

A Proposed System for an Interactive E-Learning Environment using Hologram Technology

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Abstract— Nowadays, e-learning is one of the important techniques which are helpful for a student to learn the concept online using innovative methods. In recent times, the use of hologram technology is increasing and a user also wants to learn the concept through such technology. A hologram display 3D image generated from the inference of light source. It is intended to use this technology in the education sector so that it will be useful for a student to understand a concept in an interactive manner and gain more information. In this paper, a user interaction with a virtual hologram to gain required output is presented. This system will support an administrative panel that has an authority to access and modify all the data available in the database. A user access, through which a user can access the required data by interacting with a virtual character, is supported. A Voice based interaction using java library for interaction between user and hologram and a Data fetching module to fetch required data from a database is to be provided. In case data is not available the virtual hologram is queried.

Key words: Electronic-Learning, Virtual Reality, 3D Hologram Technology

I. INTRODUCTION

Traditional learning is one of the techniques of teaching where teacher gives information about a topic to a student and the student, receives this information provided by the teacher. This was a one-way approach. This was followed by a computer generated technology which provided information through PowerPoint and projector technology in a classroom. Nowadays, e-learning is an important technique helpful for a student to learn a concept online [1]. E-learning is an interactive way where a student and faculty meet on social networks to get more knowledge [4, 10]. It aims is to providing information to an educational community so that a student and a teacher can exploit learning and communication capabilities. There are many applications of E-learning such as teaching and conduct courses using electronic devices, online courses and online lectures [3]. There is a huge collection of video and audio material available for e-learning such as expert lecture videos, game preparation videos, interviews etc. [10]. A Virtual learning environment also supports E-mail, newsgroups, and bulletin boards [4]. Through Virtual reality, a system user can interact with a computer to gain knowledge.

Using a hologram Technology, we can overcome the drawback of [6] learning. In distance learning, a student may not clearly understand the flow of virtual practices or will not be able to clear a doubt in his mind. Hence, to make the lecture or practical session interactive and to provide a lot of information about a concept or to clear the doubt of a student we use the hologram technology. Paper, plastic, wood, aluminum foil etc. can be used to display hologram images.

There are many areas where this hologram technique is used some of them are advertising, marketing, to deliver a lecture etc. In our proposed system a huge base of interactive hologram technology is used through which a user can feel the virtual environment process.

In our proposed system we have components like an administrative panel that has all authority to access and modify the data required stored in a database, a user access, where a user can interact with Virtual Hologram through voice to access data and a JAVA library to perform voice processing. For data fetching from the database C4.5 algorithms can be used. In this algorithm flow of data is mentioned. The output is presented through a hologram character. This new type of holographic technology brings participants at remote locations into the class in 3D [2].

II. RELATED WORK

Kader [1] represented how virtual reality environment [3] is beneficial in e-learning applications. They had shown these benefits by implementing two web-based applications: 1. An on-line virtual chemistry lab system. This application was helpful for the student who wants to perform chemistry experiment. 2. An on-line English language education system. Such type of system was helpful for the student to learn the language online. From this system, we take an idea of interactive hologram system. Alexiou et al. [2] used a 3D simulation of a radio pharmacy laboratory. Here a learner is shown in 3D avatars which performed the experiment on Radio Pharmacy equipment. From this, we take an idea of 3D avatar for showing the lecturer's video or audio to students. Bouras and Philopoulos [3] in their work project the communicative character would allow for students and staff to meet in socially shared spaces and get extra knowledge by attending online seminar etc. They presented multiuser distributed virtual environments, which is used for education purpose. In their work, they had distributed the evaluation sheets to the staff. Next step in the process of developing this m-DVE (multiuser Distributed Virtual Environment) was to do the minor changes in the current environment by considering the teachers and student's evaluation results for the more suitable educational environment. Here they give an idea of interactive lectures so that a student and teacher can get extra knowledge about the concept. Bouras [4] Presented the Virtual European School (VES) that was a European project. They also developed the on-line resource for higher education schools. In this VES project, they reduced instructors' hesitation towards computers which is used as the teaching assistants, in which they offer an innovative delivery system. Here one is introduced to the idea of explaining the concept in an interactive way using hologram technology. Chittaro and Ranon [5] had their project based on Web3D open standard. This project introduced how virtual reality

used in education based on Web 3D technology. Here the idea of making the 3D avatar using hologram technology for explaining the concept in an interactive way was exposed. Kalogeropoulos and Karatzas [6] analyzed the use of virtual reality in chemistry instruction as well as presented an integrated web-based learning environment for the simulation of chemical experiments. Here an idea for delivering virtual practical to the student via virtual hologram was introduced. Toni et al. [7] described a 3D virtual lab environment. By using Open-Sim software this work was developed which is integrated into Moodle. They had used Virtual software tool to support lab to create online texts and delivering them to the students. In this work, the courses taught in the virtual lab are related to the theory of multiple bits of intelligences. Here an idea of providing virtual practical's procedure step by step was introduced. Stefan [8] identified ways to improve the learning process by using cloud computing technologies [8]. The main focus was on the request, create, deploy, monitor and manage the virtual laboratories using Cloud Computing. The idea of introducing the concept of e-learning using cloud computing technology for getting required data from cloud storage was introduced. Michelle and Davide [9] focused on e-learning Web 2.0. In their work, they used Think Tag Smart which is a new platform of e-learning web 2.0 to train more than 135 students of the University of Milano-Bicocca. The use of Web 2.0 in learning environments allows teachers and students to participate in the learning process. The idea of hologram technology uses instead of using think tag smart platform for e-learning was exposed. Salih [10] used the rapid content production and delivery concept which could be provided by using MS PowerPoint, through instructors and using some other software. Instructor's course lecture videos, audios, text, animations can be added to existing course contents to convert rapidly to online deliverable format. In this work, they have given an example of how to deliver an instructor's lecture demo online. They give an idea of the use of 3D hologram technology for increasing knowledge of student by providing interactive session instead of delivering the concept to the student via MS PowerPoint etc. Yuen [11] used video instructor to support classroom learning. Using such videos students can learn at their own pace, own time and in their own style, as well as they can learn independently without taking others help. They also used YouTube for learning purpose. In this project, they also created a chart of student belief and use of video instruction for learning to visualize video instruction was good from the student point of view. Here an idea of providing multimedia data through virtual hologram character which would be more interesting and beneficial was introduced. Tariq et al. [12] deliberated upon the applications of e-learning and learning practice in engineering education. They presented the results of a survey conducted to examine the adoption of ICT and e-learning tools. The results of this project were discussed in research for suggesting recommendations improve e-learning implementations in engineering education. Lobo and Korulkar [14] demonstrated how 3D hologram technology can be used in the education sector and how it is useful for the student.

III. METHODOLOGY

The system architecture of our proposed work is shown is Fig.1. Here communication of learner with virtual character

is shown to access required data. If required data of the learner is not found in the system, then the system contacts Internet SOAP where web services are available. If required data is available on internet SOAP, then it is fetched from knowledge module. If data is not available in knowledge module, then it goes to the retrieval system and data is fetched from cloud storage i.e. through API and the output is returned to the learner.

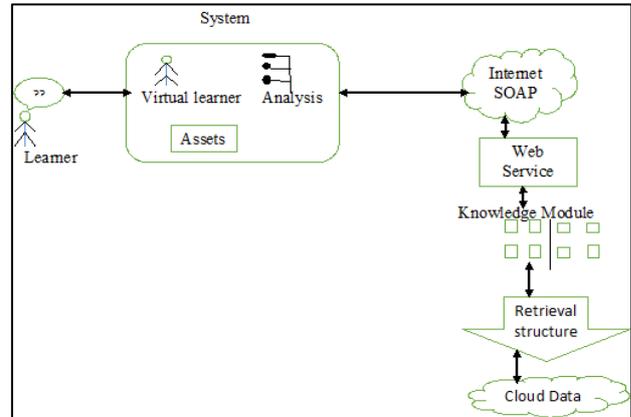


Fig. 1: Proposed System Architecture

The aim of the proposed system is to generate a virtual learning environment. The applications in e-learning tasks is a more natural and interactive scenario. Also using this technology, it is possible to get a sense of a three-dimensional environment and level of a user involvement.

The system provides a virtual character for the student who comes and interacts with them in their own style. It will be helpful for the student to understand a concept easily.

The 3D hologram technology [14] is the latest technology. The major benefit of taking this system in education is to allow a student to actively participate in the learning process and increase their abilities. In most of the cases delivering all lectures theoretically is not suitable for a student. In this case, the use of such a system is very essential. Here a student also learns the concept interestingly and applies their brain in thinking about the innovative ideas and concept [3]. The use of such a type of system is very useful for a student to pick up concepts of Engineering Graphics.

The hologram is made up of rays of light and its displays as a 3D image on plastic, paper etc. There are various ways of displaying hologram, they are projector hologram, pyramid hologram, LED display hologram etc.

The actual framework for the proposed system is shown in Fig.2. In this system we perform voice processing through JAVA library and data is fetched from database if available.

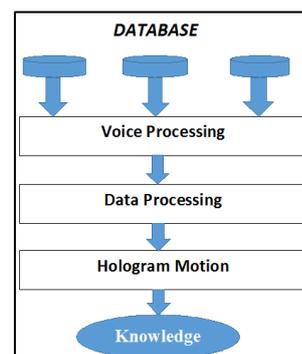


Fig. 2: Conceptual overview of proposed system

IV. EXPERIMENTAL SETUP AND RESULT

The important part of e-Learning is the concept. Nowadays, the virtual community like Facebook (www.facebook.com) is widely spread in the world where people make more friends and communicate with each other to get more knowledge. There are some 3D virtual communities like Second Life (www.secondlife.com), MyLife3D (www.mylife3d.com) which attract many people to experience their virtual life. E-Learning can also be done in the virtual community. People can attend virtual class [4], virtual conference, virtual practical etc. to discuss with virtual teachers and other people to learn concept easily. People can choose their study resources, study form and study plan. Such type of interactive e-learning is one of the future development direction of e-Learning. Using such virtual e-Learning environment, people can learn the courses they want [5]. Also, they can play video games, watch movies and do virtual exercises in the virtual environment. This can easily attract people's interest in learning.

In our work, we are going to use virtual hologram who conduct a lecture and students can ask their doubt and get the appropriate answer. The user interface is important for the experience of the virtual e-Learning environment. Graphical user interface and two-dimensional interaction devices such as keyboard and mouse are widely used in the current interactive system.

For the immersed virtual e-Learning environment, the learning process is progressing in a 3D virtual world. Multimedia class contents are displayed in the virtual world. People need to interact with the 3D world. The 2D user interface and devices are not natural and difficult for the user immersing in the 3D world. Thus 3D user interface needs development for the interaction. Normally this is a Multi-Modal user interface. People can choose what they want to learn and communicate with virtual hologram using voice.

There are many e-learning examples like distance learning, use of the 3D hologram concept, one-way interaction e-learning concept etc. In distance learning student might not clear their doubts because of the one-way communication. If the session is interactive which includes 3D hologram like concept then student feels the interest in the learning and they may feel to learn or innovate or use such type of the technology in their study.

The input of our proposed system would be learner's requirement that may be text data, audio or video clip related to the particular topic through voice command and output would be a multimedia display as per student requirement using hologram technology.

V. CONCLUSION

In this system, we have proposed the Hologram technology. We used a virtual character to which user can interact and get the required output. Hologram technology is very useful and interactive technology for student or users through which a user can get more knowledge and understand a concept easily. With the help of JAVA library, we performed voice processing. With the help of Hologram motion, we explain the concept very well so that a user gets the required concept. A user interacts with the virtual hologram by voice. This type of technology is very popular nowadays and concept learning becomes more interesting using technology enhancement.

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