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Research Paper

Virtual Reality in Systematic Life

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Abstract

Past 20 years there has been a rapid growth in virtualization. With the help of Internet of Things [IOT] we can achieve so many things in Virtual Reality [VR]. IOT is the source of connecting devices together by using an address called as IP (Internet Protocol). This will help us operate devices remotely. To simply put VR is the future world. In this paper we would like to show some improvements that can be made to the present VR devices and how can it change the standards of living of people and helps us grow in all the possible ways.

Keywords: *Internet of things; Internet Protocol; Virtual Reality.*

1. Introduction

We live in a time where the distance between Virtual Reality [VR] and our world keeps diminishing. We can see that from the use of the Internet of Things [IoT], [3] both in homes and factories, where everyday objects are connected to the Internet to expand their use and enhance their features [6]. This enables data from these network-connected devices to be transferred around the world, transformed into other types of information and included in virtual simulations. Virtual Reality is slowly replacing many different devices as working with them is very easy and even the work load on a person is even reduced. By all the achievements made until now we can say that the future world will turn into a virtual world where everything is made a simulation. In this paper I would like to show the benefits of Virtual Reality and the possibilities it must connect with different devices and how we can completely replace controllers with just our body motion.

2. Literature review

As far as of what we have seen, there is only one group that is working on the application that we are going to describe in this paper. [1] This team has developed a plugin that can be installed in an engine and can be integrated with our simulations. This plugin that they developed can support Android, IOS and Desktops. This will help users to build their own Virtual environment in their homes without having to setup some huge equipment's.

Paper [4] on Immersive Reality in Education which described on how the VR can help the Education field and how it can be developed to meet the present day's education system. It also described basic principles of virtual reality which are Immersion, Interaction and User Involvement. This paper described some statistics on how many papers based on virtual reality in education are being published from every country.

In Figure 1, a graph is given below that shows on how many papers that are related to virtual reality are being published from all over the world.

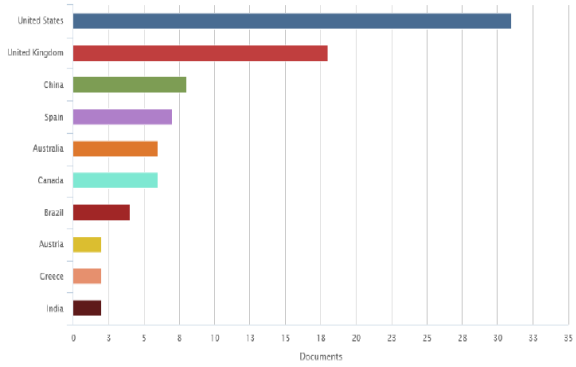


Fig. 1. Virtual reality papers published from all over the world

University of Southern California has released an article on Medical Virtual Reality which explains how VR can be used to improve patient's conditions [5]. On this article they described several methods like Mental and behavioral Health, Game Based Rehabilitation, Neurocognitive Assessment and Training, Virtual Humans. All these shows how virtual reality can be used in neuroscience, psychology, and other therapies effectively.

A paper was published on "Three-Dimensional touch Interface" for medical education. In that paper they displayed the specialized and assessment of a multimodal virtual reality. It was an interface which helps in learning the anatomy of the brain where the students will be able to feel the proportion, form of the brain by using a 3d printed brain. Information regarding to the point of contact is recorded by the sensor, handled, and outwardly showed. The client can picture and control the graphical data of the cerebrum surface.

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3. Virtual reality in Games

- As we see there are many games that that developers are developing using virtual reality which make user feel more interactive with the games.
- This makes the player to feel that he/she is in the game world.
- To make this possible we need some software's to develop such games and the devices which support them.
- This software can not only help the developers but also even the people who don't know anything about coding can easily use them and built any virtual world that would inspire that individual.

4. Software's used

To make use of virtualization through virtual reality we need some software's that can be used to develop virtual applications. This software's are referred as Real-time engines.

- These Engines has made it possible for the developers to make VR game.
- Some of the examples are Unity, Unreal Engine 4. There are many more engines which support but these two are quite popular.
- I personally used both and they are both great software's to play with.
- But, Unreal Engine 4 is more powerful than unity in my perspective. It may be different depending on the person. Though I don't use these engines that I prefer using unreal engine when I wish to use an engine.

5. Devices

We can't just enter virtual world without using any devices made to do a specific purpose. Such devices are called VR gear. There are diverse types of VR devices we cannot say which is better something is better at something.

- Most of the gamers are familiar with this term as these devices help in playing VR games.
- There are many such devices like Sony VR, Steam VR, Oculus Rift, HTC Vive.
- These devices have been widely used not only to play games but also in some educational institutions to make studies more comfortable.
- Most popular that is out in market is Oculus Rift DK2. Many use this as it gives best performance of all.
- Beware of the cost it too pricy. It's around 400$.
- There is one more device from HTC which is also around 500$. It's called HTC Vive [8]. If you can afford it these two are great options.



Fig. 2. HTC Vive



Fig. 3. Oculus Rift



Fig. 4. PlayStation VR

These are devices that are used in regular computers. But, in case of PlayStation it has a separate VR that works best with Sony devices.

6. VR in other fields

Not only games VR is used in different fields like Education, Medication, Architectural Visualization, and some simulations where they train people on how to survive critical conditions.

Examples are Simulations like when there is an earthquake or tsunami or any other natural disasters the people will be simulated to such environments to prepare them to face such danger.

For getting jobs in some petroleum companies they will train people by taking them to sea and throwing them into water by tying their legs to a rope. This will help them to experience stress in the work. This is dangerous activity as the person life is on line. So, if we use simulation instead of this we can save a lot of time and money.

Virtual Reality is now in a state where it can be used by artists (digital artist) to draw or sculpt virtually with use of these VR headsets. Good news is that Oculus Studio is currently developing a software that will allow the artist or the user to interact with their paintings. They are using haptic devices which allow you to feel a TV show then by transmitting the touch feedback through air. HTC is also trying to bring out the Google's painting app to HTC Vive VR Headset.



Fig.5. Artist using VR

For a person to learn car driving first he need to play games which will simulate just like real world environments and if the person passes the test he will be allowed to learn driving on a real car.
Virtual reality has also been widely used in military like army, navy, air force for training purposes. Since it is a virtual world there can be no risks and serious injuries. So, it can be used to any extent. The main advantages of using VR in the field is Fight Simulation, Battlefield Simulations, Medic Training, Vehicle Simulations. This will help improve the success rate of battle.



Fig. 6. VR in Army

7. Problems

- Even though VR is used in different fields it has some direct impact on a person's physical health. Some people are also prone to nausea, dizziness and even vertigo after using VR for a little time. Its occurrence is rare and not all people are affected.
- Also there are some of the few issues the need to be considered and try to avoid them when beginning to make a VR. Motion sickness is one of them VR effects the human brain and no one really has much about it.
- Moving in VR world is another main problem. Most of the VR headsets are equipped with tracking capabilities that can track our room and help us bumping into our stuff. But, when we look at open-world games there are lot of objects in the world which would be difficult to set up in a single room. So, we need to look out for such things.
- With all the pros and cons there are some changes done even if these device changes in size and performances still these doesn't meet the user's requirements. It doesn't satisfy the user.
- As a fellow gamer I am not satisfied with the achievements we made and want to move ahead.
- If we try any simulation with the present VR devices, we need to use controllers and that would not be that accurate and preferable to do some simulations.



Fig. 7. Motion Sickness with VR

- Medical Students feel it easy to simulate the anatomy of human body in VR. This will help them to know the geometrical proportions of that part of body.

8. Solutions

To solve the problems that we discussed above we can use another device named Kinect developed by Microsoft. Not only Kinect we can also use different devices that will be working similar to Kinect. This device projects a lot of dots on the object and capture the death maps of that object. After the projection of dots on the object in front of the Camera this sensor then creates a depth map for that objects and start recording the movements of that objects and integrate these movements with the character in a game or any other simulations.

9. Achievements made using Kinect

As we already know that we use motion sensor in Kinect, we can connect it to the VR and then use it for our own purposes. Figure 4 refers Kinect sensor.



Fig. 8. Kinect Sensor

Even though it feels like we are in virtual world we cannot really do anything there. So, taking this into consideration Microsoft has started a project named "Project Natal" which has brought a substantial change in virtual word.

Project Natal:
It is a technology developed by Microsoft [2]. It was a code name of Kinect shown in Fig. 9 which was released on November 10, 2010. It was first introduced for Xbox 360 for gaming purpose and later to desktops.
It is then developed for Xbox one top improves the gamer's experience. [7] Even though it looked like it's getting popular day-by-day this did not put much of an impression and desktop versions were discontinued by 2015 and those for Xbox one and other Microsoft device services were discontinued by April 2016.



Fig. 9. Kinect

Manus VR Gloves:

In October 2014, Manus VR was looked over 10,000 contenders who took part in the Dutch Startup Bootcamp High Tech XL, together with eleven distinct individuals. The program helped Manus VR animate and build the business in just three months. After the program's Demo Day in February 2015, the organization joined driving advancement accomplices and customers. It was completely financed at record speed, empowering the organization to additionally build up the item.

These gloves can relate to VR headsets like HTC Vive and other devices so that the tracking movements of hands can be made easy. They say soon there will be no need to use even these gloves as the headsets are already given with complex information for hand tracking and Microsoft has also started a similar project and is under development.



Fig. 10. Manus VR Gloves

By accessing both these devices we can experience immersive, flawlessness in the virtual reality world.

The thing about these gloves is that they are affordable to common people starting from the price of 275$.But, unfortunately at the time of publishing this paper the gloves are not available for sale and can only be pre-ordered.



Fig. 11. Manus Gloves with VR

10. Kinect working

A student named Ken Mankoff visited Norway and reaches to a small carven where he has a back pack which consist of a laptop, a battery pack, and a Kinect. He then used the Kinect to find out the irregularities on the glacier so that they can better understand the ice flows to the sea. Kinect can capture about 9 million data points per second.

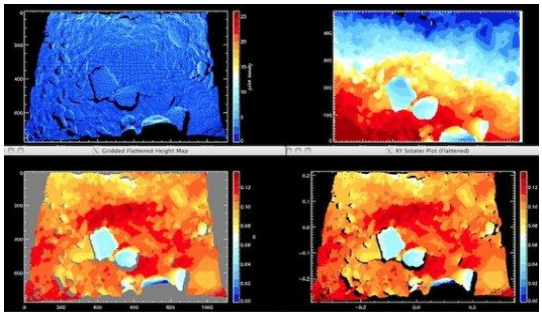


Fig. 12. Image taken by Ken Mankoff

In Fig. 12 Ken Mankoff showed some of the calculations that he took using Kinect of the movement of the ice in Norway.

11. Conclusion

The research paper proposes some device which can connect real-world with virtual world. The devices will give a real time experience in various fields like education, medicine, and architecture. Although new devices are available to meet the modern technology, they are very expensive and can't be used in regular work. However, the method we introduced can be used by anyone without having any previous experience.
This can be further developed so that it can suit the needs at that time when someone need to make further advancements to the existing projects and researches done by different people.

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