On Exactitude In Science: Semiotics Of Representations

Early Modern Maps & [Virtual] Reality

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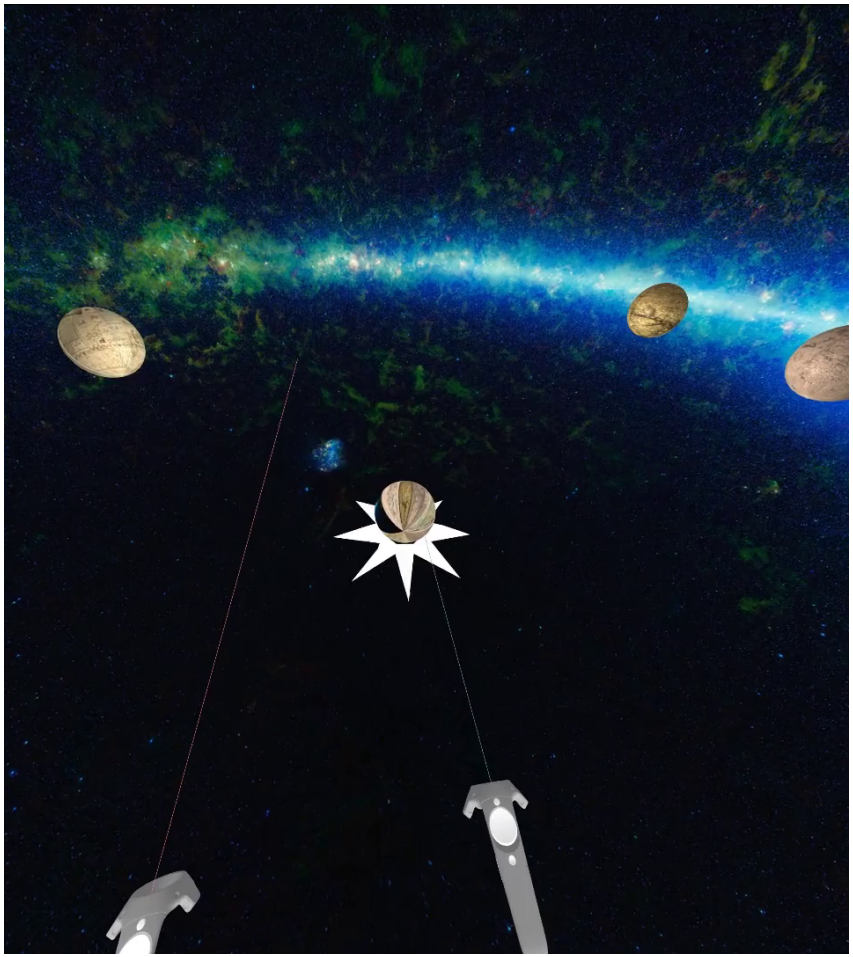

Repository: https://github.com/domenicus/VR-Mapping

On Exactitude in Science, by Jorges Luis Borges

... In that Empire, the Art of Cartography reached such Perfection that the map of a single Province occupied a whole City, and the map of the Empire a whole Province. In the course of time, these Disproportionate Maps were found wanting, and the Colleges of Cartographers elevated a Map of the Empire that was of the same scale as the Empire and coincided with it point for point. Less Fond of the Study of Cartography, Subsequent Generations understood that such an expanded Map was Useless, and not without Irreverence they abandoned it to the Inclemencies of the Sun and of Winters. In the deserts of the West, tattered Ruins of the Map still abide, inhabited by Animals and Beggars; in the whole Country there is no other relic of the Disciplines of Geography.

Suárez Miranda, Travels of Prudent Men, Book Four, Ch. XLV, Lérida, 1658

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Del Rigor en la Ciencia de Jorge Luis Borges

... En aquel Imperio, el Arte de la Cartografa logró tal Perfección que el mapa de una sola Provincia ocupaba toda una Ciudad, y el mapa del Imperio, toda una Provincia. Con el tiempo, estos Mapas Desmesurados no satisficieron y los Colegios de Cartógrafos levantaron un Mapa del Imperio, que tenía el tamaño del Imperio y coincidía puntualmente con él. Menos Adictas al Estudio de la Cartografa, las Generaciones Siguientes entendieron que ese dilatado Mapa era Inútil y no sin Impiedad lo entregaron a las Inclemencias del Sol y los Inviernos. En los desiertos del Oeste perduran despedazadas Ruinas del Mapa, habitadas por Animales y por Mendigos; en todo el País no hay otra reliquia de las Discíplinas Geográficas.

Suárez Miranda, Viajes de Varones Prudentes, Libro Cuarto, Cap. XLV, Lérida, 1658

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Cartography

1. Maps are everywhere
2. Maps are complex graphical, representational, and narrative objects
3. Medieval mapping technologies concerned themselves as much with symbolic relationships among peoples, places, and the unknown (including the spiritual)
4. As mediators between an inner mental world and an outer physical world, maps are fundamental tools helping the human mind make sense of its universe at various scales.
5. To represent is to signify ... to create meanings:
6. In relation to semiology is that maps form a system of signification (semiotics)

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"Semiology ... aims to take in any system of signs, whatever their substance and limits; images, gestures, musical sounds, objects, and the complex association of all these, which form the content of ritual, convention or public entertainment: these constitute, if not languages, at least systems of signification."

Roland Barthes, Elements of Semiology

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About Reality

1. Esse est percipi: "to be is to be perceived"
2. According to this argument 18th-century Anglo-Irish empiricist George Berkeley, all the qualities attributed to objects are sense qualities.
3. Maps as representations, an objectification of space, produce and project a reality that in western tradition has been accepted as "reality" remember the arrow in a map telling: "you are here"
4. Virtual reality as we currently understand it, its an immersion experience in a 3D computer generated environment.

"We accept reality so readily - perhaps because we sense that nothing is real."

Jorge Luis Borges

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Why is a map different in a VR Space

Why VR is better than reality for observing a map, playing with a map?

1. Iteractivity: zooming, voice-over, text, animation
2. Ease of focus: the eye is focused on a single object: the vision is captured by a giant image of representation of space
3. Map of maps: the ability to browse a huge catalog of map in a single space, and to curate that huge map
4. Inhabiting a map; recreating a map as 3D space. Gaming maps.

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The paradox of Exactitude in Science.

1. The map of scale 1:1 is being constructed by the internet, actually AR: The Mirror World.
2. VR and the Inner mirror: The Inner map of knowledge
3. We propose to go inside the object of knowledge: in this case Early Modern Maps but it could be any knowledge
4. The Aleph is an sphere in which all places of the universe are located is the universe.
5. We place an Aleph on a compass: that sphere is actually an entrance to a constellation of planets inhabited by knowledge

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“Truth cannot penetrate a closed mind. If all places in the universe are in the Aleph, then all stars, all lamps, all sources of light are in it, too.”
“Of course, if you dont see it, your incapacity will not invalidate what I have experienced.”

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Technical Aspects

1. Software toolchain
2. How to make reality convincing
3. Example: compass
4. Example: voices

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Software toolchain

1. We deliver all content through the browser. All of our code is JavaScript and HTML.
2. We do not have a serverside component; any HTTP server will do (e.g. Apache, Nginx).
3. To access VR we depend on the WebVR browser API, the Gamepad API, and the A-Frame JavaScript library.
4. Firefox controls the headset on our behalf through SteamVR.

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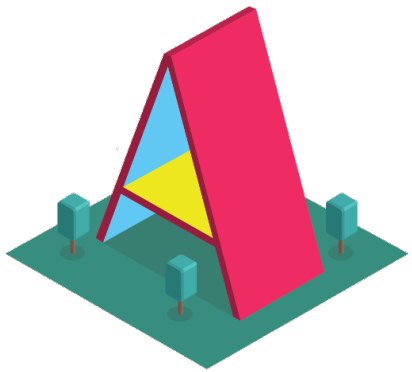
Why A-Frame



When we set out, we wanted to ensure we weren't tied to a single headset or a single computer. The easiest way to achieve this is to use a headset-agnostic, OS-agnostic framework like A-Frame.
A-Frame is completely open source, meaning that we can make our own modified copies and keep and distribute them without issue. This avoids relying on a commercial software licencing agreement for future availability.

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How to make reality convincing

We started with very basic environments, like rooms with flat maps on the wall. We learned a variety of important lessons:

1. Sharp transitions are scary, slow transitions are nauseating.
2. Turning around is annoying.
3. Boring space is bad space.

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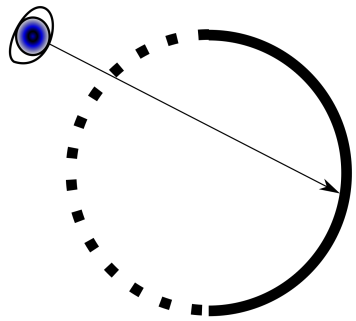
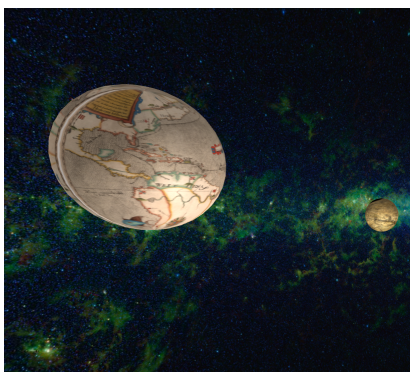
Compass





1. At first, we just started people in front of a map. This was not exciting.
2. So, we added an introductory space, with a 'portal' to get in. We made our 'portal' by putting an image on the 'inside' of a globe, and making the walls transparent from the outside.
3. We ultimately transformed the introductory space to the literal vision of space we now have, but the portal had captured out attention as the 'Aleph' from Borges.
4. We kept the portal, since it was a good (and philosophically satisfying) transition.

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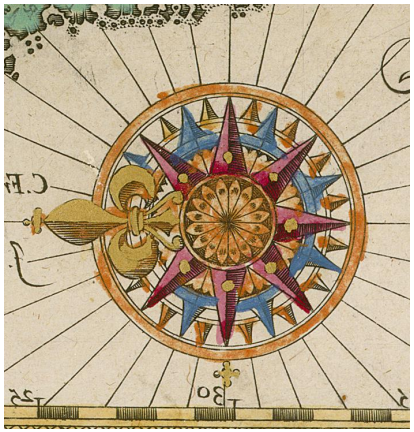

1. To really have an Aleph, we needed to be able to access **all** the maps, not just one.
2. We put all the maps in one little portal, and let the user select which one they want. This was also very convenient!
3. We decided to use a motif from one of the maps we studied, a compass.
4. We made a 3D model and attached it to the portal, making it feel more physical.

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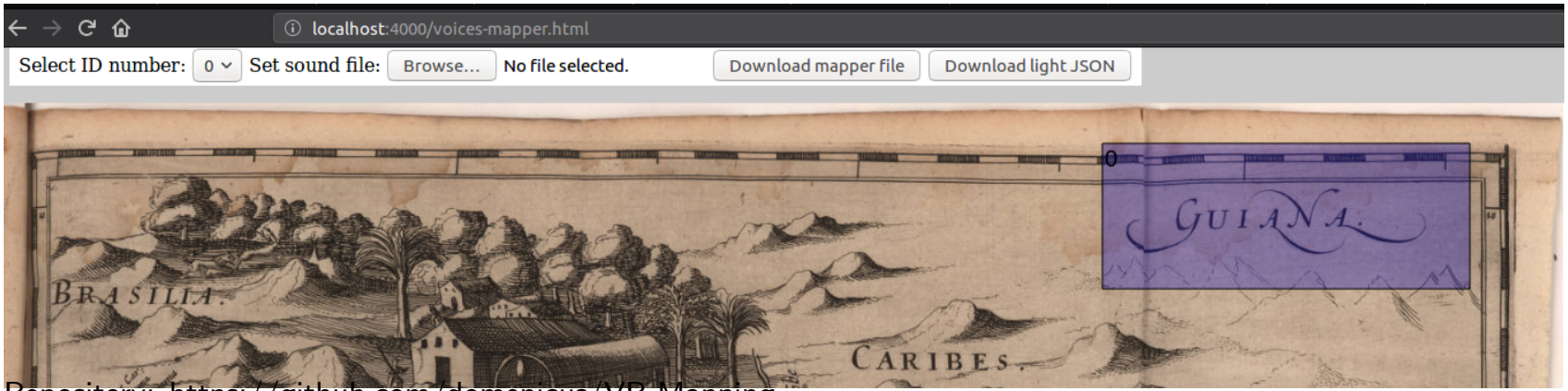
Voices

1. We first experimented with having a box of information on one side of the screen.
2. Reading text in VR is both boring and occasionally difficult.
3. So, we decided to have voice annotations.
4. We created a flat, non-VR tool to graphically map audio files onto the map.
5. We used to play audio whenever the user looked at the right area, but it was annoying.
6. We play the audio back when the user zooms in – giving them context only when they ask for it.



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