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Abstract

Internet today has become an integral part of our lives. The World Wide Web which started as a small dull data repository has now become massive and irreplaceable. Present activities being partially or completely linked with the virtual world can be optimized to a higher level. Every activity associated with our daily life is mapped and related to some entity in the digital world. The world has seen vast advancements in Internet and in 3D stereoscopic displays. Time has come to merge the two to deliver a new level of experience to the users. 3D Internet is an idea which is yet to be implemented and requires browsers having the property of depth perception and artificial intelligence. If this property is incorporated then the idea of Internet of things can become a reality which is also discussed in this paper. This seminar aims to provide a clear concept about 3D Internet which includes its features, possible setup methods, applications, and advantages and obstacles faced in the implementation of 3D Internet and also to proffer possible solutions to these obstacles.

1. INTRODUCTION

The World Wide Web, which initially was document inventory is constantly evolving to a full-fledged virtual environment that incorporates services, interaction, and communication. The Internet which we currently use completely lacks 3D experience. But the day to day activities of our lives occur in a 3D world, then limiting ourselves to 2 dimensional activities on the Internet doesn't make any sense. The websites which are now available on the Internet are in 2D and they contain just written matter and images. Such websites are added to the Internet daily.

The internet has gone through some revolutionary trends, From the initial startup point of a rigid read only Web 1.0 to the much more acceptable web 2.0 that allows users to upload contents and finally the real time creative web 3.0 which are the three sections that describes the development and improvement of Internet over the ages [Michael, 2015].

- **Web 1.0:** This was the first model of Internet which refers to the main features of the WWW during the first 10 years its existence (1994-2004). People could only read content online provided by a small number of developers. Users couldn't upload or provide their content to other peers at this stage. This can be simply termed as "read only" form of Internet.
- **Web 2.0:** Early web could only be used to retrieve information from the Internet but with the introduction of web 2.0 users could upload their content as well. Internet finally gave users the opportunity to provide their individual contributions to the world. Social networking sites like

Orkut and Facebook began at this stage. People could now add their profiles to such websites. Blogs and forums were now a common part of the digital world.

- **Web 3.0:** Web 3.0 is not yet fully developed. In the above two versions of web, information was mainly generated by people. In web 3.0 raw data is processed and converted to information by the Internet itself. It will provide the users with related suggestions and recommendations based on their Internet activities that will be useful to the user. Web 3.0 comprises of online integrated gaming, live educational and business presentations and avatar representation. It is basically a real time creative web [Sumalatha, 2013].

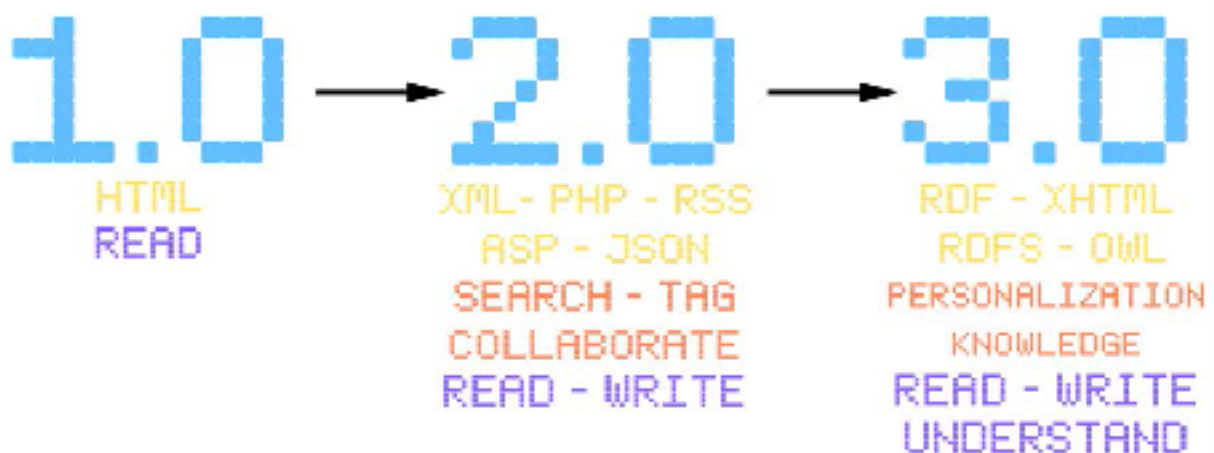


Fig 1. Web 1.0, Web 2.0, Web 3.0 (Michael, 2015).

Thus, in order to compete, existing technology has to be upgraded where such written matter and images will be replaced with 3D models which will

facilitate user interaction and provide a real-life experience. 3D Internet is a virtual environment where the user can experience the real-world scenarios. It can broaden the user's scope about how he perceives the world (Melvin et al., 2015). It can be a powerful new way for you to reach consumers, business, customers, co-workers, partners, and students.

2. CONCEPT OF 3D INTERNET

3D Internet also known as virtual worlds, can be seen as the combination of two powerful technologies, Internet and 3D graphics. The aim of 3D Internet is to deliver interactive real-time 3D graphics over the web. It is also a simulation of a 2D webpage in real life graphics. Sections of Internet that we use today come under the category of web 2.0 and web 3.0. The next form of Internet takes user interaction and 3D experience to a whole new level. This type is often so lively that it is considered as virtual reality. 3D Internet can be visualized as a virtual world. People who are active in the virtual world are more interested and active in the digital world than in real life.

It can be termed as the combination of Passiveness of television, Vastness of web, Networking like in the social media, Stereoscopic experience of 3D movies. But as we can see Television is a passive source whereas 3D Internet is engaging and interactive. 3D Internet has the live broadcasting property of television with the copious content of the Internet. The disadvantages of the current Internet can be given as follows:

- Wastage of time due to mouse movements
- Less interactive web pages

- Less Efficient i.e. slow speed of working
- Ineffective representation of certain images and 3D graphics

Thus, we can see the current technology is highly futile. It needs a replacement or an upgrade in the coming time. The solution to these shortcomings can be covered in 3D Internet. It is a powerful new way for you to reach consumers, business customers, coworkers, partners, and students. It combines the immediacy of television, the versatile content of the Web, and the relationship building strengths of social networking sites like Face book. People who take part in virtual worlds stay online longer with a heightened level of interest.

2.1 3D INTERNET ARCHITECTURE

3D Internet shares the time-tested main principles and underlying architecture of the current Internet as well as many semantic web concepts. The operational principles the 3D Internet shares with its predecessor include open and flexible architecture, open protocols, simplicity at the network core, intelligence at the edges, and distributed implementation. We adopt here the terms universe, world, and web place as 3D counterparts of WWW, website, and sub domain, respectively. We describe each component's functionality briefly below:

- i. **World Servers:** Provide user- or server-side created, static and dynamic content making up the specific web place (3D environment) including visuals, physics engine, avatar data, media, and more to client programs. A world server has the important task of coordinating the co-existence of

connected users, initiating communication between them, and ensuring in-world consistency in real time. They may also facilitate various services such as e-mail, instant sagging, and more.

- ii. **Avatar/ID Servers:** Virtual identity management systems containing identity and avatar information as well as inventory (not only in world graphics but also documents, pictures, e-mails, etc.) of registered users and providing these to individual world servers and relevant client programs (owner, owner's friends) while ensuring privacy and security of stored information. Avatar/ID servers can be part of world servers.
- iii. **Universe Location Servers:** virtual location management systems similar to and including current DNS providing virtual geographical information as well as connection to the Internet via methods similar to SLurl. They can also act as a distributed directory of the world, avatar servers and users.
- iv. **Clients:** Browser-like viewer programs running on user's computers with extensive networking, caching, and 3D rendering capabilities. Additional components of the 3D Internet include web places (replacing websites) and 3D object creation/editing software, i.e. easy-to-use 3D modeling and design programs such as Sketch-Up and standardized mark-up languages and communication protocols. Emergence of new software and tools in addition to the ones mentioned should naturally be expected.
- v. **Intelligent Environments:** Emerging fields such as ubiquitous computing and ambient intelligence draw heavily from adaptive and

intelligent algorithms. They are concerned with computing and networking technology that is unobtrusively embedded in the everyday environment of human users. The emphasis is on user-friendliness, efficient and distributed services support, user empowerment, and support for human interactions. All this assumes a shift away from desktop or portable computers to a variety of devices accessible via intelligent interfaces. The 3D Internet, which is a virtual ubiquitous computing environment, provides the perfect test bed for developing these ideas and emulating them in realistic 3D settings with real users.

vi. **Intelligent Services:** In the case of the 3D Internet, the concept of intelligent environments naturally extends to underlying communication protocols and enabling services as well as to user centered services. Given its inherent P2P nature, the 3D Internet can make use of paradigms such as intelligent routing where mechanisms being aware of the network topology and information structure allow for flexible and context-dependent distribution of traffic. As in the real world, one could think of adaptive algorithms that control traffic flow depending on the time of day, user-behavior patterns, or a variety of global and local events.

vii. **Intelligent Agents and Rendering:** In order to increase the users' acceptance of services like the ones just mentioned, they will not just have to be personalized but also be presented and accessible in a way users will consider natural. This leads to the problem of modeling

artificial agents and avatars that act life-like and show a behavior that would be considered natural and human-like. First attempts in this direction have already been made in the context of computer games. Here, machine learning has been shown to provide an auspicious avenue. The network traffic generated by a group of people playing a multiplayer game contains all the data necessary to describe their activities in the virtual game world. Statistical analysis of this traffic and a derivation of a generative model there from allows for implementing agents that are perceived to act more human-like. Corresponding approaches can be applied to improve on the quality of virtual clerks and information personnel.

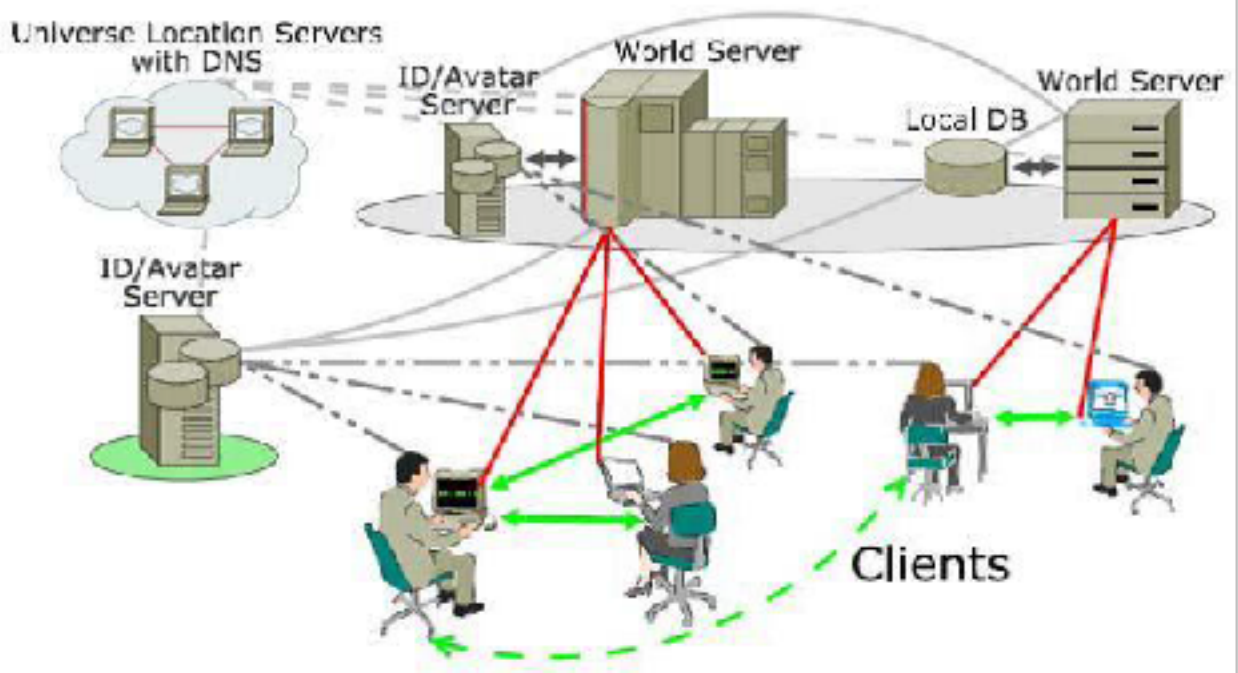


Fig 2. A graphical depiction of the proposed 3d Internet Architecture.

3. APPLICATIONS OF 3D INTERNET

The world is moving into a digital era. Our day to day activities are getting digitalized and Internet is at the center of everything. A few possible applications of modernizing the current Internet to 3D Internet have been listed below.

- i. **Education:** By implementing 3D Internet in education, people can have a better understanding of the subject. They can view lectures and experiments in a 3D manner that will help them learn more efficiently than the traditional approach. One such example can be that the Medical professionals can view operations in 3 dimensions, distance education will be valued, illustrative and demonstrative tutorials shall be more effective.
- ii. **Real Estate:** 3D Internet can drastically change the real estate industry. Customers can view the property they are interested in online with a stereoscopic view. They will get a basic idea of the area and locality they are going live in even before its complete construction. This will ease the selection process of property to a great extent.
- iii. **Social Interaction:** The current generation has a much more active online social life as compared to real life. Addition of 3D to social networking can revolutionize our digital world. Video calls can be more interactive and appealing. 3D chat spaces can be introduced to social

media. Personal interaction won't be limited to real world. People unable to meet on regular basis can interact online.

- iv. **Tourism:** It is important to choose the right destination to spend holidays which can be much easier after the implementation of 3D Internet. Tourists can have a sample 3D view of the desired locations and later decide which destination has to be visited. They can have a short demo of the place they are about to visit and decide if it's worth investing on the trip.
- v. **Entertainment:** Online 3D games, 3D movies, etc. won't be a dream anymore. All this can be achieved using 3D Internet. Users won't be compelled to go to a multiplex for experiencing a 3D movie. Gamers can enjoy 3D online games at home and can easily connect with their friends. Live action sports will be more interesting.
- vi. **Religion:** Religious organizations can make use of the 3D Internet to open virtual meeting places within specified locations.
- vii. **Embassies:** We could create embassies in 3D Internet, where visitors will be able to talk face-to-face with a computer-generated ambassador about visas, trade and other issues.
- viii. **Arts:** The modeling in 3D Internet would allow the artists to create new forms of art, that in many ways are not possible in real life due to physical constraints or high associated costs. In 3D Internet artists could display their works to an audience across the world. This has created an entire artistic culture on its own where many residents who buy or build

homes can shop for artwork to place there. Gallery openings even allow art patrons to "meet" and socialize with the artist responsible for the artwork and has even led to many real-life sales. Live music performances could also be enabled in the 3D Internet.

4. PROBLEMS HINDERING THE EVOLUTION OF 3D INTERNET AND IT'S SOLUTIONS

4.1 PROBLEMS

Along with the benefits, obstacles such as present network speed, hardware limitations and cost factors also come with 3D Internet. These hurdles obstruct the evolution of traditional Internet to 3D Internet.

- i. **Internet Speed:** The pace at which data transfer occurs is one of the major obstacles for the full implementation of 3D Internet. These are in terms of limitation of bandwidth. As 3D Internet requires high end graphics and models, the requirement of high bandwidth is mandatory. The report by "Akamai Technologies" named as the state of the Internet in 2017 shows that the world average Internet speed is 7.2 Mbit/s [Akamai, 2017]. This report shows that there are very few countries with high speed Internet while others lack the necessary speed for 3D Internet. Thus, even though some countries do have good speed, most of them can't support 3D Internet. Due to which complete implementation of this technology is difficult.

- ii. **Hardware:** The current Internet which we use is 2D thus it requires a normal screen. When we move from 2D to 3D Internet, we will also have to move from our traditional screens to ones that are compatible to render 3D graphics. We will also require separate tools to view these 3D images. Moreover, rendering of such high-end models requires high usage of RAM and GPU. Thus, upgrading to this technology requires an overall upgrade of the present system around the world.
- iii. **Cost:** From the points above, it can be seen that the cost involved in the overall implementation in providing adequate internet speed and porting to modern 3d rendering device will be very high, This may discourage the wide spread of the technology.

4.2 SOLUTIONS

Solutions to the problems currently influencing the widespread use of 3d internet are not far-fetched, We would take a look at the solutions to each of the factors inhibiting the evolution of 3d internet below:

- i. **Internet Speed:** The answer to the average broadband Internet speed problem is Google Fiber. [Richa, 2014]. Google Fiber provides a lightning speed of 1 gigabit per second (1,000 Mbit/s) which is about 100 times faster than the current speeds. It has already laid its roots in some cities with a vision of expanding worldwide.
- ii. **Hardware:** The best solution to hardware implications is to use a Vision Station. Vision Station provides a 180 degrees ultra wide view of 3D visual world, providing a terrific 3D experience over the Internet at a cost

much lower than the multi- projector systems and other hardware devices implementing 3D graphics (<https://vrealities.com>, 2017).

3D goggles is also another solution that can be employed to overcome the problem of the Hardware implications. As we know there are various range of 3D goggles available in the market, we can select from these wide variety of 3D goggles, and the cost of these goggles is even very less, so this prospect can be considered in the preliminary stages of the 3D Internet, later on these could be upgraded with the latest technologies which could be used to implement/display the 3D data.

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