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# CUNY VirtualizedClassroom™ Creator and Player User's Guide

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## 0. Requirements

You should have the following installed on your Windows system.

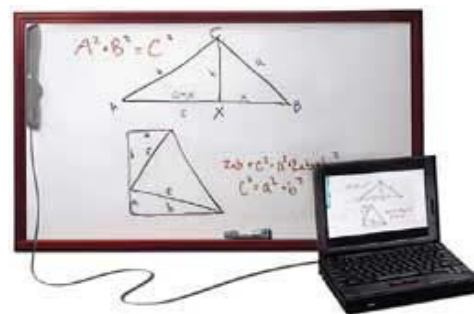
- Microsoft PowerPoint and the PowerPoint recording macro add-in [1] (if you want slides to be included in your presentation).
- Mimio Ink Hardware and Software package [2] (if you want what you write on the whiteboard to be included).
- Omni directional mirror and DV recorder [3] (if you want panoramic or normal video /audio to be included).
- Computer microphone (if you want audio only to be included).
- Java JMStudio



(a)



(b)



(c)

Figure 1. Sensors used in our data collection. (a) Berkeley Powerpoint Recording Add-In; (b) Sony DV camera + RemoteReality Omni360 lens; (c) Mimio Virtual Ink

## I. Data Collection:

Before you record a presentation you must properly setup the individual components. Depending on which types of media you want to include there may be a specific order in which things must be setup.

### 1. Single Media Capture Guidelines

If you want to capture one type of media only, use the instructions below:

(1) **PowerPoint:** There are two ways to play and record a PowerPoint only presentation.

#### A. PowerPoint presentation from your computer.

Start the PowerPoint presentation. Make sure that the PPT recording Add-In window opens. When it does make sure that you type the correct directory into the window. Then show present your lecture as you usually do. After you finish your presentation, all the slides in your presentations are saved as image files (e.g. in JPEG). In addition, a log recording timing information and titles of all the slides is automatically generated and save as a text file (.txt).

#### B. PowerPoint presentation controlled from the whiteboard.

In a classroom setting you can project the PowerPoint presentation onto a normal whiteboard and use your computer to capture it. To do this you must

- First setup the projector and attach the Mimio *Virtual Ink* to the whiteboard.
- Then open the Mimio Ink software and start the Mimio Mouse. The Mimio Mouse allows you to click on the projected image to change to the next slide, so you don't have to go back and forth to a computer.
- After you calibrate the Mouse, start the PowerPoint presentation.
- Make sure that the PPT recording Add-In window opens. When it does make sure that you type the correct directory into the window.
- Then continue with the presentation as you normally would using the Mimio Mouse.

(2) **Whiteboard:**

- First, you must get all of the Mimio Ink hardware setup.
- Then start the Mimio software.
- Next, put the Mimio *Control Panel* somewhere on the whiteboard and load the Control Panel module on the software.
- You will have to calibrate the Control Panel using one of the Mimio Markers.
- After it is setup you can capture what you write on the whiteboard with the software.
- Keep in mind that if you want to make a small change on the board you must use the Mimio Eraser to have the changes reflected in the software.

- When you wish to erase the whole board you should click on the *new board* button on the Control Panel, and then you can use a normal eraser to erase the whole board.

After the presentation, you must *manually* save the whiteboard. In the Mimio software, click on the *export* option which is located in the file menu. Then make sure that you export to **html**. On the popup window make sure that you click on the “**With Dates**” checkbox that is located in the pages section. Also, click on the “**Modified Date**” checkbox in the Properties section. The whiteboard presentation will be saved in a series of html files, one html file (with the time information of the page) for each whiteboard page (in jpeg image). An index.html file is also generated, which will be used to retrieve the white pages.

(3) **Audio:** You just need to setup the computer microphone, and in the PPT recording Add-In, simply check the “Audio” checkbox. A .wav file will be saved, and it is synchronized with the slides.

(4) **Audio/Video:** You just need to setup the Omni directional mirror and DV camera if you want to capture the entire classroom in 360 degrees or just setup the DV camera to get a normal video capture. Start recording right as you click “OK” button in the PPT Recording Add-In pop-up panel so that the video stream will be synchronized with the slides. Right now you should save video either in an .avi or in .mpg file.

## 2. Multi-Media Capture Guidelines

When capturing more than one type of media at a time, there may be a specific order in which you must setup. Unless listed below, you can setup the components in any order.

### (1) PowerPoint and Whiteboard:

- You must first setup the projector to display on the whiteboard.
- Then setup Mimio hardware and load the software.
- Then you must setup and calibrate the Mimio Mouse and Mimio Control Panel.
- After you calibrate the Mimio Mouse and Control Panel, use one of the Mimio markers to put an ‘X’ on each corner of the projected image as it appears on the whiteboard. Then click on the new page button on the Control Panel. The first page will be used for registering Mimio pages with PPT slides.
- Then start the PowerPoint presentation making sure to put the correct directory in the popup window.
- Now you can write anywhere on the whiteboard (including over the project slides) and the presentation will be accurately recorded.

**Note:** you can put the Control Panel anywhere on the whiteboard, but if you plan on having a one-to-one relation between PowerPoint slides and whiteboard pages then the best presentation will be created if you put the Control Panel inside of the projected image of the PowerPoint. Then, when you wish to change slides click on the Mimio Control Panel new page button with the Mimio Mouse marker, this

way both components will register the change at the same moment. This way the slides and whiteboard will change at the exact same moment during playback.

However, if you plan on having more than one slide for one whiteboard page or visa versa then put the Control Panel anywhere on the whiteboard. Then you should advance slides by using the Mimio Mouse on the projected image, and make new whiteboard pages by clicking on the new page button on the Control Panel with a Mimio marker.

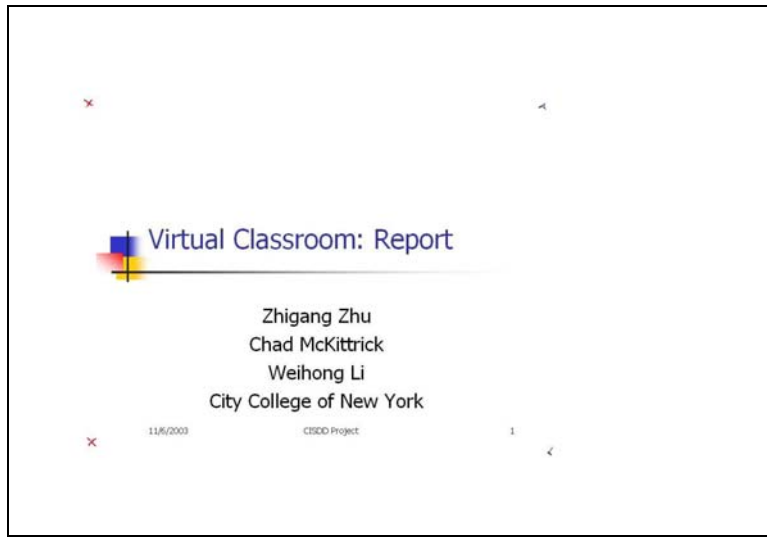


Figure 2. Markers for registering PPT slides and Mimio whiteboard pages. Four “x” markers are written on the whiteboard corresponding to the four corners of a PPT slide projection on the whiteboard.

**(2) PowerPoint and audio:**

You must first attach the computer microphone. Then you must setup the PowerPoint as described in the PowerPoint only explanation. However make sure to click on the record audio check box so that the audio is recorded while the PowerPoint presentation is shown.

**(3) PowerPoint, whiteboard, and video:**

The setup steps are the same as those for the PowerPoint and whiteboard, however, make sure to setup and record the video as you want before you start the presentation.

**(4) PowerPoint, whiteboard, and audio:**

You must first attach the computer microphone. Then you must setup the PowerPoint and whiteboard as described in the PowerPoint and whiteboard section.

**(5) PowerPoint, whiteboard, video, and audio:**

The instructions are the same as described in PowerPoint, whiteboard, and audio, except that you must install the video equipment before you begin the presentation.

### III. Data Processing

Right now the two main data processing modules are standalone modules (in Matlab as well as C++): (1) generation of the panoramic video from the omnidirectional video and (2) combination of a Mimio white board image with the corresponding powerpoint slide image. However, in the course of the projection, we are going to integrate them into the Virtualized Classroom program (we have successfully connected the basic algorithm of the panoramic transformation module into VC creator/player program).



(a)



(b)

Figure 3. Transformation from an original circular image sequence to a cylindrical panoramic sequence. A corresponding pair is shown in (a) and (b).

#### 1. Panoramic Video Generation

There are 3 steps for transforming the donut images into cylindrical images.

**(1) Extracting image sequence from the omnidirectional video.**

This step is done first by using a tool called “VideoPak”, which can convert the DV codec AVI file to a regular codec AVI file (Microsoft Video 1), then the new AVI file can be read by another tool called “rv2”, which can read an AVI file, and generate the image sequence. Both tools can be downloaded freely.

**(2) Transforming the omnidirectional images to panoramic images**

This step is done by using the algorithms from [4]. It was first implemented in Matlab. Then Matlab code is converted to VC++ code.

**(3) Generating a new panoramic video based on these panoramic images**

This step is done by using the free software “Bink and Smacker” Video tool, which can generate a desired AVI file from the image sequence.

## 2. Registration of whiteboard images with PPT slides

This part is done using our planar image transformation algorithm. Using 4 pairs of points, i.e. the four corners of a PPT slide image, and the four “x” markers in the first Mimio whiteboard page, we can perform the planar image transformation based on projective transformation. The algorithm was first implemented in Matlab, then it was translated into VC++ code.

Note. In order to use the Matlab code to do the combination (registration), first it need to get the coordinates of 4 points. It is not a hard task to automatically detect the four markers in the whiteboard image. Alternatively you this can be done manually in any image processing software, such as photoshop, paint, or by using the Matlab function ginput() to get the coordinates. After the registration parameters are calculated from the first frame pair, the two image sequences (PPT and whiteboard images) can be combined.

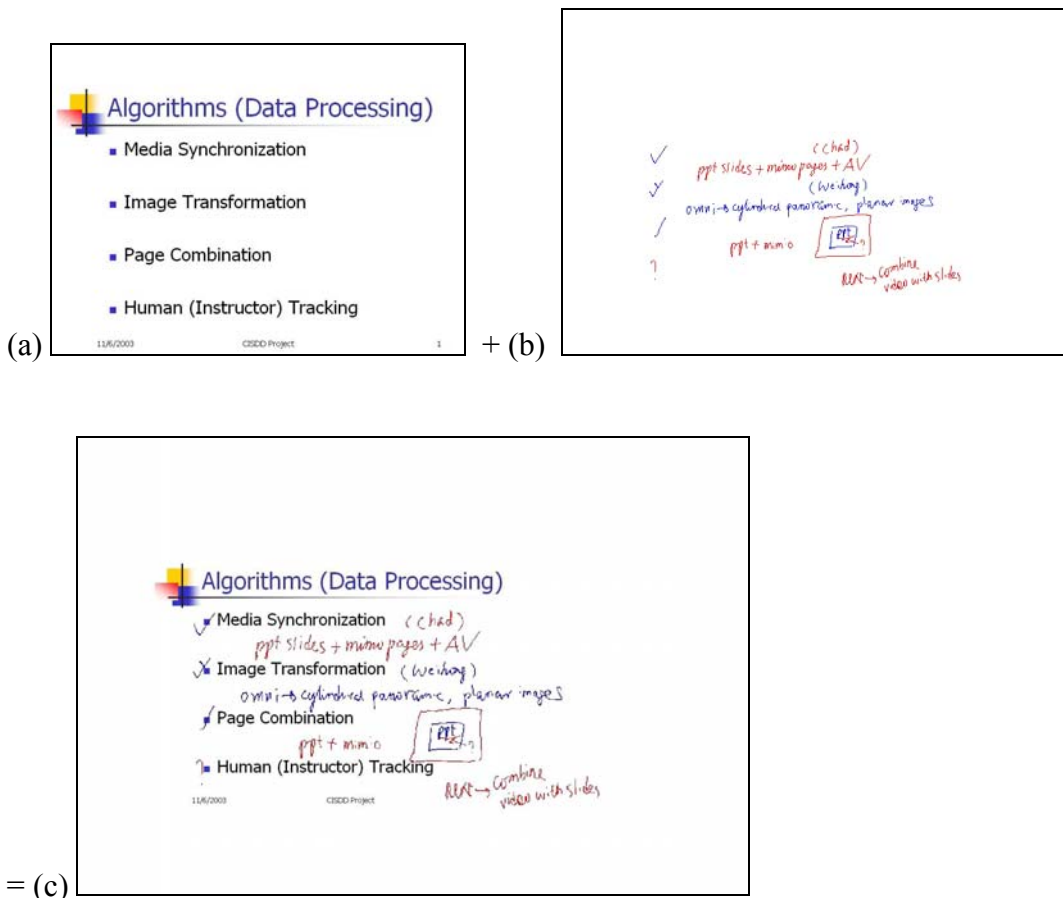
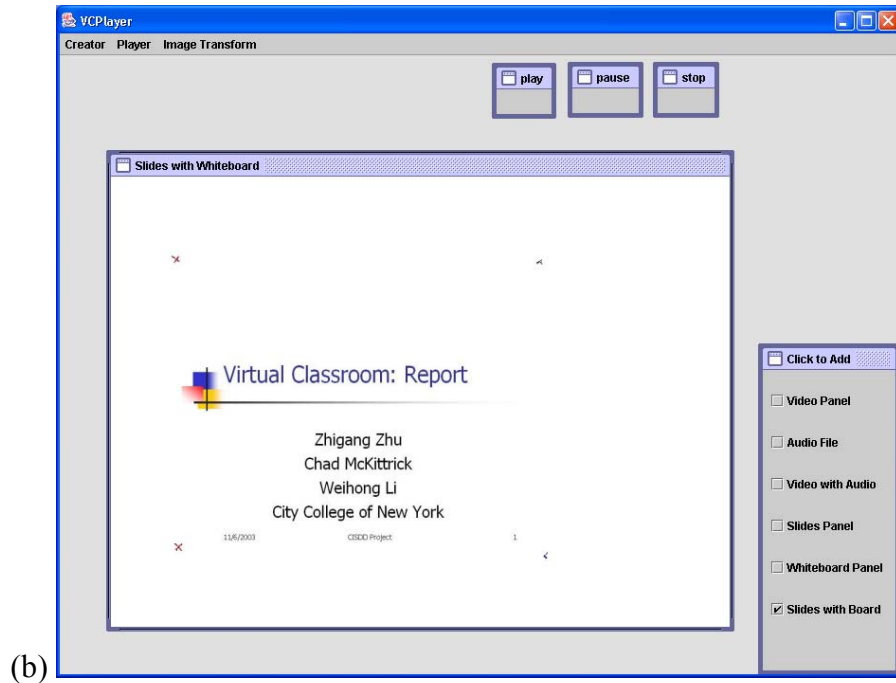
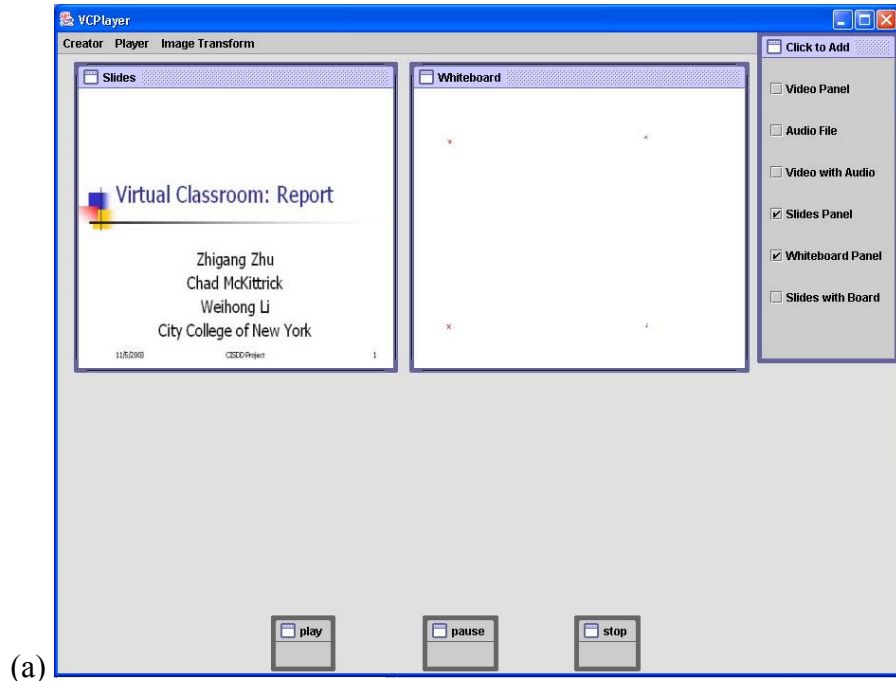
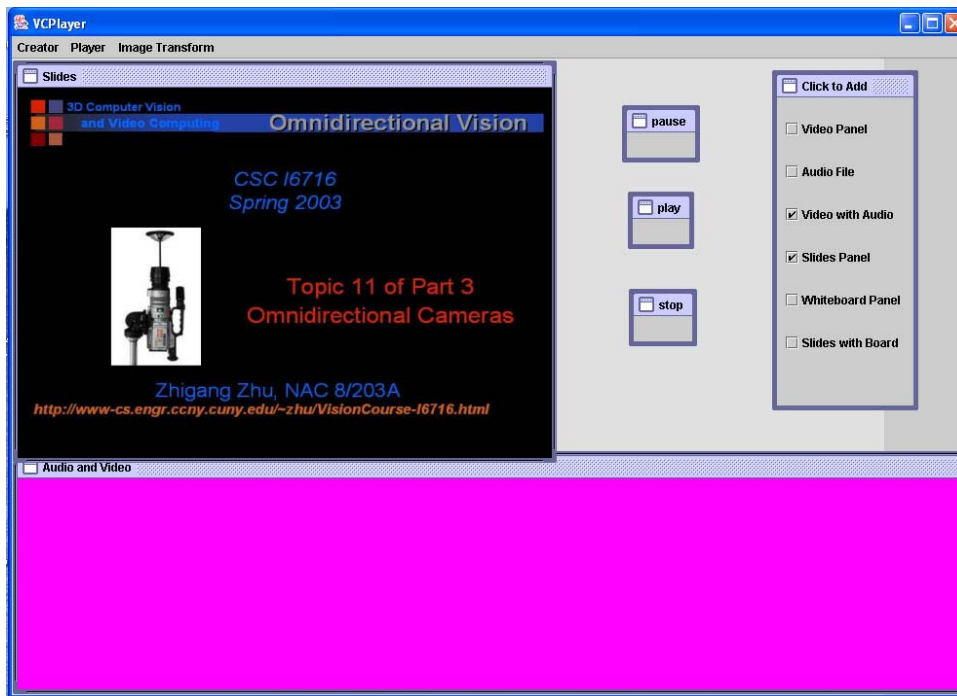


Figure 4. The combination of (a) a PPT image and (b) a whiteboard image is shown in (c).

### III. Virtualized Classroom Creator

Once you finish with your presentation, almost everything has been taken care of for you by the various software/hardware sensors (Virtual Ink, PPT Add-In, Microphone, Camera, etc). However before you use the Virtualized Classroom Creator to generate a digital presentation you must make sure that all of the presentation files are all in the same folder.





(c)

Figure 5. Three examples of the VC Creator Interface. (a) Separate PPT and Whiteboard pages; (b) Combined PPT and whiteboard pages; (c) PPT slides and a panoramic audio/video window. Note the differences in locations of various windows and buttons.

Even after you have recorded and saved a *real* presentation, but you still need to create a *digital* presentation before it can be played. Here are the simple steps you need to follow:

- (1) Open the Virtualized Classroom program and open a new Creator page. There will be a floating frame that has checkboxes on it.
- (2) Use these checkboxes to add or remove presentation components as you like. Each time that you click on one of the checkboxes a popup window will appear directing you to click on a certain file so that the program can load the proper information.
  - a. For Slides Panel, load the PPT log file (.txt)
  - b. For Whiteboard Panel, load the whiteboard index.html file.
  - c. For Video with Audio or Video Panel, load the mpg or avi video file
  - d. For Audio file, load the .wav file
  - e. For Slides with Board, load the PPT log file (.txt). The VC Creator/Player assumes that the whiteboard information is in index.html file, and the combined pages (from PPT and whiteboard images) have been generated.
- (3) After you add presentation components, the application window will contain frames encompassing the presentation video or slides. You can resize and reposition any of the frames (including the ones representing the buttons). Keep in mind that the Creator works in a WYSIWYG fashion, thus the frame window



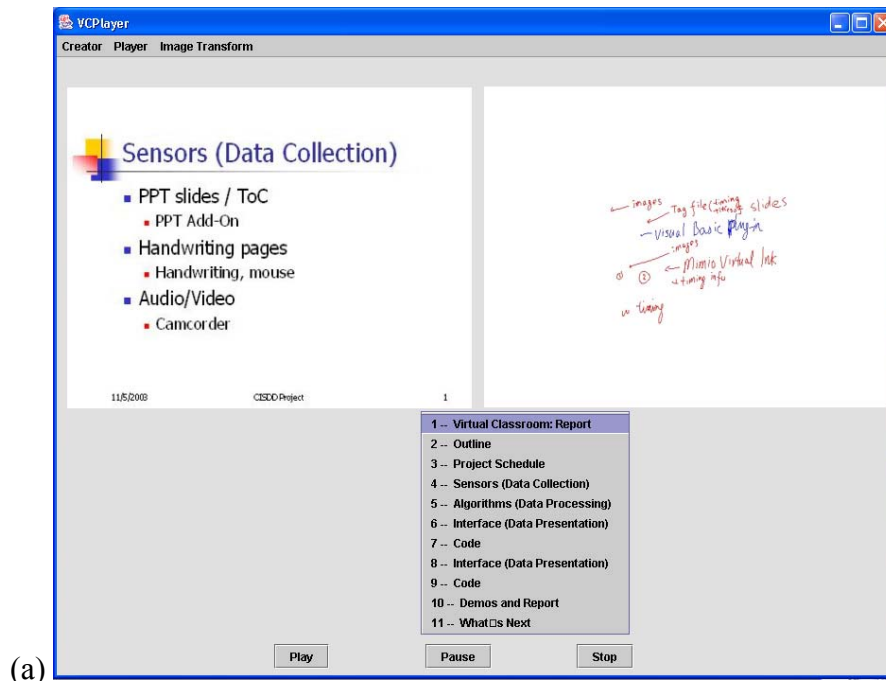
will be larger than the component will be when it is played. So, even if frames overlap a bit, if the content in the frame is positioned as you want, the presentation will play as you want.

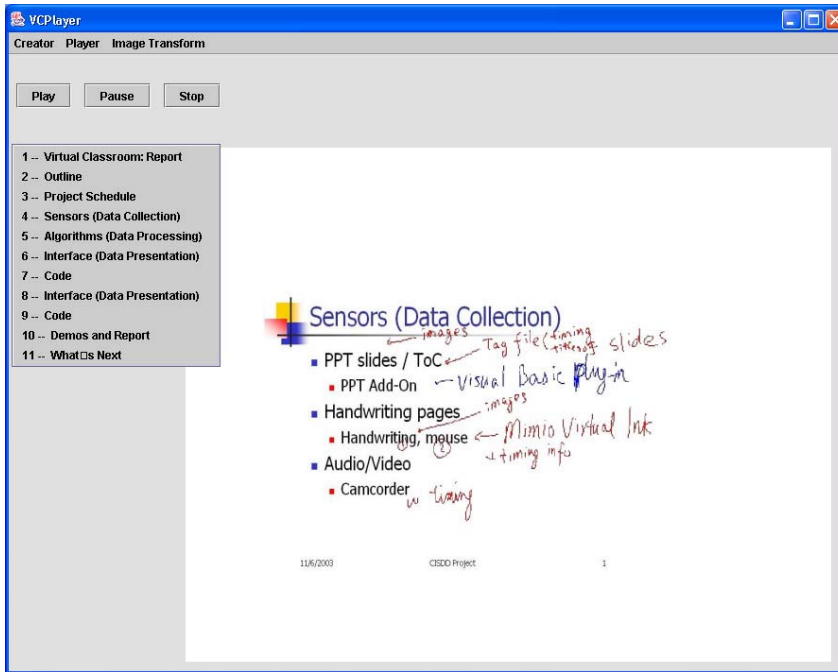
- (4) Once you have included all of the components in your presentation you need to save the presentation to a .vcp file. Go to File and click on save. Give the file any name that you like and click on save in the popup window.

Now the presentation is ready to be played in the Player.

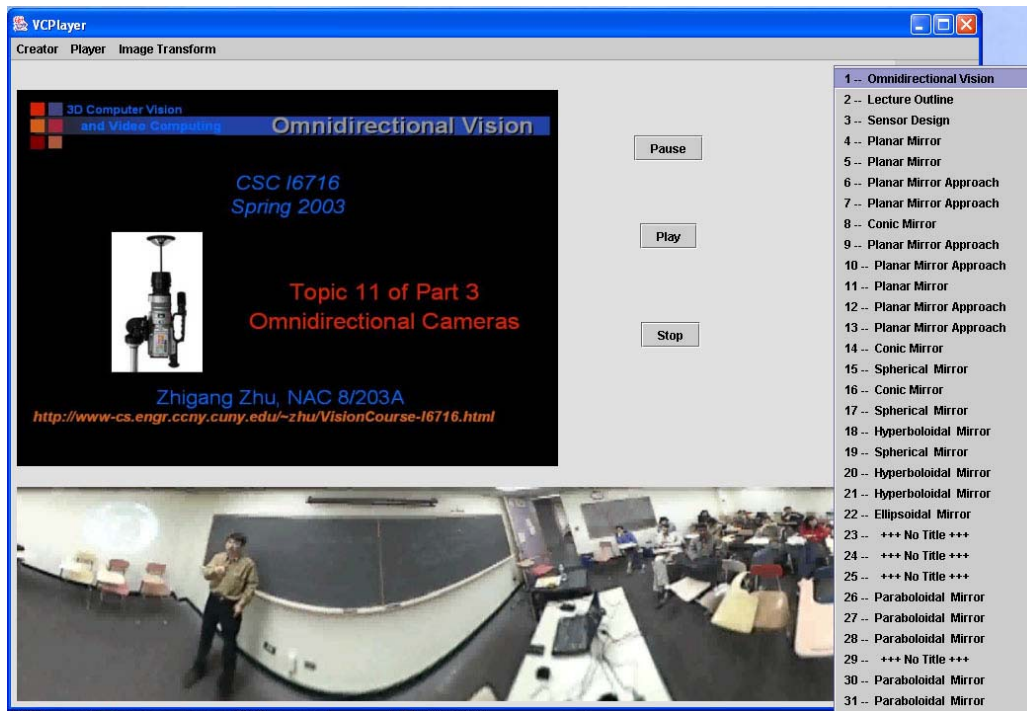
## IV. Virtualized Classroom Player

When you want to play a presentation all you have to do is click open under the Player menu. It will take a few minutes for the presentation to load and to transform into the right sizes. Once it has loaded you can click on the “Start” button to start the presentation from the beginning, or, if there are PowerPoint based slides, you can right click to get a slide based Table of Contents to guide the presentation to a specific topic in the presentation. All the media contents are synchronized by using the timing information ( from PPT log file, whiteboard html file, and video/audio timing information).





(b)



(c)

Figure 6. Three examples of the VC Player Interface. (a) Separate PPT and Whiteboard pages; (b) Combined PPT and whiteboard pages; (c) PPT slides and panoramic audio/video window. The pop-up Table of Contents (TOCs) are shown in all three examples, with various user-selected locations.

**Reference:**

[1]. PINY ELN: e-Learning Lecture Navigator, <http://westlabp4-7.poly.edu/webpage/index.htm>

[2]. Mimio Virtual Ink, <http://www.mimio.com/index.shtml>

[3]. RemoteReality, <http://www.remotereality.com/>

[4] S. K. Nayar, Generation of Perspective and Panoramic Video from Omnidirectional Video, Proceedings of DARPA Image Understanding Workshop, 1998.