Design of a Personal Live Broadcasting System

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Abstract. Nowadays, web browsers provide video playing facility and watching video is one of the most popular usages in Internet. As the popularity of watching video increased, demand for personal broadcasting was initiated. AfreecaTV and USTREAM are examples of popular personal broadcasting systems. These existing systems suffers from the following shortcomings: a lack of evaluating contents, a lack of real-time monitoring and controlling broadcasting status, and the delay time from content generation to broadcasting is too long. This paper introduces our design of a live broadcasting system that overcomes those shortcomings.

Keywords: personal live broadcast, cue sheet, prompt, caster.

1 Introduction

Television (TV) is a telecommunication medium for transmitting and receiving moving images with or without accompanying sound. Commercially available since the late 1920s, the television set has become commonplace in homes, businesses and institutions [1] and TV is the most popular resource people rely upon to get relaxation and at the same time useful information such as news. Meanwhile, the Internet is a global system of interconnected computer networks that use the standard Internet protocol suite (TCP/IP) to serve billions of users worldwide. The Internet carries an extensive range of information resources and services, such as the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support email. They have invented several new services by combining these two powerful and popular creations. The followings are just few of them.

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Internet Protocol television (IPTV) is a system through which television services are delivered using the Internet protocol suite over a packet-switched network such as the Internet, instead of being delivered through traditional terrestrial, satellite signal, and cable television formats [3]. IPTV services may be classified into three main groups: live television, time-shifted television, video on demand (VOD).

Internet television (Internet TV, or Online TV) is the digital distribution of television content via the Internet [4]. Web television (web TV) is original television content produced for broadcast via the World Wide Web [5].

Live broadcast generally refers to various types of media broadcast without a significant delay. Personal broadcasting is a term for participatory journalism that focuses on television webcasting over the mobile internet [6]. AfreecaTV and USTREAM are examples of popular personal live broadcast systems.

These existing systems lack of real-time management functions. In other words, any subscribed user can take any video including suggestive or violent video and broadcast it on the Internet without any restriction. This paper describes our design of a personal live broadcasting system that provides management functions such as monitoring channels and stopping programs to system managers.

## 2 Description of the System

What the personal live broadcasting system does is best described in Fig. 1. ‘Live Video’ in the figure shows the video being taken by the webcam, ‘Contents video/image’ shows a reference image, ‘Combined video’ shows the result of computer graphics that will be broadcasted via terrestrial broadcast or internet.

![Fig. 1. Conceptual description of our personal live broadcasting system](image)

The live video is taken by a caster and there could be many casters. Therefore, we need a ‘Broadcast management system’ that assigns time slot to a caster, ‘Live cast’ that takes video stream from the caster and transfers it to computer graphics. The computer graphics sends a request to find a reference image to ‘Live broadcast DB’ that searches for the requested image from ‘Contents data provider’ via and delivers it to ‘Computer graphics’. ‘Computer graphics’ combines the live video with the reference image, transcodes the resulting video into HDMI or SDI and IP signal. The HDMI or SDI is broadcasted to TVs and Multimedia Messaging Service devices through terrestrial broadcast stations whereas the IP signal is streamed out through Broadcasting System. The system is described in Fig. 2.
3 Design

We need four servers and a broadcasting switcher. One of the servers will manage the image files and it is called 'File Server', another one will be the 'DB server' that receives a request and finds the file name of the retrieved image, another one is 'Interface Server' that delivers requests from the 'CG Server' to 'DB server' and transfers image file to the 'CG Server', and the final one is 'CG Server' that takes the video stream from the client and the image from the Interface Server and combines them. The client is the one on which our caster program runs. A caster takes his video using the program and sends the live video to the 'CG Server'. Broadcasting Switcher is the one we use to select the final contents that is broadcasted. For example, there can be several videos arrive at the switcher from several cameras. An operator can select one of them with the switcher so that the selected one can be broadcasted. An example broadcasting switcher is shown in Fig. 4.

![Fig. 2. Components of the system](image)

![Fig. 3. Hardware components of the system](image)

![Fig. 4. Broadcasting switcher (source: www.wkyc.com)](image)

The configuration of the system is shown in Fig. 5. In the 'DB', information of subscribers (casters), programs, and schedules is recorded. The schedule contains cue sheets and a cue sheet information includes reference image, video and scripts. The 'weather DATA' in the figure provides the current temperature, humidity, cloud for...
the weather casters. We should have many other kinds of data in order to support various casters. 'CG Server' collects the reference image and related data from the databases through the interfaces.

The 'CG Server' uses FFmpeg in order to catch the live video from the caster and the reference image from the graphic generator, combine them, convert the result into HDMI or SDI as instructed, and send out the signal to the 'Broadcasting Switcher'.

Wowza media server is a Java server platform that can stream out stored video files or live broadcast. With this, we can also dynamically send out advertisement and playlist. It supports multiple channels, each channel requires its own playlist. By designating playback time and position for each video file, we create a playlist. We develop our broadcasting system with Wowza IDE. The output stream can be received by the web interface, custom software applications, mobile devices or set-top boxes as shown in Fig. 2.

4 Conclusions

We have described our design of the personal live broadcast system. For the further study, we are planning to implement the system and integrate the system with the existing content management and broadcasting management systems.

References