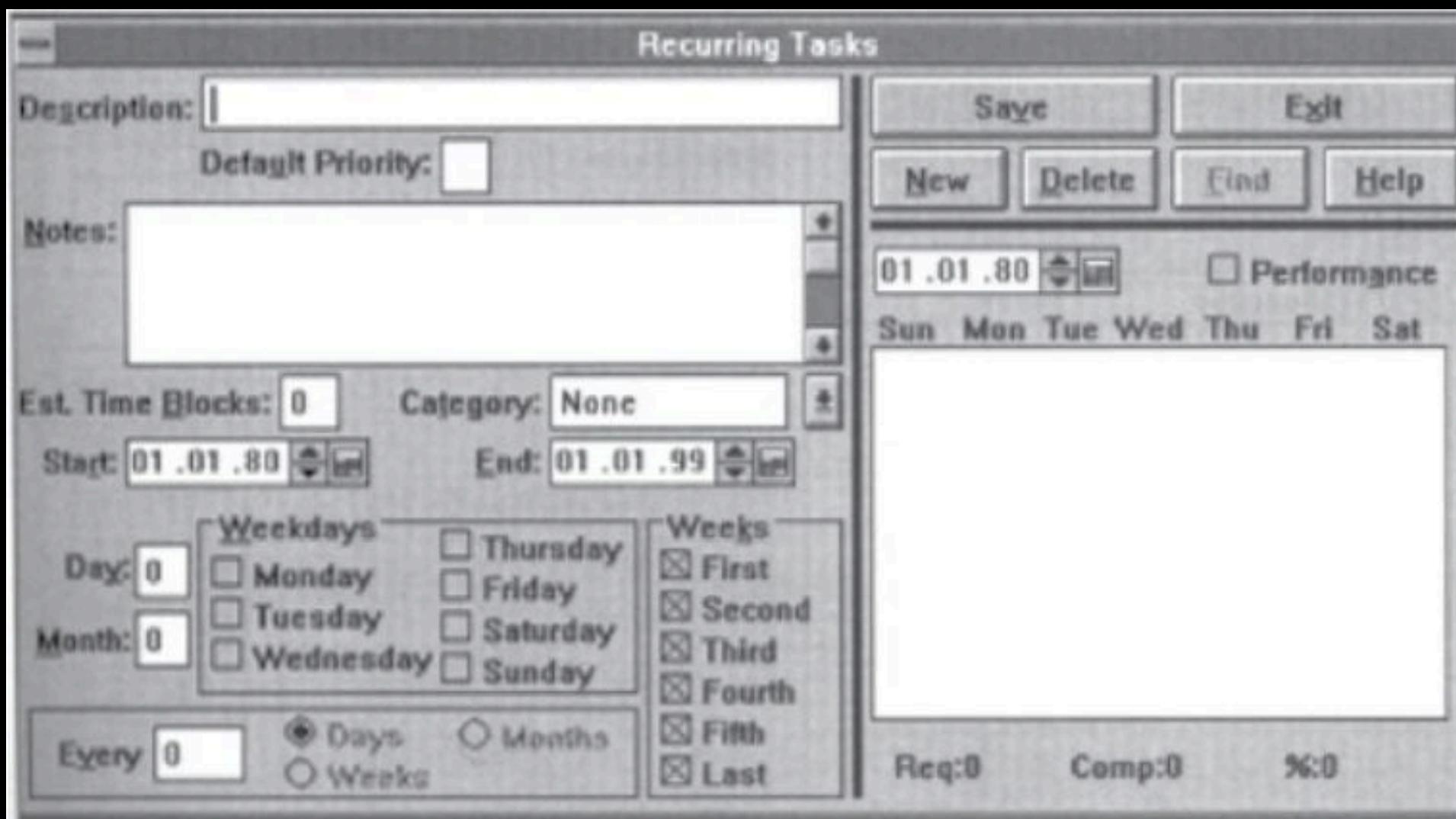
Notes

- Replaced by GUI
- Occasionally faster
- scripting for batch ops
- Power users (del 10k files)

Considerations

- Form of commands
- Syntax
- Organization

GUI

Notes

- WIMP: (windows, icons, menus, pointer)
- Same building blocks now
- Windows to overcome screen size
- Multiple Menu styles
- Icons used for objects metaphors

Considerations

- Window management
- Form design
- Menus terms
- Meaning of icons

Multimedia
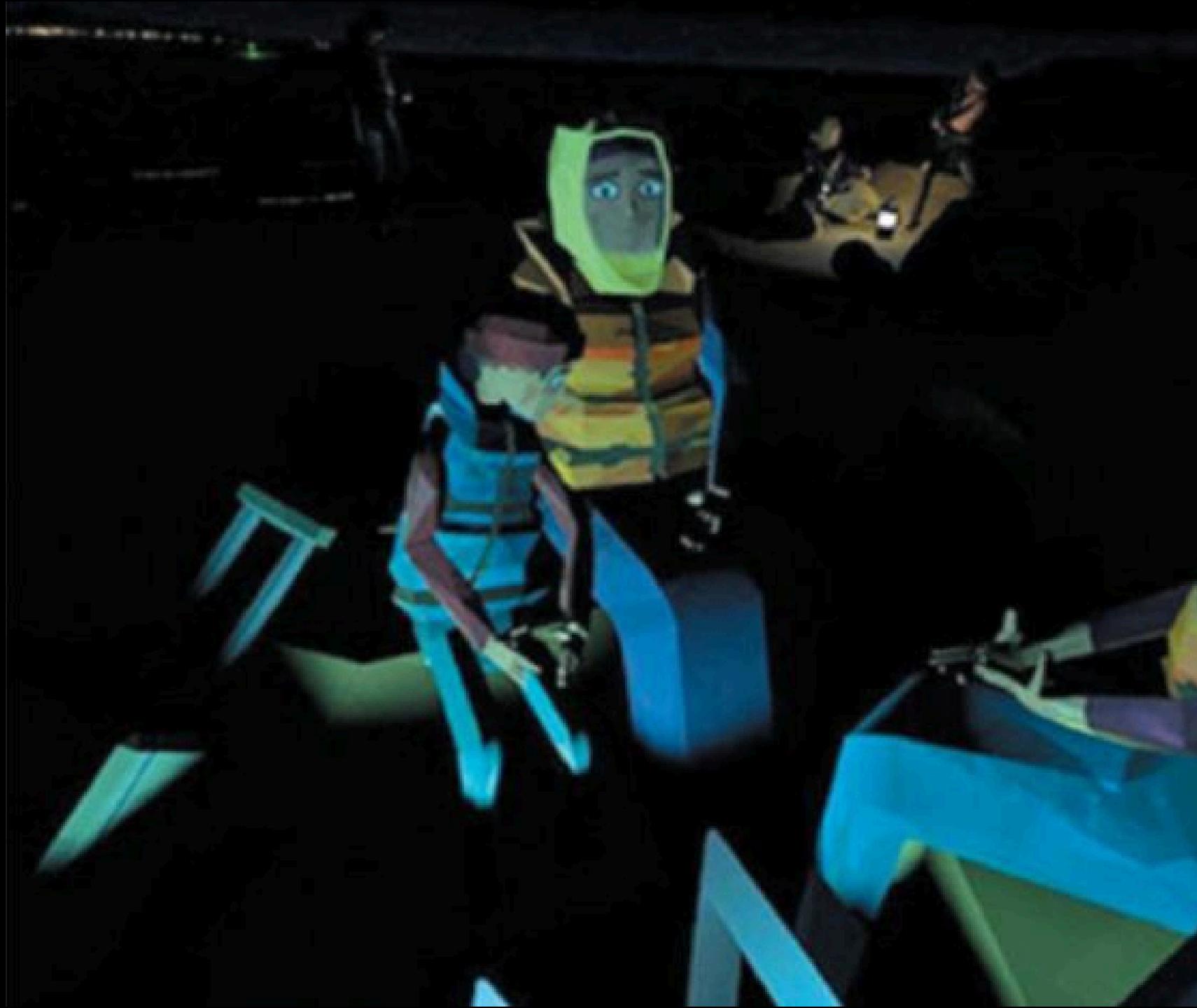
Notes

- Mostly for education and enterntainment
- Video, sound, images, interactivity, text ..

Considerations

- How to encourage people to interact with all aspects

Virtual Reality

Notes

- Since 1970
- reality-like experience
- different level of fidelity
- different viewpoints
- high degree of freedom

Considerations

- Used for simulation for danger situations
- Practice social skills
- Used for therapy
- simulator sickness
- Navigation
- Body presence

Appliances
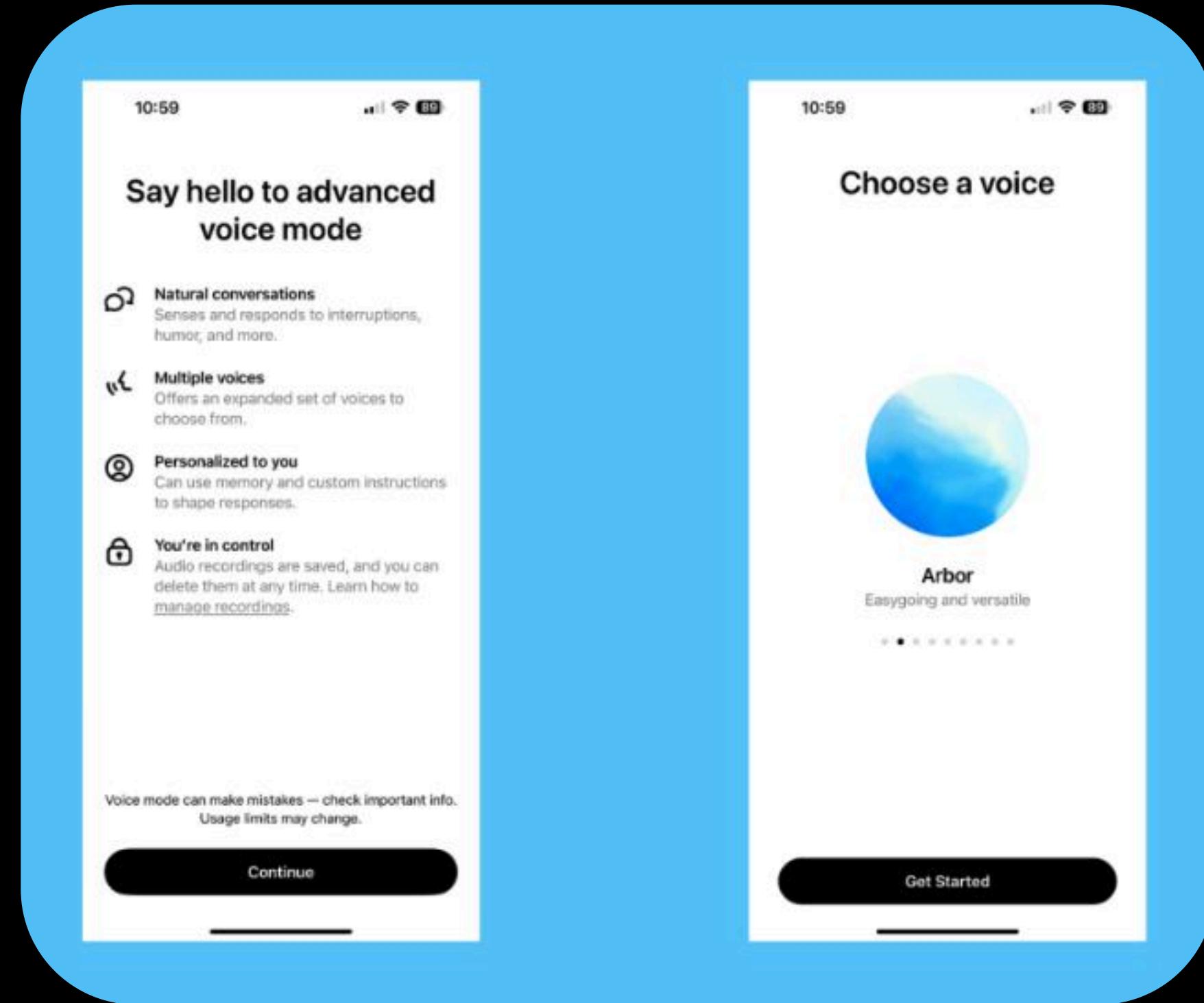
Notes

- everyday machines
- quick task to finish
- some are smart

Considerations

- transient: short interaction
- simplicity and visibility
- physical vs digital interface

Voice

Notes

- mishearing in the past
- now optimized with ML
- faster than typing
- call routing
- people interrupt (barge-in)
- struggle with children
- who is talking

Considerations

- natural
- gender
- flow of conversation
- responses

Pen

Notes

- use camera
- infrared
- good for annotations
- .. ?

Touchless

Notes

- moving arms, hands, etc.
- how can tech recognise
- used in operating rooms
- MS kinect

Considerations

- recognition of gestures
- mirroring peopel

Haptic

Notes

- Tactile feedback
- Tesla's vibrate when off-lane
- Remote communication
- Educational use
- Ultrahaptic (illusive touch)

Considerations

- gaming, smartphones
- effect on user experinece
- reaction speed
- when, where, how long?
- kind of buzz

Sharable

Notes
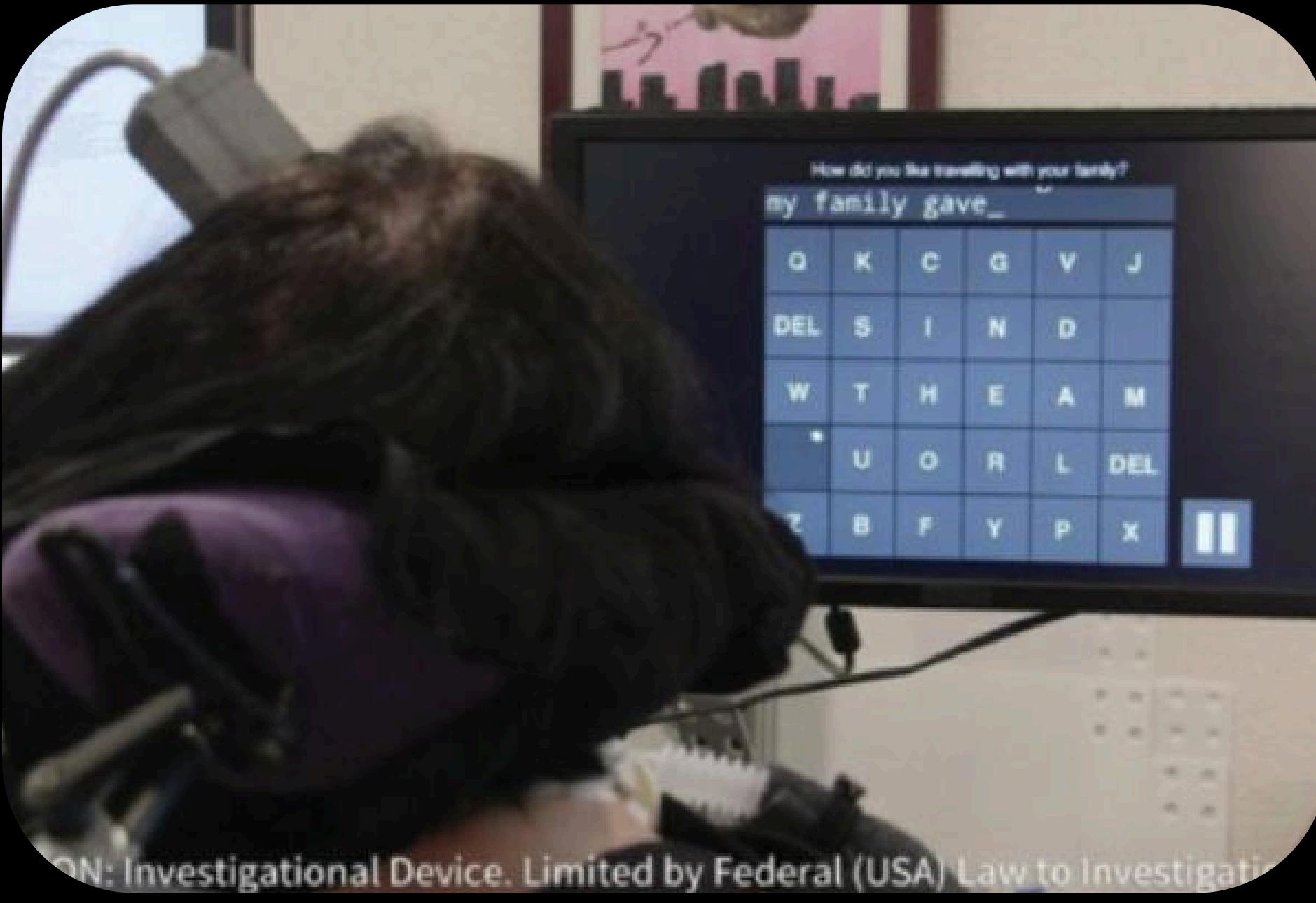
- Multiple people
- screens, boards, etc
- museums, galleries, design studios
- remote shared mode

Considerations

- past included electronic issues
- seamless interaction
- facilitate new forms of interaction
- indv vs shared exp

Brain–Computer Interfaces

Notes

- Detect changes in neural function
- BrainGate > control a robot arm and a mouse
- Also for entertainment
- BBI

Considerations

- privacy concerns
- helping paralyzed

Tangible

Notes
- sensor-based interaction
- Connected to computer
- good for children edu

Considerations
- coupling btw physical & digital
- feedback

Augmented Reality

Notes

- Got famous with Pokemon Go
- Started in medicine (x-rays overlay)
- used in Navigation
- Smart glasses
- complex instructions

Considerations

- Form & location of digital objects
- Concern of ads-noisy world
- a bit off

Robots and Drones
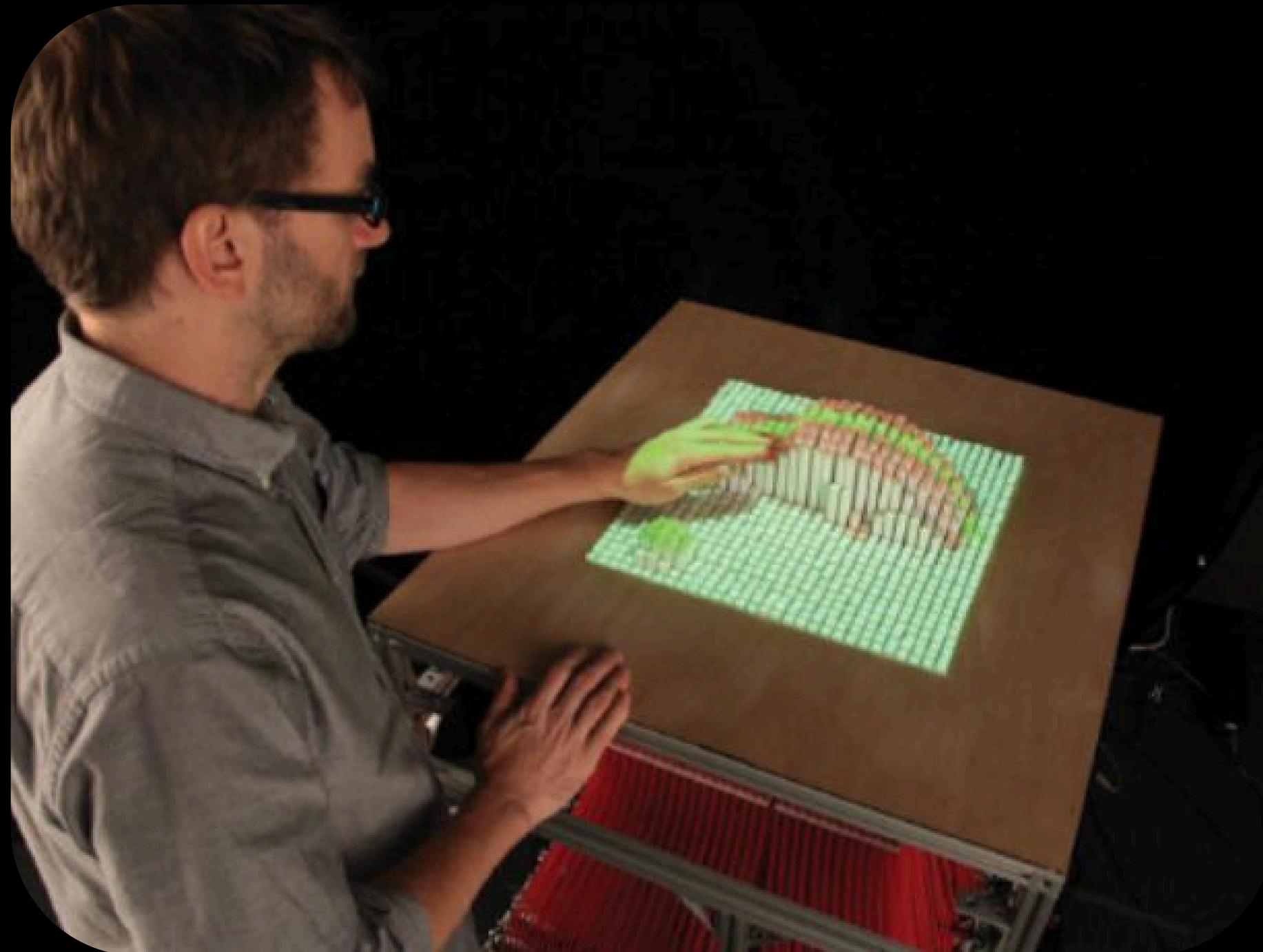
Notes

- conducting danger experiments
- different types of robots
- drones initially in military
- now help with agriculture

Considerations

- Humanizing effects
- privacy in drones
- Safety in drones

Shape Changing Interfaces

Notes
- physical-physical systems
- live shape forming

Considerations

- opts for data analysis
-

Multimodal

Notes

- Using different modalities
- assumed to be more efficient
- example: Kinect

Considerations

- recognition of diff human aspects
- what is gained from this different modalities

Natural User Interfaces

- **evolution of UIs**
- **NUIs = real-world interaction**
- **Is it easy? faucet example.**

Natural User Interfaces Are Not Natural

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Nielsen Norman Group, Northwestern University, KAIST Industrial Design | don@jnd.org

"I believe we will look back on 2010 as the year we expanded beyond the mouse and keyboard and started incorporating more natural forms of interaction such as touch, speech, gestures, handwriting, and vision—what computer scientists call the 'NUI' or natural user interface."
—Steve Ballmer, CEO Microsoft

Gestural interaction is the new excitement in the halls of industry. Advances in the size, power, and cost of microprocessors, memory, cameras, and other sensing devices now make it possible to control by wipes and flicks, hand gestures, and body movements. A new world of interaction is here: The rulebooks and guidelines are being rewritten, or at least, such is the claim. And the new interactions even have a new marketing name: natural, as in "Natural User Interface."

As usual, marketing rhetoric is ahead of reality.

Fundamental principles of knowledge of results, feedback, and a good conceptual model still rule. The strength of the graphical user interface (GUI) has little to do with its use of graphics: It has to do with the ease of remembering actions, both in what actions are possible and how to invoke them. Visible icons and visible menus are the mechanisms, and despite the well-known

problems of scaling up to the demands of modern complex systems, they still allow one to explore and learn. The important design rule of a GUI is visibility: Through the menus, all possible actions can be made visible and, therefore, easily discoverable. The system can often be learned through exploration. Systems that avoid these well-known methods suffer.

Gestural interfaces are not new. Gestures have been part of the interface scene since the very early days. Brad Myers' 1998 review describes work in the 1960s and reminds us that they were first commercially deployed in systems for computer-aided design and with the Apple Newton of 1992. Myron Krueger's pioneering work on artificial reality in the early 1980s was my first introduction to gestural interaction with large, projected images. Multiple-touch systems have been around since the 1980s: Bill Buxton's review correlates the date of the first multi-touch system designed for human-computer interaction with the 1982 M.S. thesis of Nimish Mehta. Specialized sensors for detecting human location and movement have long played a role in game design. Musical instruments are both multi-touch and gestural, and electronic input devices such as

drum pads and electric guitars extend these modes of mechanical interaction into the world of electronics. But even electronically mediated gestures are over a half-century old for musical instruments: The Theremin, a gesture-controlled electronic music synthesizer, was patented by its Russian inventor in 1928.

Most gestures are neither natural nor easy to learn or remember. Few are innate or readily predisposed to rapid and easy learning. Even the simple headshake is puzzling when cultures intermix. Westerners who travel to India experience difficulty in interpreting the Indian head shake, which at first appears to be a diagonal blend of the Western vertical shake for "yes" and the horizontal shake for "no." Similarly, hand-waving gestures of hello, goodbye, and "come here" are performed differently in different cultures. To see a partial list of the range of gestures used across the world, look up "gestures" and "list of gestures" in Wikipedia.

More important, gestures lack critical clues deemed essential for successful human-computer interaction. Because gestures are ephemeral, they do not leave behind any record of their path, which means that if one makes a gesture and either gets no response or the wrong response, there is little information avail-