AVC- 603

INRIA : The tele seminar on workstation and computer networks.

TÉLÉSIA-IVS: The visio conference for every one

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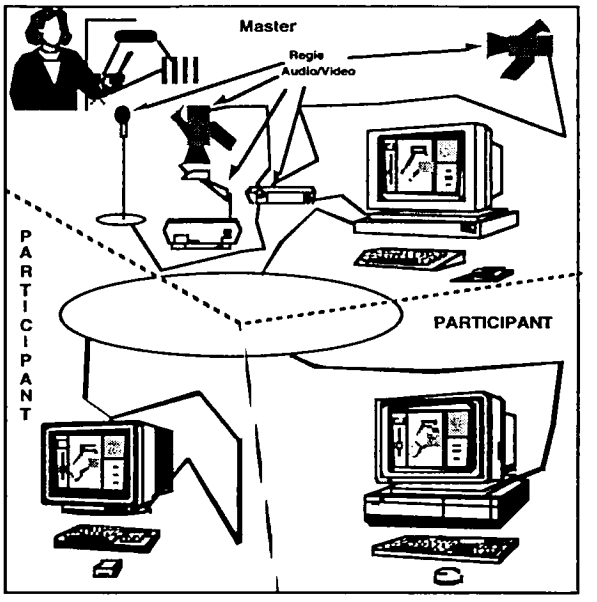
INTERNET

Participate to a video conference on your workstation :

Since 1991, the TELESIA team works on integration of audio et video images in advanced multimedia communication services over computer networks. The objectives are to develop, in collaboration with the ARISTOTE User's Group, a tele seminar and video conferencing tool to broadcast over the INTERNET the X/ARISTOTE seminars (from the Polytechnique school in Palaiseau near Paris). Using a standard workstation it's possible for the INTERNET people to take on seminar.

TELESIA-IVS is a multi-point service. It captures and digitalizes the slide's images and the speaker's video. The numerised audio and video data are sent using a unicast or multicast protocol.

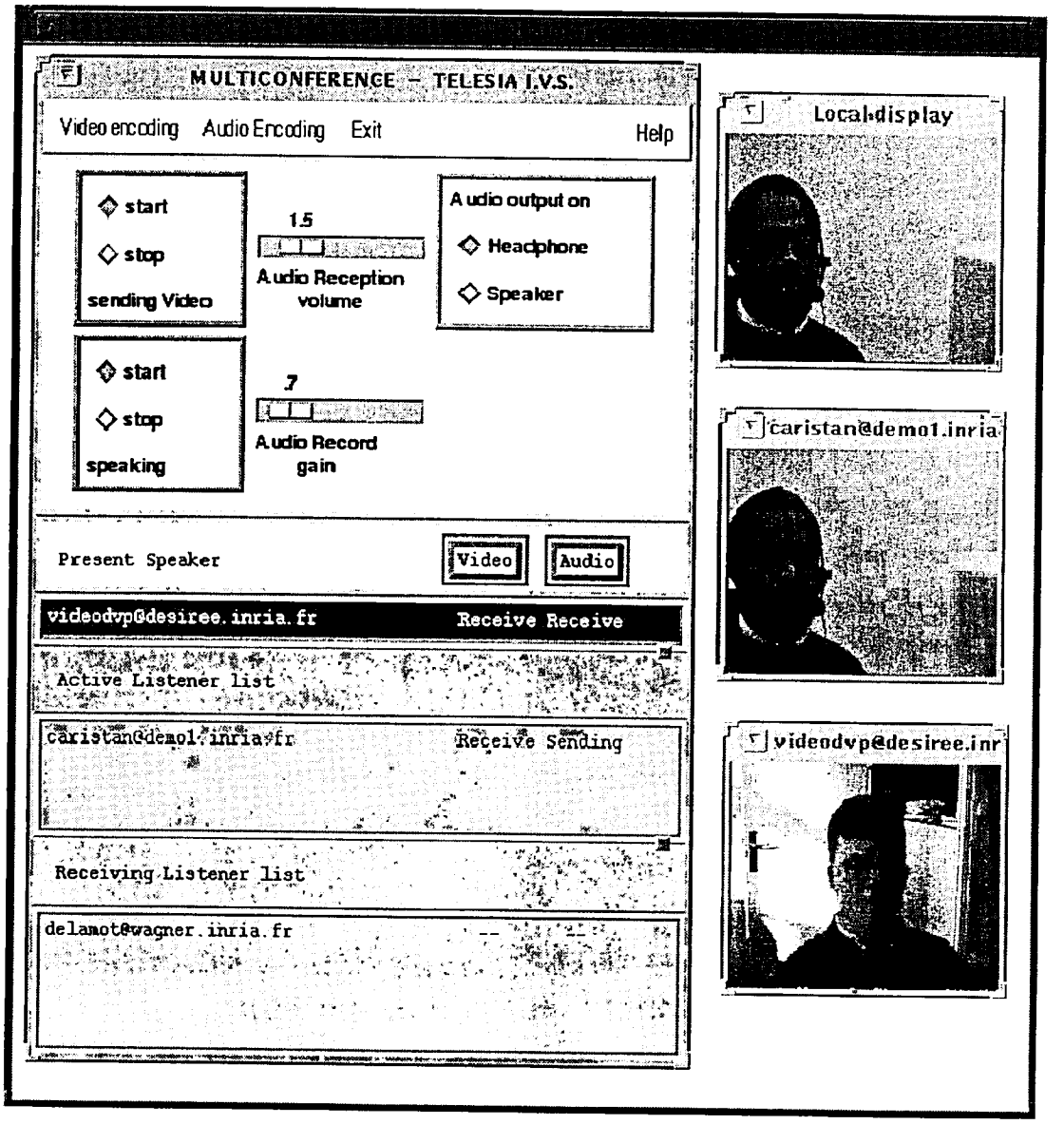
The Chairman manages the rights to speak and dispatches images and audio to the remote auditor's workstations.



Activity domain : collaborativ working and tele-teaching

TELESIA-IVS is a tele-teaching oriented application in response to an economical and social expectation. Technically, it's can be considered as a technical base to develop experimental prototypes and perform life-size experiments in order to identify some new needs in technological and organisational matters. It's possible to decline TELESIA-IVS within the

framework of multimedia data transport over the computer network and real-time interactive remote control. By this way, we prove the interest and the feasibility of industrial services such as tele maintenance and tele watching activities.



25-30 participants

TELESIA-IVS offers also a visioconference facility between two or more workstations. Using RENATER (French network for Technology, Teaching and Research), the TELESIA's visioconference can be performed between the offices of few people scattered on a wide area network, nay on the world-wide INTERNET.

Experiences :

Since one year, several actions have been undertaken to demonstrate the validity of the TELESIA approach.

From the French ministry of Research and Technology, the conferences of 25th. INRIA's anniversary (dec. 1992) were broadcasted and received in Australia and U.S.A using the world-wide Multicast Bone connectivity.

The X/ARISTOTE seminars are regularly broadcasted. In June 1993, an international multicast link was used for an interactive seminar between France (Polytechnique at Palaiseau), Quebec (CFRIO and CRIM at Montreal) and Germany (GMD at Bonn) during the ATM seminar.

Several TELESIA Video conferences have been made to promote the regional backbones connected to RENATER (French high speed computer network for Technology, Education and Research.

During the satellite video conference Delta on teleteaching (Montpellier), TELESIA-IVS was used as a relay throught RENATER. At the same time, we were demonstrating the reception on the INTEROP exhibit at PARIS on FRANCE-TELECOM's booth.

Finally, TELESIA-IVS is used by the TELESIA team as a collaborative working tool with it's partners. We have very often private and technical tele-meetings whose duration doesn't justify a long trip.

A major side effect of this experiments is the grooving use of the INTERNET for distributed multimedia activities. That means that the Multicast Bone need to be managed by the all international community. The work undertaken by INRIA and ARISTOTE is to realise a French logical network of multicast routers between the different sites on RENATER. The data are passed through tunnels between sites. Since July 1993, the FM Bone (French Multicast Bone) branch is supported by ARISTOTE in order to optimise the multicast links. The objectives are to transfer, as soon as possible, this activity to the public national operator France TELECOM.

Technical aspects :

The minimum required to receive the tele seminar is a standard workstation with audio functionality and a microphone. In order to send video, it's necessary to add a video-capture board (semi-animated or video-live) and a camera or videotape recorder.

TELESIA-IVS is actually available on Unix workstations. It uses the IP protocols over the INTERNET (UDP, TCP/IP).

The multicast protocol is based on UDP. It uses a selective broadcast on selective group addresses. The only subscriber workstation decodes the multicast packets.

The audio and video are processed in two different streams. For the moment, there is no synchronisation between image and voice. The rendering is not penalise because the low frame rate per second over the INTERNET.

The black & white and colour images have two standard sizes QCIF (Quarter

Common Interchange Format=244 x 188 pixels) and CIF (488 x 276 pixels).

In response to the particular needs of the seminar, it was added the Super CIF format (CIF x 4 = 706 x 552 pixels).

The maximum frame rate depends on the video capture, the size of images and the compression algorithm.

In order to reduce the load of the communication links (if required) TELESIA-IVS integrates a video codec software based on the H261 protocol and developed by the RODEO team at INRIA Sophia-Antipolis. The movement detection is replaced by a detection of changes.

Actually, using a video-live capture board (24 to 30 frames/second) we can send more than 15 frames/s for a b&w QCIF image on a RISC workstation. These factors can be tuned according to the available bandwidth of the network.

Perspectives :

It is planed to implement TELESIA on PC's. The synchronisation of audio and video during the restitution will be made possible by increasing the speed of the communication network or using isochrone communication protocols. Distributed clocks (using time-stamp protocols and/or isochrone networks) will allow to perform multi-sites synchronisation in order to realise co-ordinated and collaborative activities in group.

This perspectives are relevant today to research domain in protocols and in collaborative working experiments.

We expect from the manufacturers some improvements in video capture equipments in term of better adaptation to the post processing (after the grabbing) by the main processor. This will allow to reach the real-time performance for video (24 frames/s) and save time to enhance the user environment and tools.

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