Safety training using virtual reality for scientific visualization

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Abstract
Virtual Reality simulation environment as a training method is used by research institutes and industry labs to improve teaching quality. VR technologies mature, research is expanding from the military and scientific visualization into more multidisciplinary areas, such as education, art, culture, and the humanities. Virtual Reality (VR), sometimes called Virtual Environments (VE) has drawn much attention in the last few years. Very few people, however, really know what VR is, what its basic principles and its open problems are. Virtual reality (VR) is a technology which allows a user to interact with a computer -simulated environment, whether that environment is a simulation of the real world or an imaginary world. Although most of the advertising is of commercial nature but there exists an impressive role of advertising in promoting message of social relevance with the help of Multi-Modal user interface, students can control their views to interactively communicate with virtual teachers and environment. Very complicated or extremely dangerous construction situations can be presented for students in the Virtual Reality environment. Numerous systems have been designed which use virtualization to subdivide the ample resources of a modern computer. With virtual reality, we can experience the most intimidating and grueling situations by playing safe and with a learning perspective. This interactive e-Learning environment can increase the autonomy of students and enhance students’ interest in learning.

KEYWORDS: Virtual Reality, Safety Training, Scientific Visualization, E-Learning Environment

1 Introduction
Many of the newer systems are intended to allow the development of diverse applications and are not restricted to one application. Many of the newer systems are intended to allow the development of diverse applications and are not restricted to one application. Virtual Reality (VR) research is based on the growing certainty that the next evolutionary stage is computers and telecommunications fusing into virtual environments. Think of this paper as a report from network with gaps in coverage. The front by an implementer of mobile information systems. Mobile elements rely on a finite energy source. This paper introduces the design of one such system, developed specifically for creating virtual reality applications on a parallel architecture. Research into the subject over that period has increased the available software from a few systems running on expensive machines to systems that can give reasonable results on an inexpensive PC. The Virtual Reality Modeling Language (VRML) is a file format for describing interactive 3D objects and worlds. VRML is designed to be used on the Internet, intranets, and local client systems. VRML is also intended to be a universal interchange format.
for integrated 3D graphics and multimedia. Research into the subject over that period has increased the available software from a few systems running on expensive machines to systems that can give reasonable results on an inexpensive PC. Educating children now and in the future to live in an information society is critical.

The future of Virtual Reality depends on the existence of systems that address issues of ‘large scale’ virtual environments. In the coming years, as more research is done we are bound to see VR become as mainstay in our homes and at work. As the computers become faster, they will be able to create more realistic graphic images to simulate reality better. It will be interesting to see how it enhances artificial reality in the years to come. Virtual reality has also been used extensively to treat phobias (such as a fear of heights, flying and spiders) and stress disorder. Other factors such as the concepts or skills to be learned, individual characteristics, the learning experience, and the interaction experience all play a role in shaping the learning process and learning outcome. VRML may be used in a variety of application areas such as engineering and scientific visualization, multimedia presentations, entertainment and educational titles, web pages, and shared virtual worlds. There are several ways in which VR technology is expected to assist learning. Most importantly it allows students to visualize abstract concepts, to observe events at atomic or planetary scales, and to visit environments and interact with events that distance, time, or safety factor make unavailable. This type of therapy has been shown to be effective in the academic setting, and several commercial entities now offer it to patients.

2 Importance of Virtual Reality

Using Virtual Reality 3-D virtual world can be created. However, as VR technologies mature, research is expanding from the military and scientific visualization realm into more multidisciplinary areas, such as education, art, culture, and the humanities. Virtual reality application will normally consist of one or more worlds containing object interacting toward a particular goal. An example of an application would be a walkthrough consisting of a world containing the building object and a number of furniture objects.

Users might typically interact by using the VR , either through the apply of standard input device like a keyboard and mouse, or across specially intentional equipment such as the wired glove. A 1st hypermedia and virtual reality system was the Aspen Movie Map, which was created at MIT in 1977. A goal of omnipresent computing is to bring a computer into a user's globe, like than click a user to last in a computer. The today’s trend around VR is actually to merge them interface to produce a fully immersive & integrated personal experience. A simulated environment may be similar to the real life, e.g., simulations for even pilot or combat step by step instruction, or it might differ significantly from either reality, when inside VR games. VRML is capable of representing static and animated dynamic 3D and multimedia objects with hyperlinks to other media such as text, sounds, movies, and images. Virtual reality has been heavy criticized for existence an ineffective method for navigating non-geographical reference. Now, a idea of ubiquitous computing is very popular in user interface design, & this can be seen as a reaction against VR and its problems. Their objective was to increase exposure to life-like emergency situations to improve decision-making and performance and reduce psychological distress in a real health emergency.

3 Research objective

In our system, we use captured gestures as main interface to interact with the virtual e-Learning environment. Here, we try two ways to capture user’s gestures, Data Glove+3D tracker and vision based motion capture from webcam. VRML browsers, as well as authoring tools for the creation of VRML files, are widely available for many different platforms. User’s gestures are used to interact with virtual e-Learning environment.
4 Uses of Virtual reality

VR is being applied to a wide range of medical areas, including remote and local surgery, surgery planning, medical education and training, treatment of phobias and other causes of psychological distress, skill training, and pain reduction. It is also used for the visualization of large-scale medical records, and in the architectural planning of medical facilities, although these last two applications are not covered by this survey. These are as follows:-

- **Virtual Reality for Surgery**: Surgery is mostly visual and manual. VR for surgery involves applications of interactive immersive computer technologies to help perform, plan and simulate surgical procedures. VR is being applied in all three major areas of surgery: open surgery, endoscopic surgery and radiosurgery.

- **Image-guided surgery**: When applied to image-guided surgery in this way, the images obviously need to be available intra-operatively, and accurate registration of the real patient with the data becomes a crucial issue.

- **Education and Training**: Training in the operating theatre itself brings increased risk to the patient and longer operations. New surgical procedures require training by other doctors, who are usually busy with their own clinical work. It is difficult to train physicians in rural areas in new procedures. Training opportunities for surgeons are on a case-by-case basis. Animal experiments are expensive, and of course the anatomy is different. The solution to these problems is seen to be the development of VR training simulators. These allow the surgeon to practice difficult procedures under computer control. The usual analogy made is with flight simulators, where trainee pilots gain many hours of experience before moving on to practice in a real cockpit.

- **Preoperative planning**: In pre-operative planning the interaction method need not be realistic and generally is not. The main focus is on exploring the patient data as fully as possible, and evaluating possible intervention procedures against that data, not in reproducing the actual operation.

- **Telemedicine and Collaboration**: One promising area where VR could make a contribution is in remote diagnostics, where two surgeons can confer on a particular case, each experiencing the same 3D visualisation, although located in different places.

- **Snapshot of the State of the Art**: Vista Medical Technologies had a good head mounted display to substitute the microscope. It is not head tracked, but it allows the surgeon to look through the microscope and outside. It also allows Picture-in-Picture, so that an endoscope can be used to supplement the microscope.

- **Physical and Mental Health and Rehabilitation**: It is clear that this is one of the medical areas where VR can most immediately and successfully be applied today. This is partly because the technical demands, particularly in terms of detailed visualisation and interactivity, are actually less stringent than in some other areas, such as surgery. Often these systems simulate the physical environment, a world of rooms, doors, buildings, etc., many of which are simple shapes and much easier to model that the irregular and contoured surfaces of internal organs.
5 Conclusions

We proposed to build an immersed virtual e-Learning environment and use Multi-Modal user interface in e-Learning in the paper. VR for surgery involves applications of interactive immersive computer technologies to help perform, plan and simulate surgical procedures. It is especially noticeable that almost all systems make use of some degree of parallel processing. The main difference between VR systems and traditional media (such as radio, television) lies in three dimensionality of Virtual Reality structure. An important characteristic of VRML files is the ability to compose files together through inclusion and to relate files together through hyperlinking. The studies described in this paper include the results of onetime uses of virtual world by particular group of students, with only a few results reported on the long-term use of the VR technology. The extent of this varies with the implementation architecture. The results from this preliminary study can serve as a reference for construction stakeholders in deciding the suitable VR display to be used for visualization of construction Activities. Other research findings indicate that the value of VR for education lies within its ability to provide immersion of the user in either realistic or novel and abstract environments. It is very possible that in the future we will be communicating with virtual phones. Nippon Telephone and Telegraph (NTT) in Japan is developing a system which will allow one person to see a 3D image of the other using VR techniques. The semantics of VRML describe an abstract functional behavior of time-based, interactive 3D, multimedia information. Hopefully they will serve to guide further research on the use of VR in education. Virtual Reality is now involved everywhere. You can’t imagine your life without the use of VR Technology.

6 References

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