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Virtual Lab

Shendge L. S
Department: Computer Applications
College Name: Dayanand college of commerce,Latur

Abstract:

Virtual laboratory is a platform at which certain practical's can be performed virtually. Virtual lab emerges as an excellent tool for education purpose for learners. Thus, by usage of this virtual lab platform students can perform practical as given by the teacher as well as they can give feedback. Having this concept of virtual lab into consideration we propose a unique virtual laboratory as a web application for mechanical engineering department at which students can perform practical's and also keep record of their performance activity. In this virtual lab we provide simulation, open source and videos for students. Simulations are of practical's which are provided by the university. Some subject's practical need specific software to perform their practical, so for such we provide open source at which students perform seamlessly. But there are some subjects which doesn't have open sources, so to eliminate such limitation videos are made and uploaded on virtual lab. By inculcating these all aspects in virtual lab, enthusiasm towards practical education for students will increase. Thus, improving understanding of process in practical will increase parallel.

Introduction

Virtual Labs is a project initiated by the Ministry of Education, Government of India, under the National Mission on Education through Information and Communication Technology.The project aims to provide remote access to Laboratories in various disciplines of Science and Engineering for students at all levels from undergraduate to research.

Virtual Labs have been designed to provide remote access to labs in various disciplines of Science and Engineering. These Virtual Labs cater to students at the undergraduate level, postgraduate level as well as to research scholars. Virtual Labs enable the students to learn at their own pace and enthuse them to conduct experiments. Virtual Labs also provide a complete learning management system where the students can avail various tools for learning, including additional web resources, video lectures, animated demonstration, and self-evaluation. Virtual Labs can be used to complement physical labs.

The project is coordinated by IIT Delhi and there are a total of 11 participating institutes in the consortium. IIT Delhi, IIT Bombay, IIT Kanpur, IIT Kharagpur, IIT Roorkee, IIT Guwahati, IIIT Hyderabad), Amrita VishwaVidyapeetham Coimbatore, Dayalbagh Educational Institute Agra, NITK Surathkal, and College of Engineering Pune are the institutions participating in the project. Ranjan Bose is the National Coordinator for the project.

Literature Review:

The present system is the manual one. Hence all the information about the Student, courses and faculty details maintained in the file. For Faculty, they have different-different files for different purpose, Like separate file for student details, attendance and separate file for report etc. For Student, they have different-different notebooks for different subjects; sometimes they forget something during lecture. This Virtual Classroom System is available anytime without any restriction that means we can access 24 hours a day. Although lab application in students' learning has a very important place in science education. it has some limits and problems, especially in developing countries. India is also one of the developing country so India also face the same problem. Some of the main problems faced can be summarized as follows: In carrying out experiments and arranging with equipment, the laboratory activities are expensive .For planning and application, it is much time consuming Checking students' performance during the activities can be difficult in over-crowded classes. Lack of lab or equipment, or insufficient lab conditions which limits the teacher to perform a simple lab activity. Moreover they also overcome the possible dangers that can be seen in the real lab conditions (Yenitepe, 2001). For example a dangerous experiment for human health is prepared in computer as simulations, so that students can see the experiments design and perform the experiment in computer and observe the result. Other than performing dangerous, difficult or impossible experiments, simulations have advantages from the time, security, cost and motivation point of view.

Virtual Lab Framework:

The purpose of this paper is to provide a framework that allows for the development of a virtual lab that incorporates emerging technologies such as the Industrial Internet of Things and embedded systems while incorporating open source components. The global shortage of talent is a significant concern as organizations continue to embrace and roll out new technologies such as 5G, and Artificial Intelligence. Several countries such

as those in developing countries face issues regarding technology use in the classroom. Thus, to provide a learning environment where cybersecurity and information systems concepts can be taught in an exploratory environment.

Architecture of Virtual Lab:

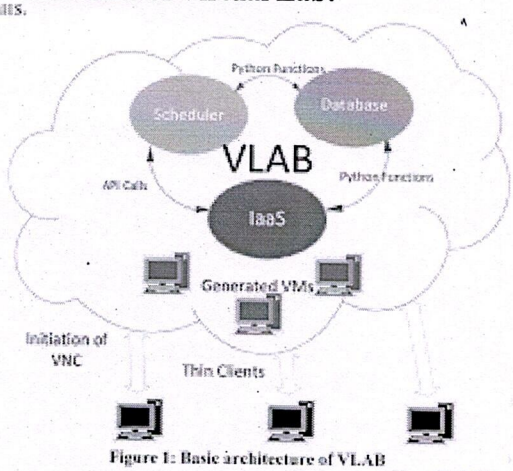

Figure 1: Basic architecture of VLAB

The Virtual Laboratory is an interactive environment for creating and conducting simulated experiments: a playground for experimentation. It consists of domain-dependent simulation programs, experimental units called objects that encompass data files, tools that operate on the objects.

The Objective is to Expose the students to the various key aspects of Digital Logic and Computer Organization by enabling them to perform FPGA based prototyping of experiments with support of a virtual environment. The primary need for virtualisation here is multifold.

1. Digital Logic and Computer Organization are core courses in most of the Undergraduate Curricula of the entire Electrical Sciences Discipline(Computer Science / Engg., Electronics, Electrical) etc.
2. Many colleges/institutes cannot procure sufficient number of FPGA boards for their students.
3. Even when such FPGA boards are available, making them available round the clock is difficult.
4. Expert help is required to effectively use these FPGA boards and such help can be easily channeled through a virtual environment.
5. Helps to standardize the set of Experiments to a large extent.

Conclusion:

Some conclusions about designing such environments: "Due to technical problems and lack of resources both projects produced virtual laboratories that were far simpler than the initially expected result. A conclusion drawn from this is that the development of successful virtual laboratories requires a huge amount of resources and time." On the positive side, authors report that users achieved intended learning outcomes despite technical production issues, in other words, it is possible to develop virtual environments with limited resources. To achieve that, the authors formulate a number of recommendations that we reproduce here:

- Be very clear about the purpose of the virtual laboratory, and in what context you intend it to be used. Media consumers, especially teenagers and young adults, are highly media literate and can quite easily see through attempts where for example a linear demonstration pretends to be an interactive laboratory. Consider which type of media you intend to build - simulation, laboratory, demonstration, and so on. Indicate clearly for the user what they are interacting with.
- Strive to use the simplest possible design and technology, still meeting the demands efficiently. In some cases advanced technology such as virtual environments or even virtual reality might be needed, but a technology-minimalistic strive will lower the risk that a too advanced technology is used for its own sake. The most eye catching techniques might not always correlate with what is relevant to show.
- Adapt levels of realism and accuracy to the intended target group as well as to the intended learning outcome.
- Continuously consider enhancements of the virtual laboratory to increase the learning outcome. It can be profitable to provide help when needed and visualise things that are not possible in a real laboratory. Balance this potential against possible advantages of having a virtual laboratory that closely mimics real-life laboratory exercises.
- Regard a virtual laboratory as an illustrative playground that requires external support in the form of guiding, explanatory texts or teacher debriefing. The virtual laboratory provides the students with experience and observations, but does not always necessarily provide understanding on its own. Guidance is often necessary to help the students to understand the illustrated scientific phenomena.

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