

Virtual Reality Games and Experiences



Ari Hollander - CEO

About Firsthand Technology Virtual Worlds, Real Results

Firsthand creates Virtual Reality (VR) games and immersive experiences that make the real world a better place. Our portfolio includes Attack! Of the S. Mutans, a suite of games that improve children's tooth brushing behaviors; SnowWorld, a VR game that reduces pain in burn patients; and IraqWorld, a VR therapy tool for treating Post traumatic Stress in veterans.

Firsthand provides custom application development services that leverage our decades of experience in VR development, creating applications that allow people to transcend the limitations of their physical reality.

We have just launched a new initiative, DeepStream VR, to create dynamic, individualized pain control software to counter the global overdependence on pain medications.

Interview conducted by: Lynn Fosse, Senior Editor, CEOCFO Magazine

CEOCFO: Mr. Hollander, what is the concept behind Firsthand Technology?

Mr. Hollander: We started back in 1995 to commercialize the virtual reality technology that we were working on at the Human Interface Technology Lab at the University of Washington. We wanted to get it out of the laboratory and into the real world where it could do some good. We focused on educational applications, medical applications, and research.

CEOCFO: And today?

Mr. Hollander: Today there is a surge of interest in virtual reality. It is the best time in history to be advancing some of the initiatives that we have been patiently working on all these years. For example: we have what I believe is the killer app for virtual reality. When people think about virtual reality games they think: "Wouldn't it be cool!" They get all excited about it. What we have is far more exciting. Not only does it have all the appeal of virtual reality games, but it also solves real world problems. It is one of the best answers to the question: "What virtual reality is good for?" With carefully designed virtual reality games we are in essence hacking the human sensory system to reduce pain. It is a technique that has been studied for about fifteen years, but it has mostly been stuck in the lab and we are trying to get it out there.

CEOCFO: Would you go into some detail about how it works?

Mr. Hollander: The general principal is sensory disruption. When you put someone in an immersive virtual environment they feel less pain because they are paying attention to the virtual world and not the pain that they are experiencing in the real world. However, there does appear to be much more to it than just distraction. There are neurological factors in terms of how the pain is transmitted and immersive virtual reality disrupts that process. There is a complex dialog between your brain and your body that results in the sensation of pain, and the way that you perceive of certain kinds of stimuli; specifically those that are involved with processing an interactive, immersive virtual world disrupts that dialog.

CEOCFO: Is it that the technology is better or the understanding of the brain is better that now is the time to put it together?

Mr. Hollander: Neither actually. The time could have been years ago, but there were a few obstacles, one of which is that I think that in general people were not ready for virtual reality. If you look back to the early 1990s when there was a lot of hype about virtual reality, virtual reality made a lot of promises and yet the proponents did not really know what to use it for. People were not used to carrying their computers with them everywhere they go, like they are now with mobile phones. This was before the Internet. People were not relating to data spaces in the way they are now. Another big thing that happened is that in the middle of the first decade of this century there was a big change where the kinds of media that

people consumed dramatically shifted. About 2007 there was a watershed point in the entertainment industry and instead of music and movies being the dominant forces, computer games became dominant. The computer games industry surpassed the size of the movie and music industries combined. I believe that this was caused by a generational shift: the kids who grew up with computer games started having kids who were old enough to play computer games. Now two generations of people were interested in interactive media. When you go from a static, passive consumption of media to an interactive engaging relationship with media, it changes the way that you use it in a big way. The kinds of things that people wanted to do had shifted. This set the stage for virtual reality being something that people could really relate to.

CEOCFO: *Would you explain how it is used in a pain reduction context?*

Mr. Hollander: One of the most studied cases is with burn victims. Much of the treatment for burn victims involves very painful procedures; stretching of wounded tissues and cleaning and scrubbing of wounds. It is really one of the most excruciating things that we can experience. The old approach was putting a VR helmet on people while they were getting their bandages changed or their wounds cleaned or they were doing stretching exercises. Then they were in the virtual world and away from their pain. We have changed that process a bit as time has gone on. Instead of wearing something on your head, more and more of the people that are doing research in this area have been using displays that are mounted on articulated arms and putting them in front of the patients face, so they can look into it and if they are overtaxed by what is going on or they get claustrophobic or whatever, they can push it away and it is gone. Before you had a helmet on that was kind of heavy and kind of awkward and was strapped on to you. That could cause problems. There were also issues because many burn victims have burned faces and they could not wear the helmets. This is a modification in that process.

Basically they are playing games. However, the interesting thing is that if you just play games on a screen it does not work anywhere near as well. Another characteristic is that some of the research has shown that if you show someone a virtual world but do not let them interact with it, do not let them look around and steer their viewpoint and create effect in the environment, then it is much, much less effective; like seventy five percent less effective. The kind of efficacy that we are talking about, just to give you a frame of reference, the typical results for immersive VR research in this area tends to be somewhere between thirty and ninety percent reduction in pain. A benchmark for that is that a dose of morphine is typically calibrated at twenty five percent. These are profound clinically significant levels of pain reduction that the research has shown.

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CEOCFO: *Where are you in the process of commercialization and utilization?*

Mr. Hollander: This is a new initiative that we are launching right now called DeepStream VR. We are raising money to build up the software infrastructure for this. We also have some hardware technology that enables delivery of it today. The old school head mounted displays were too expensive and impractical, and the new head mounted displays and other kinds of virtual reality displays really have not gone on the market yet. Therefore, we went ahead and build something ourselves to enable this process. We are also doing sensor integration, taking advantage of the new, inexpensive neurosensors and other kinds of biosensors to make the pain control experience customized to the individual dynamically. On the fly you can adjust and optimize the strategy and level of pain control the system delivers. We have a minimum viable product that we can get out there today. We have actually sold about ten systems thus far. We are raising money to try and scale up.

CEOCFO: *What is the reaction from the investment community? Do they believe? Do they understand?*

Mr. Hollander: They do seem to believe and understand. We are just trying to find the right partners to push this forward. It seems that when we talked about this kind of work years ago people were very excited about it, but it was sort of an, “Okay, I can kind of see that.” Now for some reason, and possibly due to some of the factors that I described to you earlier, people immediately get it. They say, “Oh yeah, that makes sense to me. I can see how that would work.” However, until they see, possibly, a video of someone who has gone through the process or experience it for themselves they do not really understand. That is because it is a very profound effect.

CEOCFO: *Are you looking at healthcare investors? Are you looking at tech people? Where do you see your target market to both investment and actually to gain entry?*

Mr. Hollander: As you said, we are doing all of the above. The challenge is that the healthcare industry is very set in its ways and what we are talking about here is a disruptive technology. It is something that is different, a different model and

people in healthcare are fairly complacent about, “Well, we can just prescribe a pill.” There is a growing backlash against the loading on of more and more drugs. We are four percent of the world’s population in this country and we consume eighty percent of the opioids. We have got a serious drug problem. Part of this problem is systemic in that the entire medical complex is pushing those kinds of easy solutions and they are not real solutions. They cause bigger problems in the long term as we are becoming more and more aware. We have got some alternatives here and we are hoping that they can get more traction in the mainstream medical market. People in the tech sector are much more interested in disruption in markets and in process. Therefore, we are getting different kinds of responses from different kinds of investors. There are many people in the healthcare domain that want to shake things up. They are just trying to figure out how to do it. That is because you have got to get a purchase on this system and try to figure out what your entry point is to it. There are some challenges there.

CEOCFO: *What are other areas of interest?*

Mr. Hollander: We have done many different kinds of work in virtual reality over the years. As I had mentioned, we worked in education, research and training. We have also done therapy applications. We have made tools for therapists to use to treat post-traumatic stress. This has been used by the military in various contexts. We have done simulators for training dental hygienists to give injections, so they can practice on a virtual patient, rather than a live one. We have done work in market research. We are collaborating with a group called Cascade Strategies on building a new system that takes advantage of, once again, biosensors and things like eye tracking to allow us to analyze, not just what people are seeing when they look at, for instance, a shelf full of items at a store, but how they are feeling while they are looking at it and how that influences their purchasing decisions. There are quite a range of different applications, but all of it tends to be centered around this concept of immersion. When you are immersed in a virtual environment you perceive differently. Instead of remembering something as a thing that you were looking at or hearing you remember it as a place and an experience. This is a much more visceral kind of experience and that leads to almost magical results-- like the pain control effect and like the ability to get insight into and influence over people’s behaviors. It allows us to go into new territories that really have not been thoroughly explored-- like some of the work that I did leading up to starting Firsthand back in the mid 1990s. That was in human perception here I was looking at the kinds of things that people could perceive, extending hearing into domains like shape perception that were typically associated with vision. Once you have control over the full sensory experience then you can start to extend in ways that you might not expect.

CEOCFO: *You website shows a number of products. Are you actively selling products today?*

Mr. Hollander: We are. The pain control thing is at an early stage. However, we have sold a handful of them and we are ramping up now. We are doing our initial production run on the systems for that. We have some apps in the app store for health and education. One is a little game for oral health education and another one is in sort of the same field, but completely different area. It is a tool for dentists to use to do risk assessment and communicate with their patients. We have done a lot of work with the National Institutes Health. We did some grant funded research on how to use immersive media to teach and change behaviors. One of the products of that was a game called the Attack! of the S. Mutans, which was, once again, oral health education. This was an immersive 3D experience. The initial prototype of it was part of a museum exhibit. We actually built the whole exhibit as well with a bunch of other auxiliary games. However, the focal point of the exhibit was this five player game with eleven foot stereoscopic 3D screens and the kids could use modified game controllers to reach into the screen and interact with the things there. What this did; and this is our theory and we tested it to a certain extent, was to give the kids a little bit of the science behind what is going on when they are brushing their teeth, give them a story framework that they can discuss with their parents and then give them a sense that they were there experiencing these things firsthand and interacting directly with the bacteria that cause cavities. In the game they were being effective at fighting those bacteria, so it gave them a sense of success. We believe that those factors lead to the success in influencing their behaviors. Some of the pre test / post test research that we did showed that at least some of the kids really did benefit from that, even though it was only a fifteen minute game. A significant portion of our population did improve their brushing habits by both self-reports and what their parents were saying about their brushing habits. This was better even three months later and even better still six months down the line. There was a lasting effect from a fairly short interaction in an immersive environment.

CEOCFO: *With so much possibility, how do you stay focused?*

Mr. Hollander: When you build virtual environments you, by necessity, become a generalist. Therefore, there is a constant battle between being a dilettante and being a renaissance person and innovator. Part of it has to do with staying true to your goals. We have always focused on trying to produce applications with the goal of making the real world a better place. Health education, public health, doing things for people in pain, for people suffering from trauma, we did applications for suicide bomb attack victims in Israel, for returning soldiers; all of these different things focused on those kinds of goals. There is a common thread. As I said, immersion is this magical property in virtual environments and we

can leverage it in many different ways. How do we keep from being scattered? It is challenge. There are many exciting ideas. There are many different directions to go. However, we have had a great track record of success in pursuing these ones and we get fairly single minded about each application when we are working on it.

CEOCFO: *Why is Firsthand Technology and exceptional company?*

Mr. Hollander: There is, as I said, a lot of interest in virtual reality now that has not been there in a while. We have been doing this work for twenty years. We know, not just how to create virtual worlds, but what kinds of things work best in them. We have got a lot of experience in that domain. One of the things that we have run into frequently is that people say, "I want to do this thing in virtual reality" and we have the strange situation of saying, "are you sure that you want to do that," because virtual reality may or may not be the best approach. However, what we can do is get to the heart of the matter and figure out, "here is where this application really matches," and we can built something that has a compelling purpose for being and we can really harness the technology to make the kinds of magical effects that we described in these other applications.

Bio: Ari Hollander is Co Founder, CEO, and Technical Director of Firsthand Technology and the CTO and Co founder of a new venture in Virtual Reality software applications: DeepStream VR. He has over 20 years of experience leading development of practical applications of virtual reality.

Although he already had his first gold record by age 21, instead of pursuing a Career in Rock and Roll he went into Applied Science Fiction. He has degrees in Astrophysics and Virtual Reality Interface Technology. His thesis project explored extending the domain of human perception by synthesizing "auditory shapes" from carefully constructed 3D sounds that exploit ambiguities in psychoacoustic models of spatial sound perception.

Ari has been a Principal Investigator on two significant NIH grants and has authored multiple patents in virtual reality hardware and software. He lives in Seattle with his partner Laura and their two young children.



Firsthand Technology

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