

# The video revolution made simple

Video is already established as a powerful medium on the Web, but now physicists in Italy have developed a new system that makes it easier to broadcast scientific talks and lectures online. **Michael Banks** reports

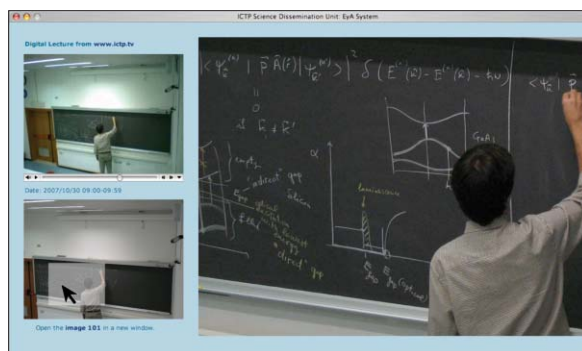
When it comes to scientific papers, physicists have embraced the Web whole-heartedly – writing, posting and downloading articles as if it were second nature. However, physicists have been much slower in realizing that the Internet is a great way of publishing not just written material but videos too. That reluctance is surprising given the huge popularity of websites such as *YouTube*, which allows anyone to share videos and “broadcast yourself” as the site’s slogan goes.

Recently, however, there have been some signs that things are starting to change. For example, a lecture on “atoms and heat” that was posted on *YouTube* by Richard Muller, a physicist at the University of California at Berkeley, has so far been viewed more than 90 000 times since it went live in September. The University of Berkeley, meanwhile, has started to post whole lecture courses on *YouTube*, while the website *SciVee* lets scientists upload videos of themselves discussing their papers.

Conference organizers have also been quick to see the potential of posting videos of talks on the Internet. This involves hiring a camera operator to film the presentation and then preparing an edited version to be downloaded or streamed. But given the expense and hassle of hiring an operator – not to mention the cost of editing and processing the videos – most conference organizers rarely film every lecture. Worse still, the resulting videos usually only show the speaker and nothing more, which means that valuable information contained in the lectures – such as detailed views of the speakers’ transparencies or blackboard – is minimal.

## Lecture window

In 2004 an attempt to cut costs was provided by a system called Lectures on Demand (LODE) developed by Marco Ronchetti, a physicist at the Università di Trento in Italy. He adapted an open-source software package called ePresence, which was developed by staff at the University of Toronto, Canada, to synchronize video, audio and transparencies. It just focuses on the slides and voice of the presenter, and only includes a tiny



## EyA in action

Recording lectures at the International Centre for Theoretical Physics in Trieste.

Recordings done with the Enhance Your Audience system are open to everyone

image of the lecturer. Ronchetti and colleagues tweaked the software so that the video screen was larger and also cut the live broadcasts by only posting lectures via post-production. As Ronchetti points out, there is little point in students watching lectures live on the Internet from home. “They’d be better off coming into class,” he says.

Although all one needs to run the LODE system is a computer, video camera and the appropriate software, the production costs from editing and running the equipment manually are still high. However, a team of physicists led by Enrique Canessa at the International Centre for Theoretical Physics (ICTP) in Trieste, Italy, have now built a new system, known as Enhance Your Audience (EyA), to address this problem. It consists of a webcam, digital camera and microphone that are controlled by a program running on an Apple Mac computer. EyA is fully automated, which means it can video someone giving a talk or a series of lectures and broadcast it over the Internet without any human intervention.

The system’s webcam records continuous images of the speaker and their slides, while the digital camera takes high-resolution still pictures – at a rate of up to one every 15 s – of the front wall of the lecture room. Users can therefore zoom in to see any specific area (such as a blackboard or a transparency). The clever aspect about the system is that the digital camera can recognize when something has changed in the presentation. If, say, a speaker does not make many changes on the blackboard, then fewer pictures are taken and the file size will be about 120 MB

for an hour-long lecture, making it quick to download. If, however, the speaker starts writing a lot on the blackboard, then this file size will increase to 200 MB.

The system currently costs about \$1500 for the camera, webcam and computer, which has to be bought for every room in which one wants to record in. Although the ICTP does not provide the hardware, it can give advice about how best to set the system up. Once the automatic processing of the lecture is complete, the file gets transferred onto a master server costing about \$1000 that stores all the processed files and publishes them on the Web automatically.

## Who’s watching

The main reason why the ICTP has developed this system is that it wants to disseminate its lectures to researchers and students in the developing world to fulfil its mission to support the best scientists in those nations. “Recordings done with EyA are open to everyone,” says Canessa who works in the ICTP’s science dissemination unit. Whole courses are now being filmed automatically with EyA at the ICTP, with a lecture series on “Symmetries, electron bands and phonons” by Sandro Scandolo, a condensed-matter physicist at the ICTP, having already been downloaded more than 3000 times since the start of October.

One physicist who has taken advantage of EyA is Snezhana Abarzhi, a theorist from the University of Chicago, who organized and spoke at a recent conference on “Turbulent mixing and beyond” at the ICTP. Her lectures were recorded in full by the new EyA system, and Abarzhi says she is using some of the videos in funding proposals. “[The funding committee] can then directly see me talking about my research,” she says.

Although only two EyA systems have been installed outside the ICTP, physicists are already thinking about how to develop it further. “The weak point of EyA is that it offers little support for semantic navigation,” says Ronchetti. This means that searching for a topic in a database of lecture broadcasts is impossible at the moment. Future versions of the software could even allow links to *Wikipedia* entries, related scientific articles or books to appear when a speaker says a particular word, thus allowing users to stop if they do not understand something. In the end, however, persuading the more conservative physicists to get in front of the camera may well be hard enough.