VIRTUAL REALITY: THE ANSWER TO THE FUTURE OF GAMING

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Abstract - With the rise of Virtual and Augmented Reality technology, gaming has undergone many massive changes. From one of the earliest known immersive multi-sensory technologies, the flight simulator known as the Sensorama, which used seat motion, stereo sound, wind, and aromas; to today's flight simulators, which simulate the all aspects behind flying an aeroplane, it is clear we have come a long way in this field of technology. Virtual reality goes hand in hand with gaming and we have seen dramatic improvements in both sectors simultaneously. Games involving virtual reality are not only used for entertainment purposes but also in a multitude of industries such as education, health, real estate, advertising, tourism, and more. These games have had a positive impact on a plethora of industries and are quickly gaining attention from the gaming community as well. Virtual reality is a multimodal, interactive technology that has made communication more natural, helped in improving the 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. This study was conducted for the purpose of seeing if virtual reality is truly the future of gaming. Through data from different games that are considered successful and trends in the sales of virtual reality consoles and games, we see if virtual reality is what makesit stand out from the other games or if there is another factorthat makes it popular in the gaming community.

Keywords - Virtual Reality, Gaming, Future of Gaming

I. INTRODUCTION

A "synthetic world" refers to a computer-generated environ- ment that simulates the real world. Here, people can interact and experience the virtual environment, immersing the user in the feeling of being in a different world, which is known as Virtual Reality (VR). The users interact with everythingin the same way they do with objects in the real world. This concept, which started around 1929 when Edward Link createdthe "Link trainer," is now widely used in various industries including entertainment, driving or flight simulations, scientific and medical visualizations, training and learning, and more. Virtual Reality can help with risk and cost reduction whilealso providing the facility of creating a controlled environmentrepeatedly [1].

Interactive computer graphics didn't make their mark until the early 1980's. However, the concept had been widespread since the 1930's. Computer generated imagery, scientific vi- sualization and most importantly Virtual Reality(VR) started becoming popular. VR created waves of "hype" that accordingto 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 the Half-Life series, OperationFlashpoint, and more [2]. These interactive games which utilize concepts of virtual reality have a bigger purpose than just providing entertainment. They can provide a valuablelearning experience.

In the past 20 years, VR has made many developments. Many of these developments have been based on the work which was done earlier in 3D graphics, visual simulation and user interfaces. The number of people working on and researching 3D, virtual reality science, and technology has increased remarkably. The world of gaming and virtual reality has started intertwining as more and more research in both fields show: one without the other has become impossible. Virtual reality has a wide range in audience appeal. Not only can it be for children or teenagers, but can include adults and the elderly as well. Research in gaming and VR not only affects the entertainment industry, but it 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 involving virtual reality, which provides a more immersive world for theuser to experience. 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 like Frogger, Pacman, or The Original Grand Theft Auto (1997) were sufficient to entertain people. However, games have become more advanced in recent years with addition of attractive graphics, integration of 3D imagery, improved physics and better gaming technologies. Recently, games like Pokemon GO, Counter Strike GO, Fortnite, GTA V, Call of Duty have become popular due to their realistic and appealing graphics [5].

In 2016, Pokemon GO made history when it was released. No other game had ever done what Pokemon GO did. The game had so much mass appeal that it was downloaded by over a 100 million people in 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 disconnect from the real world, and immerse into the computer generated world to make everything feel scarier. According to Steam, an average Phasmophobia player plays it for about 4 hours a week compared to Poke´mon GO's 2.5 hours [6].

The Gaming industry as a whole, and Virtual Reality along with it, have increased since the early 2000's. With lots of investments in the industry, eSports, frequenly called the "irrelevant sport," has become popular in the mainstream media. Game Streaming Websites such as Twitch and YouTube Gaming, have become frequently used sites for the gaming community, and games keep amazing the players with the newest updates. Many claim that these streaming websites represent the future of gaming. Since the differences in gaming space, social networks, and 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[7].

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 [8]. 63 percent of gamers are familiar with Virtual Reality, and have a positive opinion of it [8]. 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 [9]. 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 [9].

There are many video games that can be played alone but there are just as many games that can be played by multiple people or with strangers online. 76 percent of the gamers in the United States play video games with someone else, either with someone in their home or someone online [10]. 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 the elderly [11]. Furthermore, these games have been used as tools to make the learning-teaching experience better. It has been shown that educational virtual reality games have increased the student's motivation to learn [12].

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 [13]. It also carries potential mental health risk as the online gaming space can take a toll on a lot of people. Additionally, there is a privacy and persuasion issue that comes up when using the AR and VR games online [9].

IV. OBSERVATION OF THE SUCCESS OF GAMES

A. Method

To verify the data on different popular games to determine if VR really plays a big role in popularity of

the games, elec- tronic 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, 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 are summarized in Table 1, and their success is summarized in Table 2.

III. FACTORS OF A GAME'S SUCCESS

As table 1 shows, we looked at 13 different games that were available on various platforms including Windows, Android, iOS, PlayStation, XBox and more. Table 2 shows how each game performed in sales, average user playtime, and rating.

Looking at the games available for Windows only, we found that not many Windows exclusives are widely popular. Counter Strike Global Offensive is a game that is widely popular among PC gamers but not really amongst the PlayStation users, maybe due to the lack of VR support. 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, PlaySta- tion 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, 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 none of five 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.

Name of the Game	Year Released	Genre	VR support	Platforms Available
Counter Strike: Global Offensive	2012	Shooter	No	Microsoft Windows, Classic Mac OS, PlayStation 3, Linux, Xbox 360
Call of Duty: Warzone	2020	Battle Royale/ Shooter	Yes	PlayStation 4, Xbox One, Microsoft Windows, Android, iOS
Beat Saber	2018	Rhythm	Yes	Oculus Quest, PlayStation 4, Microsoft Windows
Half-Life: Alyx	2020	Action/ Survival	Yes	Microsoft Windows
Walking Dead: Saints and Sinners	2020	Shooter/ Horror	Yes	PlayStation 4, Microsoft Windows, Macintosh operating systems
Fortnite	2017	Battle Royale	No	Nintendo Switch, PlayStation 4, Xbox One, Android, iOS, Microsoft Windows, Classic Mac OS
PlayerUnknown's Battleground	2017	Battle Royale	No	PlayStation 4, Xbox One, Microsoft Windows, Android, iOS
Pokémon GO	2016	Augmented - Reality	Yes	iOS, Android
Jurassic World Alive	2018	Augmented - Reality	Yes	Android, iOS
Keep Talking and Nobody Explodes	2015	Puzzle	Yes	Android, Microsoft Windows, OS X, PlayStation 4, Linux, Nintendo Switch, Xbox One
Resident Evil 7: Biohazard	2017	Action/ Survival	Yes	PlayStation 4, Xbox One, Nintendo Switch, Microsoft Windows

Mincraft	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
Population: ONE	2020	Action / Shooter	Yes	Oculus Quest, Microsoft Windows

TABLE I - SUMMARY OF VIDEO GAMES INCLUDED IN STUDY

Name of the Game	Sales / Downloads	Average Play Time	Ratings
Counter Strike: Global Offensive	more than 75 million	65.3 hours total	8.5
Call of Duty: Warzone	around 75 million	32 hours total	7
Beat Saber	more than 1 million	94 hours total	9.5
Half-Life: Alyx	around 1 million	15 hours total	9.5
Walking Dead: Saints and Sinners	around 180,000	12 hours total	9
Fortnite	more than 350 million	11 hours per week	9.6
PlayerUnknown's Battleground	around 555 million	750 hours per year	8.6
Pokémon GO	more than 1 billion	2.5 hours per week	6.9
Jurassic World Alive	around 20 million	Not Disclosed	8.5
Keep Talking and Nobody Explodes	around 1 million	Not Disclosed	8.5
Resident Evil 7: Biohazard	more than 8 million	7 hours / week	9
Minecraft	more than 200 million	2976 hours total	9.3
Population: ONE	more than 50,000	Not Disclosed	9

TABLE II - SUMMARY OF STUDIED GAME SUCCESS

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

IV. CONCLUSION

With the release of new VR games and new VR consoles, virtual reality and the 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 [14]. Some of the increased interest in VR may stem from how virtual reality games also increase user engagement, emotional response, and self-selected happiness scores after playing [15]. However, we cannot generalize the data we collected to be for all the people that play games. We suspect that people using VR are mostly going to be professional gamers, 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 [16]. The hype generated from casual gamers seeing professional gamers may also play a part in the rising success of VR [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. By the looks of it, VR is very likely to be the future of gaming, and with the increasing amount of interest and investment in it, those chances improve even more.

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