FY2014

Embodied Media Technology Based on Haptic Primary Colors

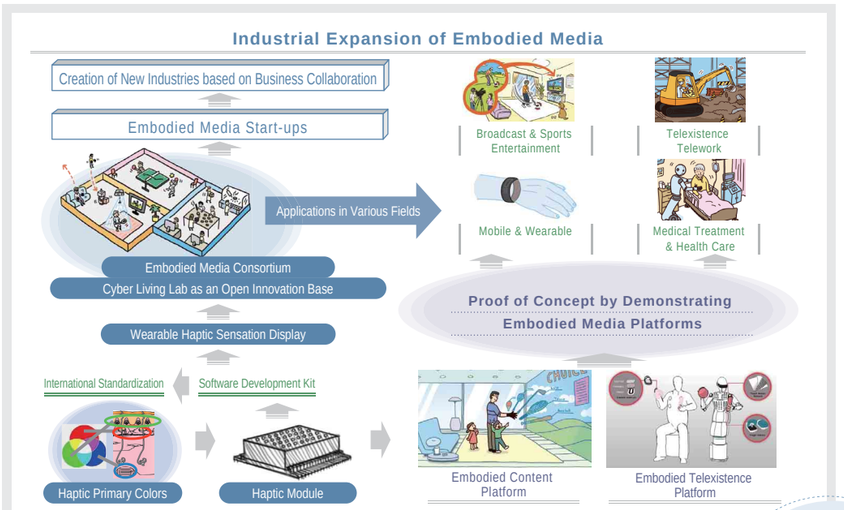
Researching into technology to transmit haptic as well as visual and auditory sensations

In terms of human visual and auditory senses, the spread of transmission technologies such as television has already allowed us to experience sensations through images and sounds, just as if the real thing were in front of us. In addition to visual and auditory sensations, we have newly developed a technology to record, transmit, and reproduce haptic sensations based on the principle of haptic primary colors. We have constructed the fundamental technology of haptic sensation transmission by developing technology such as a display apparatus by which 3D objects projected in the air can be directly touched, and telexistence technology in which a robot installed in a remote location transmits visual, audio, and tactile information to the user, giving them the sensation of being inside the robot.

Presenting the world with “embodied media”

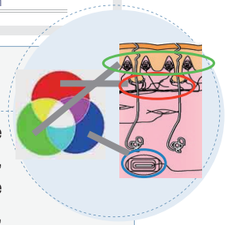
The ACCEL project, based on our previous CREST research, aims to build “embodied media” that create new physical experiences by heightening haptic media to the same level as visual and auditory media, and unifying them. We are currently developing an “integrated tactile sensation transmission module,” which is the key to commercializing tactile sensation transmission technology. This will digitize the sensation of an object touched by haptic sensors installed on robotic fingers, and have a user touch a haptic sensation display, which will reproduce the sensation, permitting the user to feel it.

Embodied media has the potential to accelerate a range of industries and industrial fields such as architecture, civil engineering, agriculture, service, medicine, welfare, and education.



Haptic Primary Colors

Human haptic sensation is a perception based on several types of sensor information. We came up with the idea that this haptic sensation could be broken down into three elements: vibration, force, and temperature; and proposed to call it the “principle of haptic primary colors” after the three primary colors of light. Like reproducing color on a display resolved into three primary colors, digitizing each element of haptic sensation enables it to be recorded, transmitted, and reproduced.



Research Director

Susumu Tachi

Professor Emeritus, The University of Tokyo

I specialize in robotics and virtual reality (VR), and have made contributions to the creation of each of these disciplines and academic fields of study.

My research came from an idea that the power of science and technology could be used to augment human functions we lose and to further empower our inherent abilities.

In 1980, I came up with the idea of telexistence, a technology that allows humans to transcend time and space. Ever since, I have conducted research with the goal of realizing telexistence, which evolved from visual and auditory sensations into tactile sensations and then into full embodiment.

In the ACCEL project, I would like to build groundwork to commercialize embodied media technology as a compilation of my long-lasting research. I will create a new industrial field by developing a compact, integrated tactile sensation transmission module and realizing virtual reality and telexistence as embodied media that incorporate visual and auditory sensations as well as tactile sensations of presence.

Telexistence is a technology that can expand human existence by making users feel as if they exist in other locations without actually being there.

Program Manager

Junji Nomura

ACCEL Program Manager, Japan Science and Technology Agency

My role in the ACCEL project is to commercialize technology that universities have developed in concert with companies. I will provide a path for the use of embodied media in the broadcasting, entertainment, and other fields. I will also pave the way to the industrial world by introducing telework using telexistence. Telework using telexistence will solve problems such as labor shortages and night work, helping provide better ways of life. In addition, as one of the open innovation strategies, I will organize a consortium on embodied media to apply it to society by disseminating research outcomes and bringing together a great range of knowledge and wisdom.

Giving back research results to society will allow the birth of completely new media, which will lead to the realization of a society where you can feel the sensation and warmth of the skin when you shake hands with a person who lives overseas, or that you can take care of your parents living far away from you, and where you can manufacture precision parts effectively by reproducing a craftsman’s delicate touch.

I feel that haptic sensation is the ultimate element of manufacturing. Turning it into technology is a great challenge for the industrial world.

Transmitting “embodiment” to locations far removed from the physical body will cause a paradigm shift in lifestyles, communication, and industry.

PROFILE SUSUMU TACHI

1973: Ph.D. (Engineering), The University of Tokyo; Visiting Scientist at Massachusetts Institute of Technology; Professor, Graduate School of Information Science and Technology, The University of Tokyo; Professor, Graduate School of Medial Design, Keio University. Research into guide dog robots, telexistence, retroreflective projection technology, autostereoscopic VR, and haptic primary colors.

PROFILE JUNJI NOMURA

1971: Graduated from the Faculty of Engineering, Kyoto University. Joined Panasonic Electric Works Co., Ltd. (currently Panasonic Corporation). R&D in virtual reality, etc., and Innovation management in business. Promotion of standardization as President of IEC (International Electrotechnical Commission). Ph.D. (Engineering)