Sophisticated Computer Environment for Field Work Activities with Wearable/Mobile Devices, Field-Use Multimedia, and Networking (Field-AID)

Today we are seeing far greater use of IT technology to support a broad range of different field work activities including maintenance of telecommunications equipment, inspections of manufacturing equipment and plants, and all sorts of other maintenance tasks. In these tasks, a field worker has to do complicated operations, for example, collecting digitized work logs and register them to remote database, collaborating with expert engineers who is in the remote maintenance center. If the worker successfully carries out his or her jobs, it is strongly required to introduce computer-aided system that can support him or her to execute above operations.

NTT Laboratories have developed a field work support environment called Field-AID that exploits the latest advances in wearable/mobile PC technology and multimedia networking technology.

Hardware for the Field-AID system consists of a client PC used by the worker in the field (this could be a wearable PC or mobile PC), a server PC employed by the support center, and of course a network infrastructure connecting the client and server. Software that has been developed for the system includes (1) a digital manual and work procedure guide with look-up function, (2) worksite visual record-keeping and database access functions, (3) and two-way audio-visual communications software. The system also includes voice operation software, enabling a worker to continue working while using the client PC hands-free. Note that supported software consists of multiple components, in which specific function such as audio-visual communications, voice operation, or data acquisition is implemented. This system architecture makes the customization easy so that the applications are composed by combining the necessary components.

Some of the specific applications we had in mind in developing the system include spot checks and diagnostic work on telecommunications equipment, maintenance work on plant equipment, emergency medical care, and disaster relief support. Field trials are now being conducted in various field work settings.

Future upgrades and enhancements include multipoint audio-visual communications, the function to integrate work data and equipment data using XML*, and the development of a remote factory management system tailored for manufacturing sites using a data center.

(Cyber Solutions Laboratories)

* XML: eXtensible Markup Language

3-D Display Based on a New Perceptual Phenomenon Discovered at NTT — Natural and Fatigue-Free 3-D Imaging

With the full-scale spread of high-speed, large-capacity network environments close at hand, hopes are increasing for communication applications with a high level of presence, especially video applications. 3-D imaging is an important element for dramatically increasing true-to-life presence through its application in such areas as electronic museums, video game machines, and simulators. Such imaging can also simplify operations and increase reliability when used in remote operation and CAD* systems. However, conventional 3-D displays of the past that required 3-D glasses only used some of the visual cues in 3-D perception, so the viewer was susceptible to fatigue. Therefore, 3-D glasses could not be used for long periods of viewing. Moreover, caution was necessary when giving 3-D glasses to children because it was feared that the glasses might adversely affect visual functions.

This research laboratory has investigated a 3-D display system based on a groundbreaking new discovery, and as a result, has developed a 3-D display method that allows 3-D video to be watched comfortably for many hours without the need for special 3-D glasses. The new concept is entirely different from that of conventional 3-D displays. The 3-D depth of an image is expressed through the overlapping of the same image displayed at different levels of luminance. This has several merits.

For example:
(1) It can be simply constructed using only ordinary displays and a half mirror;
(2) Natural and life-like 3-D images can be watched without 3-D glasses and in almost fatigue-free comfort;
(3) It reduces the volume of data required for image display by 1.3 times compared with regular 2-D imaging, thereby making it easier to transmit data over a network.

These features solve many of the problems associated with conventional 3-D displays. Furthermore, a simply configured display unit makes it comparatively easy to alter the image display area (presently, 28 inch diagonally and 60 cm deep).

There are plans to develop an integrated input/output system incorporating technology for handling interactive 3-D imaging in the future, as well as to introduce high-definition, large-screen displays.

(Cyber Space Laboratories)

* CAD: Computer Aided Design

Novel perceptual phenomenon discovered at NTT and prototype 3-D system