

# Online Experimentation @ REV2012

<http://dx.doi.org/10.3991/ijoe.v9iS1.2186>

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**Abstract**—In conferences, a participant is supposed to present his/her work to the audience in around 15-20 minutes.

When the topics are in the experimental field multimedia components like pictures, video clips or animations are recommended to give to the experimental issues as much realism as possible.

In topics like online engineering it is mandatory to have real resource demonstrations.

A new model for specific conferences like those on online engineering topics, has been implemented. Participants are invited to get together and try to demonstrate their online resources.

**Index Terms**—remote labs, virtual reality, training, computer aided instruction, computer experiments.

## I. INTRODUCTION

Usually, in conferences, a participant is supposed to present his/her work in around 15-20 minutes to an audience of mainly academics and also students.

The presentations are normally organized by topics in order to gather the most familiar audience and the PowerPoint is the worldwide used tool.

When the topics are in the experimental field multimedia components like pictures, video clips or animations are recommended to give to the experimental issues as much realism as possible.

In topics like online engineering it is mandatory to have real resource demonstrations. However, this has not been the current practice. Many reasons underlie this fact: technical failure in communications, requirements in the internet connection quality, hardware and software failures, possible requisites for client software to be installed, system reliability, institutional firewall policies, etc, are reasons for avoiding live presentation of online resources.

But this is not acceptable in present days full of information technology.

The guest editors decided to test a new model for specific conferences like those on online engineering topics, in which they invite participants to get together and try to demonstrate their remote and virtual resources. The first edition of an Exhibition Session “from and for” participants took place in the 1st Experiment@International Conference, held at Calouste Gulbenkian Foundation, November 17-18, Lisbon, Portugal [1]. The Session was enthusiastically joined by all participants and the guest editors submitted a similar proposal to REV2012

organizers. So, in the University of Deusto, Bilbao, Spain, a new interesting Exhibition Session took place involving many of the participants, either as exhibitors or as visitors, Fig. 1.



Figure 1. Exhibition Session @ REV2012

Once more the result has been encouraging, proving the interest of the idea. In the following paragraphs the demos will be briefly presented.

## II. DEMOS

### A. The Portuguese Contribution for the lab2go - pt.lab2go

This work disseminates a new consortium of online experimentation in Portugal which came out of a one year project funded by the Calouste Gulbenkian Foundation. It aims to foster the national potential in online labs, using the Portuguese version (<http://pt.lab2go.net/>) of the lab2go platform [2]. It provides access to remote, virtual and hybrid experiments in different areas and their supporting materials. The web platform supplies direct links to online experimentation, preserving the identity of each host institution. A dissemination site (<http://paginas.fe.up.pt/~expat/experimentaportugal/?lang=en>) informs users about the consortium, emphasizes the used ontology and provides short clips from some

resources and questionnaires on the use of online labs. These aspects were shown at the exhibition session.

#### *B. Immersive learning environment using 3D virtual worlds and integrated remote experimentation*

Remote Experimentation Laboratories (RExLab), Brazil, seek to help users with tools that can promote improvements in teaching methods, modernizing teaching processes and approaching concepts and practical activities. Through access to online experiments via the 3D virtual world, RExLab provides interactivity with a scientific and technological environment for users, offering total control of the experiment through the 3D virtual world. The authors demonstrated the integration between virtual worlds and 3D remote experiments, allowing more attractiveness to students who are studying the fundamental concepts of science and technology careers. This demo has received a very special interest from participants.

#### *C. A Flexible Online Apparatus for Projectile Launch Experiments*

This experiment has been developed in order to provide a more flexible learning environment in physics. The developed projectile launch apparatus enables students to determine the acceleration of gravity and the influence of a set of parameters on the projectile movement. This apparatus is remotely operated and accessed via web, by first scheduling an access time slot. This system has a number of configuration parameters that support different learning scenarios with diverse complexities. The web interface allows users to setup their experiment and receive the experimental data. It also provides the user with a live video stream of the whole process, captured by a webcam and has been successfully demonstrated.

#### *D. Demonstration of Collaborative Features of Remote Laboratory NetLab*

An Australian remote laboratory, used by undergraduate students to perform experiments on electrical circuits, was demonstrated. Unlike the majority of other laboratories, NetLab was designed from the beginning as an interactive collaborative environment where a number of students can access the equipment remotely from different places in the world and collaboratively wire circuits, connect and set up instruments and perform measurements. The designed virtual instrumentation has a high level of realism allowing students to recognize different standard test equipment. To enable this collaboration NetLab has a number of features to support interactive collaborative work. The collaborative aspects of the remote laboratory NetLab were demonstrated.

#### *E. [flock.uc.pt](http://flock.uc.pt) – a Web platform for Online Educational Modules with Online Experiments*

The Web platform [flock.uc.pt](http://flock.uc.pt) (flexible learning & online collaborative knowledge) under development, aims to offer to different types of users, from secondary to higher education, and also for lifelong training, a framework where tutors and students/trainees can communicate and interact remotely through the internet, in a b- or e-learning context. Carbono intended to be an Environment Simulation Tool, where the tutor may design

his/her own experience or adapt existing ones with contents and structural elements according to student/trainee level, and to fulfill the requirements of a given educational subject. Modules with an illustrative virtual experiment for training basic physics concepts will be demonstrated.

#### *F. e-lab Remote Laboratory Demonstration*

*e-lab* is a remote laboratory infrastructure, powered by a software framework designed for distributed data collection, that allows to perform experiments and retrieve data from a remote apparatus. The demonstration covers some examples of remote access to *e-lab*'s laboratories and experiments presently available at Instituto Superior Técnico, Portugal, giving users a full experience of how to control and use them. In parallel, some data analysis based on MSExcel and Origin demonstrates how this complementary computer aided tools can help on the underlying physics interpretation.

#### *G. Technology PLC - Power Line Communication used in monitoring systems online.*

This work describes a development which allows not only remote monitoring but also system supervision using power line communication (PLC) technology and data acquisition. This is a contribution coming from Brazil. The wind turbine temperature is the variable to be controlled in the real case. For laboratory tests the temperature control is simulated by controlling the heating of a resistor. The authors intend to put in evidence the results of the PLC technology compared to the LAN network, confirming the possibility of using this technology in remote monitoring systems, allowing increased reliability and operational convenience.

#### *H. Sharing remote labs: a case study*

In this demo authors presented, demonstrated and discussed a widely spread remote laboratory (VISIR, present in 6 European universities + 1 in India) and which is shared among 3 institutions (2 universities + 1 high school), in this special group. The open source WebLab-Deusto framework supports two relevant features: 1) a load balance among different copies of a remote laboratory and 2) a transitive sharing, which is presented and analyzed for a particular case of study: the VISIR remote laboratory.

#### *I. Virtual Instrumentation in Biomedical Equipment*

LipoTool (<http://lipotool.com>) is a new integrated system for body fat assessment (%BF). It is a simple, non-invasive and cost-effective method. LipoTool measures skinfold thickness and evaluates %BF based in a mechanical device with novel characteristics (Adipsmeter), a Virtual Instrument (LipoSoft) integrating a database and data processing capabilities using bidirectional wireless communication. With a sampling rate of 60 Hz it permits to trace the dynamic response of body tissue under compression. This measurement technology, remotely controlled and interacting with a friendly Virtual Instrument, has been enthusiastically tested by many participants. Similar acceptance had happened in the Geneva International Exhibition, April 2012, where it was awarded a silver medal.

ACKNOWLEDGMENTS

The Guest Editors wish to thank the REV organization for the support to this Special Issue and the Editor-in-Chief, Prof. Michael Auer, for his cooperation.

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Received 14 July 2012. Published as resubmitted by the author 18 December 2012.