

# 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

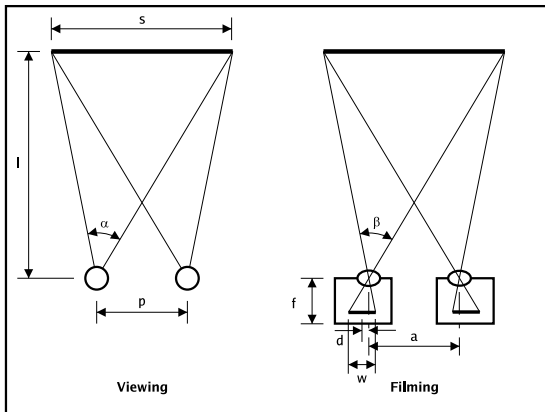
- SDL display
  - Fast displaying method
  - Fullscreen mode, several scaling modes
  - Support for Xinerama
- X Windows
  - Backup, compatible display method
  - Too slow

# 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



$$a = b$$

$$\alpha = \beta$$

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

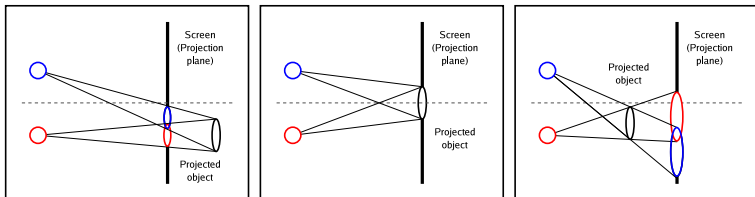
- However whole setting may be done by hand

# Stereoscopic video capturing

- Camera tripod head (Parallax Setting Device by APEC)



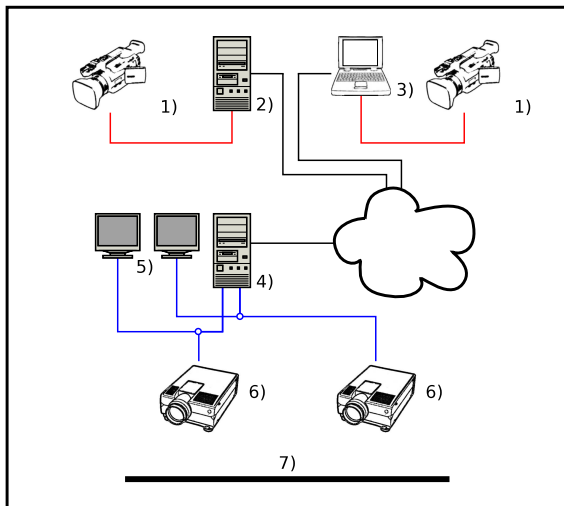
- Parallax setting



# 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



# 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