Virtual Reality: the Answer to the Future of Gaming

Kashav Piya

Augustana College

Rock Island, Illinios 61201

kashavpiya19@augustana.edu

Abstract—In the twenty first century, with the rise of technology, gaming industry has gone through a revolution with the introduction of augmented reality and virtual reality. From 1950s Sensorama which used seat motion, stereo sound, wind and aromas to today's flight simulators which uses the total science behind flying an aeroplane, we have come a long way in this field of technology. Virtual reality and gaming goes hand in hand and we have seen dramatic improvements in both the sectors simultaneously. Games involving virtual reality is not only used for entertainment purposes but also in industries like education, health, real estate, advertising, tourism and many more. These games have positively affected a lot of industries and are getting a lot of attention from the gaming community as well. Virtual reality is a multimodal, interactive technology that has made communication more natural, helped in improving health of users, made learning easier, and made entertainment more realistic. We have seen in the trends that games involving Virtual Reality or Augmented Reality have become more and more successful and appealing to the gaming community. In this study, we are trying to see if virtual reality is going to be the future of gaming as we go through data from different games that are considered successful. We try to see if it is really the virtual reality feature that makes it stand out from the other games or is there some other factor that makes it popular amongst gamers.

Index Terms—virtual reality, gaming, future of gaming

I. Introduction

A "synthetic world" which includes a computer-generated environment that can replace the real world where people can interact and experience the virtual environment, giving the user a feeling of being in a different world is known as virtual reality. The users would interact with everything the same way they would interact with any objects in the real world. This concept which started around 90 years ago is now widely being used in various industries including entertainment, driving or flight simulations, scientific and medical visualizations, training and learning and many more. Virtual Reality can help in risk and cost reduction with also providing the facility of creating a controlled environment repeatedly. [1]

It was not until the early 1980s that interactive computer graphics made their mark even though the concept being wide spread since the 1930s. Computer generated imagery, scientific visualization and most importantly Virtual Reality(VR) started becoming popular. VR created waves of "hype" that according to many researchers, never lived up to the expectations. [2] The first step towards interactive computer gaming was recognized when "Battlezone" from Atari was published which was followed by Unreal, Quake and Half-Life series, Operation Flashpoint, Far Cry and many more. [2] These interactive games which utilized some concepts of virtual reality had a bigger purpose than just providing entertainment, imparting valuable learning experiences.

In the past 20 years, the VR community has made a lot of developments which have been based on the work which was done earlier in 3D graphics, visual simulation and user interfaces. The number of people working and researching on 3D, virtual reality science and technology has increased remarkably. The world of gaming and virtual reality has started intertwining as mentioning one without the other has become impossible as more and more research work are being done concerning both the fields. This not only affects kids or teenagers, but has a wide audience which can include adults and old people as well. Researches in gaming and VR not only affects the entertainment industry but also has its effects on businesses, medicine, government and different organizations that may utilize training, learning, simulations and serious games. [3] "America's Army", a game used initially to recruit personnel in the army is one of the leading examples of how a non-entertainment industry benefited from the development of VR and gaming.

Fig. 1. Oculus VR Gaming Headset
[4]

II. Evolution of Virtual Reality in Games

In the recent years, we have moved away from our typical 2D games to more advanced 3D games or games that involve virtual reality which gives the user a feeling of being present in another realm. 3D games have worlds that are realistic and VR amplifies that feeling. Head-Mounted-Display or simply VR goggles are being used to simulate the presence of the person wearing it to a different virtual environment. In the

past, 2D games likes Frog Arcade, Pacman, The original Grand Theft Auto 1997 were sufficient to entertain people. However, the games have become more advanced in the recent years with addition of attractive graphics, integration of 3D imagery, improved physics and better gaming technologies. Recently, games like Pokémon GO, Counter Strike GO, Fortnite, GTA V, Call of Duty have become popular due to its realistic and appealing graphics. [5]

In 2016, Pokémon GO made history when it was released. No other game had ever done what Pokémon GO did. The game was so appealing to people that it was downloaded by over a 100 million people over 30 different countries. [6] The game was one of the first to utilize geo-located augmented reality elements. This motivated game developers to think outside the box to create games that give its users a unique experience. In 2020, Phasmophobia has become a popular game that can be played using VR. This horror genre game utilized VR to make the player feel disconnected from the real world and scare them using the computer generated world. According to Steam, an average Phasmophobia player plays it for about 4 hours a week compared to Pokémon GO's 2.5 hours. [6]

Fig. 2. VR Gaming has become popular among the gaming community [7]

Gaming industry has had its move since 2000s and is moving towards positive direction with the addition of Virtual Reality. With lots of investments in the industry, the "irrelevant sport" has become the attractions in many of the mainstream media. Game Streaming Websites like Twitch, YouTube Gaming, have become a frequently used sites for the gaming community as the games keep amazing the players with the newest updates. Many claim that these streaming websites represent the future of gaming as the differences in gaming space, social networks, face-to-face communication has been blurred. The inclusion of virtual reality in games is going to make the same impact as the streaming sites, if not more. [8]

III. Impacts of Virtual Reality Video Games

There has been a huge revolution in the gaming industry in the twenty-first century and has taken the whole world by storm. Data shows that in 2010, at least one person out of 60 percent of American Household are familiar to playing video games. About 40 percent of Eastern European and one person out of every five in Asia play video games. [9] Also, 63 percent of the gamers are familiar with Virtual Reality Games and enjoy it. [9] Looking at these statistics, it looks like Virtual Reality Games might have a huge impact to the gaming community. There might be positive as well as negative impacts that VR games might have on people. Some of the positives might be people make more social connections in game, promotion of healthy behavior, exergaming, different method for teaching and learning and many more. Also, there are some negative impacts like issues in mental and physical safety, and ethical issues in the usage of the VR games. [10] The new young demographic have been brought up with the usage of technology and video games. It is so easy to lose the connection between the parents and the children in this scenario. In recent studies, pediatricians have recommended parents to engage with their children through video games as it makes their bond stronger and to avoid the lost of connection. [10]

There are many video games that can be played solo but there are as many games that can be played by multiple people or online with random people who are strangers. 76 percent of the gamers in the United States play video games with someone else, either with someone in their home or someone online. [11] People keep meeting new people who share the same interests, have good conversations which increases the social interaction. Also, gaming has been associated with high body mass index, weight gain in the past, but with the introduction of virtual reality or augmented reality gaming has changed that and now promotes healthy behavior by increasing their physical movement which alleviates a lot of health risks. We have also had uses of interactive VR games in order to improve the physical functioning of old people. [12] Furthermore, these games have been used as serious games to make the learning-teaching experience better. It has been shown that these educational virtual reality games have increased the student's motivation to learn. [13]

Although, there are lots of advantages of using Virtual reality games, they also have risks and negative impacts that are associated with it. With the usage of motion tracking, there has been an increase in physical risks. Studies have shown that augmented reality games and virtual reality games increases the risk for physical injury more than just motion-tracking games. [14] It also carries potential mental health risk as well as the online gaming space can take a toll on a lot of people. Also, there is a privacy and persuasion issue that comes up when using the AR and VR games online. [10]

IV. Study

A. Method

To verify the data on different popular games to determine if VR really plays a big role in popularity of the games, electronic search on Destructoid, Game Informer, Steam, Game Spot, Nintendo Life, Open Critic, Statistica were used. We looked at the number of downloads, average played time,

Fig. 3. Designer Working with Virtual Reality Headset
[15]

average rating as our factors to determine the 'success' of the games for the games that were selected as deemed appropriate.

B. Selection

We selected games belonging to similar genres that could be played in various platforms and its availability to play using virtual reality. We looked at games that were only available in limited platforms as well as games available in multiple platforms, so as to see if platforms make any difference. Also, we looked at games that do not support VR as well as games that do. The variety of selection was diverse as we wanted an accurate outcome.

The games that we selected were:

- Counter Strike Global Offensive
- Call of Duty: Warzone
- Beat Saber
- Half-Life: Alyx
- Walking Dead: Saints and Sinners
- Valorant
- Fortnite
- PlayerUnknown's Battleground
- Pokémon GO
- Jurassic World Alive
- Star Trek: Bridge Crew
- Keep Talking and Nobody Explodes
- Resident Evil 7: Biohazard
- Minecraft
- Population: ONE

V. RESULTS

As table 1 shows, we looked at 15 different games that were available in various platforms including Windows, Android, iOS, PlayStation, XBox and many more.

First, looking at the games available for Windows only, we found out that there are very few games that are famous if it was only released for Windows. Valorant, the only game we looked at that is available for only Windows users is a rare success. The game does not provide VR support but falls under the Action/Shooter genre which is repeated quite a few times in our list. Counter Strike Global Offensive is another game that is widely popular among PC gamers but not really amongst the PlayStation users, maybe due to the lack of VR support. Again, this game falls under the Action/Shooter category which looks like the most popular genre of games worldwide. Another Action/Shooter game that is available on all Windows, Android, iOS, PlayStation and XBox is Call of Duty: Warzone. This game has VR support for PlayStation which makes it a really popular choice for PlayStation users with about 75 million sales in under a year. However, the rating it got from various reviewers does not justify the popularity and success of this game. Population: ONE was yet another game that falls under the Action/Shooter that has become popular in its short life as it is fully available with VR support in Oculus Quest and Windows.

The second type of games that were found to be popular in 2020 was the Battle Royale and Action Games. Games like Fortnite, PlayerUnknown's Battleground, and even Call of Duty: Warzone was a major success with nearly a billion sales all combined. Players have played Fortnite and PlayerUnknown's Battleground in VR even though the direct support is not provided by the game itself. Minecraft is another game available in various platforms that has more than 200 million sales with Virtual Reality support. This game is widely enjoyed by gamers as it falls under the Action/RPG genre.

We also had two games that utilized Augmented Reality: Pokémon GO and Jurassic World Alive. Both these games have been really successful and enjoyed by a lot of people with more than a billion downloads combined. It cannot be neglected that Augmented Reality games have been a close competitors of VR games looking at these statistics. It can also be implied that one does not need to get extra gear to use the augmented reality feature of the game other than their device itself unlike VR where we might need a headset or other additional gears.

Other games in the list which include: Beat Saber, Half-Life: Alyx, Walking Dead: Saints and Sinners, Star Trek: Bridge Crew, Keep Talking and Nobody Explodes, Resident Evil 7: Bio-hazard were all specially designed for Virtual Reality. All these games have succeeded in the market with more than 13 million sales combined. Users have definitely enjoyed these games as only one out of six mentioned above got a review rating below 8.5. The number of sales do not correspond to the likability of the game as like mentioned before, the VR gears need to be available to play these games, which might not be in every gamer's disposal.

One of the biggest factors for the success of these games were found to be the genre rather than the platforms it is available. The use of Virtual Reality and Augmented Reality also plays a huge role as the Augmented Reality games look to be the fan favorite. Virtual Reality games have been successful. However, there is more hype for those games than actual sales. We also realized that games available to be played normally can be a success. With the addition of VR support, those same

Table 1: Data Summary of Video Games belonging to different genres with or without VR support

Name of the Game	Year Released	Genre	VR support	Platforms Available	Number of Sales	Average Played Time	Ratings by Gamers
Counter Strike: Global Offensive	2012	Shooter	No	Microsoft Windows, Classic Mac OS, PlayStation 3, Linux, Xbox 360	more than 75 million	65.3 hours lifetime	8.5/10
Call of Duty: Warzone	2020	Battle Royale/ Shooter	Yes	PlayStation 4, Xbox One, Microsoft Windows, Android, iOS	about 75 million	32 hours lifetime	7/10
Beat Saber	2018	Rhythm	Yes	Oculus Quest, PlayStation 4, Microsoft Windows	more than 1 - million	94 hours lifetime	9.5/10
Half-Life: Alyx	2020	Action/ Survival	Yes	Microsoft Windows	about 1 million	15 hours lifetime	9.5/10
Walking Dead: Saints and Sinners	2020	Shooter/ Horror	Yes	PlayStation 4, Microsoft Windows, Macintosh operating systems	about 180,000	12 hours lifetime	9/10
Valorant	2020	Action/ Shooter	No	Microsoft Windows	not disclosed	not disclosed	9/10
Fortnite	2017	Battle Royale	No	Nintendo Switch, PlayStation 4, Xbox One, Android, iOS, Microsoft Windows, Classic Mac OS	more than 350 million	11 hours per week	9.6/10
PlayerUnknown's Battleground	2017	Battle Royale	No	PlayStation 4, Xbox One, Microsoft Windows, Android, iOS	555 million	750 hours per year	8.6/10
Pokémon GO	2016	Augmented - Reality	Yes	iOS, Android	more than 1 - billion	2.5 hours per week	6.9/10
Jurassic World Alive	2018	Augmented - Reality	Yes	Android, iOS	about 20 million	not disclosed	8.5/10
Star Trek: Bridge Crew	2016	Action/ Adventure	Yes	PlayStation 4, Microsoft Windows	not disclosed	not disclosed	6.8/10
Keep Talking and Nobody Explodes	2015	Puzzle	Yes	Android, Microsoft Windows, OS X, PlayStation 4, Linux, Nintendo Switch, Xbox One	about 1 million	not disclosed	8.5/10
Resident Evil 7: Biohazard	2017	Action/ Survival	Yes	PlayStation 4, Xbox One, Nintendo Switch, Microsoft Windows	more than 8 - million	7 hours per week	9/10
Minecraft	2009	Action/ RPG	Yes	Windows, OS X, Linux, Android, iOS, Xbox 360, Raspberry Pi, Windows, Phone, PlayStation 3, Fire OS, PlayStation 4, Xbox One, PlayStation Vita, Universal Windows Platform, Wii U, tvOS, Nintendo Switch, New Nintendo 3DS	more than 200 million	2976 hours lifetime	9.3/10
Population: ONE	2020	Action/Shooter	Yes	Oculus Quest, Microsoft Windows	more than 50,000	not disclosed	9/10

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games do much better as it was found to be appealing to the gaming community.

VI. CONCLUSION

With the release of new VR games and new VR headsets and gears, virtual reality and gaming industry has seen a boom in its popularity. The quality of these games and headsets have been improving with every new release and has attracted a lot of eyes in the market. [16] However, we cannot generalize the data we collected to be for all the people that play games. The people using VR is mostly going to be pro gamers but not the casual and first time gamers. This might be the case as VR headsets are not a common gear to possess as of now. However, the price of these gears are reasonable and might get cheaper in the future which will definitely attract a lot of gamers. [17] Looking at the trends from our data, we have seen that VR games have had a certain amount of success and will keep doing well in the market as the games become more advanced. It has already attracted many other industries outside of entertainment including tourism, medicine, science, education, real estate, advertising and is bound to attract attention from many more in the near future. It is not a question that Virtual Reality is going to be the future of gaming as the potential of virtual reality is untouched and will only improve exponentially here on attracting more pro gamers and the casual and first time gamers as well.

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