

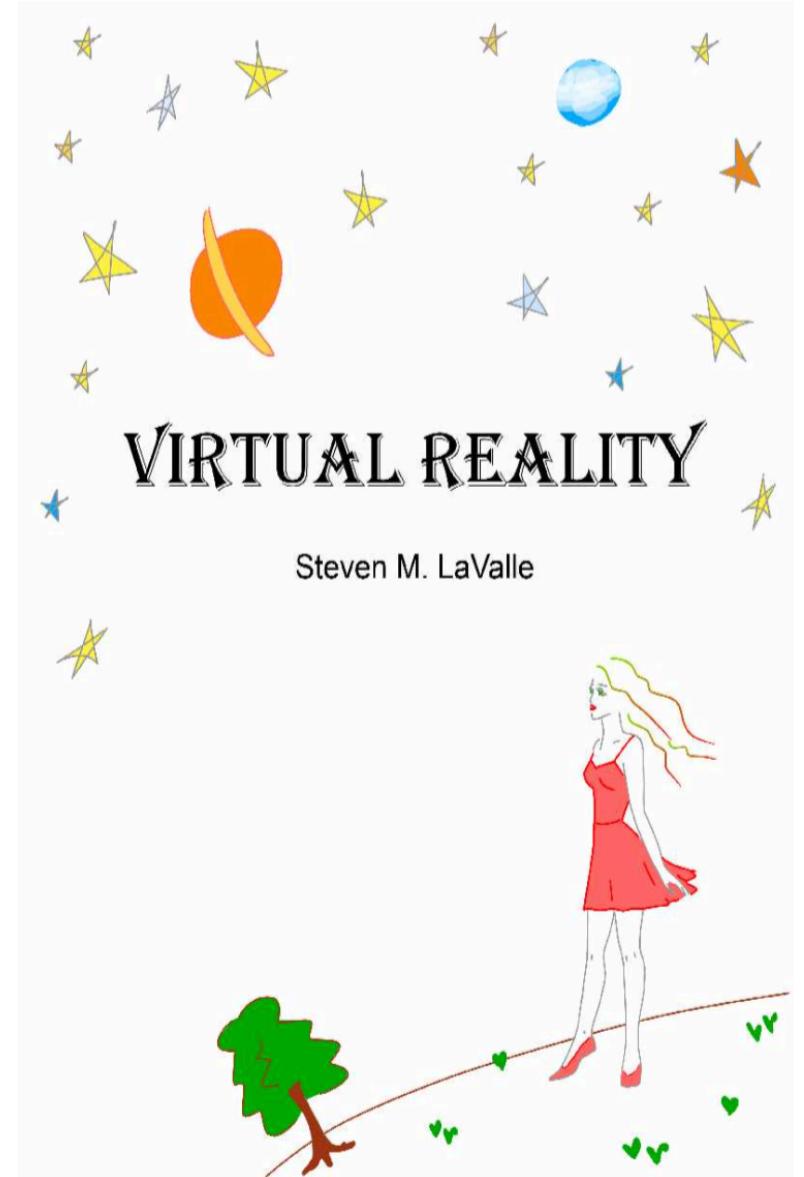
Interaction Design & Virtual Reality

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Assistant Prof.

2016.10.14

Definition of VR

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



targeted behavior :: flying

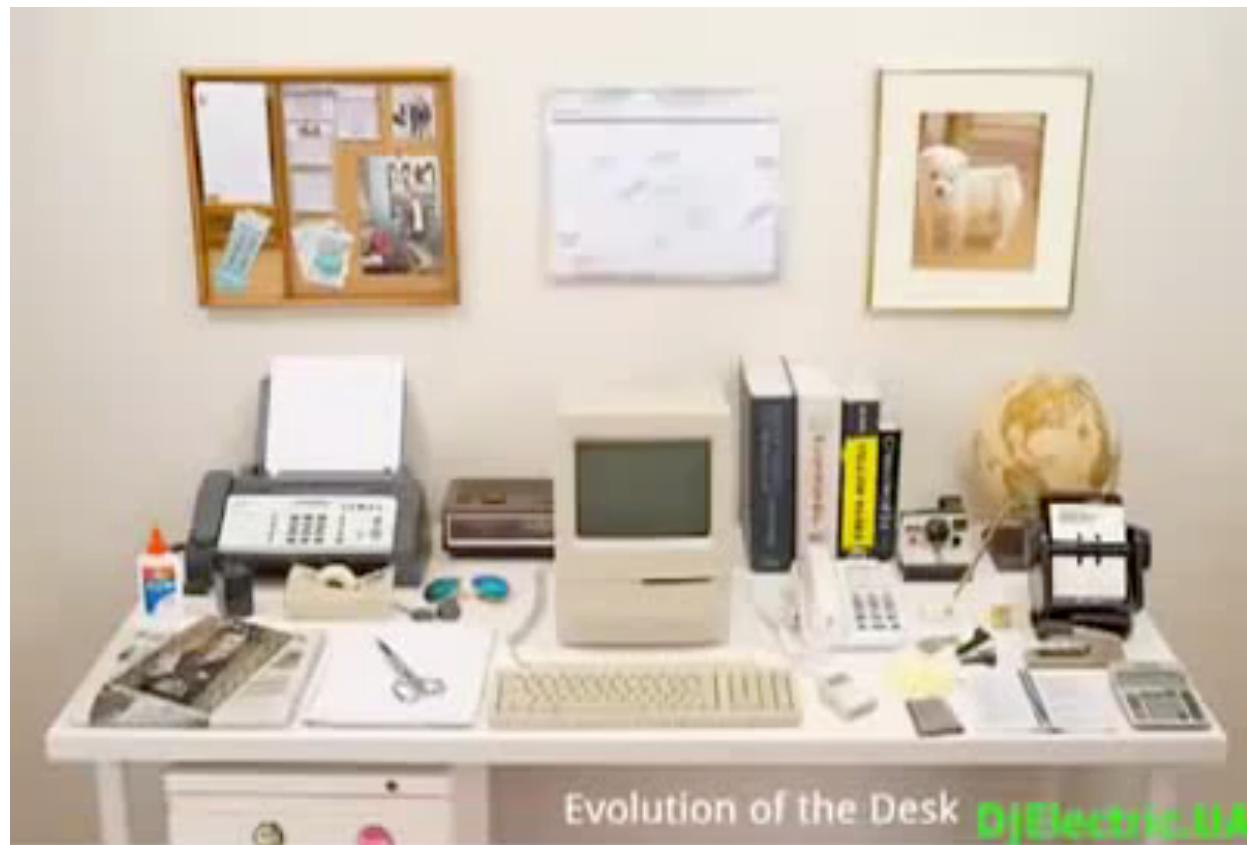
Organism

unawareness

**Artificial
sensory**



another view



Evolution of the Desk [DjElectric.BA](#)

1980





Frame of reference

Evolution of the Desk Electronics.UA

Knowledge in the world



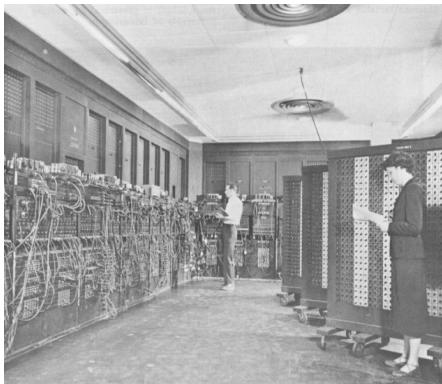
Electronics.UA

Which is considered better interface ?

Trend Towards Invisible Interfaces

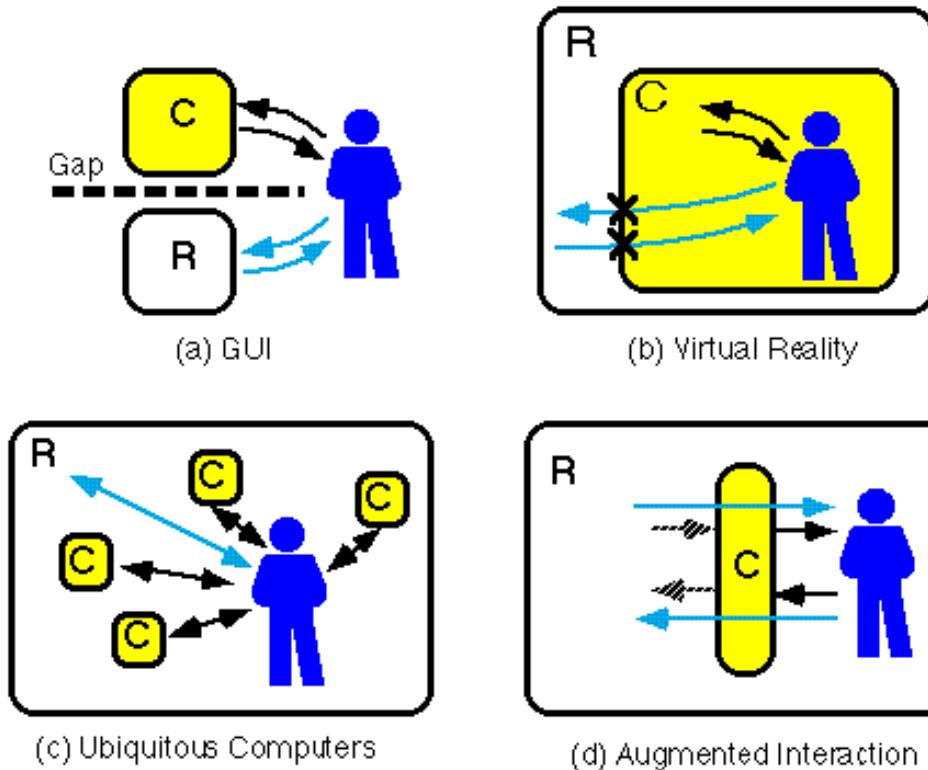
Content form
Mark Billinghurst, Bruce Thomas
University of South Australia

- Trend from room scale to invisible computing



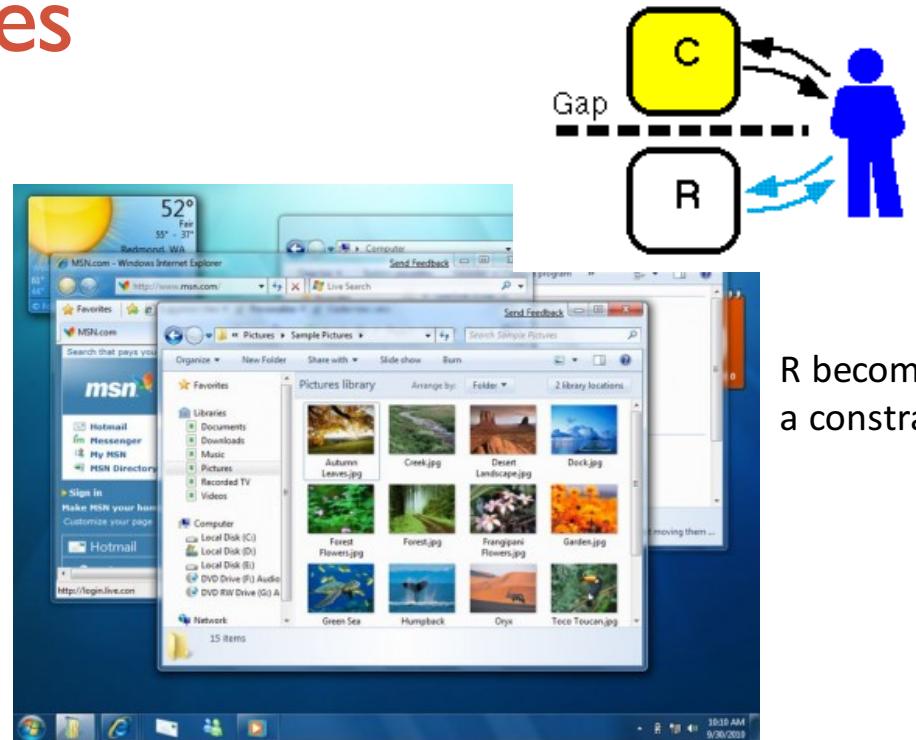
- Making Computers Invisible
 - hide the computer in the real world
 - Ubiquitous Computing
 - put the user inside the computer
 - Virtual Reality

Making Interfaces Invisible



Rekimoto, J. and Nagao, K. 1995. The world through the computer: computer augmented interaction with real world environments. In *Proceedings of the 8th Annual ACM Symposium on User Interface and Software Technology. UIST '95*. ACM, New York, NY, 29-36.

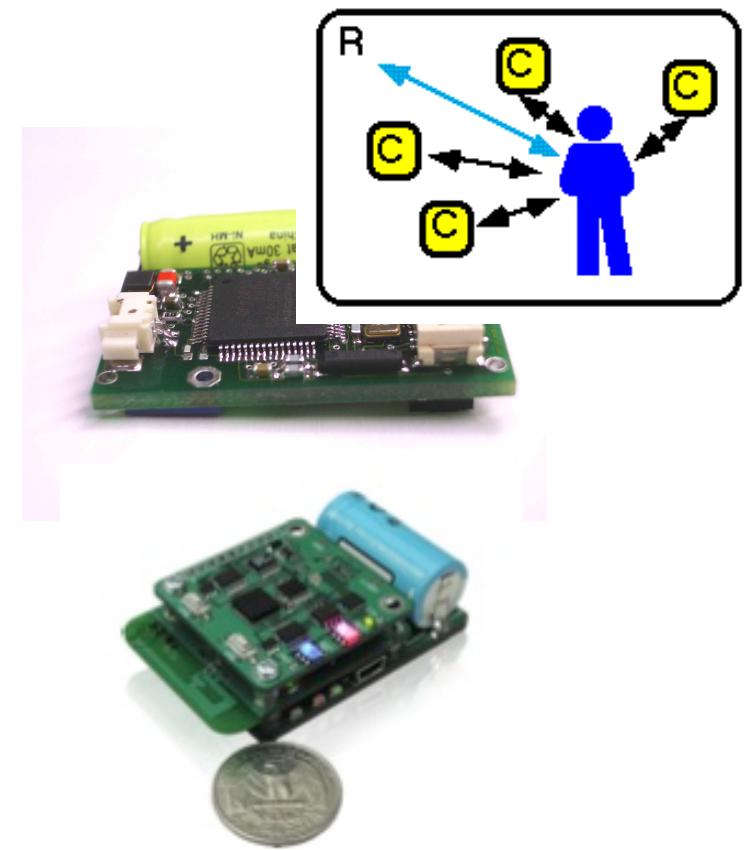
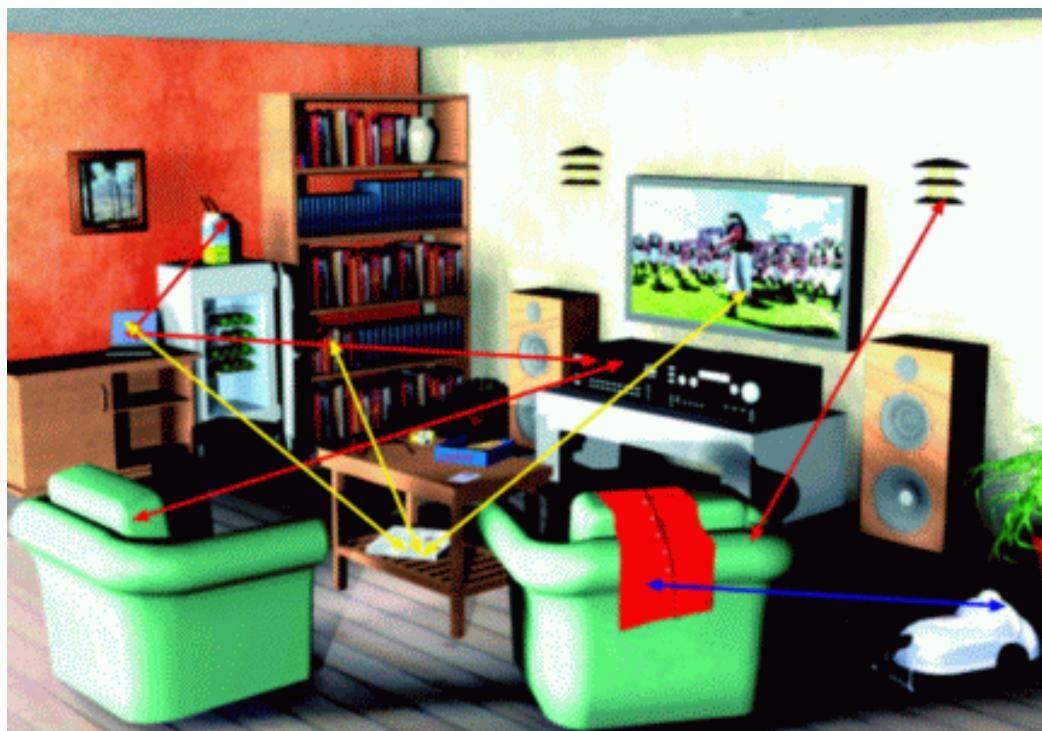
Graphical User Interfaces



R becomes
a constraint

- Separation between real and digital worlds
 - WIMP (Windows, Icons, Menus, Pointer) metaphor

Ubiquitous Computing



- Computing and sensing embedded in real world
 - Particle devices, RFID, motes, arduino, etc

Virtual Reality



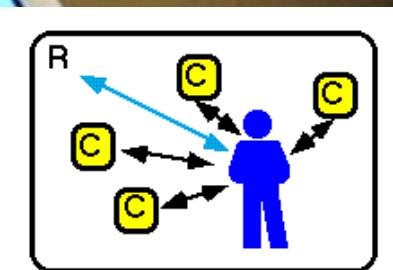
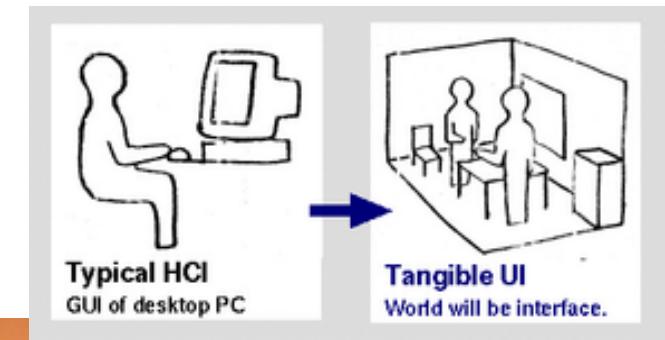
- 1985...

The image shows a page from the July/August 1988 issue of NASA Tech Briefs. The title 'NASA Tech Briefs' is at the top, followed by the subtitle 'Transferring Technology to American Industry and Government'. The date 'July/August 1988' and volume information 'Volume 12 Number 7' are also present. On the left, there is a small diagram showing a blue stick figure interacting with a yellow square containing arrows labeled 'C' and 'R'. Below this is a large illustration of a person wearing a white VR helmet, looking down at a 3D grid-based virtual environment. Several small aircraft are visible in the sky above the grid. At the bottom of the page, the text 'NASA's Virtual Workstation Shapes A VIVED Reality' is written in red.

Tangible Interface

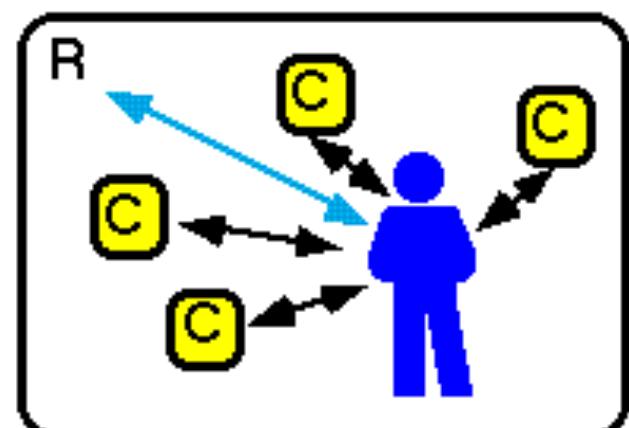
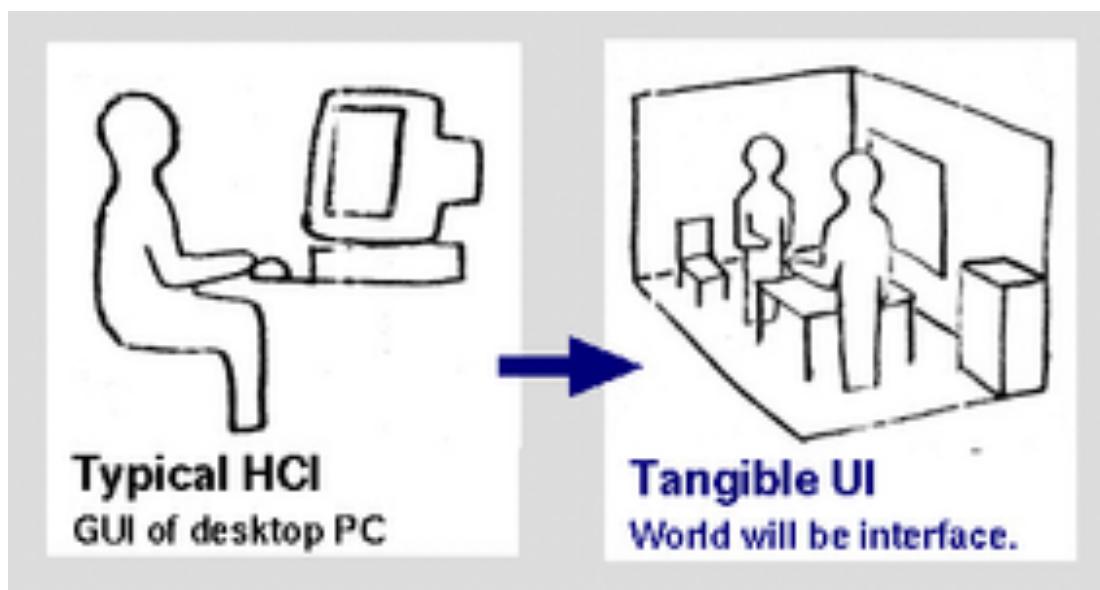


Interface in the world

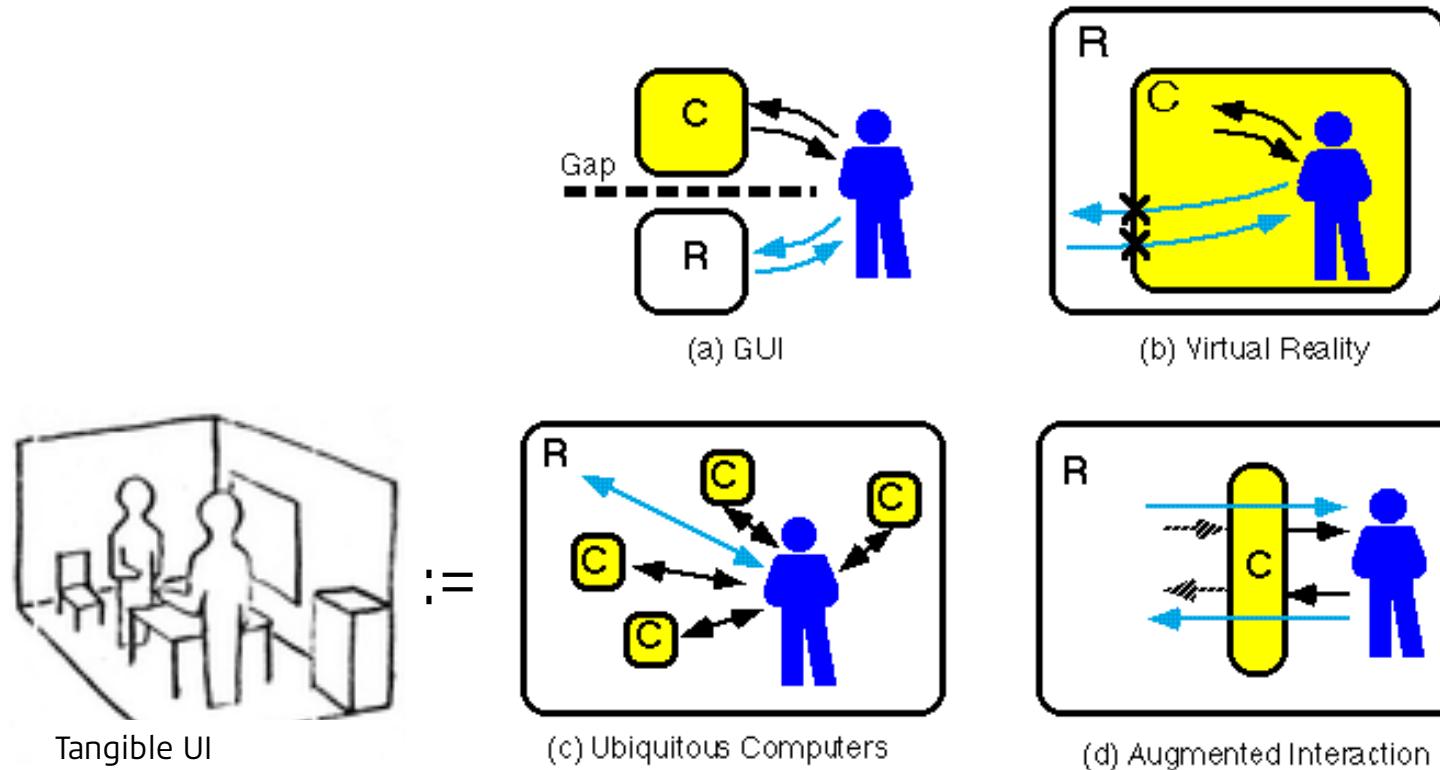


(c) Ubiquitous Computers

Conceptually,
Tangible UI is similar to ubiquitous computing.

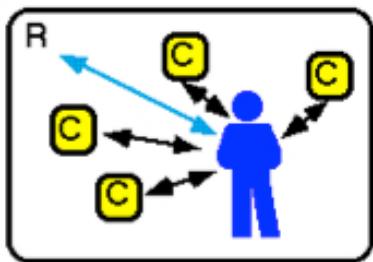


Making Interfaces Invisible

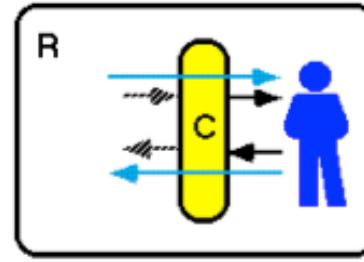


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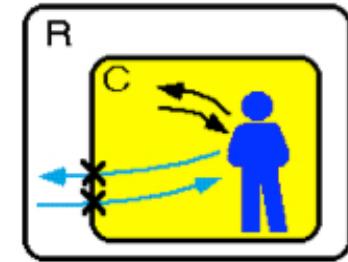
From Reality to Virtual Reality



Ubiquitous Computing



Augmented Reality



Virtual Reality

Real Environment

Augmented Reality (AR)

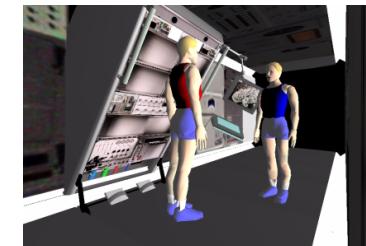
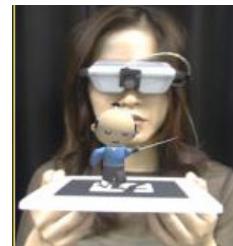
Augmented Virtuality (AV)

Virtual Reality (VR)

← Spatial Real World

Mixed Reality

→ Immersive Virtual World



Augmented Reality

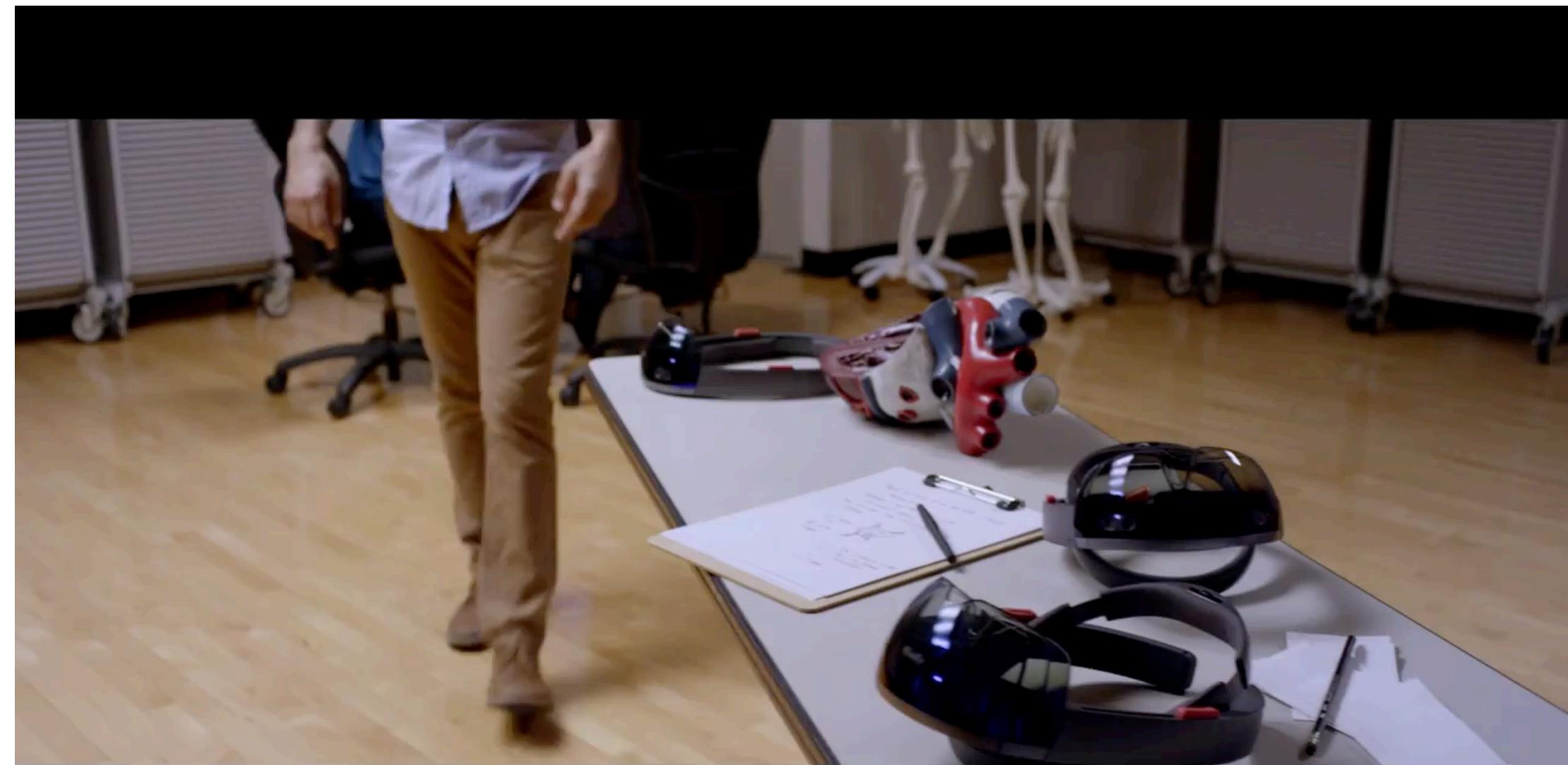


1977 – Star Wars

Augmented Reality Definition

- Defining Characteristics [Azuma 97]
 - Combines Real and Virtual Images
 - Both can be seen at the same time
 - Interactive in real-time
 - The virtual content can be interacted with
 - Registered in 3D
 - Virtual objects appear fixed in space

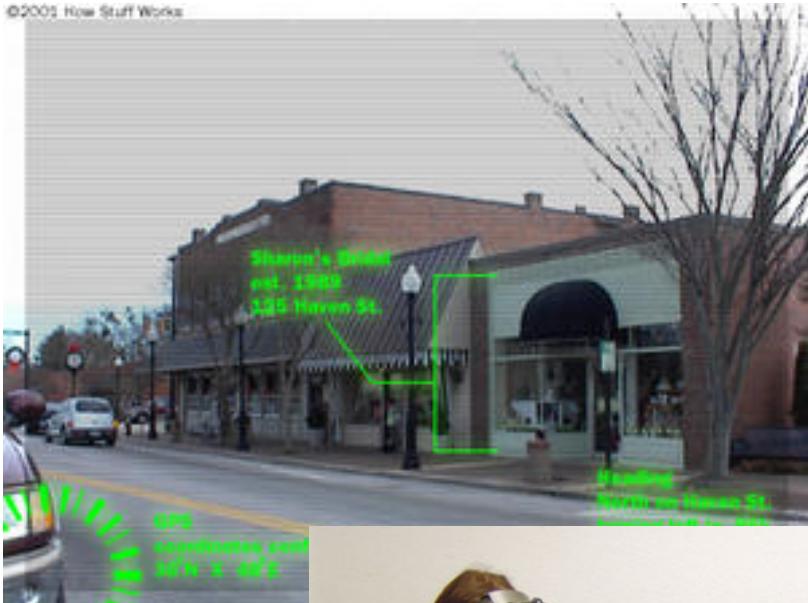
Azuma, R. T. (1997). A survey of augmented reality. *Presence*, 6(4), 355-385.



The perception of stationarity

Augmented Reality Examples

©2005 How Stuff Works



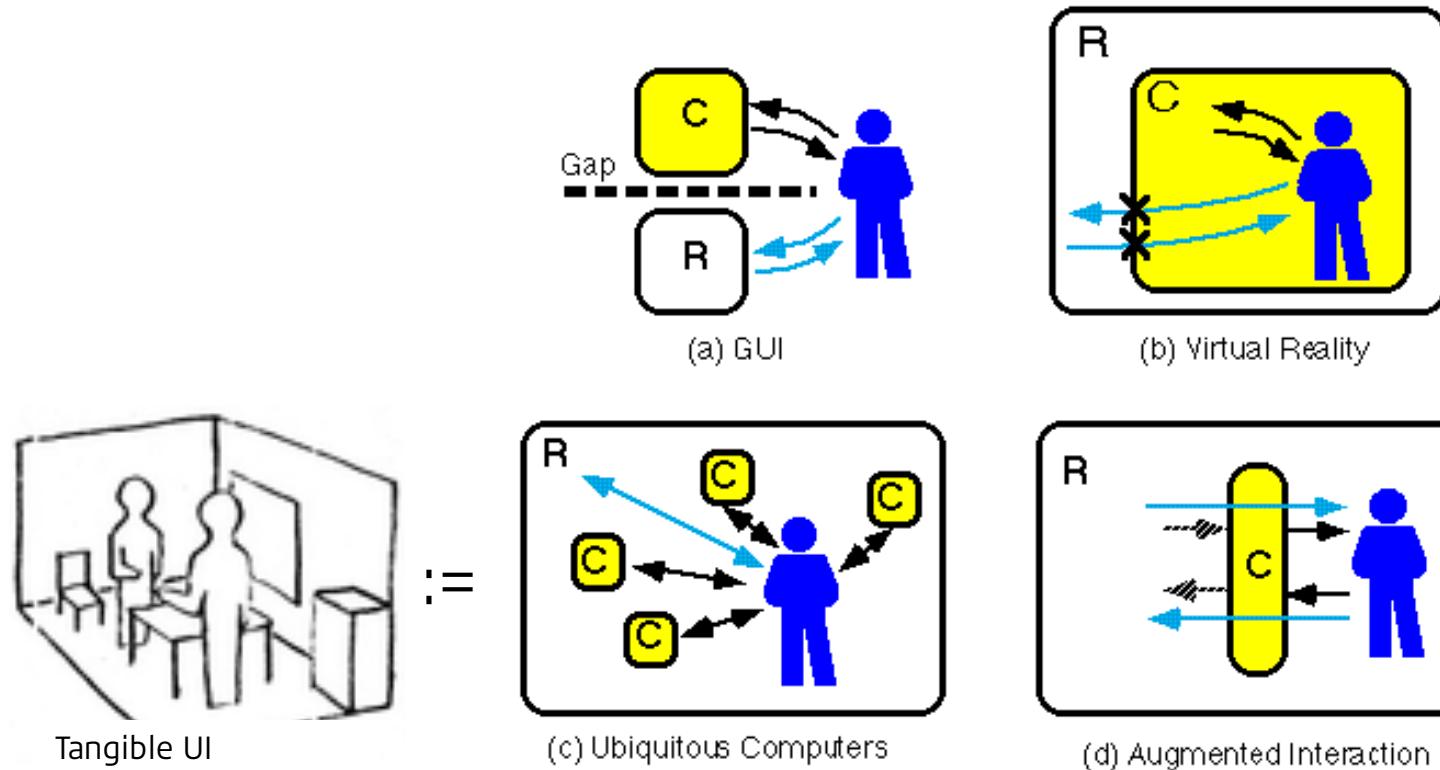
Pokemon GO..



AR vs VR

	Virtual Reality <i>Replaces Reality</i>	Augmented Reality <i>Enhances Reality</i>
<i>Scene Generation</i>	Requires realistic images	Minimal rendering okay
<i>Display Device</i>	Fully immersive, wide field of view	Non-immersive, small field of view
<i>Tracking</i>	Low to medium accuracy is okay	The highest accuracy possible

Making Interfaces Invisible



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