



# The Models of Used Virtual Reality Technology in Sports

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*Abstract: Wearable technologies are being used to monitor performance real time, big data is helping coaches analyze athletes so that they can be improved further and hypobaric chambers that simulate high altitude environment are being used by wrestlers and other combat athletes to train in low oxygen environments to condition their cardiovascular systems. However, while all these technologies focus on making athletes physically better, the psychological component has been missing. It is said that sports are 90% mental and 10% physical, so, suffice to say, there is a lot of scope for improvement as tools to help athletes win the mind game are finally here in the form of virtual reality. Because training is only as good as the sense of immersion it can impart and the closer a simulation approximates real life conditions, the more an athlete can learn from it. Now, if sports were all about having the greatest endurance and strength, then the results would always be predictable, which would frankly be quite boring. No, it's the skills with which sportsmen and women exhibit while in the heat of the moment, as they gracefully intercept and react to their opponents that makes sports truly exciting, and this is where VR can help them. Imagine a baseball player who can practice his swings as many times he wants against a virtual representation of his opponent. Not only can he analyze the intricacies of his throw, but the simulation can be setup to let the batter practice at his or her own level. The batter can also review his performance later. Likewise, boxers can practice speed drills, shadow box and train their reflexes in VR far better than they could ever do in real life. Since a virtual situation is completely within our control, it can be tailor made to recreate any scenario. This boxer who tried out Thrill of the Fight was certainly optimistic about how VR could be used to train athletes in the immediate future. Race car drivers will find an immediate interest in VR as many games such as Project Cars are extremely immersive and do not require a very expensive setup to get going. Being able to race as if it were real without burning through gallons of fuel and no risk of grievous injury is something a driver will surely appreciate.*

## 1. Introduction

VR based training has already proven to be successful in military and aviation, so, being a visual-kinesthetic learning aid, its utility in sports is all but a given. The true beauty of VR based sports training lies in its ability to create real muscle memory through virtual experiences. There's only so much learning an athlete can do by watching and re-watching tapes of their opponents and past matches to learn. Virtual reality techniques are one of the new ways that are employed in many human practices, in order to make phantom things create an effect that simulates natural effect. CES 2018 in Las Vegas, USA, has introduced a virtual fitness box, which has the same effect as conventional sports halls. The Black Box VR device, with 30 minutes of operation, provides results similar to what would happen if it were true. (1) The appliance comes in the size of a home bathroom, equipped with an integrated telephone headset and an automatic resistance device for training, making it a machine that combines real-life training with virtual reality technologies. But one of the experts said that "the manufacturer will have to take safety measures to succeed the idea. The player will also have to engage in sporting challenges with himself and with other champions, all in the field of branding. It is noteworthy that there are two men behind this whole idea, namely: Ryan Deluca and Preston Lewis, who have already succeeded in the idea of creating a [bodybuilding.com](http://bodybuilding.com) fitness network. The company's plan is to open virtual gymnasiums all over the United States, and each member will have a black box to handle within the lounge. The company says that "the current version is not home, designed for lounges only," and will work in the future to develop the home version. Most people stop going to the gym after two weeks, so commitment is very important that we try to solve here. People find it generally difficult to keep exercise routine, so there are a lot of attempts to make it more attractive, to turn gyms into places that are less boring. That's why such ideas will be useful. But the cost of hardware will make this kind of virtual sports expensive. Is it also safe enough to use people? The researchers ask. "To prove the efficiency of the experiment, there are effects that must be studied on the human body by dealing with a virtual reality in sports. (2) Job Stover, a game developer with the FAR Health Institute, who helps promote the Black Box, said he personally benefited from virtual reality, telling BBC English he lost more than 82 lbs (37 kg) Matches, in addition to improving his diet. Virtual reality techniques have been used in training pilots, training in ice skating and hockey and gaining skills in different sports. And specialists believe that it will lead to a reduction in injuries in future matches. Today, the technology is finally here to put them right in that experience so that they can actively engage with the lesson, not just passively sit by and watch. Coaches will understand the importance of such an ability and adopting it first will give any gym or team the first mover advantage.

## 2. Virtual Reality (VR)

The basic philosophy behind EON's virtual reality sports simulators echoes the core promise of VR to make the impossible a reality. By leveraging advanced player and game data, the EON simulations allow players to practice against virtual opponents whose behavior and playing style tightly mimics that of their actual opponents. In essence, players can enjoy a "trial run" before a game, playing against virtual simulacra of a team days before the real-life match. EON's professional-level virtual reality sports application involves the use of a green screen and physical equipment like baseball bats, in addition to a head-mounted display. The green screen allows coaches, analysts, and other team support personnel to see what the player sees so that they can offer the same type of concrete advice and guidance they could in a real-world training

environment. The physical sports equipment used means players can play in the simulated world exactly as they would in real life, without the mental or physical adjustments that might be needed by a more conventional controller. The firm also offers a home version of their application, which uses a custom-developed mobile-based head mounted display called the SIDEKIQ that includes eye tracking technology. (3) Although this version of the software certainly does not offer the same level of training benefit, it has nonetheless found success among sports enthusiasts looking to dip their toe into the world of virtual reality and sports. 2016 made clear that virtual reality is poised to become one of the largest trends in tech. With the release of consumer-level equipment like the HTC Vive and Samsung Gear VR, industry analysts predict that VR and AR will be a \$120 billion industry by 2020. The technology is finding particular success by supplementing a much older and even larger industry – Sports. VR is lauded for its ability to essentially transport the user into the digital realm. Wearing a head-mounted display and often haptic gloves or other gear, users can interact with a computer-generated world using natural physical motions and gestures. By necessity, therefore, every motion the user makes is perceived and recorded by the software driving the simulation. This tangential effect is what makes virtual reality and sports such a natural fit. Sports thrive on data, as any devotee of player statistics already knows. A virtual reality sports simulation allows for a player's performance to be analyzed and optimized to a heretofore impossible degree. It can be easily defined as an embodiment of the real reality, but it is not real, giving us infinite possibilities of extension, sound, sensation, vision, and emotions as if we were in the physical reality. With virtual reality possibilities, virtual reality simulations can be created completely and the trainee can engage in this experiment or scenario designed according to the nature of purpose.(4) This is very useful in conveying the real reality before going down. Such simulations are used well before field exercises. Virtual reality technology can be defined as a promising technology that makes users feel they are in a virtual environment by using software and hardware. It is designed as a virtual space imaginable of animation, so that humans can access it by wearing special computers. These devices are called "glasses", but they are larger than natural, because most of them are connected to the smartphone and then they can be operated. Technology enables people to handle information more easily, and provides different ways to see and test data in an efficient and fast manner.

## **2.1 Applications of Virtual Reality in Sports**

The entering of virtual reality into sports is no longer a question of if, rather a question of when. In the near future, expect to see aspects of virtual reality gradually transforming the way you enjoy your favorite games. Here are some of the most interesting things that are happening in the space today.

## **2.2 Virtual Reality Sports Training**

VR has seen use in training surgeons, fighter pilots, and construction workers. Today, it is also used to push our professional athletes to the furthest heights of excellence. Virtual reality firm EON Sports specializes in creating virtual training environments for athletes. Using both commercially available and custom-designed head-mounted displays, Eon places athletes on the field virtually. By leveraging the power of a computer simulation, Eon's solution presents a

unique opportunity for athletes to practice against their actual opponents. Eon programs their simulations with data on opposing teams' style and performance, custom-building a training regimen for the needs of each athlete. Users stand in front of a green screen and hold physical equipment, such as a baseball bat, to interact with the simulation. The green screen projects the user's view into the real world, so that coaches and other personnel can follow along. Eon's professional training programs are in use by teams of the NFL, SEC, and more. In addition, the firm also offers home software for use by the public. Software is available for purchase from Eon's online store, along with SIDEKIQ, their branded mobile-based head-mounted display. The existence of competitors such as StriVR point to the viability of virtual reality training in professional sports, with advantages including increased safety and better data collection. (5) Avoiding impacts and injuries during training means healthier, safer athletes who are in top fighting form when game time comes. Simultaneously, confining the action to a computer simulation means that every action and reaction can be shared by coaches and specialists, as well as recorded for later analysis.

### **2.3 The Next Generation of Live Streaming Sports in VR**

Sports viewers are used to seeing a great deal of flash and sizzle in broadcasts, as epitomized by the NFL's constant adoption of bleeding-edge technology. In the case of virtual reality, though, the affordable cost and widespread availability means that the latest tech isn't just limited to multi-billion dollar organizations like the NFL. Startup firm Virtually Live is committed to "Expanding the Fan Experience." The company takes an unusual approach to bringing fans into the game. Rather than planting 360° cameras on the field, Virtually Live instead places static cameras around the stadium, covering the action from every angle. Their software then creates a computer-generated virtual environment and streams it to viewers, who can move freely through the broadcast using their commercially available head-mounted displays. The sports match is recreated using CGI graphics, but the action is completely real. Virtually Live is in the startup phase and has not yet found widespread adoption in the United States, but the amount of press and media coverage the firm has received is promising. As a test, the company live streamed the FIA Formula E Championship, a car racing series exclusively raced by electric cars. (6)

### **2.4 Next VR Brings Sports Home**

Virtual reality firm NextVR was an early adopter, allowing home viewers to use their Oculus Rift or Samsung Gear VR head-mounted displays to virtually attend matches since 2009. Early in 2016, the firm inked a 5-year deal with Fox Sports to live stream events from college basketball to NASCAR races. The idea is a natural fit, allowing fans to gain a better view of the action than is even possible from the stadium seats. NextVR takes a more traditional approach to sports broadcasting than Virtually Live. The firm has developed suite of patents covering highly sophisticated 360° cameras, allowing them to capture a sporting event in high definition 3D, and from all angles. Viewers can use their home equipment to virtually attend the match, turning their heads and viewing any part of the action. Although not as quite as full-featured as Virtually Live's free-wheeling, free-moving experience, NextVR has its advantages. Providing a live HD feed, rather than a computer generated simulation, has obvious appeal over Virtually Live's "video game" approach. Watching a game on NextVR is more akin to a traditional broadcast

than Virtually Live, which at times seems so dissociated from the actual game that some drama is lost. Both solutions are receiving a great deal of press coverage, although NextVR at the time of this writing has landed far more actual broadcast contracts. The race between them should be fascinating to watch, and the competition can only be good for the fans.

## **2.5 The Future of Virtual Reality in Sports**

It's not hard to imagine additional applications for virtual reality in the sports world. Sports already encompasses a great many disciplines and technologies, and VR has the ability to change all of them. Equipment and apparel designers can benefit from highly advanced simulations, letting them spot design flaws or improvements in their products even before they are prototyped. These simulations could be distributed to professional athletes and coaches for evaluation and feedback at a fraction of the cost of shipping out physical goods. By recording a match and then replaying it in VR, judging and referee errors could become a thing of the past. The kind of disputes over inches and milliseconds that occur regularly in sports from racing to football could be resolved if only the ref could replay the moment from another angle. As the technology continues to take hold in the public eye, it is likely that we will see more and more applications in the sports world. In many ways, the two industries create a perfect storm. Sports professionals are always hungry for new and dramatic tech to incorporate into their enterprise. At the same time, virtual reality is a tech hungry for new implementations and applications to showcase its possibilities.

### **3. The importance of virtual reality in physical education**

1 - Multiple sources of education: The technology of education is flexible in the process of learning, as it includes more than the source to complete the process of teaching and learning, and this multiplicity in sources makes the educational process more accommodating there are the teacher, tools, devices, and activities available, materials and the educational environment.

2 - taking into account the individual differences: The process of technology education in physical education must be individual to a large extent, as there is a significant relationship between the technology of education and sports education in its various activities and multiple, where this multiplicity multiple means the method of systems is the phenomenon of the modern era, where it has become the method of dealing with most areas of life in the field of education, for example, cannot be the educational process through the teacher only, but through the teacher and student and the designated means and the school environment and activity.

4 - Diversity: the multiple and efficient multimedia and the use of appropriate teaching methods and multiple technology-based education All this helps to remove boredom and freedom of choice and encourage individuals to practice.

5 - Education technology is a vital and inevitable activity to achieve the goal of physical education: The presence of qualified teacher and modern teaching methods and methods of teaching and teaching based on sound scientific foundations and other components of education technology all this helps to achieve the goal of physical education efficiently.

6 - Facilitate the process of teaching, teaching and learning: The existence of certain means and tools and appropriate devices and the presence of a teacher is understanding of the material and talented and able to manage the study, as well as tools and facilities sports adequate and modern All these factors of the implications of the technology of education certainly facilitates the process of teaching and education.

7 - Accuracy of implementation: The advance knowledge of the appropriate method of implementation and methods of teaching and learning the best, and the time available to achieve the learning skills all this helps to the accuracy of implementation and thus can be said that the technology of education is a reason to achieve achievement.

8 - Achieve the principle of speed in the process of learning: The application of learning technology in the learning of motor skills in physical education make the process of education directly towards the goal, ie, the skill required to teach and thus shorten the learning process to be speed in the process of learning speed calculated and not a random speed to achieve the desired purpose With economy in time, effort and money.

9 - Knowledge explosion: In the modern era, physical education has become dependent on many theoretical and applied sciences and the success of adapting these sciences to sports education as much as success in its mission and achieve its goals. Physical education depends on many principles derived from the various scientific facts that emerge from the multiple researches that follow us with new facts every day.

10 - Improving the efficiency of the preparation and training of physical education teachers: the more efficient the teacher of physical education, the greater the gifts, especially with the increase in the number of students in schools frightening, and the more efficient as he is able to deal with the continuous change in the curriculum and keep up with this change without wasting the educational process and lift Through the use of an integrated education technology system.

11 - Raising the efficiency of the educational process: does not come to raise the efficiency of the process from a vacuum, but there are constants must be worked out and the most important scientific knowledge that helps us to raise the level of individuals and reduce the loss of time and narrowing the effort of the phenomenon of cultural ignorance of individuals and here is not wasted educational process. (7)

#### **4. Negatives of virtual reality in sports training**

1. The use of virtual reality is limited due to the excessive initial costs when purchasing the required equipment and the high cost of production of virtual programs.
2. The limited impact of the five senses in the virtual reality system, which is used only in the sense of hearing, sight and touch, but may appear other developments that use other senses in the future.
3. Excessive use of virtual reality programs and computers, has a negative health impact.

4. The use of special types of computer systems, which include the frequency of frames of moving images and more than fifteen frames per second, lead to injury to the individual nausea and headache and other symptoms such as fatigue and tension of the nervous system.
5. The virtual world places everyone in front of the whole world, giving it all ideas, creeds, and bees. This exacerbates the social and educational role, reduces the practice of tutelage, and undermines the idea of one opinion.
6. Tools that the user needs to wear on his head, eyes and hands, a problem researchers are seeking solutions.

## 5. Virtual Reality Concepts

Creating a virtual environment is a necessary component of the virtual reality, it is the one that brings us to it, we see and we will be in the world, such as what exists in real life. These are the functions in which the computer is installed and where the software is not allowed to run. 3D models and real-world experiences of the environment. These functions will be used by special programs that have the ability to control their data. Visualization of the three-dimensional feature on the computer screen (or more often than on the screen) or on the screen of a larger screen like this used with projectors overhead. This may be due to the use of special monitors. Treat them and give them the appropriate responses. It is also possible to use the audio codecs that can be switched off. Tools used in the virtual reality: (8)

- 1- Visualization
- 2- Projectors & Displays
- 3- Head Mounted Display
- 4- Navigation
- 5- Equipment Driven
- 6- Equipment Mounted
- 7- Touch &Control
- 8- Grasp
- 9- Position Tracking
- 10- 3D Sound

Wearable technology will achieve its full potential when technology moves from the stage of devices that monitors us to the stage of platforms that use the data produced by that monitoring to provide tailored advice to us (or to target a player with or a team for particular products). This technology has extraordinary potential. But the problem is that in order for those platforms to anticipate what we need, they will have to have learned correctly what we usually do. Both enhanced reality and virtual reality provide consumers with completely new ways to receive content. VRs can change the concept of broadcasting by enabling users to attend live events, such as sports matches, in the virtual environment. Watching any TV program while wearing an enhanced reality device can result in relevant content on the device (similar to the 'second screen' experience in mobile applications that provide content relevant to viewers). It is the professional task of the teacher of physical education also to analyze the required teaching skills, it must clearly define the objectives to be achieved, and then determine the different methods that may

be reached to achieve these goals, and choose between these possibilities and choose what he deems appropriate, and decide when to study each subject, and how It is taught, added on the ways to present the course material to the students, and the design of the various activities of the students. There is no doubt that these professional tasks require the teacher to work and great effort, through good leadership and guidance can develop in his students positive attitudes towards the subject of physical education, and also bear them the responsibility of education, and this requires a measure of good behavior and tolerance and fitness by the teacher.

## **6. Examples of Virtual Reality in Sports**

Sports viewership and popularity are declining due to changes in younger generations' behaviors and competition from non-sports entertainment. These days, there are fewer people who watch live sports on television. Instead, they go on social media like Facebook and Twitter to watch the game highlights. The popularity of e-Sports also poses another threat to traditional sports industry by competing for viewership and sponsorship. (9) Consider the popularity of Twitch, a live streaming gaming platform that's now attracted over 100 million monthly unique viewers to watch people playing games on the platform. At Omnivirt, we work with brands and agencies in various industries to help them leverage VR/AR technology to increase brand engagement and drive more sales. We want to share our thoughts on how sports industry can adopt Virtual Reality technology to enhance the fan experience and athlete performance.

### **6.1 VR in Sports: Broadcast matches through VR**

While most people are shifting away from TV screens, VR can revolutionize the way we watch sports and attract more new viewers. By capturing matches using 360° video cameras, the audience can watch the events as an immersive experience through headsets or mobile. The capability of VR allows viewers to see what they want and focus on their favorite players. NextVR is one of the most successful startups that provides such experience by broadcasting most popular leagues such as NFL, NBA, and Wimbledon through VR. Another big player, Turner Sports, also partnered with Intel to deliver NBA experience through VR. With a small adjustment by mounting cameras on athletes' bodies, viewers can enhance their experience by watching the games from athletes' point of view. Firstvision (a Spanish VR broadcasting start-up) is using this technique for their audiences in various sports events; one of them is Euroleague basketball. Soon, "attending" the Super Bowl from your couch could become the new normal.

### **6.2 Play sports through VR**

Apart from watching sports through VR, viewers can be the athletes themselves by immersing into a virtual reality sports arena. Virtual technology has enabled sports gaming to become more immersive. Ten years ago, Wii by Nintendo enabled players to play tennis in their living rooms. Now, VR can create the much better experience that is more engaging and interactive. Oculus Rift, HTC Vive, and PlayStation VR have built platforms for VR gaming. VR Sports Challenge and BoxVR are excellent examples of VR sports games which create a life-like experience for users. We expect to see more sports games/simulations from developers in 2018.

### **6.3 Train athletes and sports teams**

Virtual Reality can create significant benefits for training from both athlete and coach points of view. The key to modern athlete training technique is to capture and understand player's movement and motions as much as possible. VR technology let coaches observe their team members from different angles to understand the behavior better while athletes can also observe their performance from real matches and training sessions. Another great way of using VR in sports is for indoor training. For sports such as baseball, basketball, and tennis, athletes can practice in simulations and can adjust their technique according to system feedback. Companies like StriVR and Eon Sports created solutions that can train both amateur and professional athletes. Many professional teams in NFL, NBA, and NCAA, have already adopted VR in their training. We can see that using VR is a great way to train athletes' mind without affecting their bodies.

### **6.4 Scout athletes using VR**

Similar to the way coaches can use VR to train athletes, they can also use VR technology to scout potential athletes. **(10)** This possibility will allow coaches to bring scouting to a larger scale by observing athletes performance though game simulations or VR sports games. Shortly, we might no longer see sports scouts who attend tournaments. Instead, they will observe athletes from their office using VR headsets.

## **7. Conclusions**

The beauty of virtual reality for sports training is its ability to make real muscle memory through visual cues. Something that athletes cannot get by simply watching their opponents from past matches. In virtual reality, they are placed in the heart of the experience. They can actively participate in the lessons and make adjustments at the same time. Virtual reality training has had some success before. For one, US Alpine skier Mikaela Shiffrin bagged the Winter Olympics gold medal. Shiffrin is among the US Ski and Snowboard team who have used the VR training program from STRIVR as their preparation for the 2018 Winter Olympics in South Korea. In STRIVR, individuals do reps by using a special headset and a 360-degree video to engage in several different scenarios and environments that they can see in real life. This setting allows athletes to train for high-risk sports without compromising their personal safety. High-contact sports like the NFL can highly benefit from virtual reality. As you know, even a little mistake can cost someone's career, especially for quarterbacks. With the use of VR, they can improve their reaction times and sharpen them.. The next wave of wearable technology that manufacturers will launch on the market will consist of devices that include enhanced reality technology or virtual reality technology. Both technologies involve an environment created by the computer - in enhanced reality technology, that environment overlaps with the real world (eg, Google glasses), and in virtual reality technology, the user is fully immersed in that environment (eg virtual reality helmet ' (Oculus Rift)). Devices with enhanced reality technology can help improve efficiency, safety and productivity in both customer service and logistics, and can be used by players during consultations or tactical matches. The first VR devices are designed mostly for matches' environments, but after a while they can allow us all to talk across

continents, or to ensure that specialists interact remotely with devices. Virtual reality will prove to be the best way to make a home advertising, and what will make it happen very quickly is that the costs of that process will be borne mostly by the factories and retailers who want to advertise their goods at the moment companies are paying large sums of money for rental Sites to display their goods and some of those companies seek to reduce those expenses by using catalogs that are mailed directly to consumers to buy what they want from them, but the purchase through the catalog cannot be compared to the pleasure of buying through virtual reality, which makes the Design was a duplicate copy of the commercial center within walking around Buyers as if they were inside the original shop. Virtual reality is slowly changing the landscape of sports. From training the athletes to even spectators watching the games. Early last year, the EAFF E-1 Football Championship, a soccer match among East Asian Football teams introduced virtual reality viewing. The federation worked with Fuji TV and LiveLike, a virtual reality company to create a VR application that has the capability to offer live action and highlights during the soccer matches of Japan, China, North Korea, and South Korea. Electronic sports is also joining the tech game by utilizing virtual reality and augmented reality during matches. More immersive technology, particularly in sports would give both the players and spectators something to always look forward to. Applying it to real life sports aside from video games is a welcome technological advancement that many sports enthusiasts can benefit.

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