Real-time Video Communication System

(BZ1-11)

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Introduction

Nowadays, the world has become a global village and we make friends all over the world. To keep in touch with these friends living far away from us, we would like to have a chat with them and a face-to-face chat will be much better. However, the existing video communication systems like Skype and MSN Messenger require account registration and login. The user information through the server may be also collected and this leads to a privacy issue.

Aim and Objectives

Our project aim is to build a 2-point peer-to-peer (P2P) communication system, which has low bit-rate and good quality, supports multi-capture and multi-casts, and has good robustness.

The objectives are
- Establishing a videoconferencing platform via the Internet
- Synchronising both real-time video and audio signals
- Decreasing bit-rate and increasing W/H of signals
- Enhancing the network security

Implementation

Figure 2: Bi-direction 2-point communication process

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FilingP is a free software project that is
- cross-platform solution to record, convert and stream audio and video
- compatible with DirectShow library and x264 library

DirectShow is distributed as part of the Windows SDK, providing high-quality capture for both sides and audio.

x264 is a free software library and application for encoding video streams into the in.x264/MPEG-4 AAC format.

LANE (Lane Audio Video Encoder) is a codec for H.264 encoding and decoding which developed in 1998 and built in Filmping.

TCP for network establishment because it is
- Connection-oriented
- Reliable
- Error detection
- Guaranteed delivery

UDP for Data transmission because it is
- Connectionless or packet loss
- Smaller delay

VC media player is a widely used and open-source media player for playing most codecs without codec packs needed. This multimedia player is capable of playing MPEG-2, Divx, WMV and H.264 as well as DTVs and even Blu-ray. Internally, it is also built with various streaming protocols (TCP, UDP and RTP). We have used VC++ plugin to build our program in C#. In this project, the version of VC++ is VC++ 2.0 which is announced at 18th February 2012.

Conclusion

To sum up, the requirement of the project was achieved. In this project, our server is based on H.264 standard and can use for videoconferencing. The system was built by various methodologies. They are Video and audio capturing, Video and audio encoding, Network transmissions and User Interface. Also, the concept of motion detection and signal synchronisation were implementation. The system is composed of three open-source elements: they are x264, Filmping and VC media player. In future, the project can be further modified by several aspects. For example, the delay should be reduced by optimizing the encoding process. Another one is to support more people to chat.