

FOCUS

Advances in Communication Technology : Teleconferencing and Telepresence

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Technology is developing at a very fast rate and what looked impossible a few years back is becoming reality now. Sometimes a possibility may look to be impractical because it goes against our accustomed style of working or is unacceptable because it does not offer a complete solution. However, people are getting used to the existence of new technologies. Already people have started using voice and electronic mail as preferred forms of communication in the same way as the use of remotely driven devices.

Developments in 'virtual technology' offer to bridge gaps in these applications and at the same time give rise to newer possibilities. Video teleconferencing and telepresence are among such applications, widespread use of which may become a reality in the near future.

TELECONFERENCING

In spite of the various developments in communication technology—computers, telephones, fax and modems—a lot of time and money is still consumed for the organisation and movement of personnel for conferences and meetings. This is because, the

existing technology allows only one mode of communication, i.e., voice or data as compared to true face-to-face communication achieved by human contact. Equipment which allow both voice and picture, such as video phone are still not available commercially, and the available technology supports only one connection between two participants. The channel bandwidth, data compression, and applications software are still some of the limitations for adding the ability to pass binary data along with voice and video.

Large outfits like IBM and AT&T are applying technology to solve this problem. They have started many expensive satellite-based video-teleconferencing systems to create 'virtual meetings' involving people at multiple locations. But the cost of such systems is far from the reach of others because even the cheapest system costs more than a million of US dollars. Moreover, it does not provide a complete solution since participants are required to go to the special video-teleconferencing centres at their respective locations. Therefore, the developers are now aiming at bringing this technology to the desk-top to make it more acceptable and widespread.

Video teleconferencing has the power to reduce or eliminate paperwork, and delays due to commuting and travel involved. This has the potential of reducing operational costs by making an employee's location irrelevant.

Video teleconferencing integrates data, voice and image, and can be used by groups working on same subject but spread over a large geographical area. It can reduce travel expenses and speed up decision making. Using the right software, one can have a meeting with a colleague located at another office. He can send documents without breaking the conversation or constantly exchange data through attached I/O devices on the data channel. Using a network, more participants can be included while the computer will do the switching between different participants.

Already crude form of multi-participant teleconferencing is widespread in the form of a dial-up computer service's chat mode. In advanced countries, even text teleconferencing, where participants hook on through computer networks and talk through keyboards instead of their voices is common. A group-based teleconferencing system, GroupSystems from Ventana, USA, links participants in graphically managed meetings. They can share files among themselves and mark up comments on shared documents.

In full-fledged video teleconferencing, the images of the participants are captured by computer-mounted cameras; videoprocessors digitise and compress images, which are exchanged over a network in addition to data transfer. The voice signals travel through either network or standard telephone lines. With the advent of multimedia and standards for data transfer, it is becoming possible to have all these on

a single computer and communication channel.

Video Telcom, a USA-based company has developed a multi-participant video conferencing system called MediaMax. The system works with DOS-based PCs and ISDN, and can handle upto six participants who can see moving colour pictures of each other with facial expressions and voice, and pass on data through the ISDN link. Special video teleconferencing rooms are required for holding such meetings.

Yet another full featured desk-top system has been developed by Northern Telecom of USA. It is a dial-up video teleconferencing system and is named Visit. Visit enables a PC or a Mac to manage both video teleconferencing and voice mail (ordinary telephone talk). Two connected persons can see moving picture of each other in a window on the screen. They can also see their own picture being transmitted. Both users can share documents in a shared working space. The system allows them to mark and write comments in addition to two-way file transfer.

The system manages data channel dynamically to take care of variations in the information quantum in the channel. Normally audio and video occupy full bandwidth of the channel at 8-14 frames per second. When required it cuts down the video frame rate to free some bandwidth for data transfer. For still faster data transfer requirements, video is reduced or even stopped temporarily. It works with a PBX which makes it easier to get connections to multiple desks. The system costs US\$4000 per user excluding computer and telephone hardware.

At present, existing technology for teleconferencing is very limited for wide scale use. These still lack the feeling of true com-

munication which one gets by human contact—expressions, sights and voice—and involve huge costs. Efforts are on to make a video call as simple as a telephone call while retaining all the benefits offered by high speed digital channels, and to develop small systems based on personal computers that equal the quality of conference room.

In future, video teleconferencing may become more common with the developments in software and hardware for digitising and compressing video for multimedia, availability of cheaper video processing equipment, and digital telephones. Even cellular communication will soon be able to transfer high speed data and possibly low speed video also. As compared to DOS and other operating environments on computers, UNIX holds more promise for the success of this technology.

TELEPRESENCE

Telepresence is another application made possible by the developments in communication technology. Telepresence uses virtual-reality technology to simulate objects, people, sound and environment. The components of a telepresence system are sensor equipped gloves connected to a computer and head mounted displays. The computer simulates events in a distant virtual world using databases or real-time objects and sounds.

The output from the digital databases of real-time objects and sounds are sent to the user through a display mounted on the head, showing scenes. The user's senses get immersed in a illusionary yet sensible world. The person may be mounted on a movable chair fitted with movement sensors to have corresponding changes in the viewpoint of the virtual world.

The databases minimise the amount of information that is to be sent through communication channels. With such databases, virtual reality is created without moving large amounts of data. The information is passed through packet networks using high speed modems which are sufficient for two users. ISDN channels are best for carrying such large amount of data required for true telepresence effect. It is expected that with the proliferation of broadband ISDN, telephone lines would also be able to carry such data.

A typical set-up required for telepresence includes remotely operable hands required to manipulate objects, two-way microphones for speaking and listening, and stereoscopic TV cameras for sight. The current cost of this is very high which is estimated to be more than US\$100,000 per user.

Virtual reality technology enables the user to participate in artificially created worlds, simulated inside a computer. It can become a very powerful educational tool. In India, National Informatics Centre is working in this area whose 'virtual star gallery' and 'virtual art gallery' are to open in a couple of months. In Defence, virtual reality is being used to create environment of virtual battlefield where users actually battle.

Software packages to create simulated objects, people, sounds, and worlds using interactive, 3-D real-time graphics are already available commercially, for example, World ToolKit can run even on a PC AT. Developers of telepresence systems are optimistic that telepresence is going to be available online soon and the first product may be available probably by the end of next year.