Development of Multipurpose Integrated Multimedia Presentation System Based on the CCM Algorithm

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***Abstract*—People use many types of files for each of the multimedia element such as file for videos, audios, images, graphs, animations, texts and also live video streaming. However, people use a different application for presenting those different types of files for each multimedia element. This paper describes a multipurpose integrated multimedia presentation system (IMPS) based on channel controller model (CCM) algorithm. By developing and applying the CCM algorithm into the existing multimedia player (as an extension of our previous research), it is improved and become an integrated multimedia presentation system. This application system can be operated in many types of multimedia players, video previewing and capturing, and slide viewer. As a result, this multipurpose IMPS can be applied in areas such as education, entertainment and security.**

Keywords-multimedia presentation system; multipurpose; integrated presentation system; channel controller model.

I. INTRODUCTION *(HEADING 1)*

Currently, in order to present the various multimedia elements in many areas, people generally, utilize various multimedia applications. For instance in security area, a security officer wants to watch a preview of CCTV while listening to music. A teacher may needs to present the following sequentially: several movie files with various formats, followed by live video streaming, PowerPoint©, images and Flash© files. Delays between presenting these files may be destructive and may lose the continuity of the presentation that causes the audience losing their attention. In common way, the teacher needs more than one multimedia presentation application or another way is to convert all of the movie files into one file format. Of course, this needs extreme hard work from the presenter that only has a few experiences in multimedia players (that used as presentation system) and video converting. It is not flexible and ineffective task for the presenter or the teacher that must present some various types of files on multimedia element with various multimedia players.

Windows Media Player©, Media Player Classic with media codec included and AllPlayer provides more services to accommodate more multimedia files included Flash© animation and live video streaming. However, they are not employed with the extended desktop (dual view) feature. They only have single file list, no feature for audio/video recording, do not support dual or multimode player and there is no feature to switch pleasantly between different files type. It implies that basically these players are designed for (home or personal) entertainment use only. Especially with its control panel user interface, it needs to be redesign so make more flexible, powerful (multimode player) and possible to be used in multi purposes.

This paper describes the presence of multipurpose integrated multimedia presentation system (shortened as IMPS or also we named this product as IMPlayer). Since this application system was developed from the improvement of our previous research [9], the IMPS can accommodate many types of multimedia element files, support multimode media player and dual view features. We have developed Channel Controller Model (CCM) algorithm which is aimed to improve our multimedia player in order to be a multipurpose integrated multimedia presentation system.

This paper is organized as follow: section one is on introduction, section 2 is about related work, section 3 describes the improved system architecture, section 4 explains the channel controller model, section 5 is the applications of IMPS, section 6 discusses about the other application of IMPS with multimode player and then the last section is the conclusion, included the future works.

II. RELATED WORK

In the past decades, researchers have studied and developed presentation system. Schnepf JA., et al. [1] has developed the Flexible Interactive Presentation Synchronization (Flip). It is a tool for supporting a presentation with event-based model. Turban G., et.al [2][3] have developed an educational presentation system which has been approached by slide-based model with scenarios. Liu Q., et al.[4] develop EPIC, a presentation system that uses multiple display. It is a tool to support presentation with considering the quality of views of the audience members. EPIC support PowerPoint© and other multimedia file types such as some video, audio, and image file formats. Then, a system and method for adaptable presentations system has been developed and patented by Salesin D., et al. [5]. Bailey et al. [6] has developed the Nsync, a multimedia

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synchronization toolkit. The commercial multimedia presentation system (made by Crestron) which is available in the market nowadays needs more additional hardware components [7]. Recently Lanir J., et al. [8] develop MultiPresenter, a slide-oriented presentation system that concern to support a large and multi display presentation. MultiPresenter emphasizes the flow (delivering) of slides presentation and various presentation styles.

From this, we propose a novel multimedia presentation system that integrates all of multimedia elements with flexible way and can be utilized in several purposes (areas). We developed a multimedia presentation with different approach by redesigning the user interface and implement the CCM algorithm.

In the previous research, we have developed a multimedia player which is able to give performances such as support dual view and enables to accommodate numerous file types of video, audio, image, and PowerPoint©. However this player does not have Flash© controller feature, live video streaming services and cannot support multimode player [9].

In [9] the system architecture is based on disable-enable of a multimedia channel algorithm. Through this method only one mode of player can be activated at a time. This player could not support multimode player. That is, this player is not a fully integrated multimedia player and not flexible to be utilized in multipurpose. According to [8][10] adding a live (real time) video streaming feature and support PowerPoint© file, it will make the player not only function as a player but more appropriate as multimedia presentation system. The improved system architecture and channel controller model algorithm have make the player more flexible and powerful. It is possible for the system to be a multipurpose integrated multimedia presentation system.

III. SYSTEM OVERVIEW

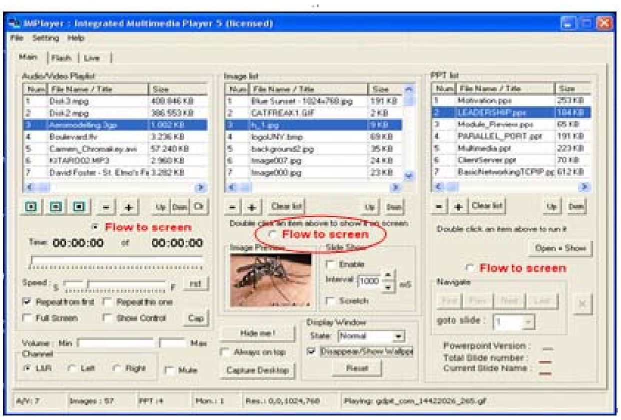

Figure 1. The user interface of the Multipurpose IMPS

The user interface of the IMPS uses single compact control panel. Refer Figure 1, all of the multimedia elements are arranged and controlled in one main window. The control panel has three tab-pages: Main, Flash and Live. The Main tab contains three file list, audio video, image and PowerPoint© file lists. The Flash tab contains one file list to take in flash animation files (swf). The Live tab contains some menus for controlling the live video streaming.

A. System Architecture

The overall improved system architecture of the multipurpose IMPS is depicted in Figure 2. It is more complete due to its five channels of multimedia stream. The improvement are in the addition of Flash© channel, Live video streaming channel and support multimode player based on the channel controller model (CCM) algorithm. A particular multimedia elements controlling routine will watch any input from user. If a multimedia element file type selected, the system will process the file by one of audio/video, image codec, PowerPoint©, or ActiveX. The output is a multimedia stream that will be placed into the appropriate channel. The camera controller routine will control the camera by choosing the appropriate device driver, start or stop preview, start or stop recording. It also controls the display window in the secondary monitor.

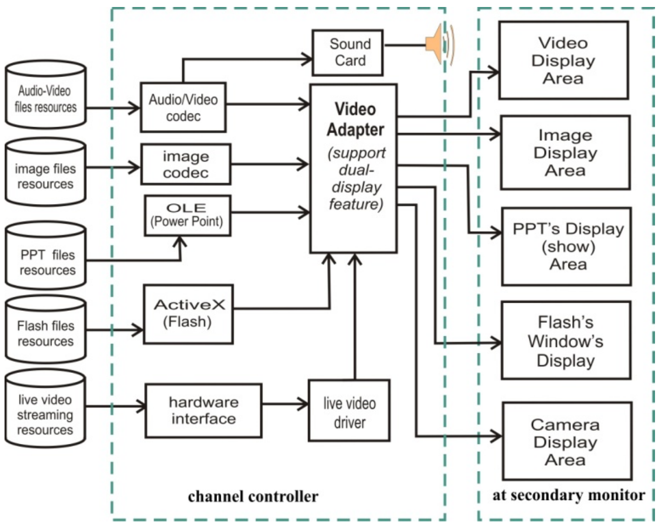

Figure 2. The improved system architecture

Although all of the display windows (video display, image display, flash display, and PowerPoint© display and camera display window) are shown in the secondary monitor, only one output channel is allowed to be shown at one time. It depends on which channel chosen by the user. Since there are five channels in the system, it needs a controller to manage and to arrange all of the channels' processes.

B. The Channel Controller Model

The channel controller model is an empirical model which is specifically built to be utilized by the system architecture of the IMPS. The channel controller main function is to control those five channels of the multimedia stream so that the IMPS can perform as multimode player, support dual view feature and finally it can be used in flexible ways.

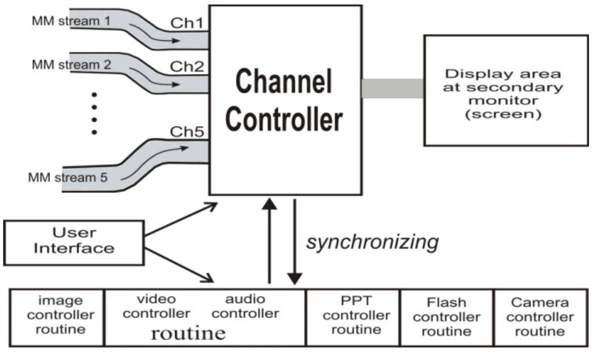

Figure 3. The Channel Controller model

In Figure 3 there are five channels (ch_1, ch_2, ch_3, ch_4, ch_5) as the input to the controller: video/audio channel, image channel, and Powerpoint© channel, flash© channel, and live video streaming channel respectively. Inside the channel controller block actually exists two flow selectors which has a duty of selecting one or two channels to be flown into secondary monitor depending on the data inputs from multimedia controller routine block.

IV. THE CCM ALGORITHM

The CCM algorithm mainly uses show-hide technique. Through this technique, the IMPS can activate more than one multimedia channels. The brief explanation about CCM algorithm is as follows:

1. Assign $Ch_1 \rightarrow V_S$, $Ch_2 \rightarrow I_S$, $Ch_3 \rightarrow P_S$, $Ch_4 \rightarrow A_S$, $Ch_5 \rightarrow L_S$. $Ch_{1..5}$ are the channel 1 until channel 5 respectively. V_S: video stream; I_S: image stream; P_S: e-presentation or slides stream; A_S: Flash© animation stream; L_S: live video streaming. $Sch_{1..5}$ represent the state of channel 1 until channel 5. $Sch_{1..5}$ can be false condition (the channel is inactive) or true (the channel is active). Sch_2 is designed as default active channel and always true. *Fsel1*: flow selector 1, it is a channel pointer that will point only one channel at a time. Fsel is designed to point all channels except channel 5. *Fsel2* is a special pointer for channel 5.
2. Set Sch_2 = true; $Fsel \rightarrow Ch_2$. Set Sch_1, Sch_3, Sch_4, Sch_5 = false;
   If (Sch_1=true) || (Sch_3=true) || (Sch_4=true)|| (Sch_5=true) then
   if $Fsel1 \rightarrow Sch_n$ (the new selected channel among Ch_1, *Ch3, Ch4*) then show (Ch_n); it means show the Ch_n, output to secondary monitor.
   Hide others output channels
   Else Sch_n persistently activated
   but on Hide mode and show (*Fsel1*)
3. If (Sch_1=false)||(Sch_3=false)||(Sch_4=false)||(Sch_5=false) then
   If $Fsel1$==Ch_1 then *show* (blank color/logo)
   If $Fsel1$==Ch_3 then *show* (wallpaper);
   If $Fsel1$==Ch_4 then *show* (blue color);
   else Ch_n persistently inactive, *show* (*Fsel1*);
4. If ($Fsel1 \rightarrow Ch_1$) ||..||($Fsel1 \rightarrow Ch_4$) then
   If (Sch_n == true) then *show* (Ch_n)
   Else if (Sch_n==false) then *show* (wallpaper)

The algorithm starts by initializing and assigning some variables which are used to hold each channel. Essentially, in this step, the program will create and provide five particular areas at secondary monitor to be used as an output display for the five channels. Initially, only one output display (Ch_2) will be shown and the others are hidden, see Figure 4. Note that the status of Ch_2 (image and graphic streams) is never changed to inactive condition because the output of Ch_2 can be used as a wallpaper of the display area at the secondary monitor.

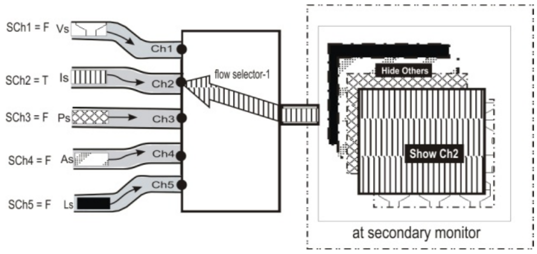

Figure 4. The default CCM initial setting

Consider the item number 3, if the user changes one of the $Ch_1..Ch_5$ state to true, and if the flow selector 1 is pointing to that channel, so immediately the output of the just activated channel will be shown on the secondary monitor and other channel's output is hidden. However, if the flow selector is pointing to another channel, the just activated channel is persistently activated and the system would display the channel's output that pointed by flow selector at that time. This is how this multimedia presentation system can support multimode player. Then if the selected channel's status is inactive so the secondary monitor would display the wallpaper.

Specifically Ch_5 (lives video streaming channel) there is a special flow selector (*Fsel2*) for pointing this channel. In Figure 5, `Fsel1` can be moved pleasantly between *Ch1..Ch4* so the output of Ch_5 can be joined with the output of the selected channel that pointed by *Fsel1*. This setting performs dual mode players with live video streaming.

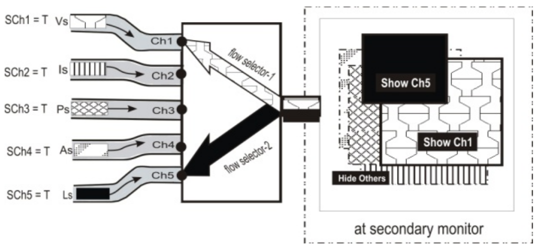

Figure 5. The setup of CCM on dual mode player (video and live streaming video)

The IMPS can be operated in several modes by changing the status of CCM's parameters. For instances, to do as PowerPoint© viewer set SCh_3 =true, $Fsel1 \rightarrow Ch_3$, to do as karaoke or movie/music player $Fsel1 \rightarrow Ch_1$ and SCh_1 =true and to do as CCTV system $Fsel1 \rightarrow Ch_5$ and SCh_5 =true. From this, the IMPS is applicable in some purposes.

V. THE APPLICATION OF IMPS

The following subsections illustrate how the IMPS can be used in education, entertainment, and security.

A. *Education*

Let's say, a teacher or a presenter has five PowerPoint© files that interrelated one to another. In the middle of the presentation, while presenting a PowerPoint© file sometimes it needs to present another PowerPoint© file and then back again to previous PowerPoint© file. Normally the presenter has to find the other files in stored memories. If dual view feature is not utilized, it will somehow cause eyesore to the audience and can disturb the flow of the teaching process. By using the IMPS (Figure 6), this case is easily solved by managing and including many PowerPoint© files into single file list so the presenter is flexible to select which one the PowerPoint© file that will be presented.

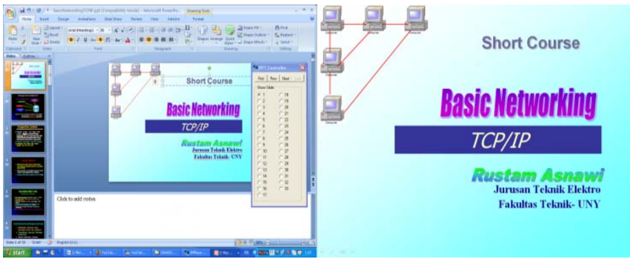

Figure 6. Figure 6. A sample application of IMPS as PowerPoint viewer

During a complicated presentation, the presenter may have a lot of topics and it implies there are many multimedia files to be presented. Each file need interrelation or interlinks (non-linear presentation). For an example in a presentation of a slide need an addition remark that stored in image file (JPG, GIF, or BMP) and video files (MPEG, AVI and flv). If these files are included in that slide, it makes the file size of PowerPoint© bigger and then it will make the execution time longer. This problem can be overcome by applying hyperlinks refer to these files. Nevertheless this method is not effective because if the destination file does not exist, it can cause trouble during the presentation.

With the IMPS, it can be done by placing each multimedia element files into the appropriate file list and then the presenter can present it in a flexible way [11]. This IMPS's user interface has a quick menu to switch fast, freely and pleasantly between presenting different multimedia file types (see Figure 1).

A. *Entertainment*

In entertainment area, the IMPS usually operated as home entertainment system such as MP3 player, MIDI player or DVD/VCD player to perform a karaoke system. This system support dual view features so it is suitable to perform a karaoke system. The secondary monitor is only to display the movie pictures. The menus for selecting, managing, and controlling the movie files are on primary monitor. Another possibility that can be used from the IMPS is, as image viewer. Since this IMPS support multimode player therefore from this IMPS a person can show a sequence of ten images and at the same time listening to the favorite musics.

B. *Security*

A security team such as at an office, hotel, and department store usually use CCTV security system to monitor indoor or outdoor surveillance. The existing CCTV security system uses devices like TV monitor, Digital Video Recording (DVR) and video compressor. VCR is for recording a sequence of video capturing and video compressor for combining two or more video signal that comes from CCTVs.

The IMPS can be implemented into the CCTV security system. The output of live video streaming is displayed at secondary monitor (can use a TV monitor) and the primary monitor is the view of menus to control the entire attached CCTV cameras in the computer. The result of video capturing is stored in internal memories of the computer.

VI. DISCUSSION

Some differences between this IMPS and the previous multimedia presentation system are the design of the control panel user interface that separate each multimedia elements in different file list and provide a way to switch quickly between each multimedia elements. Moreover supporting dual view feature and multimode player make the system enable to integrate some multimedia elements. The benefits from these IMPS's features are that the IMPS can be utilized to present multimedia in various purposes. Actually, the IMPS is applicable to be utilized in wider fields and purposes than already described above.

The usage of multimedia varies in various fields. Therefore, many domains of the user of the multimedia can be obtained. For instance, in the entertainment field, user needs multimedia presentation for karaoke, listening to music and watching movies. This user's domain does not need more complex multimedia elements or multimedia files such as graphic files, flash files, and power point files. When the IMPS are used in medical field, of course its user interface must be different than the one utilized in educational or security field. For a person who has physical impairment such as blind, mute and deaf perhaps needs to playback some multimedia files particularly audio (music) files. Basically, all of the user's domains need specific user interface design.

The IMPS user interface can be enhanced in order to extend the coverage of its user's domain. One way is, to redesign and implement the personalized user interface with multimodal and adaptive user interface.

VII. CONCLUSION & FUTURE WORK

The algorithm of channel controller model (CCM) with show-hide technique has updated to the previous algorithm model with enable-disable technique. By applying the show-hide technique in the CCM Algorithm, it provides a multimode player feature in the IMPS. The integrated multimedia presentation system that based on the CCM algorithm can be used in some areas or fields (multipurpose).

By utilizing the IMPS in educational area, a non-linear and linear presentation can be performed. In entertainment area this IMPS can be used to provide home entertainment such as karaoke system, movie player, and so on. The live video streaming controller feature can be used in security area for supporting CCTV and auto video capturer system. Some possible area or user domain (such as in medical area and person with physical impairment) can use this system with must be improved its user interface.

In the future, although at present the multipurpose IMPS could be utilized in some sectors or fields but the control panel user's interface of this IMPS still has to be improved into personalized user interface.

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