

# New World Explored by XR Services Evolved with 5G

Masashi Usami

m-usami@jllabs.or.jp  
 Japan Cable Laboratories, KDDI Corporation  
 3-4-2 Nihonbashi Kayabacho, Chuo-ku, Tokyo 103-0025, Japan  
 Keywords: XR, 5G, COVID-19

## ABSTRACT

*As COVID-19 has spread out across the world, our life style has been drastically changed. A part of real contact communications may be shifted to contactless (online) communications. XR technology will be a strong tool for such online communications. On top of that, advent of 5G will realize realtime XR services with much higher quality and ultra-low latency.*

## 1 Introduction

Although COVID-19 may be overcome in the near future, human to human physical communication has been somewhat limited, then we have to shift from physical to non-contact (online) communications to some extent. In that situation, it is very important to improve quality of online communication comparable to that of physical communication. XRs are great means to express and recreate the real world for such purpose. In some way, online communication may surpass physical communication in terms of the amount of information.

In this paper, some demonstrations where XR services are expected are introduced. A variety of devices/displays are used as user-interface for XR experiences in many usecases; smartphone, smartglass, and surrounding screen etc.

## 2 XR Demonstrations

This section describes several XR demonstrations.

### 2.1 Experience in Virtual Cosmetic Store

Retail store is one of the most adoptable environments of virtual reality experiences. Beyond the limitation of online catalogue shopping, we can enjoy to see and try commodities from any angles. Fig. 1 shows a virtual cosmetic store, while the real store is located at Harajuku, Tokyo. Through a smartphone, we can enter a virtual door into the store and move around freely inside the store synchronized with a local location position system or may jump directly to the place where they want to go.

### 2.2 Experience of future exhibition "HYPER LANDSCAPE"

Museums are suitable experimental fields for future exhibition demonstration with XR technology. "HYPER LANDSCAPE" is a digital exhibition that can be viewed through smart glasses shown in Fig.2. All you have to do is walk around the museum wearing the smart glasses,

and the system will automatically identify where you are and the direction you are facing, then display the appropriate content. You can see an image of a satellite going around the symbolic exhibit of this museum "Geo-Cosmos," the world's first display of the Earth using OLED panels, and the virtual human "coh" using 5G MEC (multi-access edge computing) will appear in front of you as your personal guide. "Another Miraiikan (nickname for National Museum of Emerging Science and Innovation)" is created in the digital space.

### 2.3 Arbitrarily Angled Audio-Visual VR Experience

Not only Visual but Audio is also key factor for XR experience. Fig.3 shows an arbitrarily angled audio-visual VR experience app for 360-degree panoramic videos using selective synthesis sound field technique. Audiences can enjoy arbitrarily angular framed videos that they extracted themselves by manipulating the touchscreen, with variable stereo sounds accordant with the spatial synchronization with the video frame. A smartphone app has been released for iOS and has been officially endorsed by Japanese idol groups. Many can also enjoy it in a domed theater.

### 2.4 Tele-existence

Tele-existence is a robotic system that expands the presence of human beings, such as Visual, Audio, and Sense of Touch, as shown in Fig. 4 A person wearing gloves and goggles navigates a remote robot as an avatar and sees the robot's view and feels the movement and reaction of the robot via the operator's gloves, remotely. The remote robot mounting touch sensors and thermo sensors, can not only touch any object but handshake with a human. The real feedback is directly transmitted to the operator by way of 5G with ultra-low latency as low as 10 ms order, so that we can touch and feel a turtle very naturally, even thousands mile away.

## 3 Summary

Several new experiences realized with XR and 5G are introduced, which were studied and demonstrated at KDDI. Contactless x-reality services realized with 5G becomes more and more important than ever. Displays are essential interfaces between human and digital world. Now we are standing just at the start line in post COVID-19 era. We can create new experienced services with more smarter displays for better future.



Fig. 1 a virtual cosmetic store



Fig. 2 a virtual exhibition

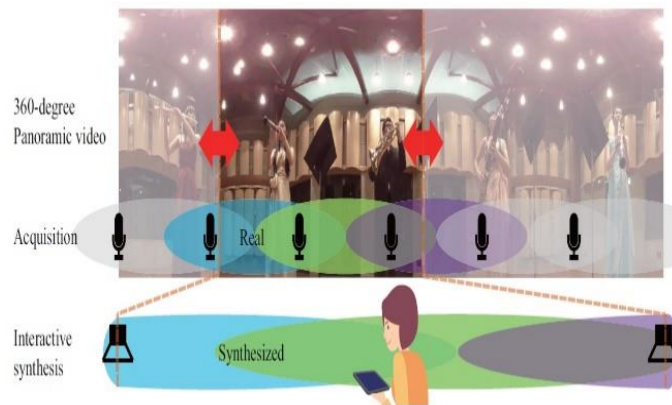


Fig. 3 Arbitrarily Angled Audio-Visual VR Experience

**Telexistence** is a robotics system that expands the presence of human beings

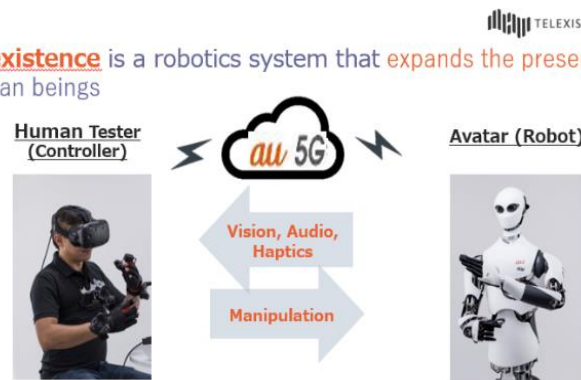


Fig. 4 Tele-existence