

## Webcasting of Traditional Chalkboard Lectures: The EyA System

E. Canessa, C. Fonda and M. Zennaro

Science Dissemination Unit (SDU) [sdu@ictp.it]

The Abdus Salam International Centre for Theoretical Physics,

Trieste, Italy

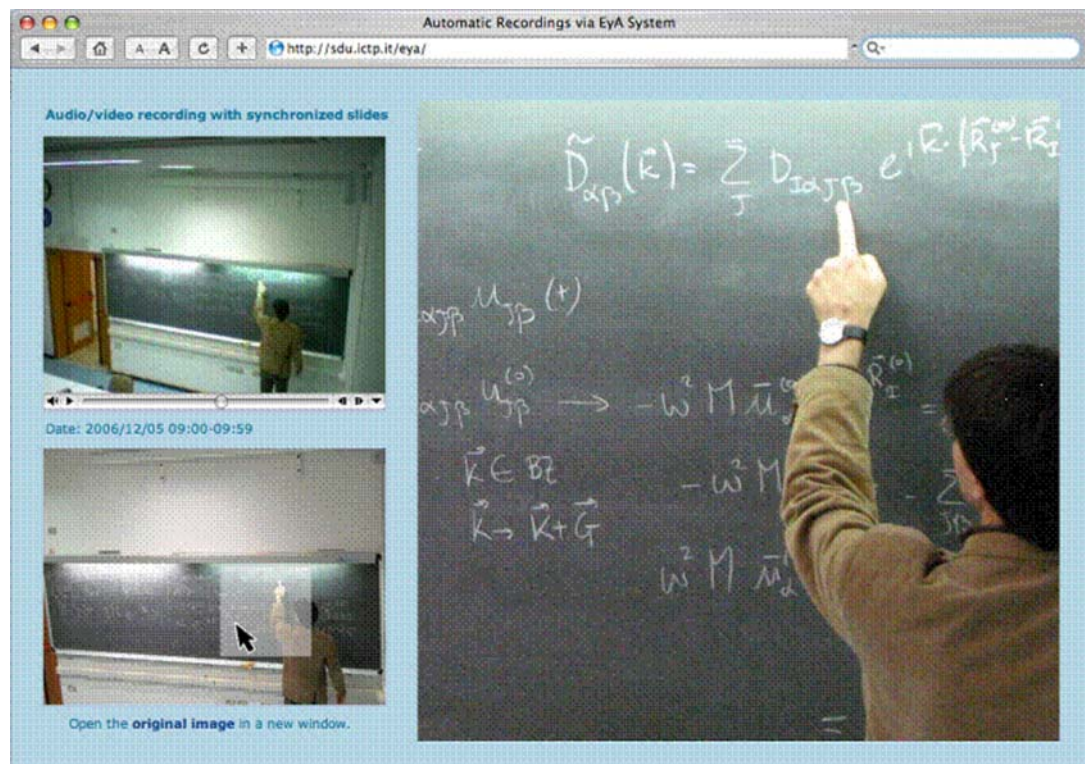
In our experience, to produce rich-media presentations and videos for Internet streaming both the type of audience and their available computer/networking facilities need to be considered. In this regard it is necessary

- to select low-bandwidth compliant applications that can keep the video quality as high as possible, and
- to follow as much as possible the proposed open standards for the authoring of audio-visual presentations in order to make them visible under many platforms and operating systems.

Also relevant to mention is to automate as much as possible the production of the presentations and to reduce the costs of any post-processing and editing (in terms of human resources and financial costs). The final result should be similar (or as much as closer) to a high quality learning experience for the remote audience. This is still an open technological challenge for research, in particular, in the case of the recording of traditional chalkboard lectures.

Typical Mathematical and Physics presentations, including seminars, talks, lectures, *etc.* are much more complex in form than relatively standard PowerPoint (PPT) or Keynote presentations. In fact, they can include the simultaneous use of a chalkboard, transparencies and overhead projector, the display of computer simulations via animations, the use of a laser pointer, the display of films and photos from experiments, devices, *etc.* So all of these variables need to be considered and synchronized when producing and archiving a recording in order not to lose information in practice.

We have developed an automated system -named "*Enhance your Audience*" (EyA), which allows to widening the audience for scientific lectures as described above and carried out using modern presentations (PPT, PDF, animations, *etc.*) or, alternatively, the commonly used traditional chalkboards found in classrooms.



**Figure 1.** Example of traditional chalkboard lectures via a synchronized EyA presentation with slides, audio and video (on the top left) recorded automatically during an ICTP Diploma Lecture. The arrow opens (OnMouseOver) a synchronized zoomed image (on the right).

The technologies employed in EyA are low-cost and the system in brief works like this:

- video/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 (high resolution photos of 10 Mega Pixels or so) controlled by USB and proprietary software and immediately downloaded from the camera to the computer (this limits the shooting interval at around 15 seconds for the higher resolution images). The recording time is in slots of 1 hour to follow usual classroom schedules.
- 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. They are

immediately processed room-by-room, 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.

- Our web server: <http://www.ictp.tv> publishes the recording with all relevant information (room, starting and ending time, size of the zip file).

In this way the integrated EyA system is completely automated, non-intrusive, low-cost and allows the recording of any lecture with a minimum of dedicated human intervention. It is also an open source application available for educational institutions.