



TECH 421 - Future of Digital Media

TECH 3706 - AR/VR in Architectural Environments

Most Up-to-date Syllabus:



<https://github.com/ivaylopg/Tech421Tech3706>

New Faces today, but I think that's it. Hopefully last day I need to recap this stuff.

I will do my best to keep the various Moodle pages updated, but I can promise that most up-to-date class materials will be here:

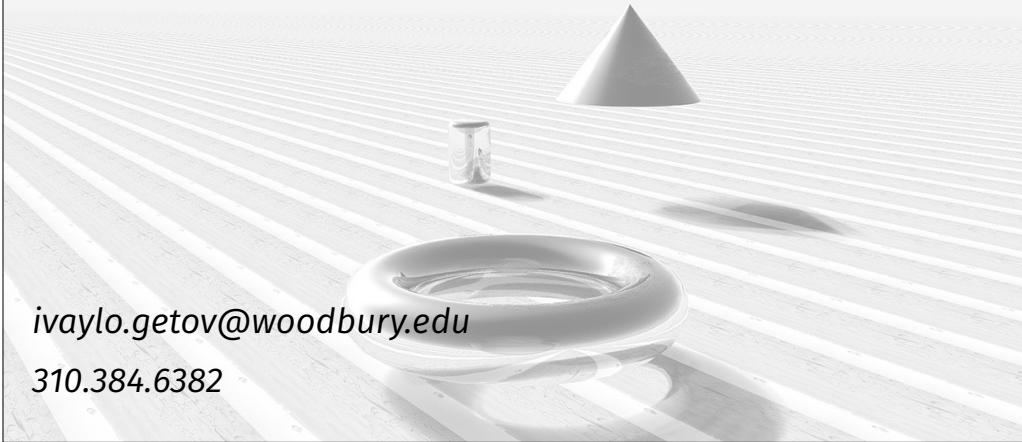
<https://github.com/ivaylopg/Tech421Tech3706>

There is additional reading on the syllabus and the class notes. Check it out if you're curious.

Contact Me

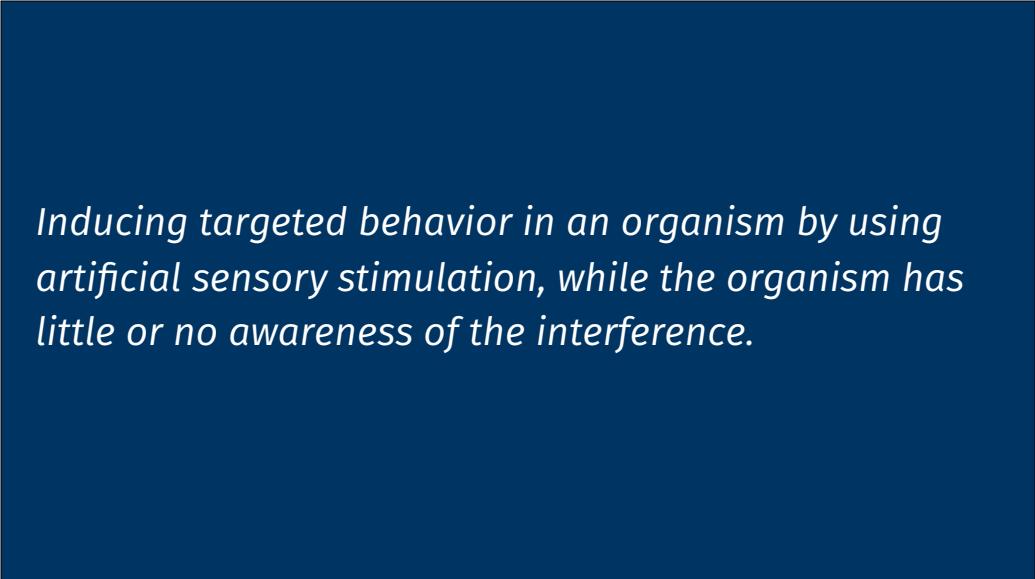
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What is AR/VR?

Recap from last time: what do we mean by Augmented/Virtual/Mixed Reality?

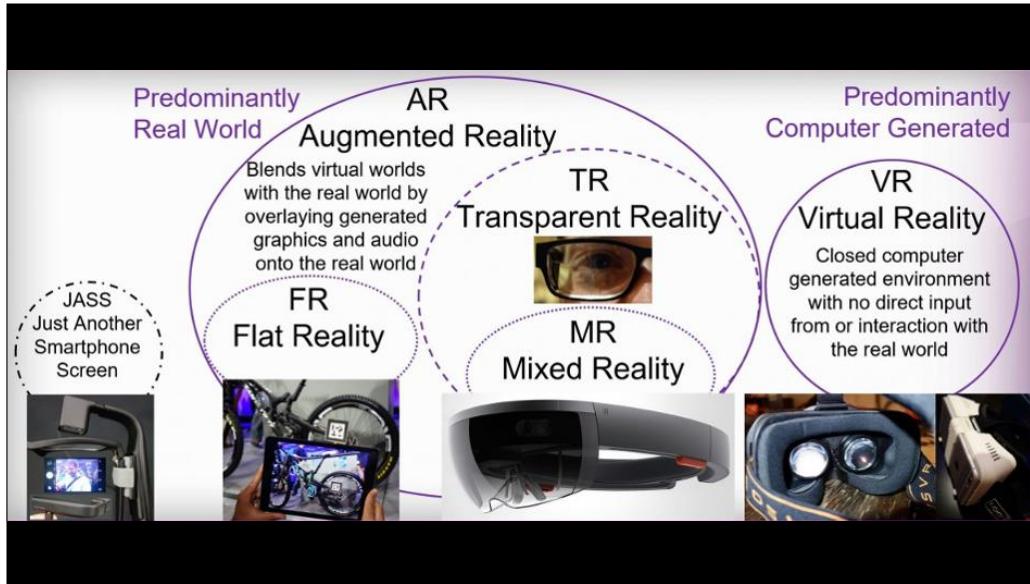


Inducing targeted behavior in an organism by using artificial sensory stimulation, while the organism has little or no awareness of the interference.

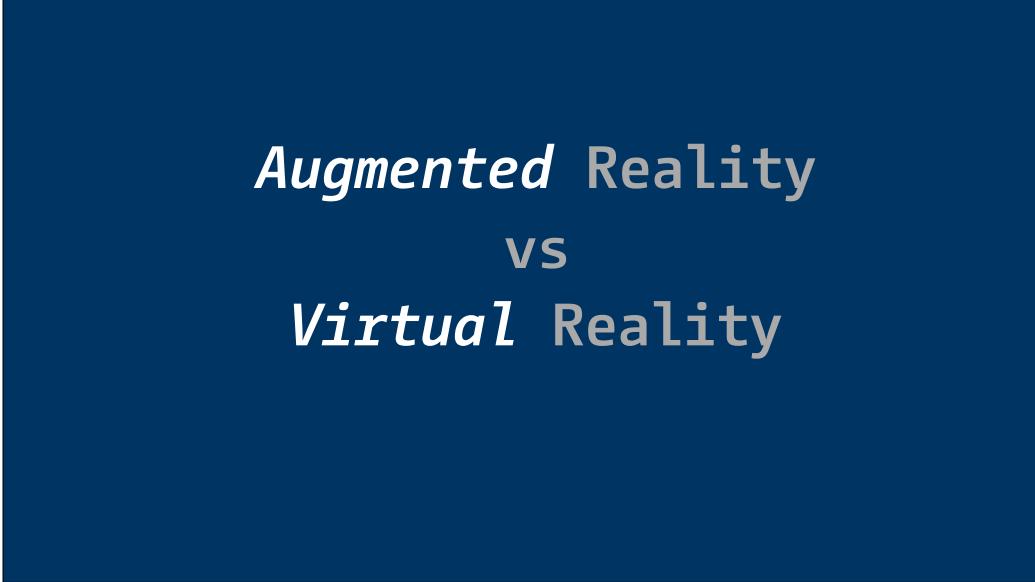
Definition by Steven M. LaValle, Professor, University of Illinois, Chief Scientist of VR/AR/MR at Huawei Technologies Co. Ltd.

Intentionally Broad

Also talked about Metaphysics - Immanuel Kant's Dual nature of reality - Physical world vs perceived world.



So much out there is marketing term or people trying to be the first to coin phrases.



Augmented Reality vs *Virtual* Reality

As far as this class is concerned, we're drawing the line here:

Virtual Reality = Where everything that the user sees & hears is controlled by the created experience.

Augmented Reality = You are adding things to the real world.



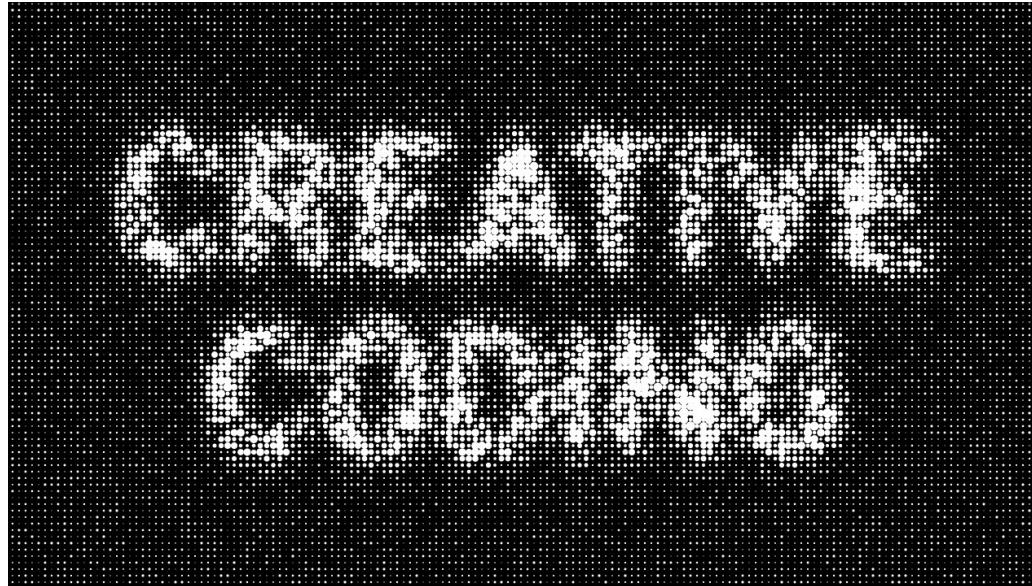
We talked about Microsoft Hololens for first time



We talked about Why Hololens for this class?

Even though it is not widely available, expensive, and technically only for “developers,” it is really good at what it can do.

It is currently the only wearable device that comes close to “ideal” AR, so we will use it as our ideal test lab.



What is creative coding?

type of computer programming in which the goal is to create something **expressive** instead of something **functional**.

Not Mutually Exclusive

Today we'll be talking about Interaction **which is often where these two ideas meet (expressive vs functional)**

If nothing else, Think of Coding as the secret sauce of turning something from a presentation to an experience

We need code as **Triggers** in what we make

- Beyond what we set up
- Lets us change (Do) stuff in the scene



Address issue from last time.

```
// Update is called once per frame
void Update () {
    if (Input.GetMouseButtonUp(0)) {
        Drop();
    }
}

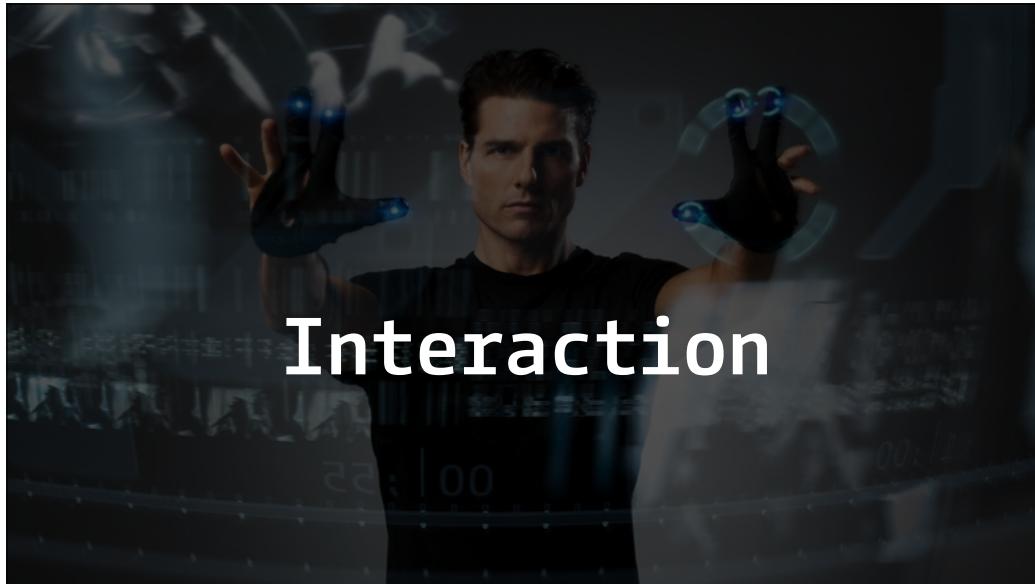
void Drop() {
    gameObject.GetComponent<Rigidbody>().useGravity = true;
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void Drop() {
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}
```

MAKE SURE TO SAVE before switching between VisualStudio (Code Editor) and Unity.



What do we mean by *interaction*?

- How do you act **upon** the HARDWARE of the computer/device?
- What does that **action** DO?

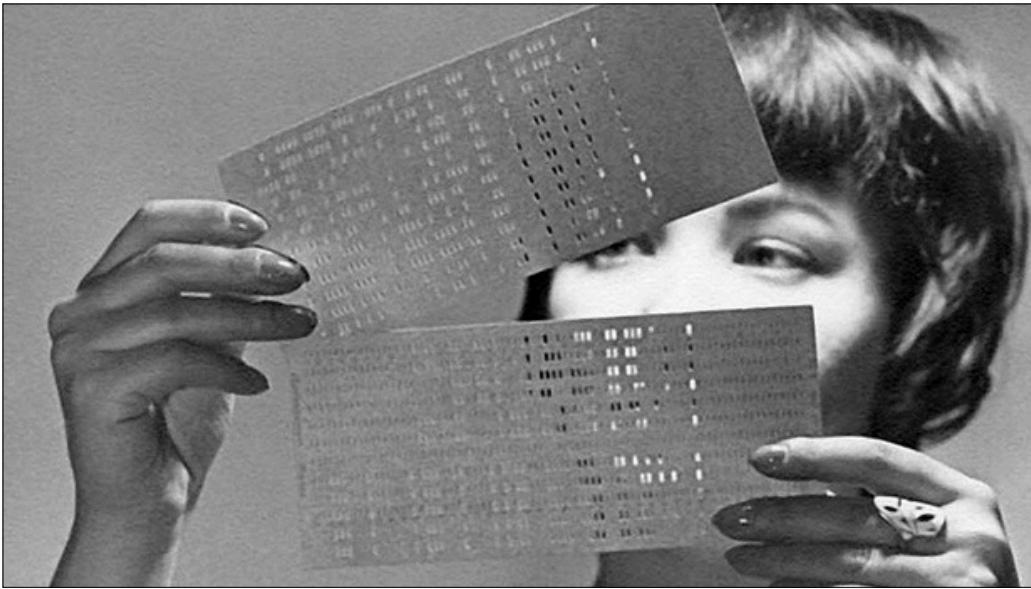


Those of you taking the Human Computer Interaction class will be able to apply some of that to designing interactions in this class.

VR/AR can be seen as an evolution of **content** (what are we looking at) and an evolution of **platform** (how are we looking at it)

Progression from “usable by a small few” to “usable by everyone”

Computers started as **Single Purpose** - performing math calculations



Computer used to be a person that would compute - that would do the calculations. Eventually replaced by computers that would be programmed using punched cards



Even the idea of a keyboard as input had to be invented - that you could interact with computers using an alpha-numeric alphabet

This is a layer of *abstraction*

```
C:\>chkdsk
Volume Serial Number is 3E76-4B58

2,146,467,840 bytes total disk space
    131,072 bytes in 2 hidden files
        32,768 bytes in 1 directories
    7,405,568 bytes in 124 user files
2,138,898,432 bytes available on disk

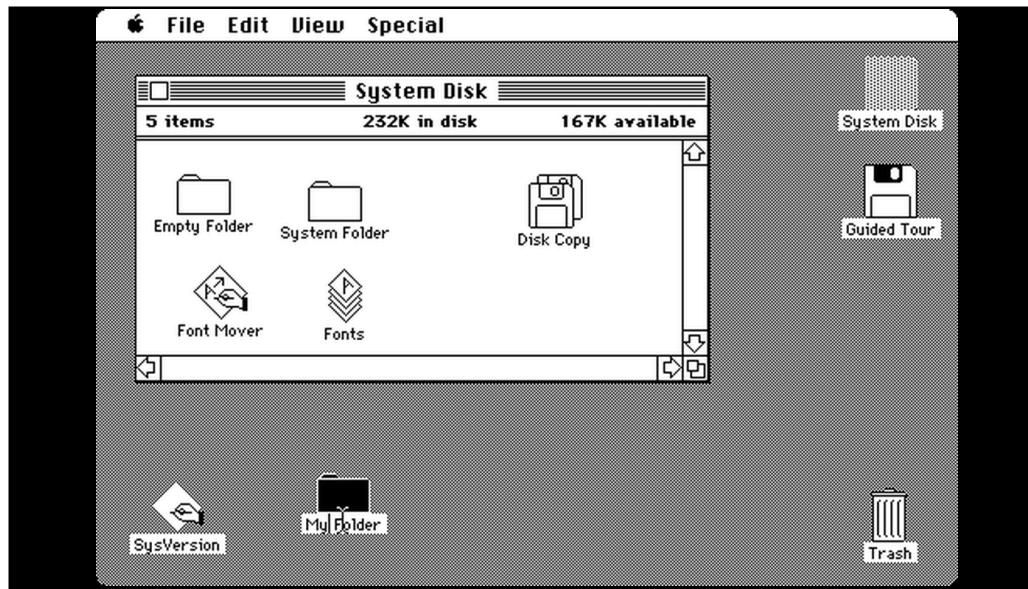
        32,768 bytes in each allocation unit
        65,505 total allocation units on disk
        65,274 available allocation units on disk

        655,360 total bytes memory
        602,704 bytes free

Instead of using CHKDOSK, try using SCANDISK.  SCANDISK can reliably detect
and fix a much wider range of disk problems.  For more information,
type HELP SCANDISK from the command prompt.
```

```
C:\>_
```

Computers were for long time (and many still) used with a text-based interface.

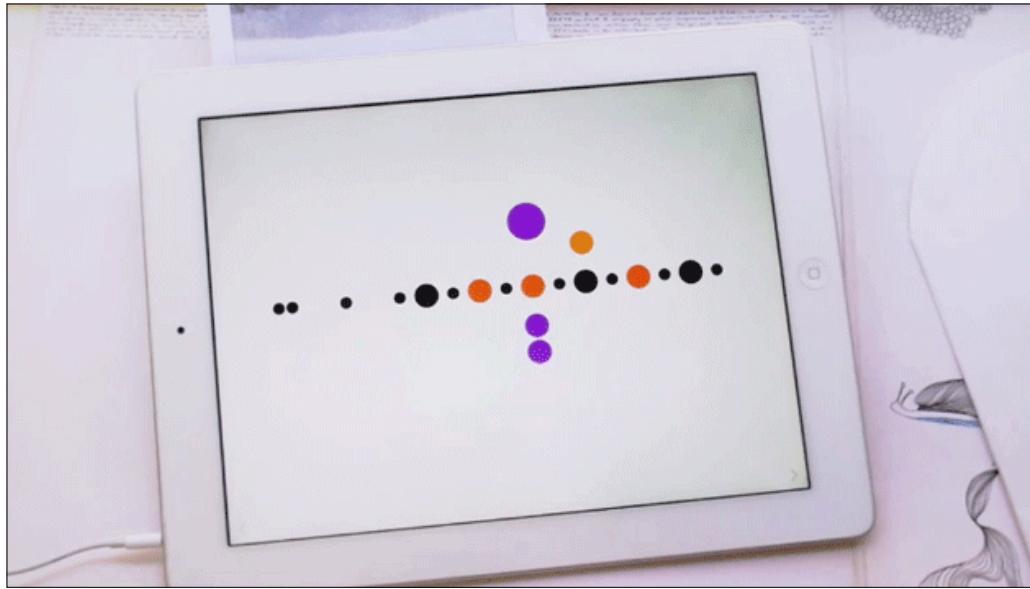


GUI (Graphical User Interface)

Invented by Douglas Engelbart and implemented by researchers at the Augmentation Research Center(ARC) at the Stanford Research Institute (SRI)

Later developed at Xerox

Popularized by Apple



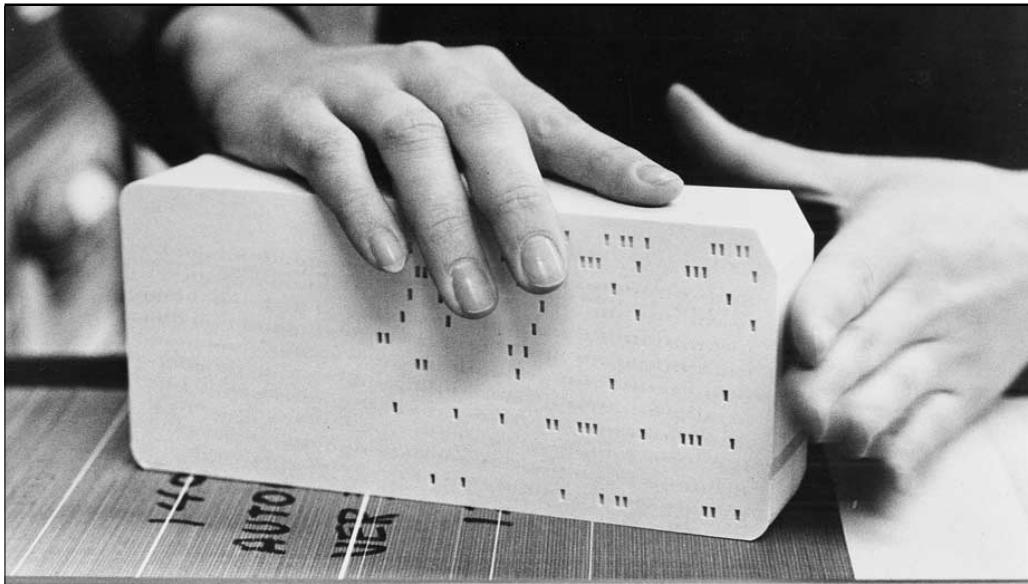
And finally (currently) touch-based interfaces.



What's next?

Current state-of-the art is all based on 2D interfaces.

How do we break into 3D?



We are back in the *punch card* era of a new type of computer interface.



Sci-fi drives what later becomes possible.

Gestural interfaces like LEAP motion.



VR systems use handheld remotes tracked in space.

Expectations

With new types of interface, we must teach users *how* to perform new kinds of interactions.

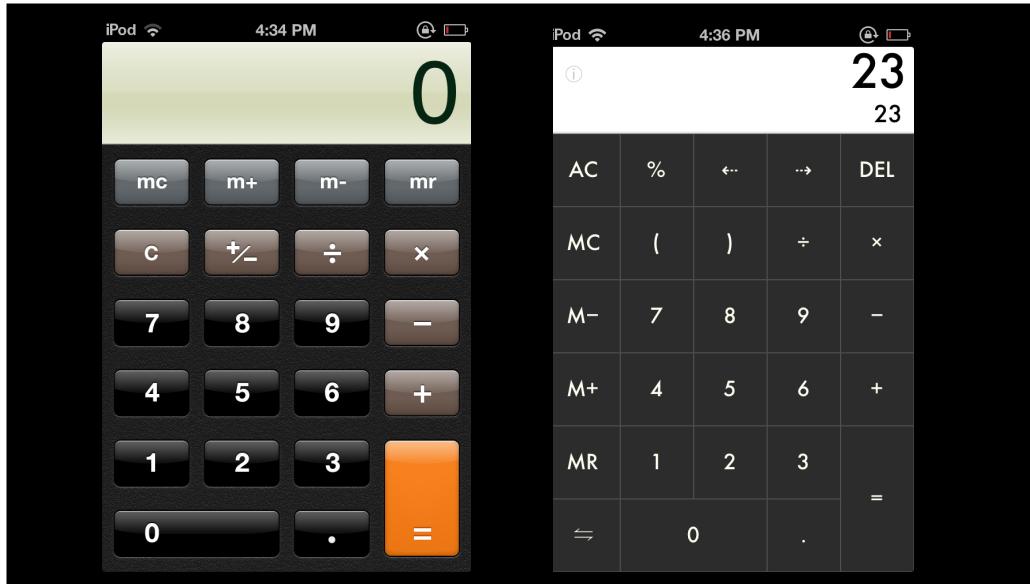


Baby trying to pinch/zoom on magazine after using iPad - 2011

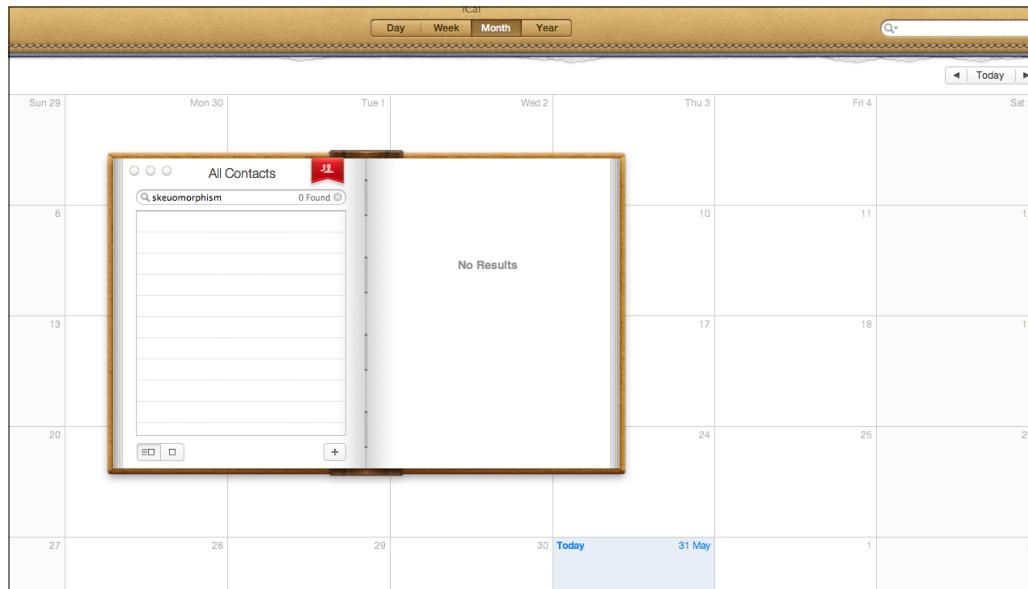
We have to be *taught* the possibilities and limitations



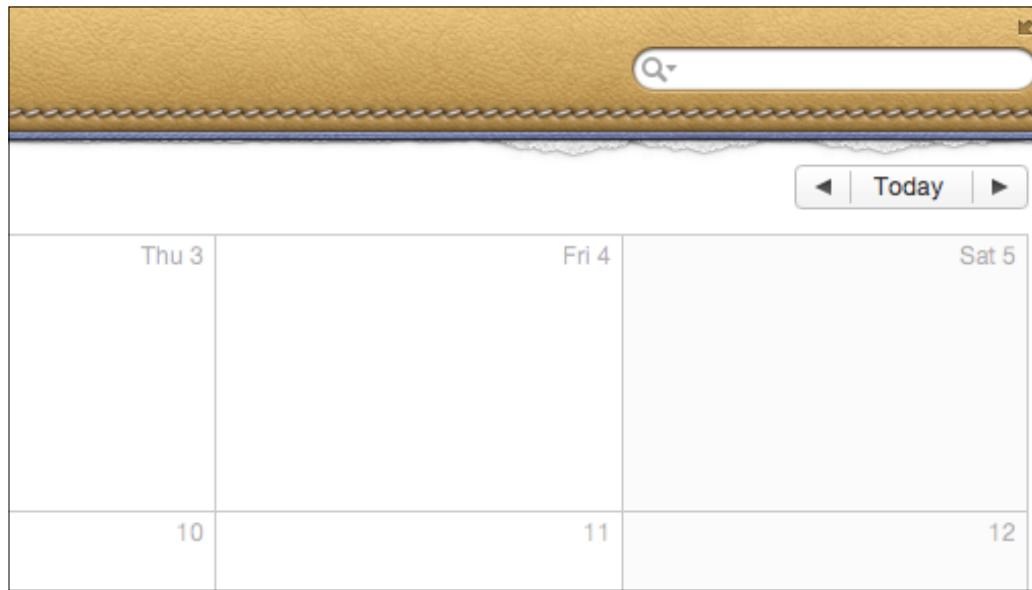
One approach is Skeuomorphism - creating interfaces that resemble their physical counterparts.



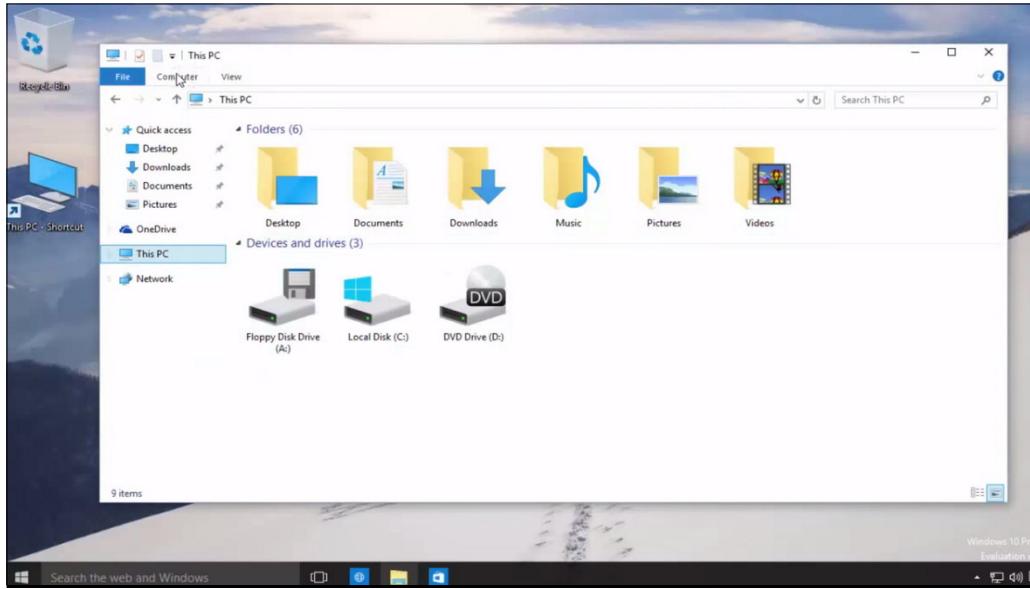
Textured leather calculator with bulgy/reflective buttons to cue people that they can be pressed.



Can easily be taken too far. Why is this calendar leather-bound?



Why does it have a ripped page?!



The computer desktop itself is a skeuomorphic design: file-folders full of documents on a desktop, with an adjacent trash-bin for waste.

Designing for Interaction

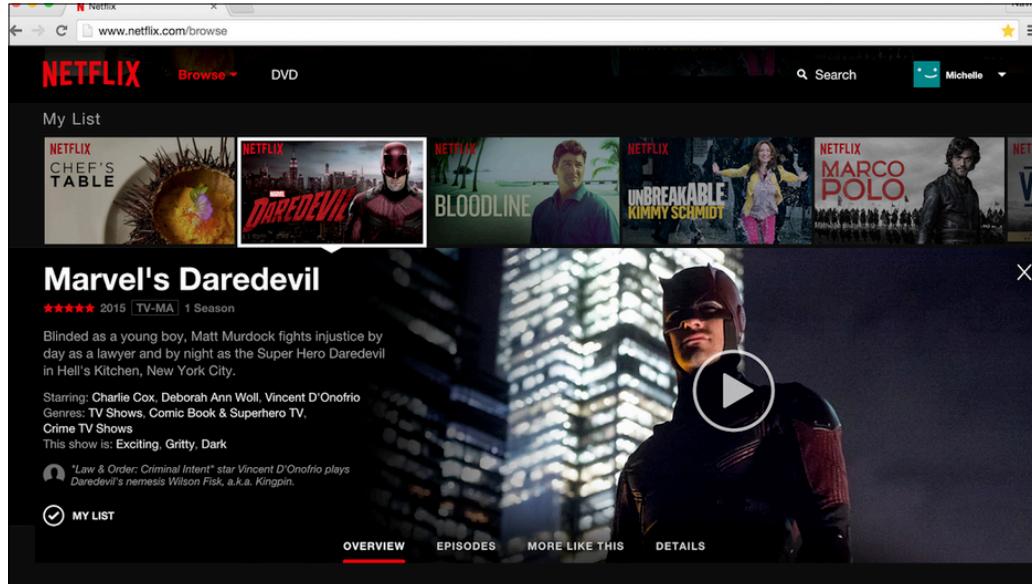
Design to the available tools or invent new tools

Don't try to find a new interface for email, REPLACE EMAIL

Screens vs Space

All of a sudden we have to think about a spatial context for what we make

We are not limited by pixels or the dimensions of a rectangle, but by the available space.



VR - deals with it by creating new environments

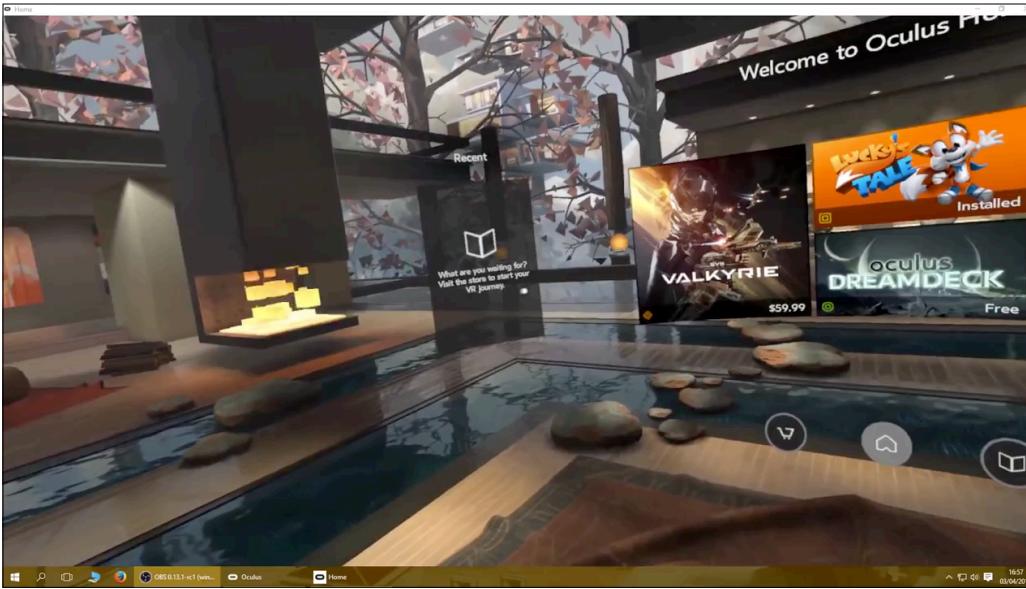
Netflix web interface...



..vs Netflix VR interface

Anticipating a future where we can comfortably sit in VR for a long time, Netflix creates the ideal context in which to watch movies (All of it's existing content is 2D)



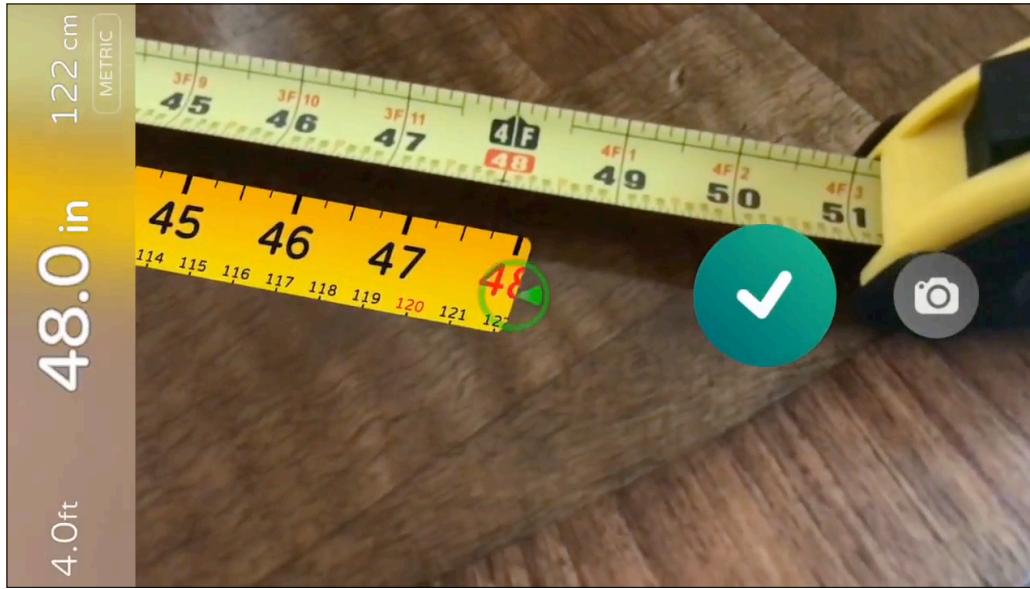


Oculus VR “Home” for your apps instead of a desktop/list.

Biggest criticism is that you can't change this home environment to suit your personality. People want to customize these spaces.

Screens vs Space

Scale is very important
Real world units



1:1 relationship with real-world scale

AR apps that can measure the environment

Manipulation

Exploration

Two main concepts to look at today: **Manipulation** and **Exploration**



Manipulation

What is the interface?



Physical interface/action and it's relationship to the effect it has

two-dimensional



POWERPLAY.

Attempts at 3D interfaces go way back.



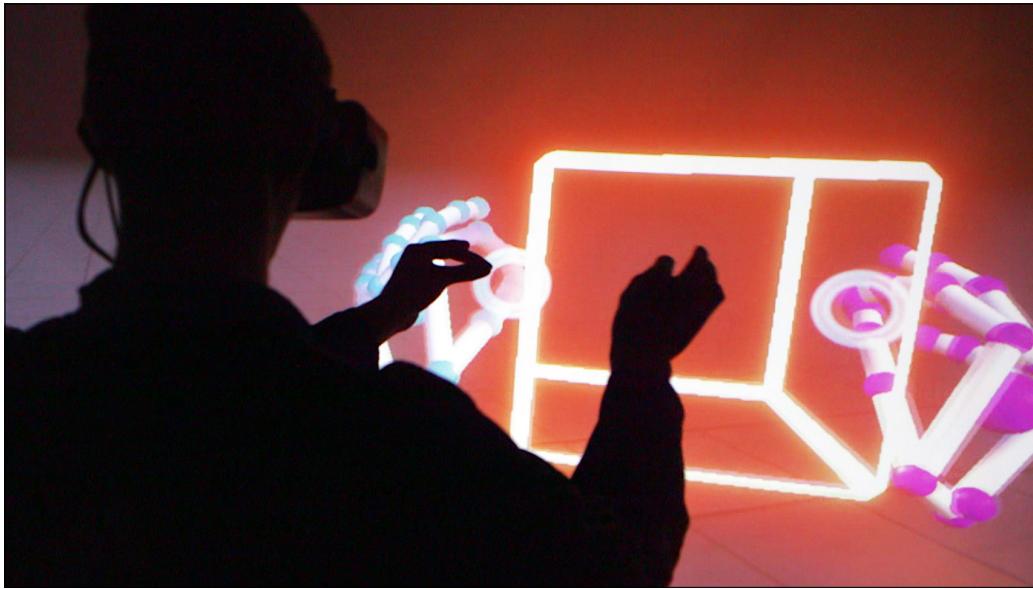
Technology is finally catching up.

LEAP almost failed because nobody wanted to interact with their email by waving their arms around: too much cardio!

Needed new kinds of interaction.



Flip the sensor, put it on a headset, and now it is used to bring hands into VR experiences without remotes



Gestures can be used to manipulate



Voice recognition is a very powerful (if socially awkward) way to interact with interface-less experiences.

Manipulation

Exploration



Moving through an environment to discover content - no direct manipulation.



JPL uses Hololens to visualize 1:1 models of rovers, allowing designers to discover relationships and problems before anything is actually built.



Exploration can still be a manipulation - content can react to viewers position



Examples

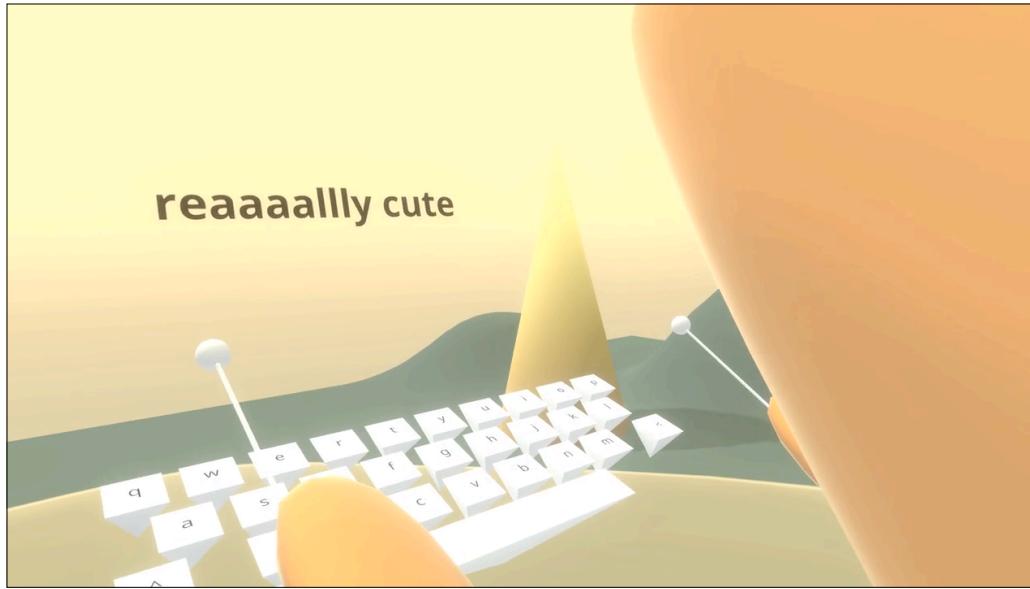
Designing for Interaction

Why

To Reveal
To Change
To Visualize



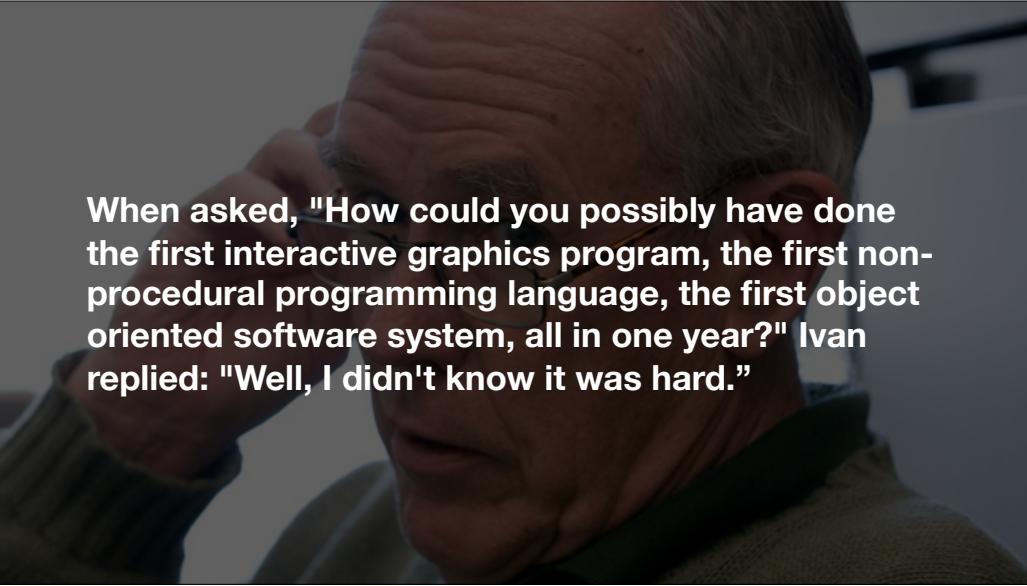
Bad/frustrating example of bringing keyboard into space: using gaze direction + time.



Good example: uses space and natural interaction for the tools you have available (handheld remotes)



Group exercise



When asked, "How could you possibly have done the first interactive graphics program, the first non-procedural programming language, the first object oriented software system, all in one year?" Ivan replied: "Well, I didn't know it was hard."

Start a design process without knowing the technical hurdles

Something Digital you Wish you could touch?

Something big you wish you could see small?

Something small you wish you could see big?

Something invisible you wish you could see?

Tool?

Format?

No bad ideas!

**Specifically think about
places where technology is a
barrier.**

The exercise isn't how do we make **email** better, it's how do we **replace** email.

Awkward silence is OK

Combine Similar Ideas

Separate Complex Ideas

**Find Cause & Effect
Relationships**



<https://sciarc.edu/events/events/edge-symposium-i/>

John Underkoffler - TED Talk and Article

<http://bit.ly/2vmZLrp>

Design For Humanity - Parts 1, 2, 3

<http://bit.ly/1T0gJ6E>

Reading/watching assignment:

<https://thenextweb.com/media/2015/08/31/a-stark-future/>

<https://medium.com/swlh/the-future-of-design-is-emotional-5789ccde17aa>



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Thank you!