

Stereoscopic Video Using DV Format

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Goals of the work

- Design and implementation of capturing, transmission and displaying of stereoscopic video in Digital Video format (DV)
 - Implementation of tools for DV video transmission and displaying
 - Design of the system for stereoscopic video capturing and displaying

DV video transmission

- RTP protocol is used for video transmission
- The transmission is defined by RFC3189 a RFC3190
- DVTS project (<http://www.sfc.wide.ad.jp/DVTS>)
 - `dvsend`, `dvrecv` and `dvplay` tools
 - (`xdvshow`)

xvshow reimplementaion

- Multiple threads architecture
 - DV video receiving
 - DV video decoding
 - Video rendering
- Robust architecture, lower CPU consumption
- DV video inputs
 - RTP stream
 - Local file
 - IEEE-1394 interface

xdvshow reimplementation

- RTP stream
 - Unicast
 - Multicast
 - Packet reflector
- DV video decoding
 - Quasar DV codec, libdv

xvshow reimplementaion

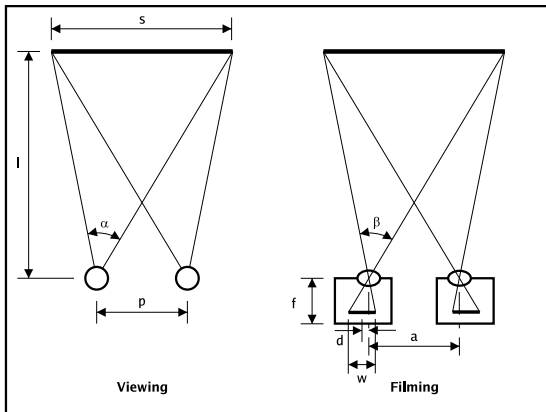
- SDL display
 - Fast displaying method
 - Fullscreen mode, several scaling modes
 - Support for Xinerama
- X Windows
 - Backup, compatible display method
 - Too slow

Stereoscopic video capturing

- Simulates real human view
- Two DV video streams each for one eye
- Camera tripod head
- Two capturing/sending computers
 - IEEE-1394 interface, Linux or FreeBSD OS, dvsend

Stereoscopic video capturing

- Theoretical background



$$a = b$$

$$\alpha = \beta$$

$$\frac{f}{l} = \frac{w}{s} = \frac{2d}{p}$$

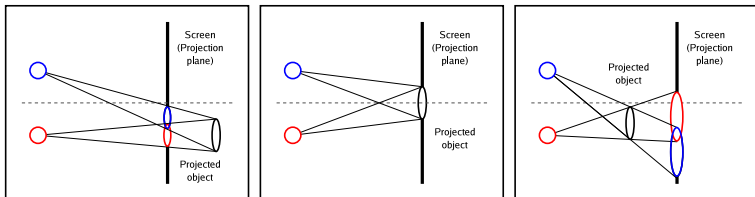
- However whole setting may be done by hand

Stereoscopic video capturing

- Camera tripod head (Parallax Setting Device by APEC)



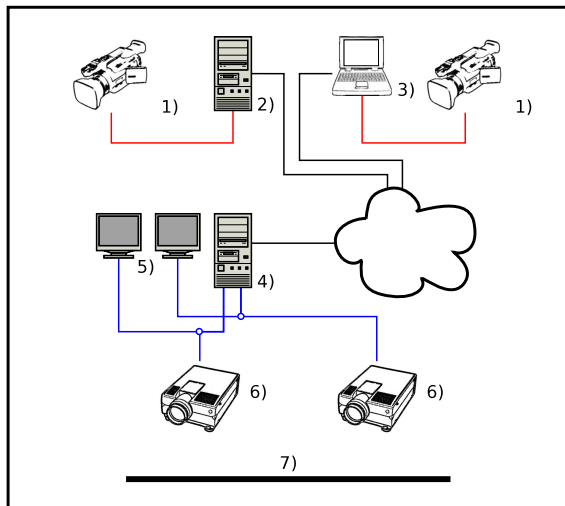
- Parallax setting



Stereoscopic video projection

- Receiving/displaying computer, graphics card with two heads
 - FreeBSD or Linux OS, X Windows with Xinerama extension
 - Enhanced `xvshow`
- Two projectors with polarising filters
- Projection screen with non-depolarising surface
- Polarising glasses

Setup overview



- 1) cameras
- 2) sending computer
- 3) sending computer
- 4) displaying computer
- 5) monitors
- 6) projectors
- 7) screen

Setup overview



DV streams synchronization

- Synchronizing packet reflector (rum)
- Source PCs must be synchronized (e.g. using NTP protocol)
- Synchronization via RTP and RTCP timestamps
- Practically absolute synchronization

- Increased overall latency penalty
- Slightly unsuitable for DV over IP transmission

Conclusions

- Stable system for DV video transmission and displaying
- Stereoscopic video displaying
- Cooperation with packet reflector
 - Videoconferencing
 - Telemedicine

Thank you for your attention