



*release 5.x.x (Alopix)*

## User's Guide

version 1.9; April 2011

*A key issue to carry out massive digital lecture recordings (capture, management and sharing), is to automate as much as possible all the needed processes of production and post-production to pull down costs. openEyA satisfies these requirements in a way that has yet no similar. The new release openEyA-webcam is easy-to-use and cost effective!*

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# 1 About EyA

EyA stands for "*Enhance your Audience*". It is the name of a system used to record continuously, and without human intervention, complete traditional Math and Physics lectures as for example those within the ICTP Diploma Programme at [www.ictp.tv](http://www.ictp.tv)

Recordings of international conferences (with parallel sessions), seminars, talks, *etc* using EyA technologies can be seen at [sdu.ictp.it](http://sdu.ictp.it)

EyA technologies can be also used in ubiquitous learning (e-Learning, m-Learning, *etc*) programs as educational content producer.

The automated EyA recording system was reviewed in the Physics World Magazine in 2007, won the Innovation Prize of Regione Friuli Venezia Giulia of Italy in the non-profit and public institutions category in 2008 and got a honorable mention in the Education category of the Stockholm Challenge Award 2010.

**openEyA** is the Linux-based alternative to EyA also developed by the ICTP Science Dissemination Unit (SDU: see Chapter 9 [Contacts], page 20).

## 1.1 openEyA-webcam Features

**openEyA** integrates different technologies under Linux O.S. **Ubuntu 10.10** to synchronize:

- **video in Flash format** (to see whatever happens in front of a classroom podium),
- **screen captures from openEyA's computer, or pictures taken with a** (high resolution, Linux compatible) **webcam** to zoom specific areas of the classroom podium, blackboard and/or projected screen -if any, and
- **classroom audio** (without the need to wear a microphone) ... *and much more.*

**openEyA** (and EyA) allows to archive and share traditional scientific lectures and talks carried out using, for instance, very large chalkboards found in classrooms and/or using digital presentations (PPT, PDF, animations, *etc*). It is innovative because of these main features:

- no dedicated human intervention during recording and post-processing (there is no need for an operator or editor); the automated audio-video-slides synchronization is done in few minutes with just a mouse click;
- scalable architecture and portable (use from one classroom to many);
- no special requirements for the lecturer (there is no need to press buttons or to wear a microphone, *etc*);
- zoomable slides or images (high resolution if using a HD-webcam); space disk is saved by *cropping* images when processing the synchronized audio-video-slides **openEyA** recordings. **Duplicated slides, or slides that have only slightly changed, are automatically discarded.** Furthermore, **images can easily be straighten out and recordings can be edited a-posteriori;**
- low total cost of hardware implementation (see Chapter 2 [Requirements], page 3);
- low-bandwidth features (recordings can be saved as Zip files).

## 2 Requirements openEyA-webcam

### 2.1 Hardware

As of this writing April 2011, the implementation cost of **openEyA in modality lite** can cost less than 200 Euros (the price of a Netbook **32 bits**) or less than 300 Euros if using in **modality Webcam** with hardware such that:

- **portable PC with Ubuntu Linux O.S.** (*e.g.*, low-cost NetBook **32 bits** as in Fig.1)
- **USB Webcam** Linux compatible , UVC Driver (*e.g.*, Logitech HD Webcam C510 8Mpx).
- **USB microphone** (omni-directional, *e.g.*, UB1 Samson Mic or Acousticmagic Array Mic).
- *optional*: small tripod.



**Fig.1:** openEyA-webcam *full hardware setup example*

## 2.2 Software

The openEyA-webcam software can be downloaded, in the form of a simple 'openeya-installer' or a debian package 'openeya\_x.x.x-i686.deb', under the License below from the website:

[www.openeya.org](http://www.openeya.org)

Prior to downloading you will be asked to fulfill a simple form for statistical purposes and to keep you updated on new releases.

As of this writing April 2011, openEyA runs under Linux O.S. **Ubuntu 10.10** (see Chapter 3 [Install], page 5)

### 2.2.1 Copyright

**Copyright © openEyA - ICTP Science Dissemination Unit, Trieste, Italy**

Permission to use, copy, and distribute the openEyA software and its documentation for educational purposes without fee is hereby granted, provided that the above copyright notice appear in all copies and that both that copyright notice and this permission notice appear in supporting documentation.

Permission to modify the software is granted, but not the right to distribute the complete modified source code. Modifications are to be distributed as patches to the released version. Permission to distribute binaries produced by compiling modified sources is granted, provided you

1. distribute the corresponding source modifications from the released version in the form of a patch file along with the binaries,
2. add special version identification to distinguish your version in addition to the base release version number,
3. provide your name and address as the primary contact for the support of your modified version, and
4. retain our contact information ([www.openeya.org](http://www.openeya.org)) in regard to use of the openEyA base software.

Permission to distribute the released version of the source code along with corresponding source modifications in the form of a patch file is granted with same provisions 2 through 4 for binary distributions.

This software is provided "*as is*" without any express or implied warranty.

## 3 Install

As of this writing April 2011, openEyA runs under the free Linux-based operating system **Ubuntu 10.10** (download from [www.ubuntu.com](http://www.ubuntu.com)) and on **32 bits computers** such as low-cost Netbooks.

There are two ways to install openEyA: *Easy Install* by a simple mouse click on a `openeya-installer`, and a most elaborated *Manual Install* in which you need to install first some extra packages and their dependencies.

Check your Netbook's configuration Date/Time -openEyA handles midnight recordings properly.

### 3.1 Easy Install

**You can install openEyA fast and easily!**

You just need to download the `openeya-installer` binary program (compressed in ".zip" form).

Simply "unzip" the file and then "double click" on the following icon on your Desktop



*RESTART YOUR COMPUTER (reboot) before using openEyA!*

### 3.2 Manual Install

There also exists a most elaborated *Manual Installation* in which you need to install first some extra packages and their dependencies as explained below. In this case you need to download the Debian `openeya_x.x.x-i686.deb` package.

This possibility is given for those who would like to know more in detail what is behind the openEyA installation process.

The following packages (and their dependencies) are needed to be installed before hand:

```
flashplugin-nonfree; libasound2; imagemagick; libqt5-qt4;
libqt4-help; libqt4-sql-sqlite; libimage-exiftool-perl; perl; zip; libltdl7;
libusb-0.1-4; libexif12; libpopt0; libreadline5; libaa1; libfaad0;
libmp3lame0; libtheora0; libvorbis0a; libdc1394-22
```

You can check the list of needed packages by using the following command (the list shown above could become out of date):

```
dpkg -I openeya_x.x.x-i686.deb
```

In 'Depends:' it is possible to find the list of the required packages.

To install the required packages (listed above) issue the command: 'sudo apt-get install <pkg1> <pkg2>' and so on. For example,

```
sudo apt-get install lame0 libtheora0 ...
```

To install the openEyA (.deb) package type the command:

```
sudo dpkg -i openeya_x.x.x-i686.deb
```

An openEyA launcher icon will appear in your Desktop for openEyA as shown in Fig. 3

```
RESTART YOUR COMPUTER (reboot) before using openEyA!
```

### 3.3 Uninstall

In order to uninstall the openEyA (.deb) package type the following command (and check the /opt/openeya directory!):

```
sudo dpkg -r openeya
```

### 3.4 Updates

By selecting 'Help' from one of the upper links in the GUI (Fig.3), it is possible to check for updates of the automated openEyA recording tool.

A connection to the Internet is needed to download new releases from [www.openeya.org](http://www.openeya.org).

## 4 Start Up

openEyA-webcam supports 2 different Modalities for the automated capture and production system of chalkboard and/or digital lectures. These are:

- **Screen grab** (*openEyA-lite*): to capture automatically your computer screen (*i.e.*, grab slides done with PPT, PDF or any other digital presentation) from the same computer in which openEyA is installed and synchronize them with video; You can give and project a seminar/lecture while recording it! Aternatvely, you can easily record self-seminars, *i.e.*, your own lectures, views, *etc.* which you can then share with your students and audience via web or through a zip file.
- **USB Webcam** (high resolution, Linux compatible UVC Driver) to take pictures and zoom in over specific areas of a classroom podium, blackboard or a projected screen.

For either case, you need to select either **Screen grab** or **Webcam** when starting the small openEyA icon in your Desktop (see Fig.2). You can modify/select the modality after running openEyA from the option **Slides** in the GUI shown in Fig.4.



Fig.2: openEyA-webcam modalities for use.

### 4.1 Screen Grab: openEyA-lite

Select **Screen grab** (*openEyA-lite*) from the option **Slides** in the openEyA GUI of Fig.4. This alternative to synchronize PPT/PDF slides or any other digital material being displayed on your computer screen with audio/video. *openEyA-lite* is useful to webcasting your own talks using any computer with Linux **Ubuntu 10.10** and built in microphone and webcam (you can also use in this case an externa USB webcam).

### 4.2 Using USB Webcam

Select **Webcam** from the option **Slides** in the openEyA GUI in Fig.4.

Plugin (connect) first the Webcam in the USB slots of your computer (and also the external Microphone if being used). *openEyA-webcam* will recognize the device(s) automatically and will appear as `video0`, `video1`, ... in the GUI.

### 4.3 Modalities Results

*Recall that after having installed openEyA you need to  
RESTART YOUR COMPUTER (reboot) first!*

**If you are also using an external (USB) Microphone and a USB Webcam,  
connect them first directly to the computer prior to the start up of  
openEyA (see Chapter 2 [Requirements], page 3).**

In either Modality `Screen grab (openEyA-lite)` or `Webcam openEyA-webcam` automatically capture slides (every few seconds from the screen and from an external HD webcam) and synchronize them to the audio-flash video.

Duplicated slides, or slides that have slightly changed, are automatically discarded when processing. With `openEyA` synchronized recordings can also 'Create output Zip file' with all files ready to upload it to the web.

It also possible to attach labels and information to recordings already processed (see Section 5.4 [Recording Info XML Output], page 13). The added information will appear in a XML file in the directory of the recording being labelled. This XML file can be used (link) directly within any Content Management System (CMS) for Ubiquitous Learning in order to describe the recording (*e.g.*, Lecture Title and Speaker). These recordings' info are also given in a text file and will appear in the main 'index.html' document for the recording-ready for the web.

Another unique feature of `openEyA-webcam` is the possibility of editing any processed or re-processed recording in a subsequent time (see Chapter 8 [Editing], page 19). This is particularly useful to cut parts of audio/videos, and its respective slides, that needs to be removed for any special reason.

## 5 How To use?

... *It is very, very simple!*

openEyA-webcam in modality "lite" do not need any extra hardware. For the modality 'Webcam', plug in first the USB Webcam (Linux compatible, UVC Driver) and then launch openEyA (see Chapter 4 [StartUp], page 7). Proceed further as indicated next.

### 5.1 Setup

The openEyA-webcam Graphics User Interface (GUI) is shown in Fig.3. It allows to configure (and preview), to record and to post-process (*i.e.*, automatically synchronize audio-video and slides taken from your own computer a through a USB webcam (*e.g.*, HD).

To start click on the big openEyA logo in green.

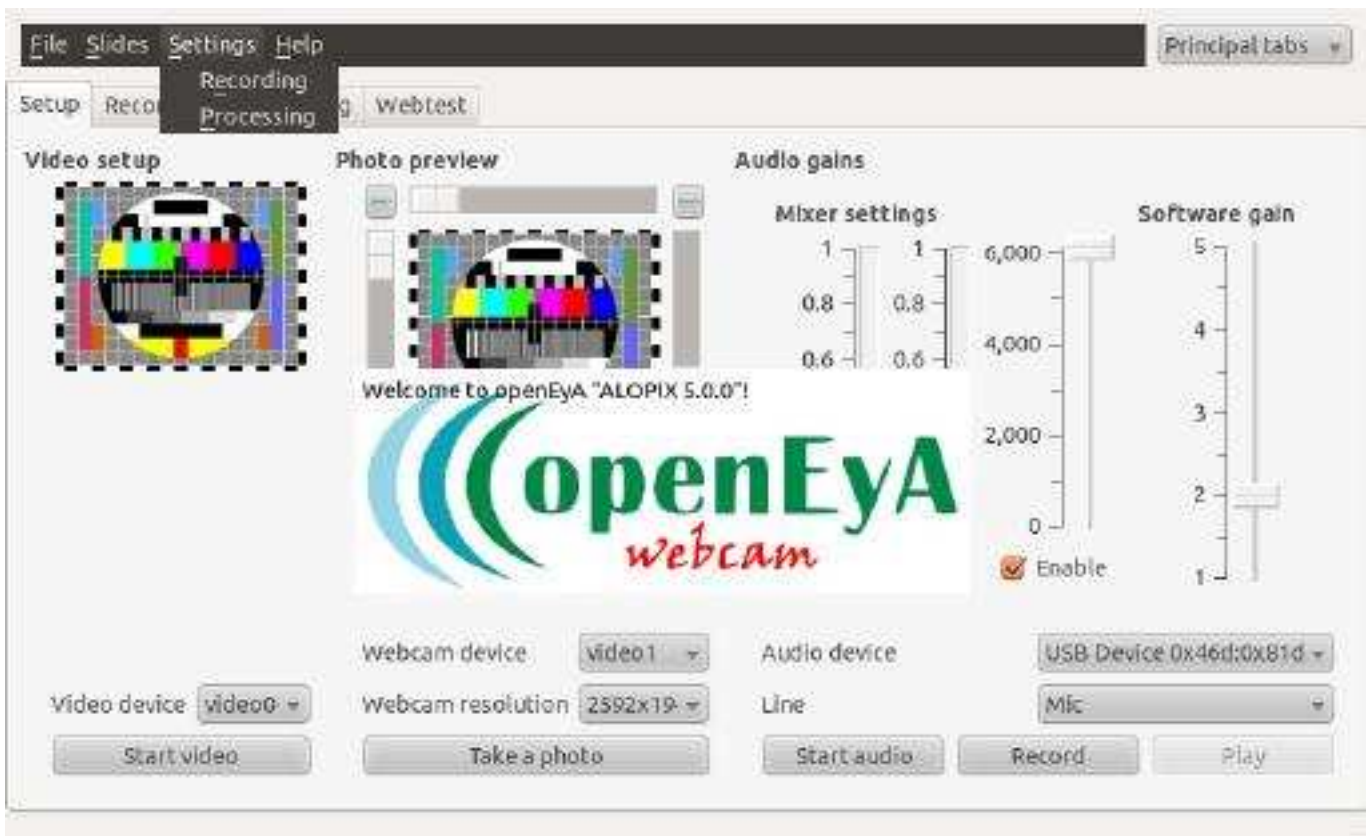


Fig.3: openEyA-webcam GUI

#### 5.1.1 General Settings

By selecting 'Settings' from one of the upper links in the GUI (Fig.3), it is possible to (i) select the 'Input/Output' recording directories and (ii) select a timing for the photos/slides. The default directory is user's Desktop for the stored recordings and a default value of 15 sec for taking photos as shown in Fig.4.

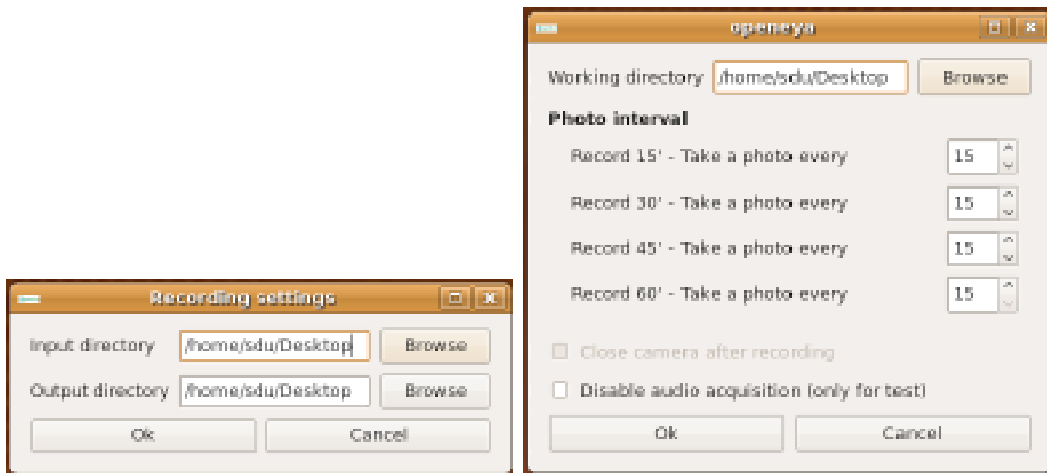


Fig.4: openEyA general settings

### 5.1.2 Video Test

Select 'Video device' (usually 'video0' or 'video1') depending if your are using your computer's webcam or an external USB webcam (with Linux UVC Driver).

Click 'Start video' to test and see the video image and positionate the webcam.

### 5.1.3 Slide Preview

Click 'Take a photo' to test, get a picture or capture! *Wait some seconds until every taken image appears in the Photo preview!*

When using an external (HD-)Webcam, with 'Take a photo' you can re-positionate the webcam if needed).

You may also want to **crop** the pictures by selecting an area within the **Photo preview** windows in Fig.5. This allows to save disk space when processing the synchronized audio-video-slides **openEyA** files. Duplicated photos, or photos that have slightly changed, are automatically discarded by **openEyA** during the 'Processing' (see Section 5.3 [Processing], page 12). Another feature of **openEyA** is that all photos taken can also be easily straighten out (see Chapter 7 [Perspective], page 17) and synchronized to the corresponding audio-video recordings.

It is also possible to select the location of the **openEyA** logo default to appear in the recordings (from the Photo Preview corners in Figs. 4 or 5). When photos are straighten out, this logo can be cleaned out.

### 5.1.4 Audio Gains

To test the audio quality, select first 'Enable' and click 'Start audio' to check the correct audio level (see Fig.5).

Select then 'Audio device' or in-'Line' depending if your are using your computer's Microphone or an external USB omni-directional Microphone.

Check also parameters such as **Capture**, . . . *to optimize the audio quality.*

After all these parameters have been set, it is possible to make a recording test of few secs (the small windows appears when pressing **Record** of Fig.5) and to **Play** it *to listen the audio quality.*

Try several brief audio recordings to adjust the **Software Gain**.

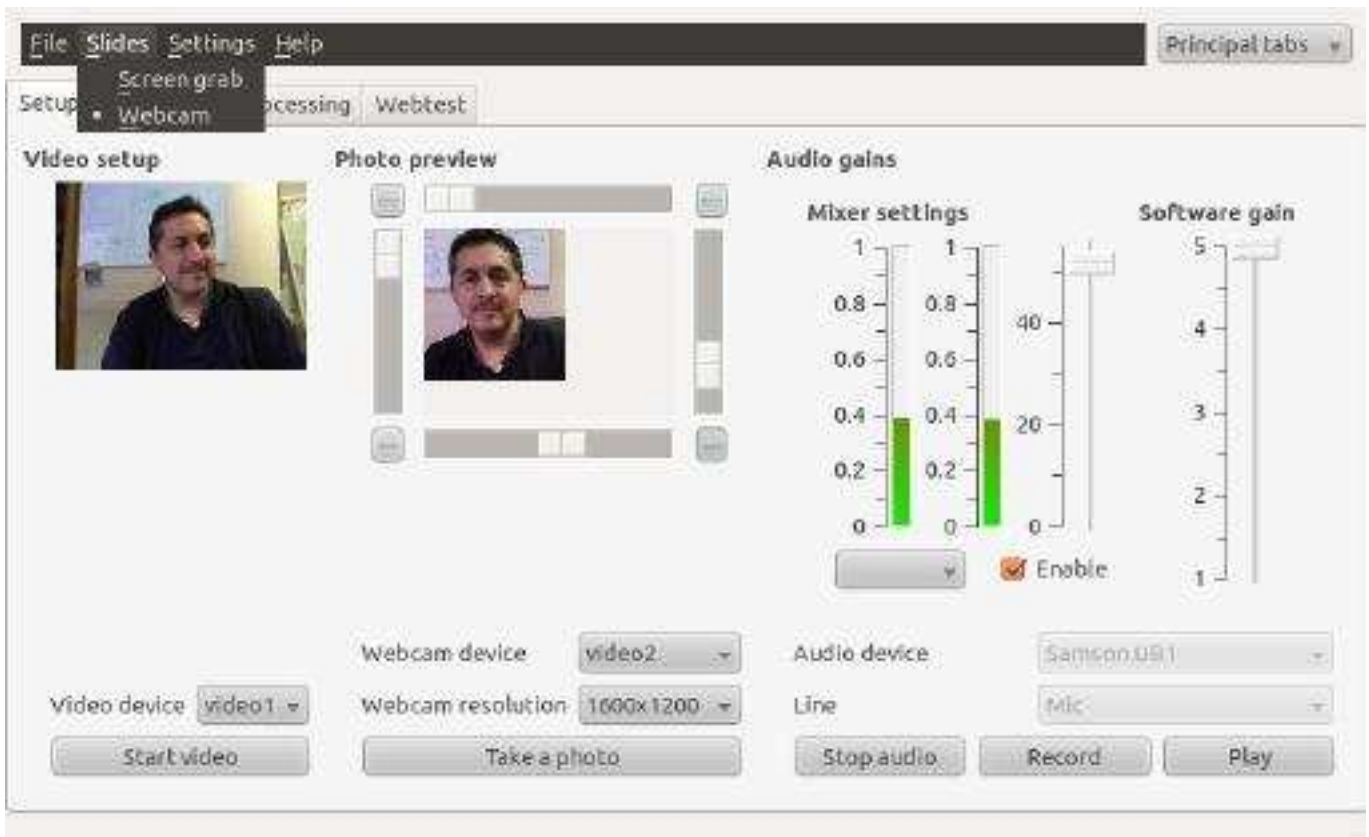


Fig.5: openEyA video, photo, audio setup example

### 5.1.5 Panel Configuration Save/Load

Similarly to the **Set of Alarms**, the Panel Configuration set for the audio, video and slides can be re-used for different occasions by simply saving them into a file and then loading them back into the openEyA control panel! Open the **File** menu and simply click 'save or load config'.

## 5.2 Recording

Within the Recording GUI shown in Fig.6, it is possible to start an 'Immediate recording' or to program recording(s) by selecting the 'Alarms' options (**it is also possible to load in saved Alarms**).

#### 'Immediate recording'

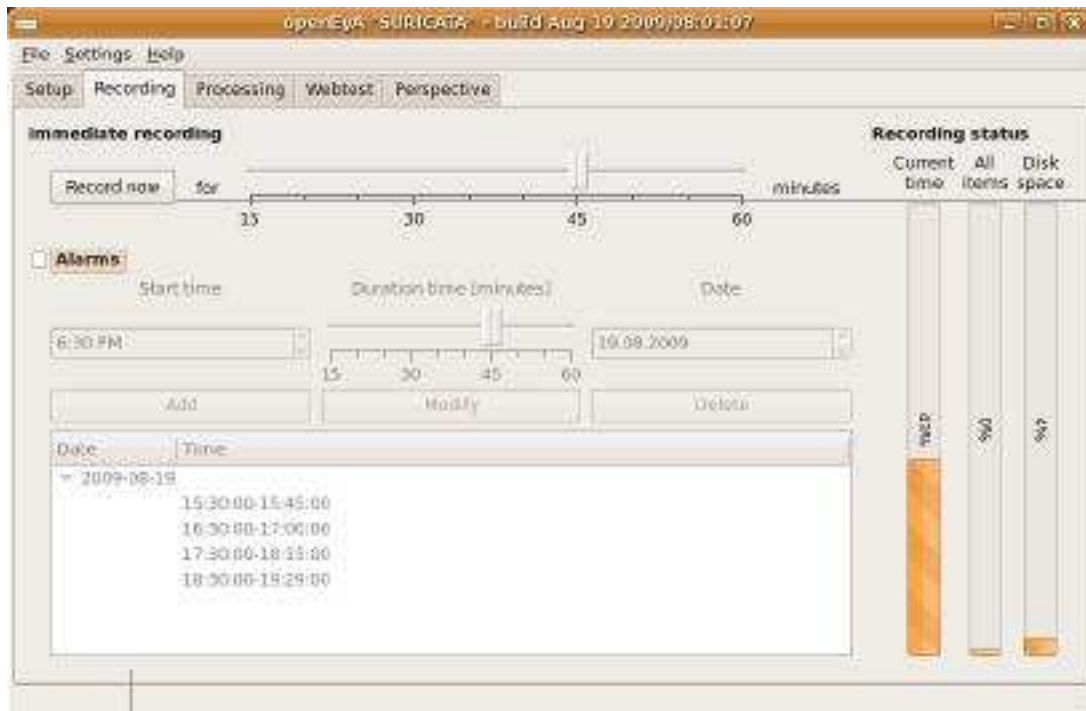
Press 'Start' and select the time lag in minutes to activate the recordings (using the Setup of previous sections). openEyA allows to record slots of 15 up to 90 minutes continuously and automatically. A 'Beep' sound is issued on Stop or completion of an Immediate recording. If you need to record for longer periods then you can set the 'Alarms'.

#### 'Alarms'

Select this option, to program future automated recordings of up to one hour maximum each. You can Add, Modify, Delete alarms to build on a given schedule of recordings.

**Set of Alarms can be re-used for different occasions by simply saving them into a file and then loading them into the openEyA control panel!** Open the File menu and simply click 'save or load alarms'.

The 'Current time' level indicates to time left (or, alternatively, the time passed) to complete the recording.



**Fig.6:** Example of Immediate recording (45 mins)

## 5.3 Processing

Within the Processing GUI in Fig.7, it is possible to start processing the synchronization of audio, video and photos taken during the recording session(s).

As in the figure, you need to select first the 'Input/output'(s) files from the list of available recordings carried out so far.

### 5.3.1 Create Output Zip File

You can also 'Create output Zip file' to backup your data or to display your openEyA recordings on a dedicated webserver (just *copy and unzip* the file and make a link to the 'index.html' file). The original pre-processed recordings are saved as zip file (with a '\_orig.zip' extension) in the recording directory.

### 5.3.2 Process ALL Recordings Later

From within the Processing GUI of openEyA it is possible to select 'Process ALL recordings later at' by indicating a time schedule in order to initiate the process *a-posteriori*. This feature is particularly useful when recording many hours one after the

other (as for example during a Conference) so that you could program openEyA to carry out the processing in one go late at night.

### 5.3.3 Create Keywords from Slides (OCR)

You can also 'create keywords from slides'. This is done by openEyA via Tesseract OCR -one of the most accurate open source Optical Character Recognition engines available. When selecting this option from the processing, an ascii file is created in the directory of the recording named 'ocr.txt' that contains all extracted text from the slides (you can then use this file to create a "Cloud Tag" or use some of them as Keywords. The process with create keywords from slides needs longer time to complete the extraction.

The Processing status is indicated in the GUI in Fig.7. *Wait until it completes (100 percent)!*.

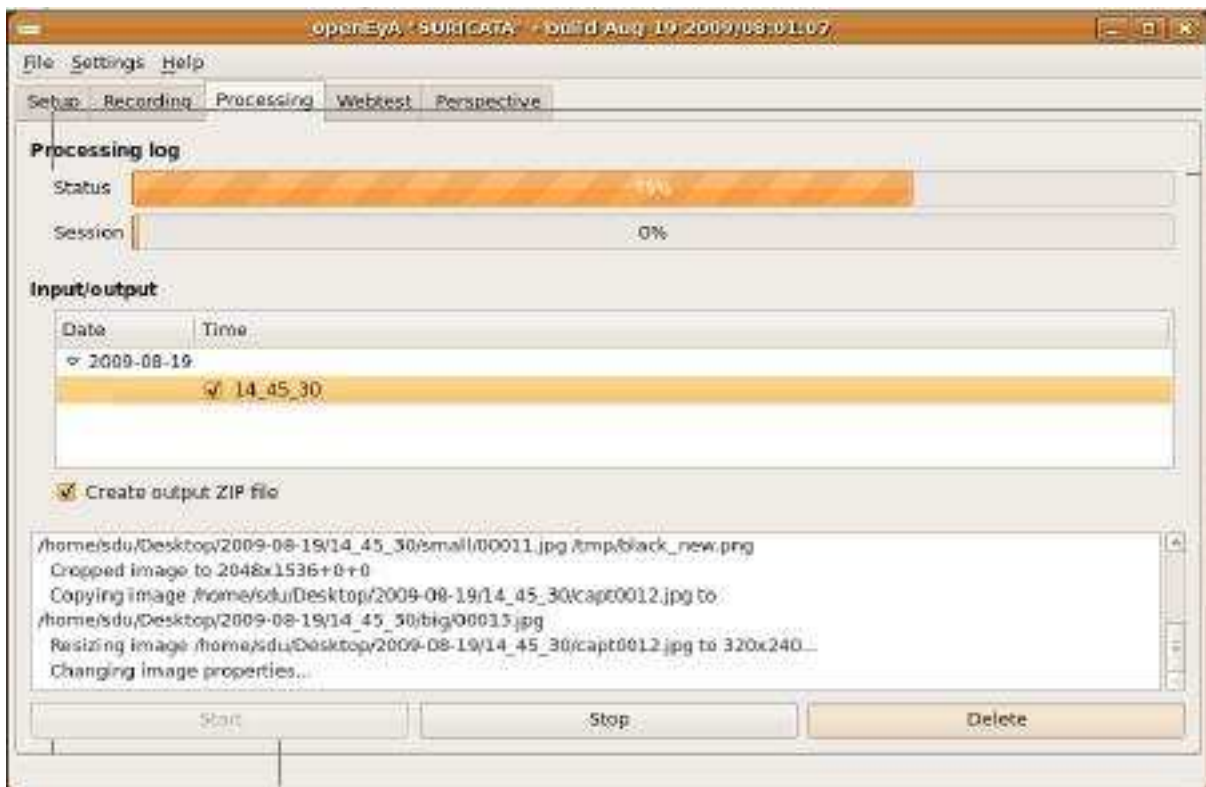


Fig.7: Example of Processing the selected recording

## 5.4 Recording Info: XML Output

It is possible to attach labels and information to (previous) recordings already processed. You can also 'Create output Zip file' with this labelled multimedia data. Select from the openEyA GUI (inside 'Principal Tabs' shown in Fig.3) the 'Advanced tabs' tag.

The added information can be found within the file 'info.xml' in the directory of the recording being labelled. This XML file can be used (linked) directly within any Content Management System (CMS) for e-Learning to describe the recording; these recordings info

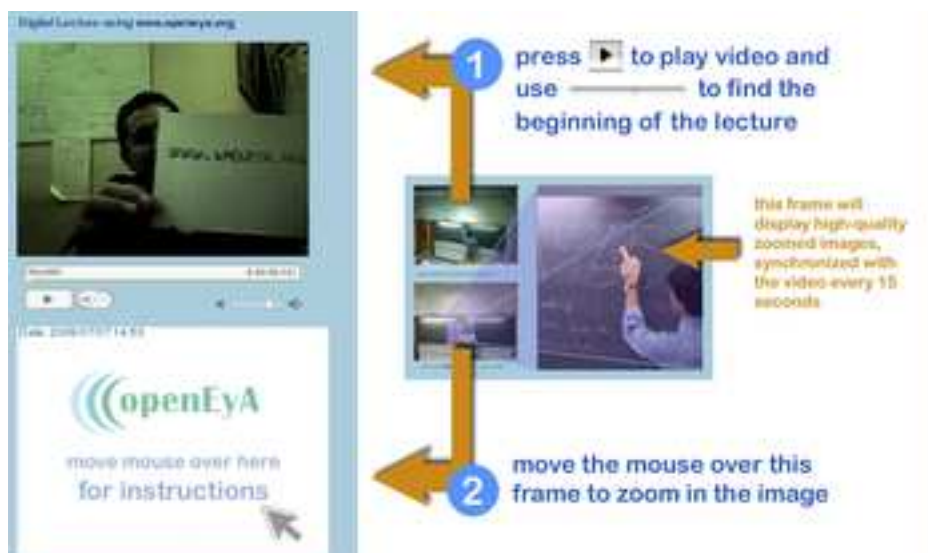
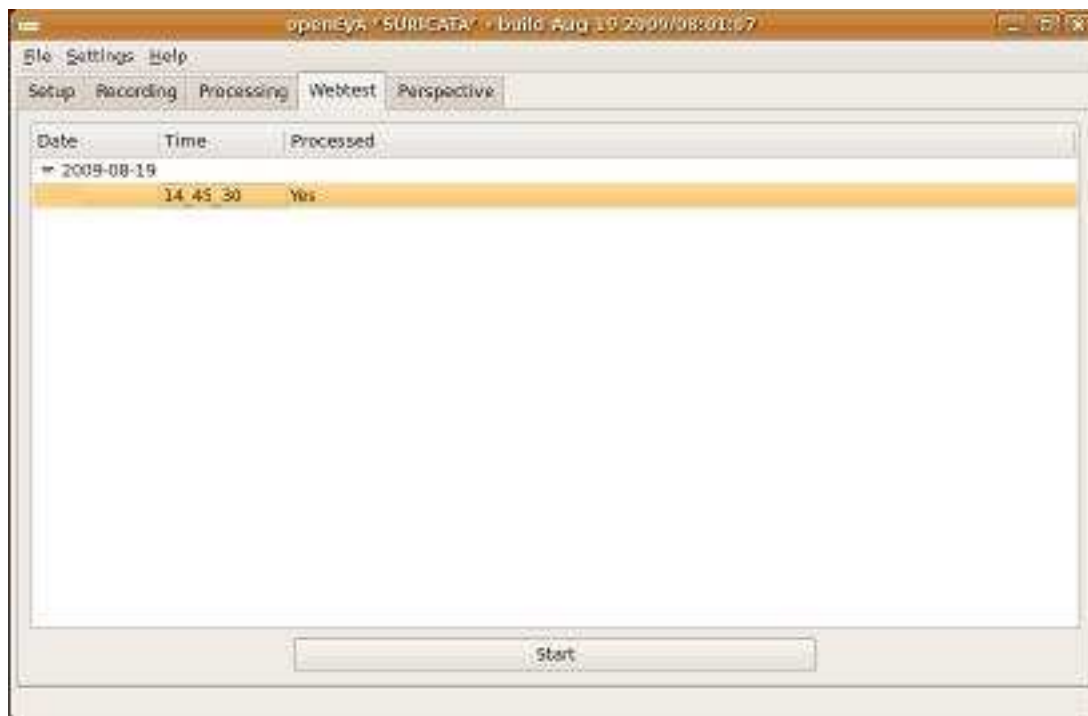
can be also found within the pure text file: 'info.txt', and the Title will appear in the main 'index.html' document for the recording.

These 'info' files can contain inputs:

```
SPEAKERS: ... ..  
LECTURE TITLE:  
CATEGORY:  
FIELD:  
KEYWORDS:  
RECORDING DATE:  
RECORDING LENGTH:  
REFERENCE WEBSITE:  
ABSTRACT:
```

## 6 Web Test

When completed the **Processing** status in the previous Section (Fig.7) you can preview the recording results by pressing 'Web test' button as shown Fig.8.



**Fig.8** (upper): *Example of Web test selection*

**Fig.9** (down): *Example of selected openEya recording to be visualized*

Navigate into the listed directories, select the one you want to view, click into the default 'index.html' file.

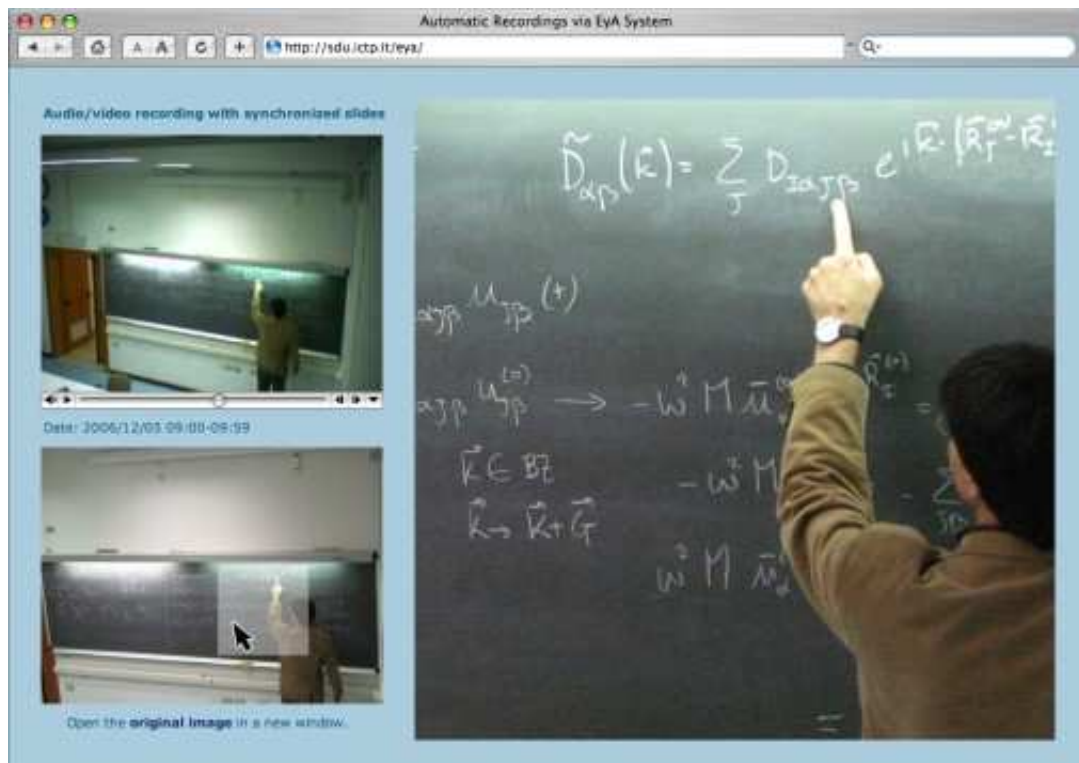
*Wait a few seconds!* and you will then be able to visualize the selected openEyA recording in your default web browser (usually Mozilla) which will open in your screen as in Fig.9

The free Adobe Flash Player need to be installed in your computer!

Please check the Adobe Macromedia website for latest releases (or see Chapter 3 [Install], page 5).

## 6.1 openEyA in Action

*In this example of synchronized and automated openEyA recording with high resolution photos (slides), audio plus video (in Flash format), the arrow opens (OnMouseOver) a high resolution zomed image (on the right) where even a dot can be distinguished. There is also a link to scroll the gallery of all photos taken.*



*Snapshot of an automated openEyA recording*

## 7 Photo Straightening/Reprocess

Another novel feature of **openEyA** is that all photos taken can also be easily straighten out and synchronized to the corresponding audio-video recordings. Select from the **openEyA** GUI (inside 'Principal Tabs' shown in Fig.3) the 'Advanced tabs' tag.

This feature can be used to grab a selected area from **all** the pictures taken. It is useful to retain the relevant information written in a Blackboard (and to save further space disk).

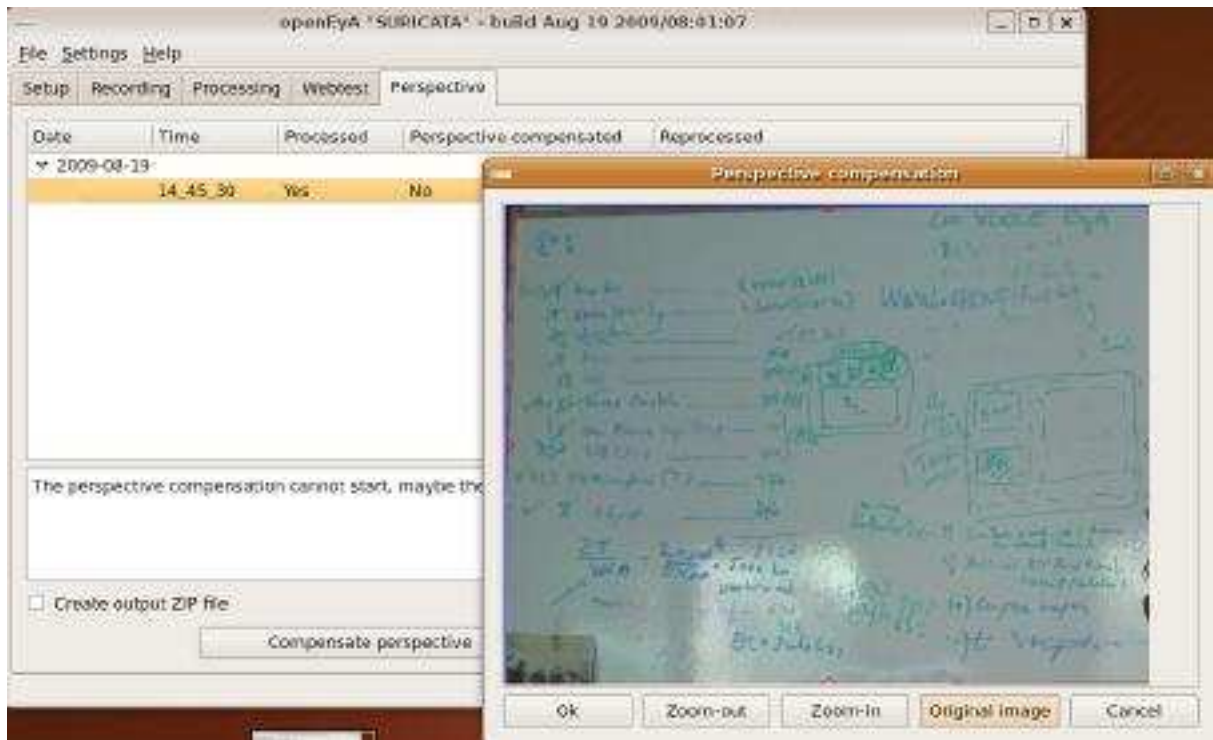
First, it is necessary to process the selected recording to be straighten. From the main **openEyA** GUI (Fig. 4 or 5), choose the **Perspective** option as in Fig. 12. Press 'Start' and the first photo taken will appear on your screen surrounded by a coloured distorted box.



**Fig.12:** Example of selected 'Compensate perspective'.

The digital picture can be zoomed in or out and the coloured (Compensate perspective) box can be adjusted to the area to be straighten out by moving the box corners with the PC mouse. When photos are straighten out, the **openEyA** logo can be cleaned out.

By clicking 'Compensate perspective' or 'original image' you can improve on, and check, the best selected area for the initial picture as in Fig. 13.



**Fig.13:** Straighten photo of Fig. 12 showing the Blackboard area only.

Then press 'OK' to complete this process. Photo Straightening via openEya is done throughout the bulk of the slides in a selected directory with recordings.

Finally, it is also possible to 'Reprocess' the selected recording (data) with the openEya audio-video-slides and save it as a new zip file (to appear with a '\_r.zip' extension).

## 8 Afterward Editing

Another unique feature of openEyA is the possibility of editing any processed or re-processed recording in a subsequent time. Select from the openEyA GUI (inside 'Principal Tabs' shown in Fig.3) the 'Advanced tabs' tag.

This is particularly useful to cut parts of audio/videos, and its respective slides, that needs to be removed for any special reason.



Fig.14: openEyA afterward Editor.

Select a recording from the list of processed files as shown in the GUI above.

By scrolling through the thumbnails of the slides, and selecting those wanted to be removed, the graphics editor allows to **Cut and Synchronize** again the openEyA recordings (see Fig. 14). The processing stage could take several minutes to complete depending on the number of photos taken during the selected recording. A 'Progress Bar' in an extra window will indicate the editing status.

Click on thumbnails to enlarge photos!

The afterward edited, and the original unedited, audio-video-slides are saved in two different directories; the later having the '.proc' extension).

The edited openEyA recordings can also be saved as zip file (with a '\_e.zip' extension) in the recording directory.

## 9 Contacts

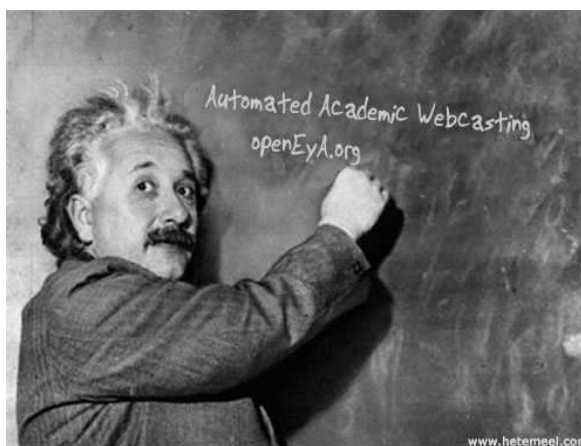
*openEyA is developed and maintained by the Science Dissemination Unit (SDU).*

The Science Dissemination Unit (SDU) of the Abdus Salam International Centre for Theoretical Physics (ICTP) aims at concrete actions to help to bridge the digital and knowledge divide in developing countries and across the north-south divide, in terms of applying low-cost open source information and communication technologies for the dissemination, support and internalization of science.

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For further information or to report Bugs, please contact us at: '[sdu@ictp.it](mailto:sdu@ictp.it)' or visit our project website: '[www.openeya.org](http://www.openeya.org)' to see papers, presentations, conferences, *etc* on (open)EyA Technologies.



... we hope you will "*Enhance your Audience*" using openEyA!

### 9.1 Credits

The openEyA Team in Trieste, Italy is composed by E. Canessa, C. Fonda and M. Zennaro, from ICTP-SDU, working in collaboration with L. Tenze (University of Trieste).

Our sincere thanks go to our sponsor Magic Toolbox at [www.magictoolbox.com](http://www.magictoolbox.com) for providing the JavaScript zoom tool used by openEyA.

..... **Your feedback is most welcome and here acknowledged!**