Visual Displays, Other sensory displays

Other sensory displays

Touching Real Things

One of the first demos to come out of Scott Fisher's VR lab at NASA in the late 1980s was a "surprise haptic demo," made with Stanford intern Mark Bolas. They had made a 3D computer model of the VR lab space, and after visitors experience the standard demos, they'd switch from aircraft and elevators to the actual room, and say "see the table in front of you? Touch it." The visitor's VR hand (via VPL's Data Glove) would reach out in a minimal wireframe world, viewed through then state-of-the-art VR headgear which Bolas calculated were equivalent to 20:200 vision, and alas!, touch the actual physical table.

Today this phenomena is sometimes called "mixed reality" (MR), now clouded by Microsoft's different use of the same term. The phenomenon involves building a location-based space with physical props whose shapes approximate the virtual world the viewers will see with their VR headsets. The first major public appearance of this MR was a Ghostbusters VR experience, in 2016, in New York's Times Square, built by The Void. Visitors wore standalone VR backpacks. Check out the video. A more recent startup, Nomadic, calls this "tactile and walkable VR adventures."

A ground-breaking and emotionally resonant MR art installation was presented last year at the Tribeca Film Festival called Draw Me Close, an autobiographical story about the filmmaker as a child and his relationship with his terminally ill mother. The installation involved a live actress performing as the mother, captured live and appearing in the MR world, who would touch and hug the VR headset-clad visitor. See this video.

Smell & Taste

I'm combining these two senses into a single section partly because they're so similar, relying mostly on chemistry, and partly because there's not much that's truly new and revolutionary.

Smell-O-Vision & the Food Simulator

"Smell-O-Vision," specially equipt movie theaters with aroma emitting machines, really did exist (1960), as did AromaRama, Odorama, & Aroma-Scope, all with custom produced movies for the experience. The biggest problem was evacuating the aromas as fast as they were emitted, and allegedly this was the single biggest reason home "aroma players" never caught on. I once heard a radio interview with the maker of such a product, a CD player like device, which flopped and when asked why, he replied "people think they'd like to have the smell of 'baked bread' but then after a few minutes, they could no longer stand it."

One solution is to wear small "scent release devices" around one's neck. Los Angeles based start-up RemniScent makes small wireless modules loaded with chemical based scent filters.

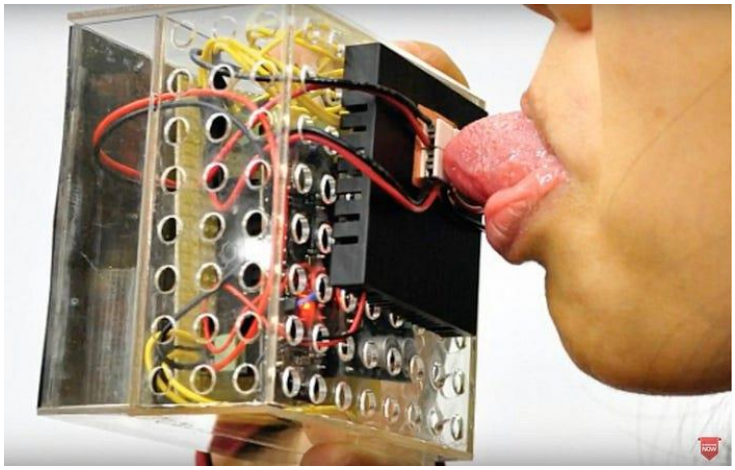
Another solution, recently demonstrated by MIT Media Lab PhD student Dan Novy, is to "target" scents across the room using a vortex generator.

On the one hand, all of these methods work, in the sense of engaging smell as a sensory input.

On the other hand, the technology remains entirely chemical, not electronic or digital, so each scent requires its own dedicated vial.

The same is essential true for the sense of taste, at least for the forseeable future.

In 2003, the Food Simulator premiered at the Siggraph Tomorrow's Reality Gallery in the LA Convention Center. Participants were asked to put in their mouth a gauze-covered electro-mechanical device with a thin plastic hose attached. Biting down triggered the device to quickly contract while squirting a food flavored chemical into the participant's mouth. While many found it "novel" (or worse) virtually no one could make the leap between this device and virtual food. To its credit, the lead inventor, University of Tsukuba professor Hiroo Iwata, is perhaps the most prolific exhibitor of edgy haptic devices.



Mind

I'm using "Mind" as any sensory input not coming in through the known five senses. This may be related, but as I understand, different from Ayatana, the Buddhist belief in Mind as the sixth sense.

ESP, Brainstorm (the movie), & Science

ESP, Extrasensory perception, was coined by Duke University Professor J.B. Rhine "to denote psychic abilities such as intuition, telepathy, psychometry, clairaudience, and clairvoyance, and their trans-temporal operation as precognition or retrocognition." While many (actually most) people polled believe that some form of ESP or psychic phenomena exists, so far it's been impossible to reliably replicate these phenomena. And it's not like people haven't been trying, including the military. We even had a "psi research program" at Paul Allen's Interval Research Corporation in Palo Alto in the 1990s.

For this session, we're only focussing on "mind as sensor:" can the mind "read" other minds or "see" something far away without any other sensory input? Next week we'll address "mind as effector," which, it turns out, is a very different thing.

Even — especially — the best ESP or psi researchers will be the first to say that if these phenomena exist, they are very weak, inconsistent, unpredictable forces.

The 1983 movie Brainstorm, directed by the (thrice) aforementioned Douglas Trumbull, has perhaps the most technically believable premise, that a "brain helmet" can serve as a total input/output device, recording and playing back full sensory human experiences via something like video tape. The teaser gives an idea of the tech (and please forgive the early 1980s styles).

Using a brain helmet as input, to inject signals into the brain containing previously recorded human experiences is simply not on the horizon.

AR visualization

Augmented reality (AR) visualization refers to the manipulation of 3D rendered objects to be experienced virtually in a user's environment. In contrast to virtual reality (VR), which seeks to fully immerse users in a virtual environment, AR combines the user's perception of their real-world environment with visuals that appear to take up space in that environment. This allows users

to interact with 3D models to fully conceptualize what a product might look like and how it might behave in the real world.

Types of AR visualization

There are four main kinds of AR visualization.

- **Marker-based visualization:** This type of AR visualization relies on real-world object detection in a camera view to serve as reference points for virtual information to appear on-screen. For example, an end user might use an app to view products on a show floor through their phone's camera and see product descriptions and other visuals pop up next to objects when relevant objects are recognized.
- **Markerless visualization:** Markerless visualization refers to a type of AR visualization that does not rely on real-world objects to display a 3D object in a fixed space on the user's screen.
- **Projection-based visualization:** This type of AR visualization projects light to create what are essentially holograms in the real world, rather than relying on an on-screen camera view of the real world.
- **Superimposed visualization:** This type of AR visualization is popular for product visualization. It combines real-world and virtual visuals to create the effect that virtual objects are overlaid onto the user's environment.

Benefits of AR visualization

While AR visualization is an evolving technology, its benefits are already being realized by e-commerce companies. Some of these benefits include:

- **Remote product demos:** AR visualization allows end users to conceptualize how a product works in the real world without actually interacting with it. This benefits companies by allowing them to host product demonstrations remotely.
- **Efficiency:** Many AR visualization tools allow users to import existing 3D models or scan real-world objects to create already made models of those objects. This saves time for teams and enables them to get their AR solutions up and running more quickly.
- **Marketing:** AR visualization can be used to display immersive marketing information and visuals as potential customers browse through products. For example, AR visualization allows potential customers to see what a piece of furniture might actually look like in their living room.

Basic elements of AR visualization

While there are different types of AR visualization, as mentioned above, and it is an evolving space, most AR visualization endeavors will include similar basic elements. These include:

- **Object or environment detection:** One of the basic elements of AR visualization is object and environment detection because AR visualization relies on merging the real world with virtual objects. Except for markerless AR, most AR visualization tools include systems to automatically detect and map real-world environments. These tools then constantly track

the objects and surfaces in that environment, even as the end user's camera angle changes, to ensure that the imposed virtual objects appear fixed in space.

- **Integration with a viewing device:** Whether an AR visualization tool is used for projection-based viewing, handheld device viewing, or even headset viewing, it must integrate with hardware and software that allows the visualizations to function.
- **Scaling:** While AR visualization can range in its 3D modeling capabilities, from thorough editing tools to simple scan-ins, most visualization tools allow users to scale objects to suit their projects. This helps companies ensure that the visual representations of their products in the real world don't look too big or too small according to actual specifications.