Who Invented Virtual Reality Know-how?

The Oculus Rift in use throughout E3 in Los Angeles, Calif. in June 2013.

Digital actuality (VR) has not only been the stuff of science fiction novels and films for decades, but it is also been an actual thing -- kind of. The first VR headsets have been produced within the 1960s. On the time, the technology took up a lot of room and value massive amounts of cash. In the late 1980s to nineties, VR grew to become accessible to basic public in arcades and other amusement venues by way of heavy headsets and controllers used to play reasonably easy video games -- reminiscent of swinging a pretend sword at virtual foes, with as much accuracy as the period's computing systems may muster. The head tracking was slow, the field of vision was slender and the graphics were low-decision by trendy requirements. The experience typically induced complications and movement sickness, and it wasn't all that immersive. Still, it was a step ahead in gaming and was certain to get higher, but it didn't catch on on the time and the industry fizzled. The mandatory expertise just wasn't out yet to make it compelling to the lots.

Excessive-finish VR headsets with better decision and response time have been developed since then, but they've remained prohibitively expensive for the house consumer and still are inclined to inhabit locations like government and company research and training facilities. The navy, automotive industry, house program and medical fields, to call a number of, all use VR in a technique or one other, out of the view of the general populace. It is the primary of a number of headsets poised to deliver lifelike VR into the realm of risk for the average consumer.

You'll count on such a marvel to come from a recognized electronics manufacturer, but Oculus Rift had a humbler beginning. Palmer Luckey, a teenage gaming and electronics enthusiast with a passion for VR, began amassing outdated headsets and tinkering to attempt to create something that may work with modern video games. Finally he realized there was nothing viable in existence, and he'd need to make his own system from scratch.

Combating Simulator Sickness

Evaluations, Availability and Possibilities

Opening the Rift

Luckey began working on what would turn out to be the Oculus Rift whereas he was in college learning journalism. He created the prototype in 2012, when he was only 19 years old. He had an concept to do a Kickstarter campaign to fund the creation of VR headset kits for maybe a few dozen devoted VR hobbyists, and he was communicating with heaps of individuals online about it, including John Carmack, the game developer well-known for

creating "Doom" and "Quake" and founder of Id Software. Carmack was working on a VR challenge and requested a prototype. He used the Rift prototype with his own firmware to reveal his VR game "Doom three BFG" at E3 2012, and that started the hype for the Oculus Rift.

Luckey based the company Oculus VR and enlisted the help of several trade insiders, together with Brendan Iribe and Michael Antonov, cofounders of gaming UI supplier Scaleform. The Kickstarter campaign commenced with a funding aim of $250,000, a objective it hit within the first day. By the end, it reached practically 10 instances that amount in pledges -- $2,437,429 total [sources: Kickstarter, Eurogamer]. It has partnered with Valve, Epic Video games and Unity, amongst others, to bring excessive-quality and low-price VR gaming to fruition.

As of early 2014, the Oculus Rift is currently out in a developer's equipment version with the aim of encouraging the creation of content for the gadget earlier than an improved consumer version goes to market. The patron model remains to be in the works, and Fb introduced it was buying Oculus VR for $2 billion in March 2014.

The machine is a lightweight digital actuality headset that blocks your view of your surroundings and totally immerses you in a digital world. The Rift permits you to step into a game, look round in any course and see the sport atmosphere throughout you moderately than on a flat screen surrounded by your living room decor. And you see it in 3D. Not fairly the holodeck or the matrix, however a very good step in that direction.

The Heads of Oculus VR
Oculus VR shortly went from a one-man operation to a multi-million dollar company poised to nook the patron VR market. As of this writing, it's helmed by the next executives: Palmer Luckey (Founder), Brendan Iribe (Chief Government Officer), Michael Antonov (Chief Software program Architect), John Carmack (Chief Technology Officer), Laird M. Malamed (Chief Operating Officer), Jack McCauley (Vice President Engineering), Nate Mitchell (Vice President Product) and Marshall Cline (Vice President Platform). Co-founder Andrew Scott Reisse was tragically killed in 2013 when struck by a rushing car involved in a police chase.

The Oculus Rift Growth Equipment version 1.1 contains the Oculus Rift head set, which vaguely resembles a pair of black ski goggles with a rectangular field masking the front finish. The equipment also comes with a control box that's completely attached to the headset via a 6-foot (1.8-meter) cable, a removable over-the-head strap for added comfort and stability, three pairs of imaginative and prescient lenses of different focal lengths, an HDMI cable, a USB cable, a DVI cable, an HDMI to DVI adapter and a 5-Volt switching US-standard energy provide along with international power adapters. All of this comes housed in a hard case. The Oculus Rift dev package goggles weigh lower than a pound -- a mere 369 grams -- and the future client mannequin could also be even lighter.

The management field is used to hook the headset up to your pc and carry out fundamental control capabilities. It consists of HDMI, DVI, mini-USB and DC energy connection ports, in addition to 5 buttons for controlling contrast, brightness and power. A blue LED on high shows you whether or not the device is on or off.

The Rift incorporates a flat 7-inch (17.8-centimeter) 60Hz LCD show display with a resolution of 1280 by 800 pixels (around 720p excessive-def resolution). The display is divided into 640 by 800 pixels per eye, with a 2.5-inch (64-millimeter) fastened distance between lens centers. The user views the display by means of two lens cups. There are plans to make the patron mannequin's decision at the very least 1080p, and the corporate has already demonstrated two 1080p prototypes (the HD and Crystal Cove fashions). The show inputs embody DVI-D Single Link, HDMI 1.3+ and USB 2.0 Full Pace+, all fed to it via the only management field cord.

The machine has a custom-built motion and orientation sensor unit with a sampling charge of as much as 1000 Hz. The sensor unit features a gyroscope, an accelerometer and a magnetometer, together with an ARM Cortex-M3 microcontroller. The info from all three sensors is combined by means of a course of referred to as sensor fusion to enable quick and accurate monitoring of your head orientation and synchronization with what you're viewing. This allows you to show your head in any route and look across the virtual atmosphere in actual-time, nevertheless it would not allow for positional tracking.

A brand new prototype, dubbed Crystal Cove, debuted at CES 2014. It has a higher decision 1080p AMOLED (lively matrix natural light emitting diode) display screen, lower latency, a higher refresh fee and far decrease picture persistence, which means that the pictures you see on the screen change as quickly as you progress slightly than persisting on the display long enough to trigger plenty of movement blurring. Crystal Cove may also observe place, quite than simply orientation, with the help of IR LEDs (which appear like little square white dots) everywhere in the headset that are monitored by an external camera, giving you 6 degrees of freedom quite than simply 3. You may lean toward issues to get a better look, or lean to look round corners, whereas with the developer package you possibly can turn your head in varied instructions to change the camera view, however you may have to use a separate controller to handle all motion towards, away from or around things. This prototype is reportedly closer to Oculus VR's imaginative and prescient for the consumer version. To use the gadget along with your pc, it must have both an HDMI port or a DVI video-out port. VGA will not be supported.6 or higher

Linux (Ubuntu 12.04 LTS)

2.0+ GHz processor

2 GB RAM

Direct3D 10 or OpenGL 3 compatible video card

Efficiency should be higher on a computer that can handle heavy-duty gaming. Per the SDK documentation, the Oculus team has discovered that a MacBook Professional Retina with an Nvidia 650M graphics card will work as a portable VR workstation.

The SDK also includes assist for some recreation controllers, including the Xbox 360 wired controller for Home windows, the Logitech F710 Wireless Gamepad for Home windows and Mac and the Sony PlayStation DUALSHOCK3 Controller for Mac.

To use the headset, you join your pc to the control field by way of the USB port and one (however not each) of the video input ports (both HDMI or DVI). Then plug the ability cord into the field and an electrical outlet. When all three obligatory cables are linked, the display screen will activate. Your computer will primarily see the Rift as one other display, and you can adjust the show's settings through your laptop's display management panels.

It presently only works with personal computers, however help for mobile gadgets is in the works, and gaming methods may be next.

The Oculus SDK is publicly accessible and open source, meaning that anyone can receive, use and even modify and distribute the code. There are a couple of caveats spelled out in their license settlement, together with that any modifications have to be shared with Oculus VR, that the software program might not be used to interface with other commercial VR headsets that are not permitted by Oculus VR, and that the code must be distributed in complete, not half. They can also revoke your rights to make use of the SDK in the event you create an software that causes health or safety points.

The SDK contains C++ source code, libraries, headers, firmware, samples, tutorials and documentation, along with the Unreal Improvement Equipment, Unreal Engine four and Unity game development software.

OculusWorldDemo, which allows you to wander through a extra advanced Tuscany setting.

SensorBoxTest, which is a 3D rendered box that reveals sensor fusion by monitoring and displaying the Rift's rotation.

Builders can access the Oculus VR Developer Middle to retrieve the most recent versions of the SDK parts and for on-line help. These assets ought to help vastly in creating or porting extra games and other content material to the Oculus Rift.

The company has additionally released an Oculus Latency Tester whose hardware and software are both open source. Its firmware is beneath the Apache 2.0 License and its schematic, board format and enclosure are licensed beneath Artistic Commons Attribution 4.0. You can buy the Latency Tester from the Oculus VR site, and you should utilize, alter or distribute any portion of the tester and its code. Or if you're a tinkerer, you may construct

your own utilizing the freely out there information.

Bodily modification of the Oculus Rift unit itself just isn't really helpful, nonetheless, since the corporate may not have the ability to support the modified device. However its supply code is fair recreation. Google Glass is a tiny smartphone in the form of eyeglasses with a transparent rectangular see-by way of display over one eye. You possibly can see your real surroundings always, however you can even name up info via voice commands, and it will appear on the screen, superimposed over what's actually in entrance of you. It's extra within the realm of augmented actuality than virtual actuality.

The Oculus Rift, alternatively, is true virtual actuality. You are fully blocking your view of the actual world and seeing a new digital, virtual world in its place. The Rift uses stereoscopic 3-D rendering, a excessive-decision show, a discipline of view a hundred and ten levels wide and extremely-low latency head monitoring to immerse you in a digital world that ought to show to be more believable than any VR most of us have witnessed before. The110-diploma discipline of view extends into your peripheral vision space and, along side the lenses, is meant to help immerse you into a sport. The low latency implies that what you see tracks together with your head movements in real-time rather than being on a delay where the image has to catch as much as your eyes.

As soon as you've acquired the developer's Rift and downloaded the SDK and any firmware updates from the Oculus VR site, that you must calibrate the machine. This consists of measuring and setting your top and your IPD (interpupillary distance, or the distance between your pupils) and operating the magnetometer calibration, which involves rotating the headset as instructed. Once your gadget is calibrated, you should use it to test or play no matter games you discover or create.

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Followers of "Minecraft" can be completely happy to know that a VR-adaptation of the game, titled "Minecrift," is on the market for obtain on the Oculus Rift site.

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Although on the time of this writing the consumer version of Oculus Rift isn't out but, there are already some games from major developers that have been created or ported to work with the system. These embrace:

"Doom 3 BFG Edition" by id Software - the first Oculus-ready game.

"Eve: Valkyrie" by CCP Video games - an exclusive launch title for Oculus Rift.

"Staff Fortress 2" by Valve - a port that can be performed in VR mode.

"Half Life 2" by Valve - another port that may be performed in VR mode.

"Hawken" by Meteor Entertainment and Adhesive Games.

These might not all be out there to the general public in Rift-prepared form, however there are non-VR variations of all but "Eve: Valkyrie" in the wild. "Doom 3 BFG Edition" was given out with the event kits bought by means of the Kickstarter campaign, and "Eve: Valkyrie" has been demonstrated with the newer Rift prototypes and is slated to return out sometime in 2014. And there's a spot on the Oculus VR Internet site right here for developers to share their games, mods, demos, simulations and the like. There are more than one hundred titles accessible on the share site already, including "Minecrift," a VR conversion of the popular sport "Minecraft" (a paid copy of "Minecraft" is required for it to work); and "VR Cinema," a simulation of a movie theater within which you can truly watch videos.

Sadly, not simply any 3-D recreation could be performed with the machine just but. Because of the unique properties of the Rift, including its large subject of vision and head-monitoring skills, games and other functions must be particularly made to work with the machine. The principle issues that should be integrated are motion monitoring and 3-D rendering together with distortion adjustment to supply the stereoscopic photographs (a slightly completely different one for each eye).

As of early 2014, round 50,000 models have been shipped [sources: Edwards, Perton]. With so many in the palms of developers, there are little doubt many video games in the works. But although the Rift was designed primarily with gaming in mind, that doesn't suggest that's all it will likely be good for. We might at some point don our headsets to look at 360-diploma videos, sit in virtual classrooms, view dwell leisure or sporting events and move by way of simulated environments paired with exercise tools for health.

Some increased-finish players are already exploring the possibilities of the Rift. The NASA Jet Propulsion Laboratory (JPL) has experimented with an Oculus Rift at the side of an Xbox Kinect 2 to manage a robotic arm -- a attainable step towards controlling robots remotely in outer area. The JPL has additionally used a Rift with a Virtuix Omni treadmill and panoramic photos captured by the Curiosity rover to simulate strolling on Mars. A myriad of companies have reportedly already bought the developer kits for their very own functions, and there's even been talk of using them for lower-price army coaching. The possible applications for a lightweight, cheap VR headset are truly endless. The term "simulator sickness" has been coined to describe the headaches, disorientation and nausea sometimes brought on by virtual actuality and different simulation strategies. The largest culprit is lag time between the user moving and the video picture maintaining, which is mostly a hardware drawback. Nonetheless, the Oculus VR staff has give you a Best Practices Guide for software builders to assist forestall these issues, as well as to create gratifying games which are well suited to VR. The doc contains advice on how to best handle picture rendering, user perspective, degree of stereoscopic 3-D depth, digicam movement in relation to head movement, in-sport pace and change of movement, placement of person interface and objects, audio, user management, visible design and other technical and design issues.

The information suggests a number of baselines for comfort, like a simulated walking speed of 4.5 ft (1.Four meters) per second, a minimum frame price of 60 frames per second (fps), an excellent latency of 20 milliseconds or less and digital placement of static objects no closer than 1.6 feet (50 centimeters) away from the person. There are additionally references in the guide to specific Oculus VR software program options like distortion shaders, predictive monitoring and the Oculus head mannequin that developers can use to improve gamer consolation with out having to reinvent the wheel. The information also advises developers to incorporate non-compulsory user settings, together with the power to change speed, acceleration measurement, field of view and the effect of collisions, as well as inclusion of a monoscopic show mode that makes the picture the identical for each eyes (which is supposed to lower simulator sickness).

Although it's a danger when running around in any digital world, partially as a result of disconnect between what your thoughts is seeing and what your body is doing, sound design may also help lower the likelihood of simulator sickness. The new Crystal Cove prototype's significantly reduced movement blurring ought to reduce the potential of motion sickness nonetheless additional. There's even some evidence that you would be able to simply get used to VR and not get as sick as your experience with it will increase.

The Oculus VR group claims that viewing through the Rift may be just a little better than staring at a normal flat display screen in terms of eyestrain, since it makes your eyes focus in the gap, which is their pure resting place.

Early impressions of the developer mannequin have been largely positive. Many individuals suppose the Rift is incredibly cool, including one early adopter's 90-12 months-previous grandmother [supply: Kooser]. It has been known as a game changer for, effectively, gaming.

There have been the anticipated complaints about nausea and dizziness, and some concern about using glasses with the Rift. You may really use the headset with most eyeglasses, depending upon their size and form. To accommodate glasses, you modify the distance of the lenses to your face by turning two screws on both facet of the headset -- the nearer the higher in order that you're getting the maximum area of view. Using it with glasses just isn't advisable, nevertheless, because of the risk of scratching your eyeglass lenses and the certainty of decreasing your field of view. They do advocate swapping out the Rift's lenses to see if any of them will work for you with out glasses. The longest set (A) was made for people with 20/20 or farsighted imaginative and prescient, the mid-length set (B) was made for individuals with reasonable nearsightedness and the shortest set (C) was made for individuals with extra extreme nearsightedness. The Oculus team is planning to make the patron version somewhat extra eyeglasses-friendly. Both iterations of the device received Best of CES accolades in 2013 and 2014 respectively.

As of early 2014, you possibly can buy the developer model instantly from the Oculus VR site for $300, however the discharge date and price point for the buyer model have but to be formally introduced. But with so many dev kits and even higher prototypes out there, hopefully -- particularly with the financial backing of Fb -- the wait won't be long for VR fun in our dwelling rooms. It is not like I have not skilled digital reality. I've executed my fair proportion of simulator rides, and tried the headset arcade video games once or twice, however I remember it being costly, extraordinarily low decision, imprecise and not all that immersive.

Because it all the time does, know-how has improved by leaps and bounds, graphics have gotten better, and now with the Oculus Rift, it sounds like extra pleasing and believable VR is inside our grasp. It's nonetheless not the holodeck, however I can't wait to check out the 1080p client mannequin whenever it becomes accessible.

And I'd just break down and get the developer model within the near future. I'm, after all, a developer (though I have not yet delved into recreation improvement). Or I could just construct stuff in "Minecraft" like I do now in common 2-D "Minecraft." Constructing random castles, shearing sheep and taming ocelots and wolves could also be even more satisfying in 3-D VR. Although running face first into a creeper in an immersive reality could be the stuff of nightmares.

Related Links

How Virtual Reality Works

Who invented digital actuality technology?

Who popularized the time period "virtual actuality'?

Sources

Antonov, Michael, Nate Mitchell, Andrew Reisse, Lee Cooper, Steve LaValle, and Max Katsev. "Oculus VR - SDK Overview - SDK Version 0.2.5." Oculus VR. Oct. 9, 2013. (Feb. 9, 2014) http://static.oculusvr.com/sdk-downloads/documents/Oculus_SDK_Overview.pdf

Burke, Steve. "The Historical past of Virtual Reality & the future: Rift, Omni, Stem, Castar." Gamers Nexus. Oct. 20, 2013. (Feb. 16, 2014) http://www.gamersnexus.net/guides/1208-historical past-of-digital-reality-and-future

Butts, Steve. "Heads-On with the Oculus Rift." IGN. Feb. 6, 2014. (Feb. 11, 2014) http://www.ign.com/articles/2014/02/06/heads-on-with-the-oculus-rift

Campbell, Colin. "Oculus CEO will get sick from VR, but says he's found the treatment." Polygon. Oct. 17, 2013. (Feb. 15, 2014) http://www.polygon.com/2013/10/17/4850272/oculus-ceo-gets-sick-from-vr-but-says-hes-

discovered-the-treatment

Ceurstemont, Sandrine. "Optical illusions assist you discover a digital world on foot." New Scientist. June 22, 2013, Volume 218, Subject 2922, Page 22. (Feb. 17, 2014)

Chacos, Brad. "Eyes-on: Oculus Rift VR headset ramps up the resolution." June 12, 2013. (Feb. 15, 2014) http://www.pcworld.com/article/2041464/eyes-on-oculus-rift-vr-headset-ramps-up-the-decision.html

Chalk, Andy. "John Carmack Turns into Oculus VR CTO - Updated." Escapist. Aug. 7, 2013. (Feb. 15, 2014) http://www.escapistmagazine.com/news/view/126644-John-Carmack-Becomes-Oculus-VR-CTO-Updated

Davis, Ian. "Oculus Finds A Repair For 'Simulation Sickness.'" Escapist. Oct. 18, 2013. (Feb. 15, 2014) http://www.escapistmagazine.com/information/view/128815-Oculus-Finds-A-Repair-For-Simulation-Sickness

Dingman, Hayden. "EVE: Valkyrie's awe-inspiring VR house combat named Oculus Rift launch exclusive." Computer World. Feb. 5, 2014. (Feb. 11, 2014) http://www.pcworld.com/article/2094725/eve-valkyries-awe-inspiring-vr-house-combat-named-oculus-rift-launch-unique.html

Dingman, Hayden. "Eyes-on with Oculus Rift's 'Crystal Cove' VR prototype and first launch sport." Laptop World. Feb. 13, 2014. (Feb. 15, 2014) http://www.pcworld.com/article/2096386/eyes-on-with-oculus-rifts-crystal-cove-vr-prototype-and-first-launch-game.html

Edwards, Jim. "Mere Words Cannot Do Justice To How Awesome The brand new Oculus Rift Headset Is - And I don't Even Like Video Video games." Enterprise Insider. Jan. 9, 2014. (Feb. 16, 2014) http://www.businessinsider.com/oculus-rift-crystal-cove-2014-1

Eve: Valkyrie. (Feb. 17, 2014) http://evevalkyrie.com/

Firth, Niall. "Jaron Lanier." New Scientist. June 22, 2013, Quantity 218, Challenge 2922, Page 21. (Feb. 17, 2014)

Graham, Jefferson. "Palmer Luckey's virtual actuality headset turns heads." USA At present. Jan. 22, 2014. (Feb. 17, 2014) http://www.usatoday.com/story/tech/columnist/talkingtech/2014/01/22/meet-oculus-rift-founder-palmer-luckey/4740631/

Grey, Scott. "The Neurotechnology Revolution Has Arrived." Futurist. September/October 2013, Quantity 47, Difficulty 5, Pages 6-7. (Feb. 17, 2014)

Griffin, Ben. "The best wearable tech coming in 2014: Google Glass, Oculus rift, more."

Digital Spy. Jan. 22, 2014. (Feb. 17, 2014)
http://www.digitalspy.com/tech/news/a545509/the-best-wearable-tech-coming-in-2014-google-glass-oculus-rift-extra.html

Heaven, Douglas. "Mind-bending games let you live your goals." New Scientist. June 22, 2013, Quantity 218, Subject 2922, Web page 20. (Feb. 17, 2014)

Hollister, Sean. "Digital reality test: why controllers have not caught up to the Oculus Rift." Verge. Dec. 23, 2013. (Feb. 11, 2014) http://www.theverge.com/2013/12/23/5238118/digital-reality-verify-oculus-rift-hardware-ecosystem

iFixit. "Oculus Rift Teardown." (Feb. 15, 2014)
http://www.ifixit.com/Teardown/Oculus+Rift+Teardown/13682

Insinna, Valerie. "Firms Supply Cheaper Simulation Tools to Military." National Defense. Feb. 2013, Quantity 97, Situation 711, Web page 12. (Feb. 17, 2014)

Katz, Leslie. "Oculus VR co-founder, 33, killed by dashing automobile." CNET. June 1, 2013. (Feb. 16, 2014) http://news.cnet.com/8301-10797_3-57587189-235/oculus-vr-co-founder-33-killed-by-rushing-car/

Kickstarter. "Oculus Rift: Step Into the sport." (Feb. 11, 2014)
https://www.kickstarter.com/tasks/1523379957/oculus-rift-step-into-the-game

Kolasinski, Eugenia M. "Technical Report 1027 - Simulator Sickness in Virtual Environments." U.S. Military Analysis Institute. Could 1995. (Feb. 15, 2014) http://www.dtic.mil/get-tr-doc/pdf?Advert=ADA295861

Kooser, Amanda. "90-yr-outdated grandma rocks an Oculus Rift VR headset." CNET. April 16, 2013. (Feb. 16, 2014) http://news.cnet.com/8301-17938_105-57579846-1/90-yr-old-grandma-rocks-an-oculus-rift-vr-headset/

Lee, Nicole. "NASA JPL takes a VR tour of Mars with Oculus Rift and Virtuix Omni (video)." Engadget. Aug. 5, 2013. (Feb. 17, 2014) http://www.engadget.com/2013/08/05/nasa-jpl-oculus-rift-virtuix-omni/

Lee, Nicole. "NASA's JPL maneuvers a robot arm with Oculus Rift and Kinect 2, points to extra immersive area missions." Engadget. Dec. 23, 2013. (Feb. 16, 2014) http://www.engadget.com/2013/12/23/nasa-jpl-control-robotic-arm-kinect-2/

MacManus, Christopher. "Gamers go ga-ga over Oculus Rift digital-reality headset." CNET. Aug. 3, 2012. (Feb. 16, 2014) http://information.cnet.com/8301-17938_105-57486608-1/gamers-go-ga-ga-over-oculus-rift-digital-actuality-headset/

Martin, Tim. "The Oculus Rift: digital actuality is no longer a joke." Telegraph. Dec. 28, 2013.

(Feb. 11, 2014) http://www.telegraph.co.uk/know-how/10540341/The-Oculus-Rift-digital-reality-is-no-longer-a-joke.html

McFerran, Damien. "Reality Crumbles: No matter Happened to VR?" Eurogamer. April 12, 2012. Minecraft Economy Servers (Feb. 17, 2014) http://www.eurogamer.internet/articles/2012-04-12-reality-crumbles-whatever-happened-to-vr

MTBS3D.com. "Oculus 'Rift': An open-source HMD for Kickstarter." Forum posts. April 15-20, 2012. (Feb. 17, 2014) http://www.mtbs3d.com/phpBB/viewtopic.php?f=140&t=14777

Nemati, Cyrus. "Digital Actuality Is Prepared for Prime Time." Slate. Dec. 20, 2013. (Feb. 11, 2014) http://www.slate.com/articles/know-how/future_tense/2013/12/oculus_rift_evaluate_the_digital_actuality_headset_will_change_every thing.html

New Scientist. "Kickstarting a digital revolution." June 22, 2013, Volume 218, Challenge 2922, Web page 3. (Feb. 17, 2014)

New Scientist. "Simulated Spaces." June 22, 2013, Quantity 218, Challenge 2922, Page 21. (Feb. 17, 2014)

Oculus VR. "About Oculus VR." (Feb. 16, 2014) http://www.oculusvr.com/company/

Oculus VR. "EVE: Valkyrie, Open Supply Hardware, and the most effective Practices Guide." Feb. 5, 2014. (Feb. 11, 2014) http://www.oculusvr.com/blog/eve-valkyrie-open-supply-hardware-and-the-finest-practices-guide/

Oculus VR. "Increasing the Team, Meet us at Gamescom, Unite, PAX." Aug. 16, 2012. (Feb. 16, 2014) http://www.oculusvr.com/blog/increasing-the-team-meet-us-at-gamescom-unite-pax/

Oculus VR. "Knowledge Base - FAQs." (Feb. 12, 2014) https://support.oculusvr.com/boards

Oculus VR. "Meet the Group." (Feb. 16, 2014) http://www.oculusvr.com/firm/people/

Oculus VR. "Oculus-Ready Games." (Feb. 12, 2014) http://www.oculusvr.com/weblog/category/normal/oculus-ready-video games/

Oculus VR. "Oculus Rift." (Feb. 9, 2014) http://www.oculusvr.com/rift/

Oculus VR. "Oculus Rift Growth Equipment Model 1.1." (Feb. 9, 2014) http://static.oculusvr.com/sdk-downloads/paperwork/Oculus_Rift_Development_Kit_Instruction_Manual.pdf

Oculus VR. "SDK Software License." (Feb. 15, 2014) https://developer.oculusvr.com/license

Oculus VR. "Share." (Feb. 11, 2014) https://share.oculusvr.com/

Oculus VR. "Transport Replace, Replacement Rewards, VR Meet Ups, and Half Life 2 in VR!" Could 17, 2013. (Feb. 12, 2014) http://www.oculusvr.com/blog/transport-replace-substitute-rewards-vr-meet-ups-and-half-life-2-in-vr/

Oculus VR. "Crew Fortress 2 in the Oculus Rift." March 18, 2013. (Feb. 12, 2014) http://www.oculusvr.com/weblog/group-fortress-2-in-the-oculus-rift/

Oculus VR. "Replace on Developer Equipment Know-how, Delivery Particulars." Nov. 28, 2012. (Feb. 16, 2014) http://www.oculusvr.com/weblog/replace-on-developer-package-know-how-transport-particulars/

OLED-Show. "AMOLED." (Feb. 17, 2014) http://information.oled-show.net/amoled/

Laptop World. "Oculus Rift headset: Alternately thrilling and nauseating." Nov. 6, 2013. (Feb. 15, 2014) http://www.pcworld.com/video/29402/oculus-rift-headset-alternately-thrilling-and-nauseating.html

Perton, Marc. "The Oculus Rift 'Crystal Cove' prototype is 2014's Best of CES winner." Engadget. Jan. 9, 2014. (Feb. 17, 2014) http://www.engadget.com/2014/01/09/the-oculus-rift-crystal-cove-prototype-is-2014s-greatest-of-c/

Purchese, Robert. "Glad Go Luckey: Meet the 20-yr-outdated Creator of Oculus rift." Eurogamer. July 11, 2013. (Feb. 17, 2014) http://www.eurogamer.internet/articles/2013-07-11-comfortable-go-luckey-meet-the-20-12 months-previous-creator-of-oculus-rift

Purchese, Robert. "Oculus co-founder killed as innocent bystander during police car chase." Eurogamer. June 3, 2013. (Feb. 17, 2014) http://www.eurogamer.web/articles/2013-06-03-oculus-co-founder-killed-as-innocent-bystander-throughout-police-automotive-chase

Ries, Brian. "Recreation On." Newsweek International. April 26, 2013, Volume 161, Concern 16. (Feb. 17, 2014)

Robertson, Adi. "All Jacked In and Nothing to Play: Chasing the right VR Sport." Verge. Dec. 23, 2013. (Feb. 11, 2014) http://www.theverge.com/2013/12/23/5237452/chasing-the-good-oculus-rift-vr-sport

Rosenberg, Adam. "Eve: Valkyrie Will probably be an Oculus Rift Unique." Digital Traits. Feb. 6, 2014. (Feb. 11, 2014) http://www.digitaltrends.com/gaming/eve-valkyrie-will-oculus-rift-exclusive/

Rougeau, Michael, and Matt Hawkins. "Arms on: Oculus Rift review." Techradar. Jan. 8, 2014. (Feb. 11, 2014) http://www.techradar.com/opinions/gaming/gaming-

accessories/oculus-rift-crystal-cove-1123963/evaluate

Senior, Tom. "State of Play 2013: The return of virtual actuality." Edge. Dec. 19, 2013. (Feb. 11, 2014) http://www.edge-on-line.com/options/state-of-play-2013-the-return-of-virtual-reality/

Takahashi, Dean. "Oculus VR's Brendan Iribe on the newest virtual reality prototype (interview)." VentureBeat. Jan. 14, 2014. (Feb. 15, 2014) http://venturebeat.com/2014/01/14/oculus-vrs-brendan-iribe-on-the-virtual-reality-prototype-interview/

Velazco, Chris. "Oculus VR Raises $seventy five Million To help Carry Digital Actuality Goggles To The Plenty." Techcrunch. Dec. 12, 2013. (Feb. 16, 2014) http://techcrunch.com/2013/12/12/oculus-vr-raises-75-million-to-help-carry-digital-actuality-goggles-to-the-lots/

Warr, Philippa. "EVE Valkyrie: Turning CCP's gaming Pinocchio into an actual boy." Wired. Dec. 24, 2013. (Feb. 11, 2014) http://www.wired.co.uk/information/archive/2013-12/24/eve-valkyrie

Welsh, Oli. "John Carmack and the Virtual Actuality Dream." Eurogamer. June 7, 2012. (Feb. 17, 2014) http://www.eurogamer.net/articles/2012-06-07-john-carmack-and-the-digital-reality-dream

Yao, Richard, Tom Heath, Aaron Davies, Tom Forsyth, Nate Mitchell, and Perry Hoberman. "Oculus VR Finest Practices Guide - v0.007." Oculus VR. Jan. 16, 2014. (Feb. 9, 2014) http://static.oculusvr.com/sdk-downloads/documents/OculusBestPractices.pdf