



# The Renaissance of VR: Are We Going to Do it Right This Time?

**Ronald Azuma**

**Intel Labs**

**<http://ronaldazuma.com>**

**SIGGRAPH 2015, August 10, 2015**

# Excitement about VR in the 1990's: A personal retrospective



**UNC Chapel Hill SIGGRAPH 1991 booth team**

# Excitement about VR in the 1990's: A personal retrospective



**UNC Chapel Hill SIGGRAPH 1991 booth (Henry Fuchs)**

# Excitement about VR in the 1990's: A personal retrospective



**"Chandelier" (1991)**  
Working with the black ceiling panels, this breakthrough head-mounted display used cameras. It was slow and gave the user a woozy feeling of "swimming."

This head-mounted display is the first to use the **wide-area ceiling tracker**. Hugo, it has four special cameras on it to sense the blinking lights in the ceiling panels.

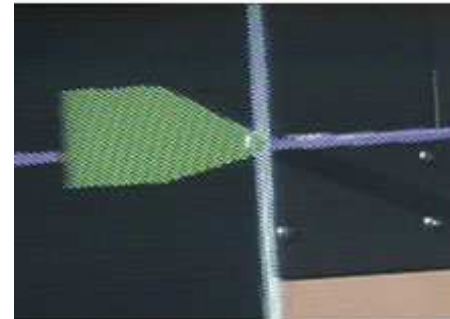
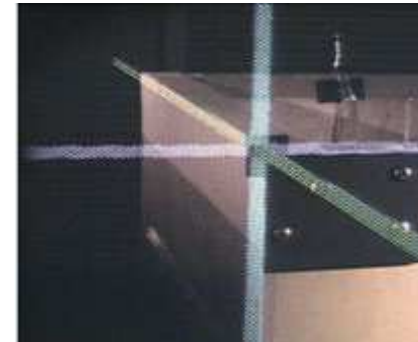
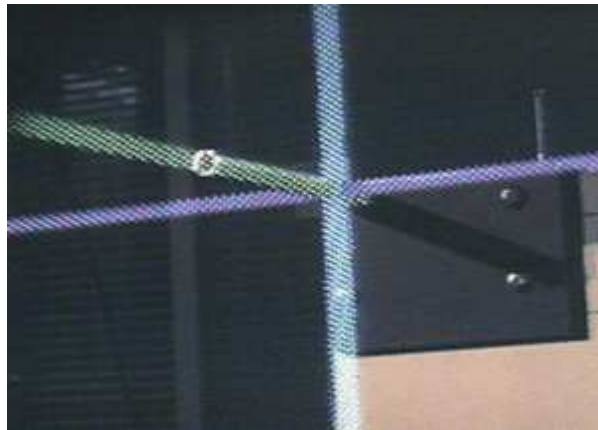
The "Chandelier" system was developed before the auto-calibration algorithm, and required a precision, steel-girded, ceiling frame. Together with the tracker ceiling and graphics computer, it was shown at the 1991 SIGGRAPH conference.

- Resolution: 320 x 240 pixels
- Field of View: 60 degrees - wide field, but slightly distorted
- Weight: Heavy! 12 pounds, plus a 6-pound fanny pack

Credits: Ron Azuma, Gary Bishop, Veim Chi, John Eyles, Henry Fuchs, Jack Katz, Steve Moller, Steve Teal, John Thomas, Mark Ward, and others

## My head-mounted display now sits in a museum

# Excitement about VR in the 1990's: A personal retrospective



**First working Augmented Reality system (SIGGRAPH 1994)**

# Will VR succeed commercially this time?

**I think so, at least in certain niches.**

- Performance high enough to generate compelling illusion
- Cheap enough that many people can buy systems and develop experiences
- Huge financial investments

# AR might have a bigger future than VR

- Virtual Reality: Indoor installations
  - Related markets: consoles and desktop gaming PC's
- Augmented Reality: Ubiquitous, wearable systems
  - Related markets: mobile and wearable devices
  - This could take longer than VR to reach widespread success

# What will ultimately determine success?

**Success ultimately determined by market acceptance of new media forms that are compelling and meaningful**

- Virtual Reality
  - Presence
- Augmented Reality
  - Combination of real and virtual is important and meaningful



# Examples of compelling approaches?



## 110 Stories

Courtesy Brian August

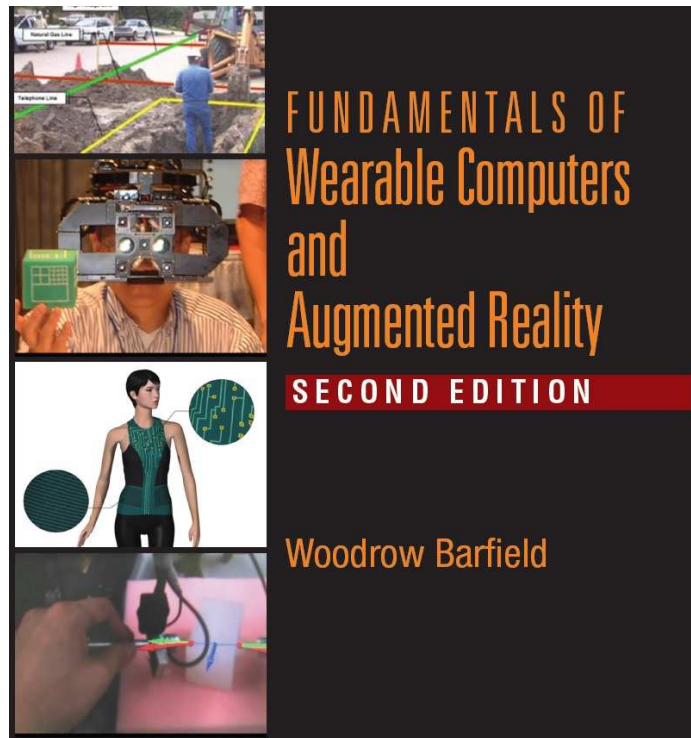


## 3 Angry Men

Courtesy Blair MacIntyre, G. Tech



# Analysis of compelling approaches



Three strategies (Reinforcing, Reskinning, Remembering) in my book chapter in **2<sup>nd</sup> Edition of Fundamentals of Wearable Computers and Augmented Reality** (Woodrow Barfield, editor), CRC Press



Other names and brands may be claimed as property of others.