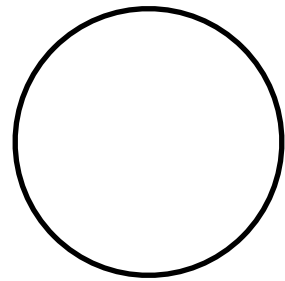


The Haptic Room



Abstract

A small circular room incased in a large, advanced electrostatic haptic electronics array. The user dons a suit that covers the body, which allows for haptic feedback emulating texture, and a helmet with a flexible 3D display that allows for visual emulation of an environment.

These elements, when combined, produce an advanced virtual reality experience, transporting the user to any space that's programmable and renderable. Forests, cities, abstract planes, and more.

Electrostatic Haptic Tech Explained

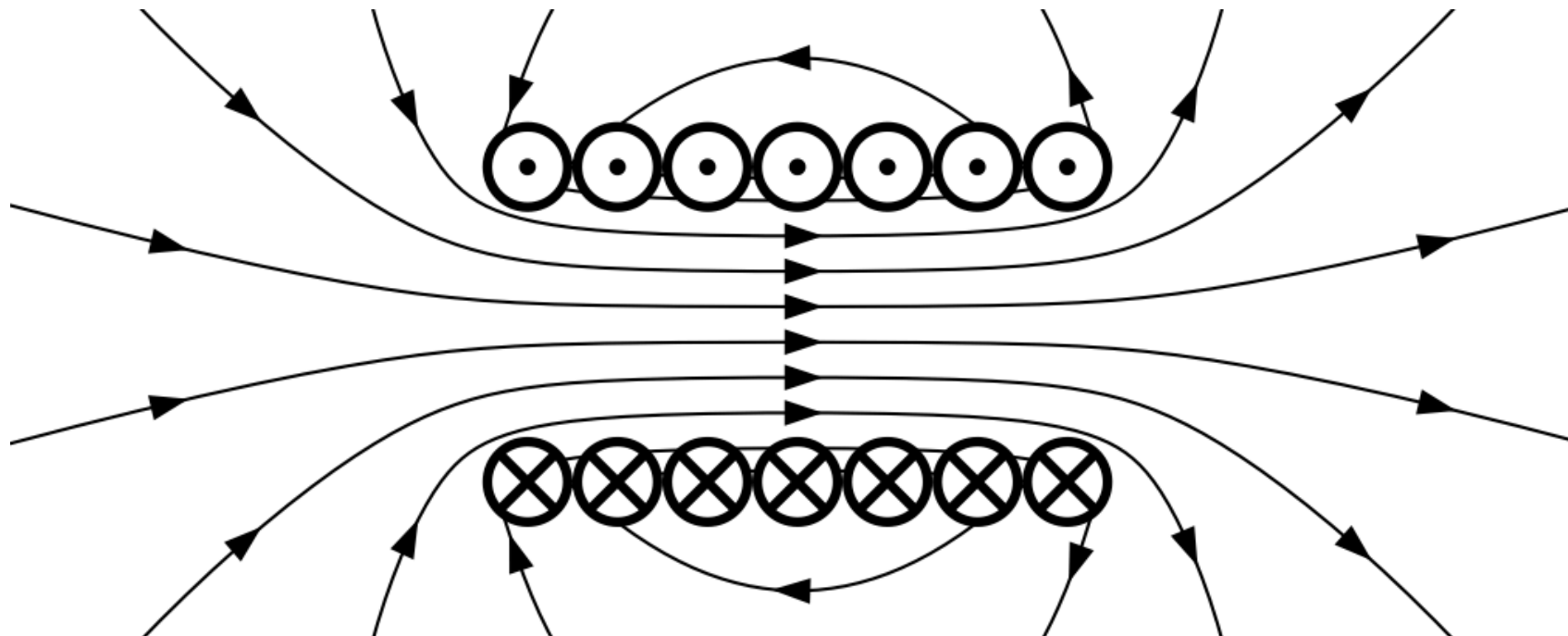
Electrostatic haptics relies on Coulomb's force, a law of physics that describes how electrically charged particles interact with each other.

“The magnitude of the electric force F is directly proportional to the amount of one electric charge, q_1 , multiplied by the other, q_2 , and inversely proportional to the square of the distance r between their centers” ([britannica.com](https://www.britannica.com/science/electricity/Coulombs-law)).

Expressed as an equation:

proportionality factor k as $F = kq_1 q_2 / r^2$

Electrostatic Haptic Tech Explained (cont'd.)



Visual representation of Coulomb's force

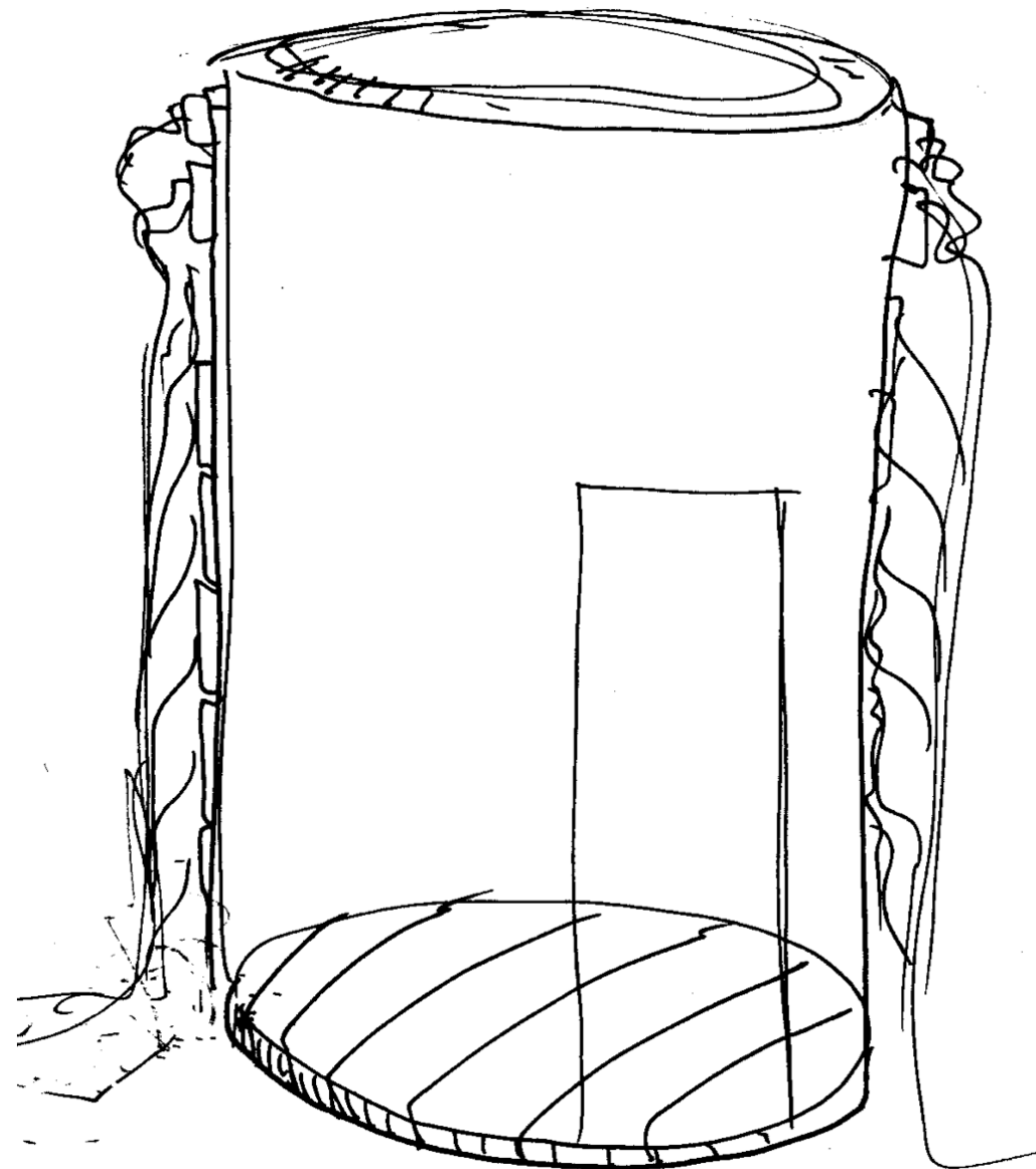
Electrostatic Haptic Tech Explained (cont'd.)

An electrical charge is passed through an array of electrodes installed in the wall, floor, and ceiling. An attractive force is created between the room's surfaces, and the user. The strength of the electrostatic field is controlled by the amount of energy inputted.

Through modulation, different textures and three dimensional objects, can be emulated. Specific objects, a pillow for example, can be emulated through this modulation (in conjunction with the proper programming).

The Room

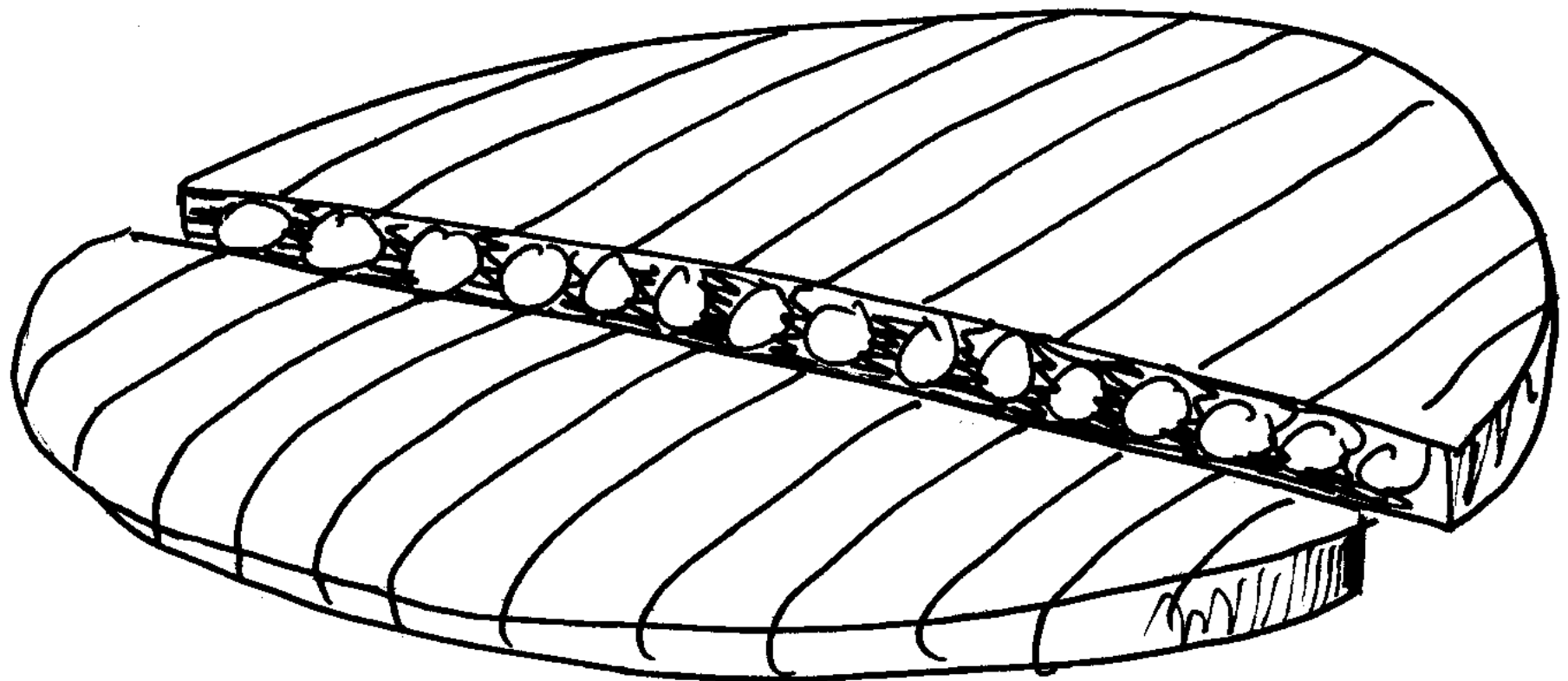
A small, circular room six feet in diameter, with a large array of electrostatic haptic electronics embedded in all surfaces.



The Room (cont'd.)

The floor employs treadmill like technology to allow the user to walk or run without making any forwards, or backwards progress. Like a regular treadmill, the floor can simulate different levels of steepness.

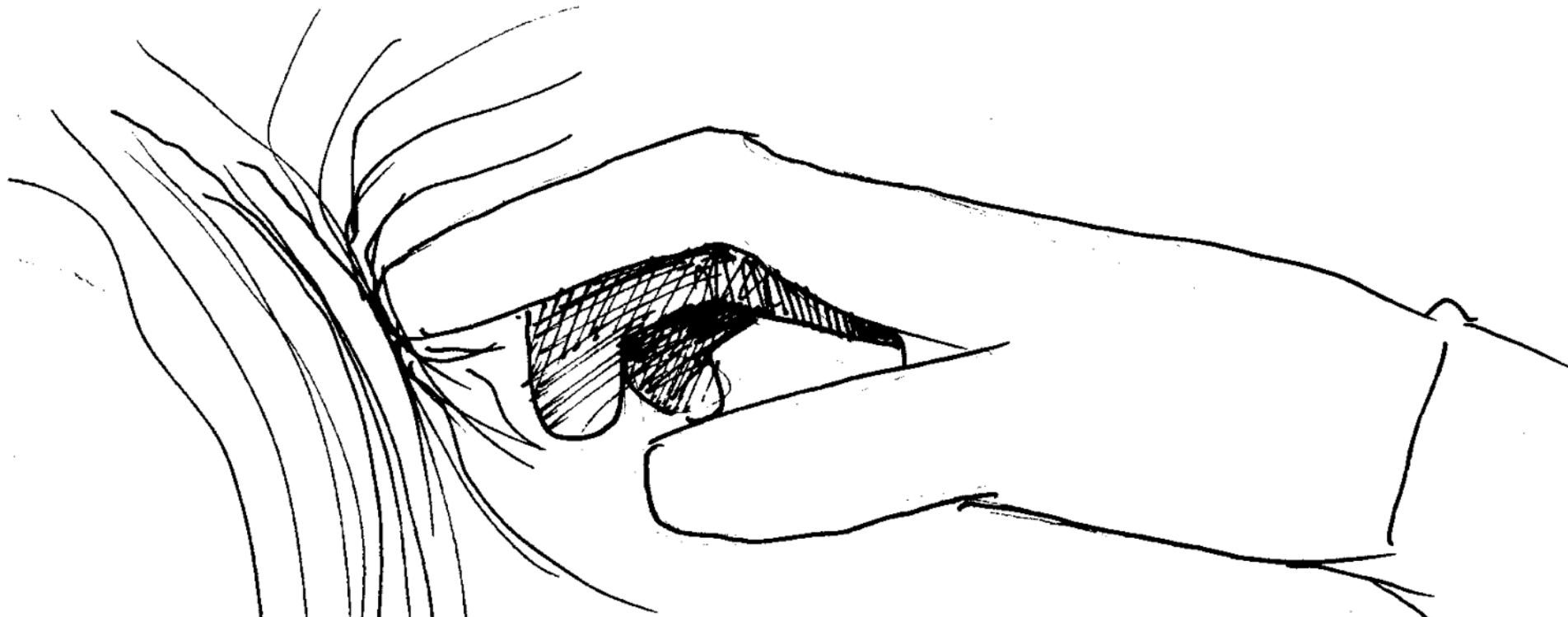
The user's movement is tracked through sensors in the floor, and a motion tracking camera.



The Room (cont'd.)

The electrostatic haptic electronics in the wall, floor, and ceiling provide macro emulation of 3D space.

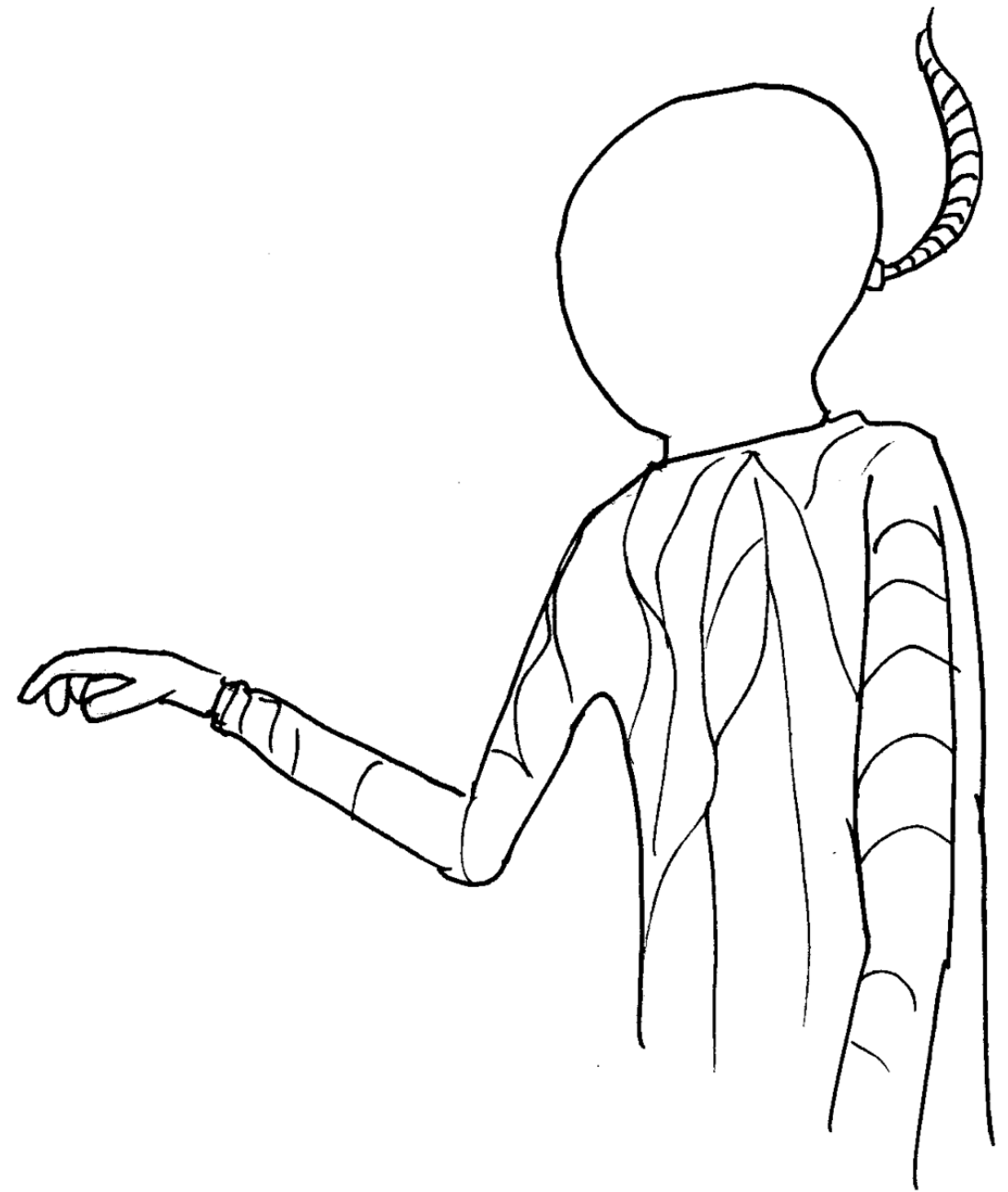
With the assistance of a motion tracking camera, the electrostatic fields are generated in specific coordinates in relation to the user's position in the room and position in the virtual environment.



The Suit

The user also dons a haptic suit. The electrostatic haptic electronics in the suit provides micro emulation of 3D space, and textures that are too subtle for the room's electrode array.

The suit also ensures an opposite charge is always present, allowing for interaction with the room's haptic charge to be more consistent.



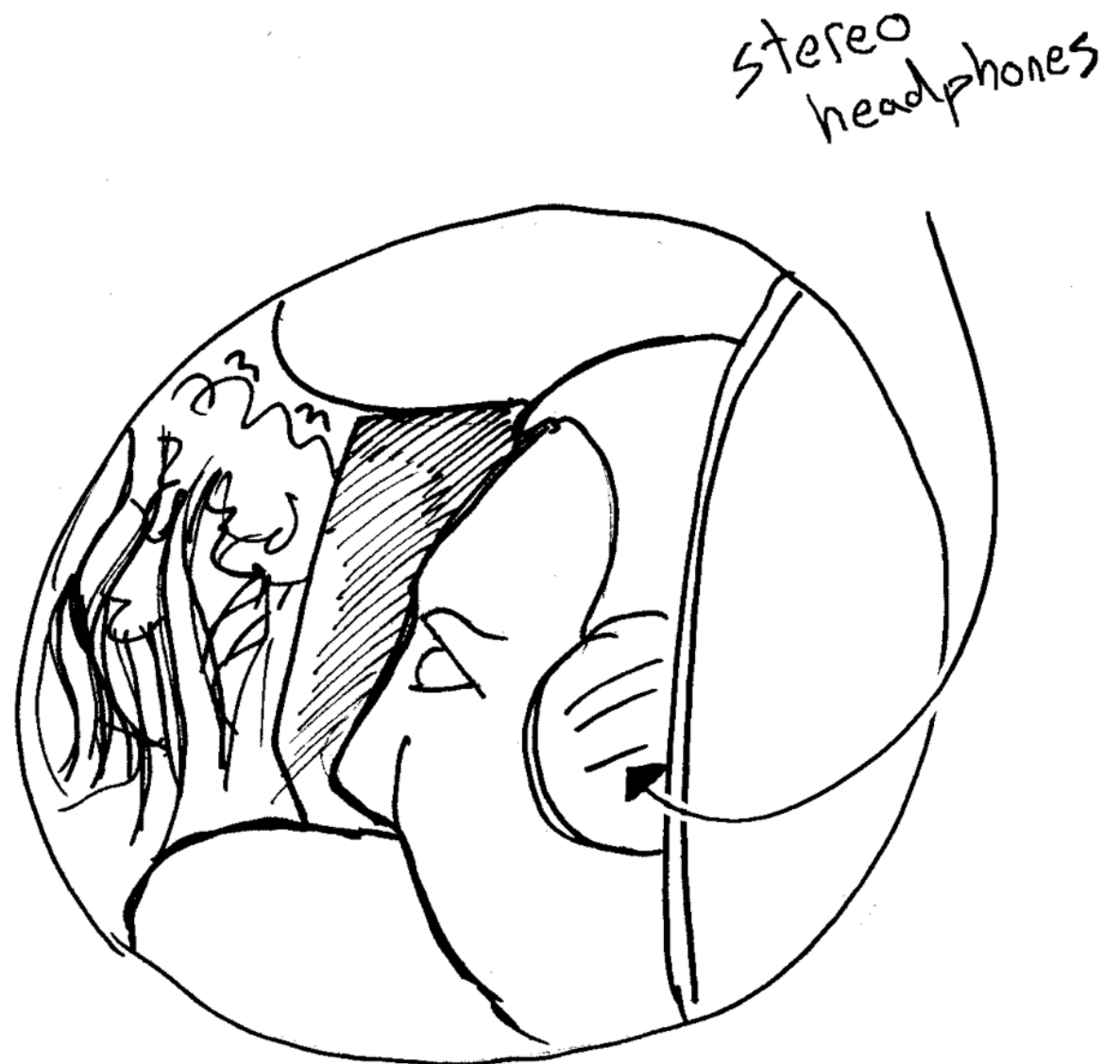
The Helmet

The helmet consists of a flexible 180 degree, high pixel per inch (PPI) display that is divided into two sections, one for each eye, allowing for an illusion of depth.



The Helmet (cont'd.)

The helmet also employs simple stereo headphones. The virtual reality program delivers binaural audio to give a realistic impression of 3D audio.

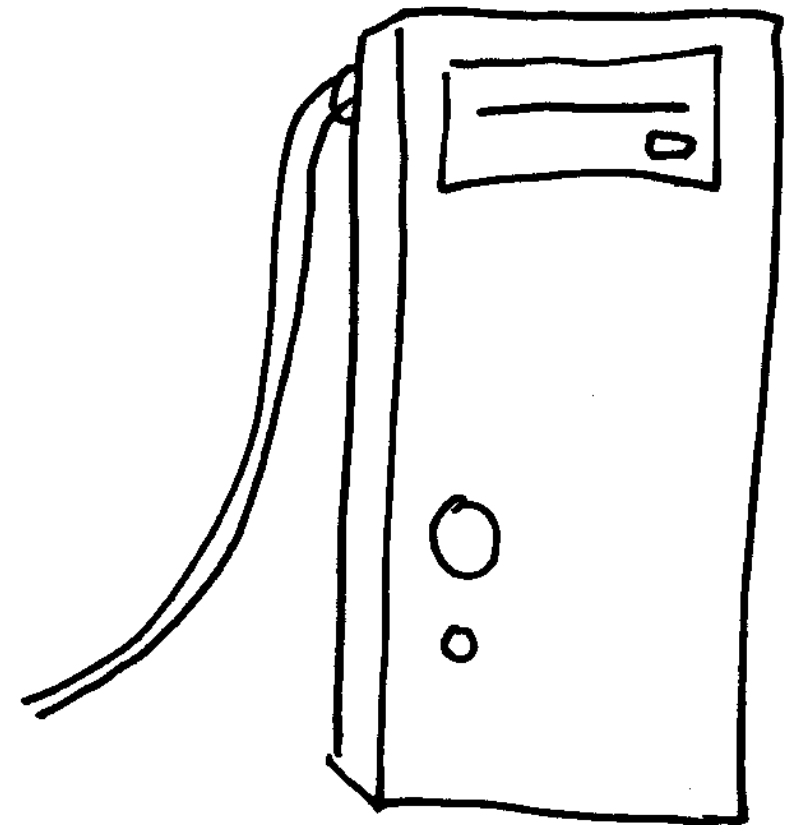


The Virtual Environment

Any number of virtual environments can be experienced to a nearly infinite level of fidelity. The experience's only constraints are dictated by data and energy. Higher amounts of both allow for a more realistic experience.

The electrostatic haptics can be controlled down to one tenth of the diameter of atomic nuclei, but the amount of data and computational power to recreate an environment with such fidelity is immense.

The computer must be capable of coordinating the haptic suit, the haptic room, and the virtual reality environment together simultaneously.



Sources

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