Academic Webcasting using the Automated EyA Recording System

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Abstract: *We introduce the EyA ('**Enhance your Audience**') system technicalities and its modus operanti to automate the production and post-production processes for audio-video-slides recordings of complete scientific conferences and/or mathematical and physics courses.*

Introduction

A key issue to carry out massive conference recordings and digital lectures is to automate as much as possible the production and post-production processes to pull down all the costs. When most (if not) all paper presentations, discussions, workshops and colloquia of a whole event will be recorded and archived on the web and/or CD/DVD ROMs, without excluding bits of information, the final digital result will become similar, or the closest possible, to a learning experience for the remote audience. This is still an open technological challenge.

The reason why this is not fully implemented to cover complete international conferences and post graduate courses is that the costs involved are high -not only in terms of allocated budget but also of human resources needed for the post-processing and editing. This is the case when adopting standard audio/video recordings (with or without synchronized slides). In doing so, many variables also need to be properly considered in order not to lose information. For example, typical scientific presentations consist of the simultaneous use of chalkboard, transparencies and overhead projector, the display of simulations via animations, the use of a laser pointer, the display of films and photos from experiments, devices, *etc.*

One concrete alternative to achieve a realistic 'virtual presence' on the short run is given by a recently proposed prototype recording system -named '*Enhance your Audience*' (EyA) [1]. This is an automated recording system in use at the ICTP-Abdus Salam International Centre for Theoretical Physics in Trieste, Italy [2] to record mathematical and physics lectures and international conferences. EyA is an innovative system developed to archive and share scientific lectures carried out using either modern (PPT, PDF, *etc*) presentations or the old and traditional chalkboard lectures.

From September 2007, all lectures given within the ICTP Diploma Course are being automatically recorded using the new automated EyA system. The access to this digital material is made available on the web [3] for free to the public –*i.e.,* students at our Miramare Campus and beyond. The '*ICTP Diploma Course On-Line'* project aims to enhance ICTP's mandate of transferring knowledge to scientists from developing countries. It is our hope that these public recordings will be also useful for lecturers beginning their teaching careers in science around the world.

EyA Technicalities and Modus Operanti

The EyA system works like this:

Video and audio is recorded on a local computer ('producer') with a webcam and USB microphone fixed on the wall. Photos are taken every 15 seconds with a digital camera controlled by USB and proprietary software and immediately downloaded from the camera to the computer via USB (this limits the shooting interval at around 15 seconds for high resolution images). The recording time is in slots of 1 hour to follow usual classroom schedules. High quality images are taken with a 7 or higher mega pixel digital camera and synchronized with the recordings of audio video every few seconds. This allows zooming in regions of a large screen, podium or chalkboard to thus visualize a presentation in great detail. EyA recordings also offer the benefit of seeing the accompanying physical gestures, body language and the like which are inherent in any scientific talks.

All photos, together with the movie and info about the synchronization, are transferred through the network, to a dedicated server ('master') as a TAR archive. This is done immediately after every hour of recording, and can happen at the same time while the computer is recording the next hour.

The 'master' server expands the TAR files just received from multiple rooms (they have unique names, with timestamps and info about the rooms), and queues them for post-processing. These are immediately processed in a room-by-room basis, creating a QuickTime (QT) synchronization track that, added to the movie file, provides the synchronization between the images and the movie. Images are also compared together to drop duplicates, in order to decrease the space needed for the storage and the download of recordings.

The idea behind producing massive and automatic EyA recordings is to allow a 'virtual presence' into, and a participation to, international scientific meetings and academic webcasting in general for all. An example of EyA recording of a chalkboard physics lecture is shown in Figure 1. Examples of automated recordings of complete conferences are available at the website [3].

Attending International Conferences for 1 Euro

With the implementation of Eya, it is now becoming possible to attend virtually an international scientific event for the average cost price of 1 euro, invested either to connect to the Internet to follow, or to buy a CD/DVD Rom to copy, all of the recorded lectures/seminars/talks. In fact 1 euro can be today the average cost for one hour of Internet when connecting from a Cyber-café -including those in developing countries, or it can be the cost of a DVD to store Gigabytes of

zip files (containing files of one recording hour with an average size of 150 MB each). This means a complete week of conference recordings for 1 euro and in just one disk!

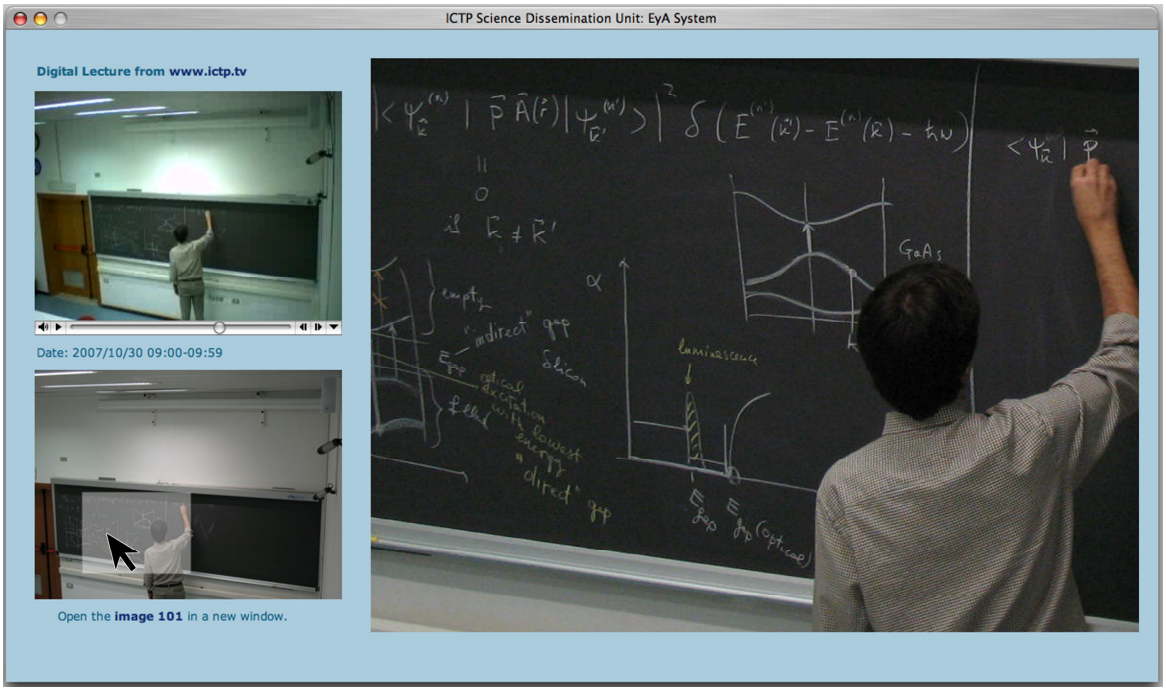

Fig.1. *Example of automated EyA recording of a traditional chalckboard lecture. The audio plus video recorded (on top left) is synchronized with the camera slides (on top bottom). The arrow opens (OnMouseOver) a high resolution zoomed image (on the right).*

Over the last decade, access to ICTs has been growing at high speed but not evenly distributed. There are major differences in quantity and quality of telecommunication services, such as mobile phones and the Internet, a situation that is referred to as the 'digital divide'. Concrete scientific measurements in terms of Internet connectivity show that within regions of Africa this divide still lies well behind industrialized countries [4]. However, public internet access franchises are springing up very quickly on every continent and on unthinkable areas as, for example, through Cyber-cafes in the Atacama driest desert. The costs for access are reasonable for local economical indexes, at the average of 1 euro per hour of connection. The connectivity in these places can be usually reasonably fast. The alternative delivery of hard disks or the copy of CD/DVDs with the recorded lectures is also feasible and rather inexpensive. Hence reproducing the environment of classrooms and conferences directed to a huge audience can now become a concrete possibility to help bridging the knowledge divide.

Final remarks

The investment needed to implement EyA at Universities, Research centers, Congress centers, *etc* is also very low. As of today (Jan 2008), a rough estimation of overall costs include

about 1,500 or less of equipment for recording in each room (computer, UPS, digital camera, webcam, microphone, some shareware software licenses for video, cables, accessories, mounting, safe plastic enclosure with lockers). Plus 1,000 for the dedicated server used to process the recordings (from 1 up to 4-5 rooms), with external hard disks for backups.

Most recenlty, besides the QT versions, synchronized EyA recordings are now also available in Flash format which allows the view in multiple platforms including Linux O.S.

To conclude, we believe that when the 'virtual presence' through EyA will become more popular, one of the UN Millennium Development Goals, i.e. '*to make available the benefit' of new technologies for all -especially information and communications technologies (ICT)'*- will be achieved. The means to produce digital scientific contents are out there [5], easier and costless than before.

References

[1] Website about EyA system: http://sdu.ictp.it/eya/about.html
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