

As We May Do

Augmented Reality and Computer Vision

Neil Milsted
Strange Loop

First a problem ...

- The technology is expanding
- The term “Augmented Reality” is waning
- We’ll use the term for now

The definition (wikipedia)

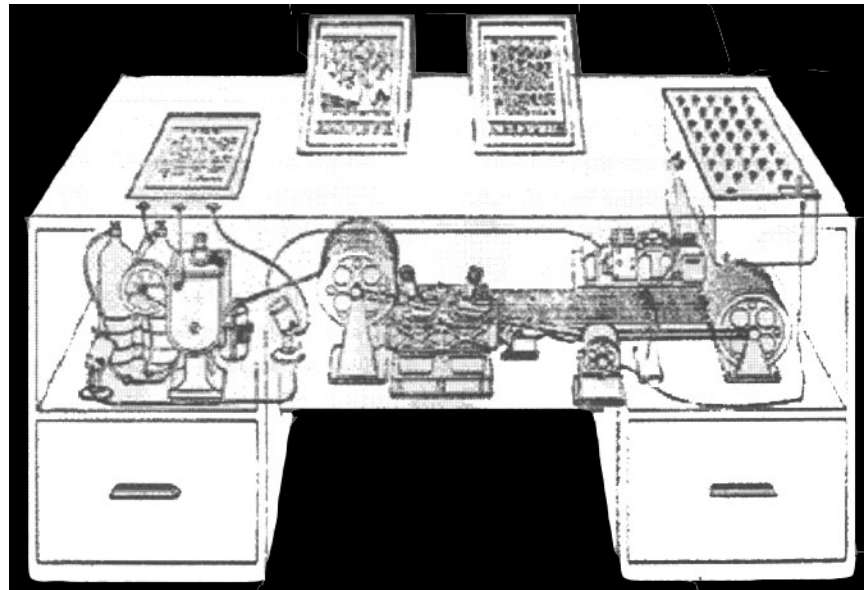
Augmented reality (AR) is a live, direct or indirect, view of a physical, real-world environment whose elements are augmented by computer-generated sensory input such as sound, video, graphics or GPS data.

Vannevar Bush



As We May Think

July 1945 Atlantic Magazine



Computers were human



Sage

1950's “Electronic Brain”



Mother of all demos 1968



Computers are still in

- Communication
 - Web / Email
 - Social / Chat
 - IP phones / voice and video
- Calculation
- Games
- Video, eReaders etc

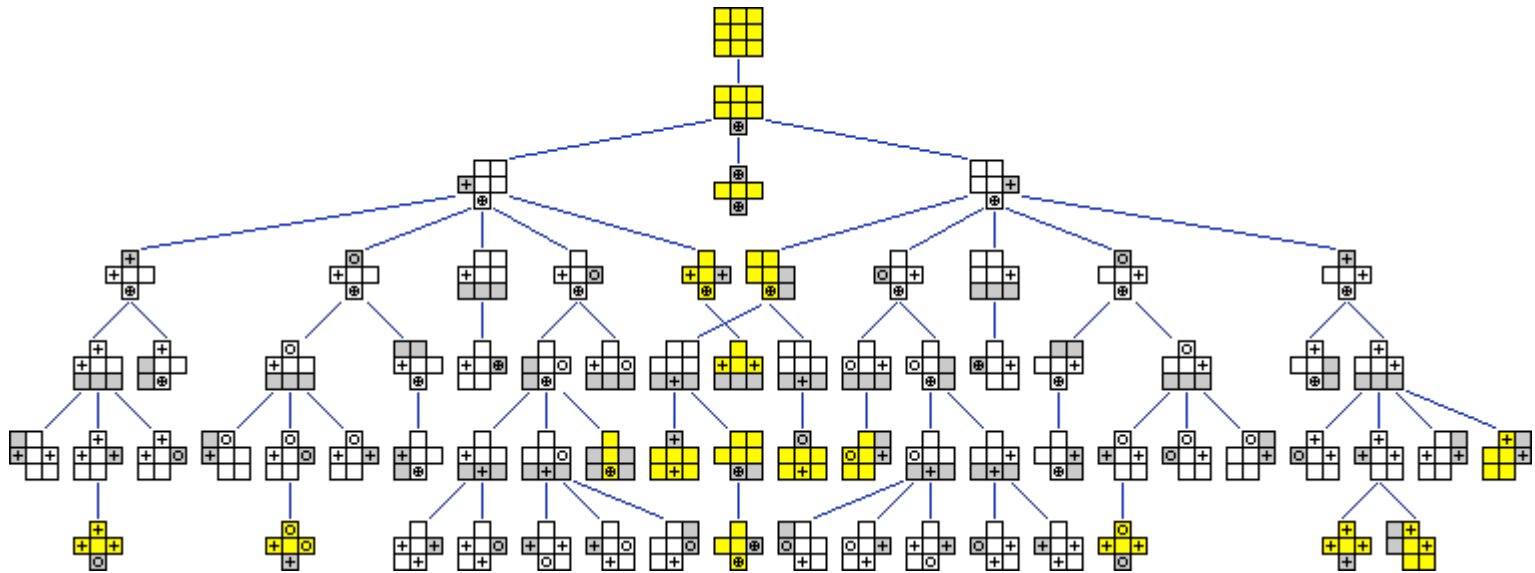
We're still in a “for loop”

- Augmented Reality may change this
- “guide” us along?

Demo



What I didn't think about (from Jaap's puzzle page)



Ways to leave Cyberspace

- Navigation systems ... an early step
 - Instructions on screen
 - Audio instructions are more passive
- Car finder applications
 - Via GPS
- Google Goggles
 - An amazing toy

Ways to leave Cyberspace

- Interactive Astronomy applications
 - Google Sky Map
- Satellite locators
- The “first down” line
- “Heads up” display

Ways to leave Cyberspace (non-visual)

- Song identifiers
 - SoundHound / Shazam
 - Name that tune ...
 - And sing along ...
- Levels

It's about leaving

- Not a specific device or platform
- Mobile devices most likely to be used
- The demo was on a plain laptop

Google Glasses 2014?



I expect the hardware to

Steve Mann's "wearable computer" and "reality mediator" inventions of the 1970s have evolved into what looks like ordinary eyeglasses.



(a)
1980



(b)
Mid 1980s



(c)
Early 1990s



(d)
Mid 1990s



(e)
Late 1990s

SimpleCV

- A python Framework using:
 - NumPy
 - SciPy
 - OpenCV
 - Python Image Library (PIL)
- Not just a wrapper
- An excellent place to start with computer vision

SimpleCV

- Components
 - Camera
 - Kinect
 - Color
 - Display (output)
 - Features and BLObs

SimpleCV

A Simple application

```
import SimpleCV
cam = SimpleCV.Camera()
while(1):
    i = cam.getImage()
    i.show()
```

SimpleCV

Features

```
blobs = image.invert().binarize().findBlobs(minsize=500,
maxsize=10000)
    if blobs:
        blobs = blobs.filter([self.isCubie(blob) for blob in blobs])
    if blobs:
        blobCount = len(blobs)
        distancePairs = blobs.distancePairs()
        blobs.image = image
        for blobIndex in range(0, blobCount):
            blob = blobs[blobIndex]
            blob.drawMinRect(width=3,color=Color.Red)
            self.addCubie(blob, distancePairs[blobIndex],image)
```

SimpleCV

Lena



SimpleCV

(binarized Lena)



Demo

- Strategy for recognizing the puzzle
 - Wait for motion to stop
 - $\frac{1}{2}$ second
 - Look for rectangular “cubies”
 - Find the middle cubie
 - Find the edge cubies
 - The closest four
 - Find the corners
 - Circle around the perimeter
 - Resolve color
 - Match pattern and find the move

OpenCV

- Originally developed by Intel
- Python support
 - Lower level than SimpleCV
- GPU support

Will this make us stupid?



Memory

“it will implant forgetfulness in their souls: they will cease to exercise memory because they rely on that which is written, calling things to remembrance no longer from within themselves, but by means of external marks.”

Making life easier?

