Immersive Telepresence

Kirari!

Yoshihide Tonomura
NTT Service Evolution Laboratories
Nippon Telegraph and Telephone Corporation (NTT)
Feeling as if they are experiencing the atmosphere of the sporting venue, wherever they are

Feeling “speed”, “height”, “strength”

Hope to make user’s eyes twinkle
Background and Motivation

- In Japan, UHDTV service has been launched in this August.
- In 2020, people will enjoy this high-quality service widely and we can share our excitement by watching on large screens at stadiums, cinemas, etc.
- NTT has been contributing to “sharing the excitement” by using latest multimedia technologies, such as HEVC and MMT, etc.
In Japan, UHDTV service has been launched in this August.

**Live Viewing of the 2012 Olympics**

- Stream super high definition video from London to Tokyo in real time.
- In Japan, SHV videos were distributed to several places by IP multicasting over NTT’s dedicated lines.
In Japan, UHDTV service has been launched in this August.

Live Viewing of the 2014 FIFA World Cup

- Stream 8K super high definition videos with 300Mbps IP transmission in real time.
- 19,000km from Rio de Janeiro to Tokyo
- 8K videos were distributed to 4 cinema locations.

9 games were shown to an audience of 10,000 at 4 locations.
Background and Motivation

But realistic is not enough to make user’s eyes **twinkle**.

We brought an illusion technique named **Pepper’s ghost** to Kirari!
Toy’s demonstration

System configuration

(1) Video is projected onto top screen or played on monitor.

(2) Projected video is refracted onto transparent foil.

(3) Audiences see refracted video at center of the box.
Latest Trial Events
Immersive Telepresence
Kirari!
We have demonstrated real-time pseudo-3D video transmission and sound field reconstruction for powerful Karate performance.

⇒ Real-time target image/audio extraction, synchronized live transmission and sound image reproduction by virtual speaker are proofed in this demonstration.
Digest Movie of NTT R&D Forum 2016

https://www.youtube.com/watch?v=HQfwt0I374E (Japanese version only)
Live viewing of KABUKI “SHI-SHI-O” from Las Vegas

World’s first remote live greeting reproduced as hologram images using “Kirari!”

Real-time object segmentation technology

World’s first spatial reproduction using multi-4K screens (Full-Dome Room)
KABUKI LION 獅子王

https://www.youtube.com/watch?v=E0D67sBsCY0
(Japanese version only)
More use case of Kirari!

- **Sports**
  - Sport viewing in public screens

- **Stage Performance**
  - Traditional stage performance in an event hall

- **music**
  - Live concert in music hall
  - Virtual / Real

- **Speech**
  - Remote lecture, speech
Technologies
- Media Transport, Video, Audio Technology -
Challenges for live media transmission using Kirari!

- Media acquisition part (what do we need to capture?)
- Media processing part (a part of making kirari! contents)
- Media delivery part (we use MMT but is not limited to use other)
- Media presentation part (how to use pseudo 3D image effectively?)

Stadium

- Media acquisition part (what do we need to capture?)
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Remote venue

Super realistic media synchronization technique

Advanced MMT

- Extracted Target Image
  - f(x, y, z)
- Background, other media
  - (ii)
- Audio and Surround info
  - (iii)

Size: 10m x 5m x 5m

Projector: 4K x 4

Speaker: 5.1ch

Light: 5
Individual technology and current progress

NTT Developed:
① Real-time image extraction technology for simple background and for a few target images
② Real-time distortion correction and stitching technology for video captured by multiple 4K cameras
③ Synchronized transmission technology for spatial information (such as size of target image positional relationship, and direction of sounds, etc), as well as audio/video
④ High-realistic images and sounds field reconstruction technologies
Conclusions

• We introduce Kirari! technologies and recent activities.
• We believe Kirari! has some promising use cases.
• But there are a lot of open issues to realize flexible Kirari! services.
• We welcome joint study if you or your company is interesting in these technologies.

Thank you!