P2-14 **Multimedia Virtual Laboratory using Japan Gigabit Network**

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1. Introduction

In recent few years, the concept of multimedia virtual laboratory (hereafter, MVL) is being studied by many institutes. Researchers in distributed location can share common research objectives by using high-speed network and can collaborate as if they were in a single laboratory. There are a lot of ideas, but very few attempts to realize MVL and put it to practical use. We begun to realize MVL in 1997 in cooperation with other institutes such as Tohoku Institute of Technology, National Institute of Environmental Study, Nagoya University, and Fukuoka University in order to use MVL as a convenient tool to promote studies of earth science.

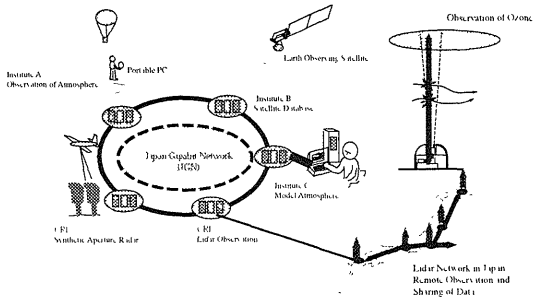

Fig. 1 Concept of MVL

2. Project Details

2.1 Collaboration System

We are constructing a pilot study of the new desktop conference system using a desktop workstations. The concept of this desktop conference system is to build a user-friendly and easy-to-use system for ordinary scientists (i.e., not an expert of computer). Each participant uses a desktop computer which he usually uses as a stationery tool. He does not have to go to a different (far away) room in order to attend a conference. When he wants to make a conference, he just types other participants' address and makes a call just like a telephone. It will be very convenient to talk, discuss, show data, documents, share information, and collaborate with others using a desktop conference system. We call this system "Multimedia Virtual Collaboration System". This conference system consists of an SGI O2 workstation, a wireless tablet, a high quality CCD camera, a high fidelity microphone, and a 3-dimensional sound effect system.

Workstation	
Name	SGI O2
CPU	MIPS R10000 250MHz
Memory	128MB
LAN	100BaseT
Option	Video in/out
OS	SGI IRIX6.5.4
Display	LCD 1600x11024

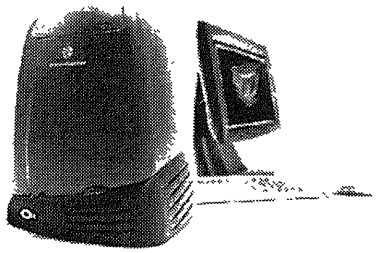

Fig. 2 O2 Workstation and LCD display

Sound effect system	
Name	Matsushita VS-XN0841-2
Input	8 channel
Output	2 channel

This system consists of several windows. Each window shows video, whiteboard, shared application, and video/audio/network control panel. The voice from each participant is controlled by a 3-dimensional sound effect machine, in order to distinguish easily the voice even when more than one person speak simultaneously. The effect machine can put eight sound source to eight different positions in a virtual space. Video window shows each participant's face captured by the CCD camera. The frame rate is controllable. The whiteboard can display HTML files, gif/jpeg image files,

simple text files, VRML 3D files, by simply drug and drop such files from SGI destkop. Thus, this system shows significant advancement in collaborative communications with remote colleagues, sharing video, audio, image and 3D model files and interacting on each workstation monitor. The system inquires multicast capable network, so we are going to use Japan Gigabit Network (JGN) instead of contemporary Internet.

Fig. 3 Multimedia Virtual Collaboration System

2.2 Remote Operation of Lidar

CRL and Tohoku Institute of Technology are building mie lidar which can be controlled from remote workstations at Rikubetsu (Hokkaido, Ashoro-gun; N43.5, E:143.75). This lidar is located a public astronomical observatory maintained by Rikubetsu town. The observatory is connected to the Internet with OCN (Open Computing Network; maintained by NTT) economy line (128kbps). Other laboratories, such as CRL, will be connected with the Japan Gigabit Network (JGN). The connection between OCN and JGN will be stable but it is unpredictable until we begin to operate the system. If the connection is unstable, we will have to promote a private line from Rikubetsu to Sapporo, in order to connect Rikubetsu to JGN directly. The lidar and other instruments are controlled and inspected from remote institutes using web based remote operation software and web camera. We are planning a campaign observation of atmosphere with other researchers using this MVL system. If it is successful, MVL systems will be considered to as quite powerful tools for advancing cooperative research work successfully beyond barriers of distance. I hope this primitive start of promotion will endorse further development of MVL

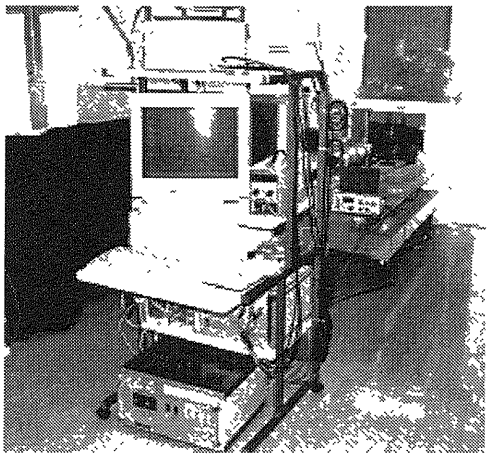

Fig. 4 Lidar and controller

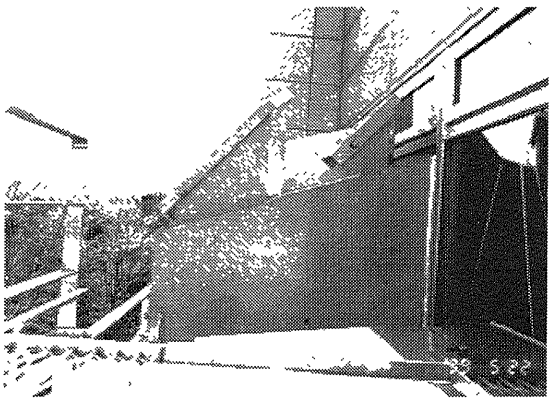

Fig.5 Remote controlled telescope cover

3. Summary

We are developing a multimedia virtual laboratory (MVL) system for the global environmental studies, using Japan Gigabit Network (JGN). This system consists of several workstations with a video camera and a microphone, connected with each other via high-speed backbone network (JGN). These workstations share many kinds of information, such as experimental data, image database, hypertext, video image, audio, and so on. This will help researchers in distant laboratories to communicate with each other and promote collaboration.