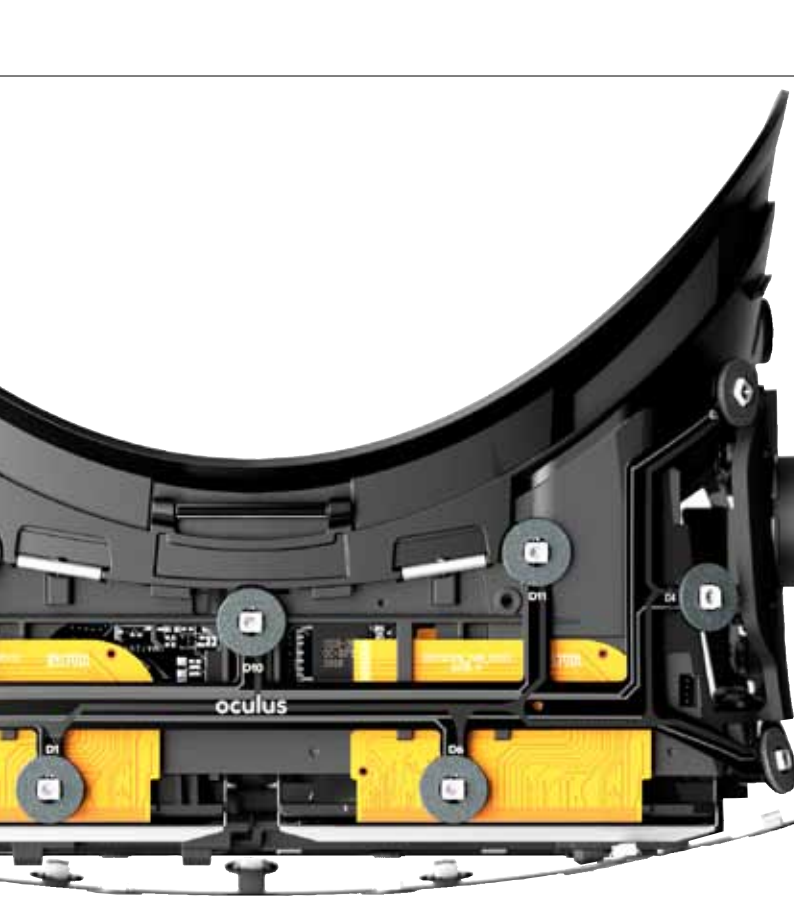




Viennese virtual reality café VREI at Lindengasse 53 in the 7th district (www.vrei.at) lets users test PlayStation VR or Gear VR headsets for free and offers a range of for-pay VR experiences, from archery to Mars walks.



OVERVIEW VIRTUAL REALITY (VR) HAS LONG CEASED TO BE THE EXCLUSIVE DOMAIN OF GAMERS. IT IS INCREASINGLY BEING USED IN INDUSTRIAL APPLICATIONS AND ADVERTISING AS WELL. IS VIRTUAL REALITY READY FOR THE MASS MARKET?

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More than just a game

2016

was supposed to become the year of virtual reality. Although sales lagged far behind expectations, analyst Canals estimated two million VR headsets with head mounted displays shipped worldwide in 2016: approximately 800,000 PlayStation VR headsets, 500,000 units of HTC Vive, and 400,000 Oculus Rift headsets. The forecast for 2020 is 20 million units sold. The majority of customers for console VR headsets are male millennials - three in four of them are gamers. But women are catching up: 48 percent of US women over 35 have tried VR headsets at home. In Germany, nearly one in ten people tried a VR headset last year, according to Deloitte. ▶

Archilogic lets you explore the flat from *The Big Bang Theory*.



VR/EL, OCULUS, BIRDLY, ARCHILOGIC

AFFORDABLE ENTRY-LEVEL VR

Companies like Sony, Facebook, HTC and Google are working hard on making the technology ready for the mass market. With the acquisition of Oculus VR by Facebook, virtual reality has become widely reported in international media. The availability of affordable mobile headsets like Google Cardboard is also contributing to spreading the technology. They convert your smartphone into a cardboard VR headset, granting entry-level access to the world of VR from approx. €10. Over five million Samsung Gear VRs are supposedly in circulation, thanks to the company's clever move of giving it away free with Galaxy S7 and Galaxy Note 7 pre-orders. The new Gear VR and controller are also free with an S8 or S8 Plus pre-order, but unfortunately only for customers in Canada and the US. PlayStation 4 VR made Sony the market leader in VR headsets with integrated display. Oculus Rift at approx. €600 and HTC Vive at approx. €900 are more expensive, but enable users to move freely around the room (room-scale VR) – which is not possible with Gear VR and Google Cardboard.

“This market is said to have enormous potential. However, sales for currently available VR systems are still below expectations. There are two reasons for this: The first is the strong focus on the mass market for gamers, but the costs to get started are still rather high. The second is a lack of content. Although I'm generally not a gamer, I have tested various VR games. And I haven't really felt the desire to remain in those virtual worlds very much,” says Klaus Stöttner, CEO of Pool3, a company from Upper Austria that has been working on interactive 3D applications since its founding in 2001. “That's why we focus on 'serious applications' – applications that make work processes safer, more precise or easier to grasp.” Like the company's VR simulation platform for forklifts (see box).

BMW has been using VR systems since the 1990s, as they help reduce ▶

*** VR TREADMILLS - THE WAITING GAME**

You won't get far in the virtual world without a controller or other input device. Virtual reality is often a rather stationary affair in the real world: While you're moving through a virtual world, your body is sitting motionless at the computer – motion sickness can be the result. Three different start-ups set out to change that with Kickstarter campaigns in 2013: Omni's Virtuix locomotion platform, Wizdish's ROVR VR treadmill, and Austrian start-up Cyberith's Virtualizer. Such omnidirectional treadmills allow users to walk, run and jump in virtual worlds, providing incredible immersion due to the realistic experience. But so far, it is mainly a waiting game. The campaign backers still haven't received their machines. Omni even announced it would not be delivering to Europe, because the company had underestimated the logistics of the product (which weighs 80 kg). The Kickstarter backers will get their money back with interest, but many are disappointed. Cyberith has completed CE and FCC certification, but the start-up has delayed serial production, and with it, delivery of the device to its Kickstarter backers, deciding to focus on B2B markets instead. Perhaps Wizdish will be the big surprise and deliver its ROVR Locomotion platform with the special shoes to its customers sometime soon?

www.virtuix.com, www.wizdish.com, www.cyberith.com



*** FUN AT THE DENTIST**

For many people, going to the dentist or undergoing a medical procedure causes anxiety and stress. The Viennese start-up HappyMed promises to distract them with VR glasses. The system allows patients to watch videos at the doctor's or the hospital. The videos are stored locally, so no Internet connection is needed. New content can be added via Wi-Fi. Studies show that positive distraction lowers anxiety and stress and increases patients' wellbeing. Innovative medical practices and clinics in Austria, Europe and the US are already using the video glasses.

www.happymed.org



VIRTUALIZER (2), DAVID LUGMAVE (2)

time and effort needed especially in the early stages of development. For example, a simulation ride allows designers to test the car's circumferential visibility or determine whether a display is hard to reach or see from a certain seat position or angle. BMW uses the laser-based tracking system of HTC Vive. Fitness, education, tourism, military, media – the applications for VR go far beyond gaming. VR simulators help firefighters train putting out fires, the Austrian National Tourism Office allows you to admire the Krimml Waterfalls as a 360° video, and Greenpeace uses VR videos to visualise the impact an Amazon dam would have. “We consider VR technology a terrific opportunity that allows us to let people experience unique endangered environments,” says Robert Korbei, head of the Amazon campaign in Austria.

FULL IMMERSION VR

Immersion is the term used for entering a virtual world so completely that it feels real. For example, the under-

water experience of Deepblu causes a small percentage of users to remove their HTC Vive because they feel like they cannot breathe. The realness of these experiences causes real emotions. Walking a virtual reality steel rope between two high-rises can trigger a real fear of heights even though you are aware the experience is not real. This allows the use of VR in therapy settings, e.g. for phobias.

VR developers are constantly improving immersion and freedom of movement. The Teslasuit, for example, is supposed to give fully-body haptic feedback, allowing the user to feel pressure, pain, temperature differences, or vibrations. The Void and ImmersiveDeck (see box) have a portable processor, which allows movement

in larger spaces, freeing the user from the limitations imposed by a connection to a stationary PC. The first VR glasses with eye tracking, developed by start-up Fove, enable completely new applications. The image focus adapts to the user's eye movements. This could be used in stores to determine where customers look or for medical applications.

POTENTIAL: MIXED REALITY

Mixed reality is expected to have enormous potential. While “traditional” virtual reality separates the user from their natural environment, mixed reality blends virtual and natural objects. One of the companies working on this is start-up Magic Leap, which has Google among its invest-

*** REAL-TIME HOLO DECK**

Virtual worlds often have spatial limits. In standard VR headsets, a camera captures the user's head movements and sends them to a computer, which calculates the image to be displayed. This limits the angle that the cameras can cover. Not so in “Immersive Deck”, a joint development by TU Wien and the Berlin start-up Illusion Walk. This walkable VR platform allows users to move freely through large-scale virtual worlds without cables. Each user carries

the technology in a backpack. A wide-angle camera is mounted directly on the VR glasses. QR codes on the ceiling and walls allow the system to calculate the user's position precisely and orient them in the room. Motion trackers on the arms and legs track the user's movements and posture. This allows every user to see both their own body and those of their fellow players in real time. The VR platform combines existing tracking and motion capture technology with high-end real-time rendering. Application scenarios range from multiplayer gaming to walkable showrooms and virtual trainings.

www.illusion-walk.com



ILLUSION WALK, BMW/ENES KUCIJEVIC, BMW, QAMTC, POOL3



BMW uses the laser-based tracking system of HTC Vive especially in the early stages of development.



tual reality sickness. Its symptoms are like those of motion sickness – nausea, dizziness, or headaches. Motion sickness is particularly frequent when the real world differs from the virtual. Like with motion sickness, the eye perceives movement in VR while the body experiences something else. The body reacts to this confusion with the assumption that it has been poisoned – hence the nausea.

tors and Peter Jackson as an advisor. Not much is known yet about the innovative optical system. However, it is supposed to create an illusion of depth, in which the eyes focus differently on objects at different distances. Currently, the focus in VR is always on a small screen in close proximity,

no matter how close or far away the item or being you are seeing is supposed to be.

Instead of separating users from the real world, mixed reality adds virtual elements to it. That also solves problems like stumbling over furniture and cables or vir-

WEBVR AND STREAMING

But virtual reality is not only limited by space: “If I create something for the HTC Vive, my friends who have an Oculus Rift, Gear VR, Google Daydream or Cardboard may not be able to participate – not to mention those who don’t have any VR ▶

*** SAFER DRIVING**

Preparing beginners for dangerous situations is the goal of the VR app “Samsung Drive”, which the Austrian automobile association ÖAMTC’s driving safety department (ÖAMTC Fahrtechnik) and Samsung are developing together. An ÖAMTC study shows that three in four drivers cannot stop in time for unexpected obstacles when they are distracted, for example if the phone rings when they are driving. The app shows users what the consequences of that can be – with realistic and lifelike VR technology.

“We use this innovative and game-changing technology to increase awareness for critical situations. Afterwards, our participants get to experience what just a second’s distraction can mean for your stopping distance on our training courses with our instructors,” says Franz Schönbauer, manager of ÖAMTC Fahrtechnik. The app will be used at the ÖAMTC driving safety centres with Samsung Gear VR from summer 2017.



*** VIRTUAL FORKLIFT DRIVER TRAINING**

The Austrian company Pool3 has created realistic VR simulations to train operators in the use of high-rack stackers. The system uses Oculus Rift combined with Leap Motion hand tracking and 2-axis movement feedback. The user sits at an authentic Jungheinrich forklift control panel. The advantages are evident: lower costs, no safety risks, and a portable plug-and-play system. The company also offers a simulation for forklift repairs. “VR allows you to learn how to remove the hydraulics unit of a high-rack stacker in two minutes, and it is easy to apply these skills to the real machine. I tried it myself,” says Klaus Stöttner, CEO of Pool3. The simulator, which has been shown at CeBIT and other trade fairs, was developed from scratch by Pool3.

www.pool3.at



equipment,” says Martin Splitt, Head of Engineering at E-Archilogic3D in Switzerland. And this is where WebVR comes in: “If we create a VR API for the Internet and do it properly, anyone who has a smartphone or computer can experience VR in their browser. The open WebVR standard is currently being stabilised. Google, Mozilla, Samsung and Microsoft are mostly in agreement, and companies like Samsung and Oculus are using WebVR – that’s a strong signal.” Archilogic allows users to upload blueprints and turn them into interactive 3D models. This allows you to see how your furniture will look in your new flat. Archilogic is also working on a platform that allows developers to place their own content in 3D models or to use APIs to create 3D models from 2D data. “The challenge is that we need good image quality but also short loading times and a high frame rate on older devices. These are rather contra-

dictory requirements, but we haven’t exhausted the technical possibilities yet.”

The Carinthian start-up Bitmovin is also concerned with image quality and loading times. Their VR streaming allows users to watch VR and 360° videos on any device with an HTML5 player: “Our developers are very creative and are always finding new ways of transmitting the enormous data volumes needed for virtual reality streaming,” says CTO Christopher Müller. He sees a growing number of use cases for VR streaming, for example VR transmissions of football games or being able to sell a seat at the Superbowl multiple times. “There’s enormous potential in VR, although there are still various problems – not only technical issues but also in terms of content creation. It is still hard to imagine what a film would look like in 360° and how it could attract a mass audience. And the long-term effects of 360° streaming and VR, such as VR sickness, are unknown. So there is still a lot to be done, but all these issues can be solved.” ✱

✱ VIRTUAL REALITY WEB BROWSER

The developers at Rocketbike ARVR in Vienna asked themselves which component was still missing from VR. The answer was soon found: There is a growing supply of content, but not enough practical tools and applications. When you’re in VR, it is often hard to surf the web and you feel cut off from the world. Thus, boomVR was born: a virtual reality aggregation platform that serves both as a browser and an interface. “It gives you

nearly seamless access to content and feeds from various sources, which are aggregated in real time. Users can browse, curate (e.g. bookmark) and share 2D and 3D-stereoscopic, 360° and VR content from the web via the boomVR platform without having to remove their VR glasses. It is a kind of Flipboard for VR,” Thomas Bogner, Managing Director of Rocketbike ARVR, explains. boomVR also offers white-label solu-

tions for creating branded VR content channels in interactive virtual environments. This allows games publishers to present their 3D products in a 3D showcase so that their customers to see characters, environments and 3D characteristics of games in a suitable setting without having to buy a product. The system also offers applications for more traditional companies: “You could advertise cruise destinations with 360° videos, the ship and its facilities in VR, and on-board entertainment with stereoscopic 3D.”

www.boomvr.com



Virtual reality becomes truly exciting when it not only reproduces reality but also allows us to experience things that would otherwise be impossible. Flight simulators that allow us to fly airplanes are nothing new. But who among us has not dreamed of truly flying and wondered what it would feel like to flap your wings like a bird and sail on the wind? From Icarus to Leonardo da Vinci, humanity has always dreamed of flying. VR now allows us to fulfil this ancient dream in the virtual world.



The ancient dream of flying



FULL-BODY IMMERSION: BIRDLY

The flight simulator Birdly was created at the Zurich University of the Arts. Max Rheiner and his team of interaction design researchers wanted to invest enough time into development in order to recreate the flight experience as exactly as possible rather than produce something for cheap mass production. The spin-off SOMNIACS was founded. Birdly is completely manufactured in Switzerland and Germany and went into serial production over a year ago.

VR often focuses only on the visual and auditory experience, but that is not the case with Birdly: The intuitive controls of this full-body flight simulator make for an incredibly immersive experience. Users lie down on the machine equipped with an Oculus or HTC Vive headset and headphones. When you flap your wings on the simulator, you do so in virtual reality – and can see your wings and feathers. You can shift your weight to soar higher or dive down, and wind feedback from a fan shows you how fast you are flying. Smells are a part of Birdly as well – when you are flying over the ocean, the machine emits different scents than when flying above a street. Since Birdly is large, complex and expensive, it is definitely not made for end users, but it can be found at the Singapore Science Centre, an adventure hotel, or a flagship cinema.

www.somniacs.co

ICAROS: MID-AIR EXERCISE

Another exciting concept is that of Icaros: The flight simulator allows you to get a workout while exploring virtual worlds. Invented by Germans Johannes Scholl and Michael Schmidt, it works with Samsung Gear VR combined with a S6 or S7, and support for HTC Vive and Oculus Rift has been announced for summer 2017. You steer by shifting your weight backwards and forwards or the sides. Icaros has three levels of intensity and helps to especially strengthen the shoulder and abdominal muscles. A fully charged controller will give you at least six hours of training time.

But flight is not all the simulator can do: in addition to a multiplayer mode and an underwater diving experience, there is also a new free fall experience, Gravity. Icaros has been available for over a year. It costs €7,900 and is also suitable for gyms. A cheaper version for end users is in development.

www.icaros.net

