

§50. Study of Video Monitoring System for Remote Participation

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Because QUEST experiment is executed by the researchers of many universities, the remote participation facilities are necessary. Therefore, NIFS uses SINET3 network to provide the remote participation facilities for the remote participants. For example, the experimental data is archived by LABCOM system which is about 1,000 km away from Kyushu University, and the participants can retrieve and view the experiment data from their room [1].

However, in order to realize smooth remote cooperation, they have to know the situation in the experiment site in real time, and the voice and video play important roles. Therefore, the authors have installed a web camera (Panasonic BB-HCM715) in the control room of the experiment site, and the user could view the situation of the control room while they stay in their room. However, because the web camera is not so powerful that the number of the connections is limited, and it cannot send the video images to all the participants.

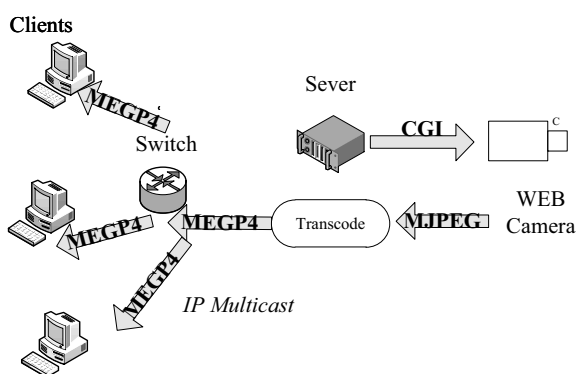


Fig1. Convert MJPEG format into MPEG4

Therefore, the authors have studied the way to redistribute the video data to other participants. First, the authors tried to convert Motion JPEG video obtained from the web camera into MPEG4 files, and send the MPEG4 video files using IP multicast. Because IP multicast packets are sent to the necessary clients by the network switch, the server load does not depend on the number of the clients. Fig.1 shows the overview of this scheme. The web camera can be controlled from the web browser using CGI (Common Gateway Interface), and its API (Application Program Interface) is open to use. Using the API, the server connects to the web camera and receives the video images as Motion JPEG. In this system, VLC media player, an open source video player, is used for the server as well as the client. VLC running on the server converts Motion JPEG into MPEG4 video stream and send it to the multicast

address. The video stream is sent only to the client on which VLC is running to play the video stream. Because this scheme does not require developing a new program, it seemed fascinating. However, the network switch does not have enough power to relay IP multicast packets. Because the authors were afraid to disturb other important network traffic, the authors gave up this scheme.

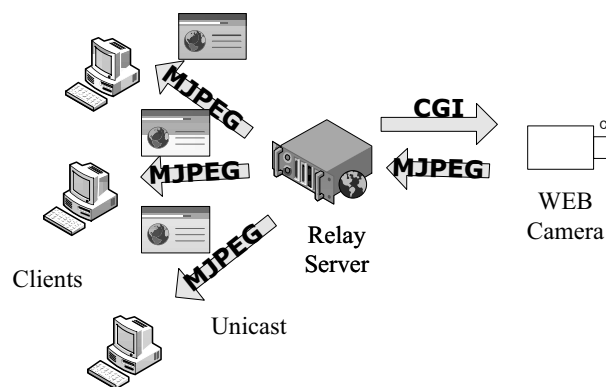


Fig.2 Relay Server

Therefore, the authors have developed another way to redistribute the video. Fig.2 shows the overview of the system. The video player retrieves the latest frame that the relay server captured from the web camera one by one. The video player is implemented as a Java Applet. Because the application is downloaded every time the web browser connects to the server, the authors do not have to distribute the application, and it is easy to maintain the application.

Using this scheme, the author has been developing a new system to broadcast the screen of image the personal computers in the control room. This image is useful to understand the experiment results analyzed by the personal computers. In this case, Epiphan's VIDEO2PCIE, a VGA video capture, is used instead of the web camera.

- 1) Nakanishi, H. et al.: Fus. Eng. Des., **82**, (2007) 1203