

Maya: The Convergence of Open World Gaming and Virtual Reality Technologies

Abhay Saxena*, Manan Singh**

Abstract

With the simultaneous exponential advances in various Computing fields, world is evolving at a pace unlike ever before. Virtual Reality (VR) is quite old field, but it has gained an unprecedented momentum in recent years. Despite this, the vision of the present (and the future) of virtual reality is very blurred. It is mostly made up of imaginations, and inspirations from science-fiction movies & novels; not the present truth. In this research, we try to clear that vision by throwing light on the current status of Virtual reality, and the imminent future. We describe "Virtual reality", its need, immersion, and some unofficial meanings of the term. Then, we observe the future of VR as the convergence of "Open World" video gaming, and the VR Technologies. We derive the components of a "true" VR system, as the union of the essential-components of the two, and also propose a model of Virtual Reality. Finally, we compare these components of VR system with the components of Maya(i.e. our real world as a system). Surprisingly, there is sheer resemblance between the both.

Keywords: Virtual Reality, Open World Gaming, Maya

Introduction

With the exponential advances in science and technology, various computing fields are evolving at a very fast pace. One very fascinating field is Virtual Reality (VR). It is not a new concept, but has gained an unprecedented momentum in recent years. Despite this development, our vision of the present (and the future) of virtual reality is very blurred. It is mostly made up of imaginations and inspirations from science fiction movies & novels, not

the present truth. So, there is a need to clear that vision by throwing light on the current status and the imminent future of virtual reality. But before that the virtual reality itself needs to be described.

Virtual Reality

Virtual Reality is a term used for computer-generated 3D environments that allow the user to enter and interact with alternate realities. The term virtual reality was initially popularised by Jaron Lanier. Some apparent synonyms to "Virtual Reality" are: Synthetic Experience, Virtual Worlds, Virtual Environments, Artificial Worlds or Artificial Reality. All mean the same.

Virtual reality has been defined in various ways as immersive and direct-manipulative real-time interactive 3D graphics (Bishop & Fuchs, 1992), offering multi-sensory experience, that simulate physical presence in places real or unreal as a clone of physical reality (Von-Schweber, 1995).

The Need of virtual reality and the motivation for such a research direction is twofold. From an evolutionary perspective, virtual reality is seen as a way to overcome limitations of standard human-computer interfaces and bring more intuitive human-computer interaction; whereas, from the revolutionary perspective, VR technology opens the door to new types of applications that exploit the possibilities offered by presence simulation, the most important ones being - virtual prototyping, simulators and training, telepresence-teleoperation, and augmented reality (Gobbetti & Scateni, 1998).

Immersion (into virtual reality) is an experience/perception of being physically present in the virtual

* Department of Computer Science, Dev Sanskriti University Haripur Kalan, Haridwar, Uttarakhand, India.
Email: abhaysaxena2009@gmail.com, Email: manan.dsvv@gmail.com

** BCA Final Year Student, Dev Sanskriti University, Haridwar, Uttarakhand, India. E-mail: manan.dsvv@gmail.com

environment, often produced due to the images, sound or other stimuli present in that virtual environment. An immersion involves engagement, engrossment and total immersion, as the 3 levels (Brown & Cairns, 2004). The broad findings about the features of immersion indicate: 1) Lack of awareness of time, 2) Lack of awareness of the real world, and 3) Involvement and a sense of being in the task environment (Jennett, Cox, Cairns, Dhoparee, Epps, Tijs & Walton, 2008).

In “The Ultimate Display”, a seminal paper by Ivan Sutherland in 1965 that introduced the key concepts of immersion in a simulated world, a challenge was set:

“The screen is a window through which one sees a virtual world. The challenge is to make that world look real, act real, sound real, feel real (Sutherland, 1965)”.

Today, after 50 years, that challenge is on the verge of accomplishment.

Beware, Virtual Reality May also Mean

Virtual reality in itself is a vast discipline and in addition to its scientific (computer graphics) meaning, there exists many philosophical and psychological explanations as well.

Literally, virtual reality means non-existent/alternate reality. VR begins in mind. The daydreaming or as cognitive psychologists label it, ‘mind-wandering’, offers the experience of being “somewhere else” in mind. Many times we encounter virtual experiences, that takes us away from “natural” or “physical” world - be it dreams, literature, cartoons, movies or online environments such as Facebook. Sometimes, VR does not require any media technology, but the psychoactive substances - natural or man-made - so called hallucinogens that facilitate “trips” to virtual realities by directly affecting the brain and the nervous system (Blascovich & Bailenson, 2011). For humans, reality is, strictly speaking, a pure construct of mind and perception. All the scientific laws - from physics to biology - are based and build on that perception. And there is no proof that it’s not an illusion. The apparent reality i.e. our own world, can be a virtual reality. Thompson (2003) visits this possibility with scientific, psychological, paranormal and ancient (Buddhism & Hinduism) support in his book, “The world as Virtual Reality.” It explores the idea of virtual reality as a metaphor for our situation as conscious beings.

With so many convincing definitions and explanations of Virtual Reality, often, there occur conflicts in discerning the true meaning in a specific context.

Open World Games

Video games have always been used as an attempt to provide users with virtual experiences and environments, and Open World Games take this attempt to a whole new level. An open world game is a game which provides the players with an open world, i.e. an in-game virtual world (often, 3D modeled) where a player can roam freely and is given considerate freedom in choosing how or when to approach objectives (Sefton, 2007). The player is free to explore and/or interact with the whole world - anytime, in any manner - at will; and that’s a serious reason why open world games must not be compared or confused with ordinary video games.

Since last few years, the open world gaming have matured with the remarkable developments in Computing Power of machines and the 3D Graphics Technology. The worlds offered are very vast and immersive, the gameplay is more “open” and interactive, and the graphics are more realistic than ever.

As evident from the data in Table 1, the gaming world has begun to offer huge in-game worlds, and most of them are based on real-world locations. The player can also choose to play/live the life of a variety of personas, from a citizen to futuristic soldier; and most of the games are massively multiplayer online, i.e. they “contain” in their world, interconnected Internet users from around the world, and in real-time.

Some games are ‘extremely real’ in their nature. On one hand, **Tom Clancy’s The Division** and **Assassin’s Creed Unity** imitates the real-world America and Paris, respectively, in its full accuracy (both geographically and architecturally); on the other hand, **Destiny** offers a whole Solar System for the player to explore and play-in. Another game, **The Crew** provides the player with a world with approximately 6,213 miles (10,000 kilometers) of open roads, plus the huge and diverse off-road gorgeous geography of America.

Grand Theft Auto V takes the interaction and immersion to a whole new level, with its remarkable realistic features. The player lives in a vast world with realistic ecosystem (flora and fauna), “intelligent” people (as dynamic state machines), and diverse landscapes from dusty hills to tall skyscrapers, rivers to farmlands, deep seas to countryside roads; and he/she has the freedom to

Table 1: Open World Environments Based on Real Locations, between 2008 to 2014

S/N	Year	Game	Setting (based on real location)	Size (in sq. miles)	You Play as	MMO (Massively Multiplayer Online)
1	2008	Grand Theft Auto IV	New York City	6.8	Civilian / citizen	Yes
2	2011	L.A. Noire	Los Angeles, California, 1947	8	Police Officer / Detective	No
3	2011	Red Dead Redemption	Western United States & Mexico, Decline of American Frontier, 1911	28	Former Outlaw / Bounty Hunter	Yes
4	2011	Assassin's Creed Anthology	Third Crusade, 1191; the Holy Land Renaissance, 15-16th Century; Florence, Venice, Rome, Italy	n/a	Assassin	Yes
5	2012	Assassin's Creed III	North America, American Revolution, 18th century. (Boston, New York, Homestead, Frontier)	n/a	Assassin	Yes
6	2012	Sleeping Dogs	Hong Kong	3.1	Undercover Cop	No
7	2012	Far Cry 3	South Pacific, tropical islands	8	Stranded Tourist	Yes
8	2013	Assassin's Creed IV Black Flag	Caribbean, Pacific Ocean and islands, early 18th Century	>50	Pirate / Assassin	Yes
9	2013	Grand Theft Auto V	Los Angeles & surrounding hills, countryside, beaches, mountains. California	49	Civilian / Citizen	Yes
10	2014	Assassin's Creed Unity	Paris, French Revolution, 18th Century	>50 (as it is)	Assassin	Yes
11	2014	Watch Dogs	Hyper-connected Chicago	9	Hacker - Vigilante	Yes [always online]
12	2014	Far Cry 4	Himalayas, Nepal	~10	Native civilian	Yes
13	2014	Tom Clancy's The Division	New York, including Brooklyn, Queen & mainstay Manhattan. (set in future)	>50 (as it is)	Hi-Tech Soldier	Yes [always online]
14	2014	The Crew	United States (New York, Chicago, Detroit, St Louis, Miami, Dallas, Las Vegas, Seattle, San Francisco and all of these cities.)	~2000	Car Racer	Yes [always online]
15	2014	Destiny	Whole solar system viz. earth, moon, mars, venus, etc. (set in future)	Huge	Advanced Soldier: Guardian (3 distinct races: Human, Awo-ken & Exo)	Yes [always online]

Size: According to scientific findings by the Gaming forums on the Internet.

(as it is): It means that the in-game world is EXTREMELY ACCURATE copy of the real world.

do anything ... literally, anything - be it buying properties and businesses, doing skydiving or sea-diving, cycling or doing Yoga, playing golf or tennis, shopping in various shops from clothes to vehicles, driving cars to flying jets.

There is even in-game Smartphone called iFruit, which, in addition to a camera, has various apps for internet, contacts, social media, a calendar, etc. The ambient weather, day-night cycle and the ambient sound adds to

the player's immersion in the game. The whole world is there in "crazy level of details".

And all of this is definitely, nothing else, but an absolute creation of whole alternate world(s); or in other words, a whole alternate reality...a virtual reality. And that virtual reality is highly illusive, and immersive. But this is not absolute in nature, as such virtual worlds are mostly confined to a screen till now. When multi-sensory VR is required, we move to VR technologies.

Virtual Reality Technologies

The most popular and common Virtual Reality Technologies (Gears/Devices) at present are:

1. **Head Mounted Displays:** HMD is a display device, worn on the head or as a part of the helmet, and includes a miniature screen for each individual eye so that it creates an illusion that image has some depth. The display units may include CRT, LCD, Liquid Crystal on silicon (LCos), or OLED. HMD use a mechanism of suspension to assist shifting of heavy weight of the device. The device may also contain speaker or headphone and is connected to high-end CPUs via VR cables.
2. **C.A.V.E:** Presented in 1992, C.A.V.E. (CAVE Automatic Virtual Environment) is a virtual reality and scientific visualisation system. Instead of using HMD, it projects stereoscopic images on the walls of room (user must wear LCD shutter glasses). A CAVE is a small room where the walls or sometimes ceiling acts as giant screens. The walls are rear projected and a computer provides the image from behind creating a cohesive and virtual environment. The lenses in the user's goggles shutters in synchronisation with the alternating sequence of the images in the video providing user an immersive environment. This approach assures superior quality and resolution of viewed images, and wider field of view in comparison to HMD based systems (Carolina, Sandin, DeFanti, Kenyon, & Hart, 1992), and is considered the most immersive display system for VR environments, by many VR specialists.
3. **VR-Clothing:** In addition to Goggles and headsets, Data Gloves are also used so that user can interact with virtual objects by making hand gestures. In

these gloves a sensor is placed on the tips of the fingers which detects amount of light. The amount of light that enters the sensor through emitter decides the position of fingers. Every gesture has different amount of light associated with it hence results in different interaction movements.

Latest Virtual Reality Devices

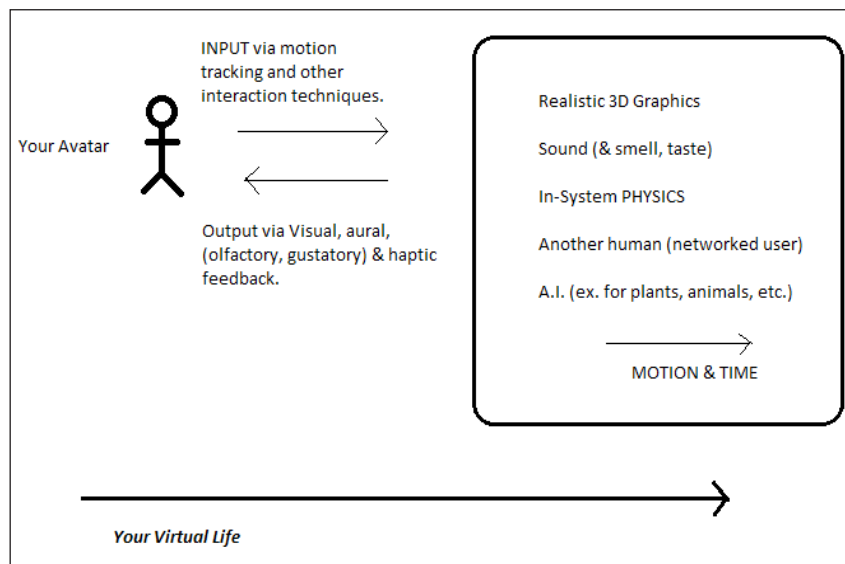
In 2006, Nintendo released Wii Remote and Remote Plus, which was a motion sensing/ gesture-controlled remote controller, based on the motion sensors namely Accelerometer, Gyroscope and Infrared Sensor. In 2010, Microsoft released Microsoft Kinect for Xbox which was a motion sensing input device. It sensed the human motion as captured by the camera - 640x480 pixels at 30 Hertz. In 2012, Oculus Rift was introduced, and was a considered a true realisation of virtual reality. It was a VR head mounted display, with features such as positional tracking, low persistence OLED display, built-in latency tester, engine integrations and the Oculus SDK. The display specification was 960x1080 per eye at 75 Hz, and the sensors were gyroscope, accelerometer, and 100 degree field of vision (Oculus Rift, 2014). Some upcoming (in 2014-15) devices and gears are Sulong's Cortex, AR / VR Goggle headset; Seebright, AR/VR head mounted display; CastAR, AR/VR Goggles/glasses; and Control VR, that is a wearable controller. Sony has announced Project Morpheus which is a VR headset, with 90+ field of view, position and rotation tracking and 1080p camera resolution (Dingman, 2014). Also, Samsung's Gear VR, a virtual reality head mounted display is set to be released in 2015. Virtuix Omni is the first-of-its-kind gaming system that uses a virtual reality interface to enable the player to walk and run freely and naturally in any game environment (that supports VR). A robust support ring and unattached support harness provide maximum safety and versatility for rapid, unconstrained movements. The user can walk, run, jump, and turn swiftly and smoothly in 360 degrees without restraints (in the game world) (Virtuix Omni, 2014).

It's obvious from the data above, that, the technological inventions in the field of virtual reality are in its full pace, and sooner, with passage of time and technological advances, high fidelity virtual reality gears/devices and systems will arrive in market.

Table 2: The Essential Components of Open World Gaming & VR Tech

Essential Components of Open World Games	Essential Components of Virtual Reality Technology (as per the union of components as told by (Sutherland, 1965; Frederick,1999))
• Realistic 3D Graphics	• Visual Display or HMD
• Ambient Sounds	• Graphics rendering system
• “Clever” Artificial Intelligence	• Tracking system; devices by which user specifies interaction with virtual object;
• Gameplay/interaction with in-game world	• interaction techniques
• a big Open-World (Map), for the user to free-roam	• database construction for building & maintaining detailed system - in real time
• Interesting Story/Objectives, to avoid monotony and keep user engaged.	• synthesized sounds
• massively online - networked players from around the world	• synthesized forces and haptic - kinesthetic sense/feedback
	• manipulated objects move realistically - in-system physics

Fig. 1: Virtual Life as per the “MAYA Model of Virtual Reality”



The Convergence of the Two

Till now, we’ve studied two independent but interrelated areas. First, the open world gaming that has begun offering highly immersive and interactive worlds, and second, the virtual reality technologies - the hardware stuff - that is implementing the concept of VR in the real world. (The essential components of both are listed in Table 2.)

Not too far from now, these two fields will converge - the open world gaming and the VR tech; and with this convergence, the mankind will have an unprecedented

power, to create worlds, parallel alternate worlds, that will be illusions but so real in look-&-feel that it would be impossible to differentiate. And that will be the “TRUE” Virtual Reality, and we will get “TRUE” VR system.

Now, the essential components of VR system will be the union of essentials of Open World Gaming and those of VR tech (in Table-II). And from that union (of properties), we derive a model of the VR system, as in Fig. 1.

We’ve named this model of VR system, as the “MAYA” model, so let’s discuss the cryptic reason of this naming, and some incredible findings.

Table 3: Components of Real World and VR System

S/N	Real World as A System	Virtual Reality System
1	You yourself	Your avatar / character - unreal
2	Your every movement/action	Input via motion tracking of your movements, and other interaction techniques.
3	Your senses - see, hear, (smell, taste), touch	Output as Visual, Aural, (Olfactory, gustatory) and haptic feedback. Eg. Visual Feedback can be HMD.
4	Some humans, plants, animals	A.I.
5	The world surrounding You as u see it	Realistic 3D graphics
6	Ambient Noise and sound (& smell, taste)	Sound (& smell, taste)
7	The natural Physics system - rain, day-night cycle, wind, etc. - realistic movement of manipulated objects	In-system Physics
8	Another human	Networked player from around the world. (Networking)
9	Motion and Time	Building, maintaining and updating above in real-time.
	Your Life	Storyline or objectives

MAYA

According to the AdiShankaracharya's (early 8th century) Advaita philosophy, this world we live in, the space as well as time is a projection of our consciousness or our awareness. Advaita Vedanta calls this projection as **MAYA**. The true meaning of Maya in Sanskrit is illusion or delusion. The word origin of maya is derived from the Sanskrit root 'ma' ("not") and 'ya', meaning "that". So the meaning of Maya is "that is not" but which appears to be real. Advaita Vedanta uses this term to bring forth a point that what we feel as real is not the complete reality. This does not mean that all of us live a life of illusion – we actually see it, we really live in it. "The world has no existence" really means "The world has no existence-absolute". It only exists relative to our minds. It is perceived by us, by our five senses. That is what is meant by the "no existence" clause. It is a mix of existence and non-existence (Sinha, 2006).

According to this meaning of MAYA, the real world that we live in, is considered to be an illusion. So, considering our 'real world', as a system, we arrive at a list of its essential components, as listed in Table 3.

Now, the astonishing part is the sheer resemblance of the components (in Table 3) of real world as a system and the VR system, that we discussed in last section. This is a wonder to ponder over, that the VR system that mankind will develop in upcoming years, will be as real as the real world. Other way round, the real world that we live

in may also be a virtual reality i.e. the world as virtual reality, considering the fact that there is no concrete proof that the real world is not an illusion (Thompson, 2003). Moreover, that's the reason of naming the model - MAYA model of virtual reality. This comparison also, in a way, validated the model.

VR/MAYA System: A Definite Destiny

The overall notion of an absolute VR seems amazing and exciting. But this is the definite future, undoubtedly. Consider the telephone. When asked with whom one is conversing "on" the telephone, one doesn't say, "That was Joe's digitised voice." One says, "It's Joel!" Indeed, most people are totally unconscious of the simple fact that the voice they hear during a cell-phone conversation is not the other person's voice but a digital construction that only approximates that voice and is measured and nearly in real time. The fidelity of that voice is simply good enough that our conscious powers remain quiet, never injecting doubt into our minds about the reality of the person with whom we're interacting (Blascovich & Bailenson, 2011).

As evident from the findings in this research, technology has already begun to provide visual fidelity (and also, touch and smell) comparable to the audio fidelity of the telephone. And, so, virtual worlds encompassing all of the senses will at some point definitely "feel" as "real" as a telephone conversation does today.

Conclusion

With the fast and parallel advances in various fields of Science and Technology, we are and we will be witnessing wonders in virtual reality. We will encounter the extreme virtual reality with the convergence of open world gaming and virtual reality tech. VR systems of future will be as real as the apparent reality. On one hand, this research tried to explore and define an absolute VR system; and on the other hand, it provided a glimpse of the much-ignored subtle connections between the Vedic (in this case, Advaita Vedanta) and the modern Computer knowledge. This research attempted to clear the blurred-vision about VR, and connect the dots from different industries (gaming & VR) and different times (modern & ancient) to form a line that points towards the future.

Soon, mankind will get the ultimate power to create parallel alternate realities. But it must be ensured that the power is kept under control, and is responsibly used for human progress and not for catastrophic aims.

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