

# 1 Introduction

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“You can see, hear, touch, and smell... our technology realizes an ultra-realistic communications environment near you.” That is the catchphrase of the Universal Media Research Center, National Institute of Information and Communications Technology (NICT). The organization is promoting research in such areas as 3D images and 3D audio acquisition and reproduction technologies, and five-sense communication technology, as well as elucidation of the sensory and cognitive mechanism that brings about ultra-realistic sensations, in an attempt to realize natural and realistic communications for allowing people in remote areas to share the same space as that currently available on-site and feel as if they were “on-site” together.

The Ministry of Internal Affairs and Communications (MIC) reported at the end of 2005 on the importance of promoting research that enables universal communications beyond various barriers, in order to solve numerous social problems including the aging of a society with fewer children. In the report, MIC described the importance of conducting research in ultra-realistic communications that seamlessly connects the real world with a virtual world beyond barriers of distance, and proposed that NICT should step up its research in that field as promoted in collaboration involving industry, academia, and government. In response, NICT formulated a second-term five-year interim plan in April 2006 and reorganized itself. With that serving as a turning point, NICT established an entity now called the “Universal Media Research Center” and initiated its studies aiming to make ultra-realistic communications a reality.

Here, we believe that the “ultra-realistic

communication system” has the following two meanings:

- (1) Super Reality: A *super reality* system that acquires, transmits, and reproduces with as high physical fidelity as possible the so-called five-sense information that stimulates the visual, auditory, vestibular sensation (cenesthesia), haptic, and other senses, in order to allow people to feel as if they were “on-site”.
- (2) Meta Reality: A *meta reality* system that allows people to have more realistic sensations with somewhat lower physical fidelity, and which seamlessly shows both virtual and real worlds, integratively presents five-sense information, and conversely offers extremely characteristic information alone to give people an even higher impression, deeper understanding and richer creativity than when people are actually “on-site”.

These two variations of the ultra-realistic communications system have been realized by taking mutually different technical approaches. The Universal Media Research Center therefore decided to set up the 3D Spatial Image and Sound Group for achieving objective (1), and the Multimodal Communication Group for achieving objective (2), in order to promote its studies as pertaining to both.

The 3D Spatial Image and Sound Group conducts its studies with a long-term outlook focusing on electronic holography and three-dimensional sound reproduction by wave field synthesis, which reproduces the wave surfaces of light and sound in three-dimensional space.

The Multimodal Communication Group, on the other hand, develops three-dimensional

video systems that are easy on people without the need of special glasses, systems that reproduce stereoscopic sound close to the ears, multi-sensory interaction systems that stimulate not only the visual and auditory senses but also the haptic (kinesthetic) sense and olfactory sense as well, along with other systems of which practical use can be expected in the relatively near future. It also promotes elucidation of the cognitive mechanism that allows people to have realistic sensations, the evaluation of good and bad influences that 3D images have on people, along with other issues.

In order to make ultra-realistic communications a reality, it is also indispensable to ensure the cooperation of people in many different fields, including content creators and psychophysicists. To that end, it is necessary for the government, industrial community, universities, and other related entities to combine their wisdom and promote their collective efforts with standardization in mind. The Ultra-Realistic Communication Forum (URCF) was subsequently established on March 7, 2007, in an attempt to allow related researchers, operators, users, and a wide range of other people to meet, share information, conduct exchange among different fields, promote personnel training, and efficiently promote research and development, demonstrative experiments, standardization, and other efforts through the collaboration of industry, academia, and government. (Hiroshi Harashima, professor emeritus of Tokyo University, chairs this forum.) As of August 2010, URCF has 93 regular members (corporations and organizations) and 108 spe-

cial members (knowledgeable persons and others). URCF conducts demonstrative experiments involving the IP transmission of 3D images and other operations, displays exhibits at exhibitions, and holds various seminars, workshops, and international symposiums involving well-known researchers invited from abroad, under the leadership of NICT. URCF also deliberates, considers, and publishes a research and development roadmap for ultra-realistic communications. The results of such debate are also proposed as pertaining to the government's telecommunications policy.

About five years have passed since we began studying ultra-realistic communications. As described in various chapters of this special issues, we believe that we have managed to fully meet the initial goals of the second-term interim plan. Moreover, we are confident that, through the activities of URCF and other entities, the public is now familiar with the term "ultra-realistic," thereby contributing to the start of the current 3D craze.

Many issues remain to be addressed before putting our research results to practical use. But we intend to realize a base for natural communications and broadcasting that entails no borders between the virtual and real worlds, and which would prove useful in creating a more worthwhile and convenient information society for everyone. We would therefore appreciate any support and cooperation on the part of our readers.



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