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MEMORANDUM FOR FILE

This report summarizes the research efforts related to Office·Communication Systems which are currently underway in Laboratory 135. It gathers in one place all of the pertinent information in this area for the purpose of promoting communication between members of Lab 135 and avoiding the duplication of efforts of same. It is by no means an exhaustive report and is not meant to be restrictive in any way. Rather it is hoped that it will prove to be a stimulus to further efforts in Office Communications research by members of Lab 135.

1. Dept. 1352

1.1. LSX System

For the past year, H. Lycklama has been building a micro-processor based intelligent terminal system flexible enough for stand-alone applications and suitable for computer-naive users. It takes advantage of the decreasing cost of the hardware components of the system (CPU and memory) and minimizes the increasing cost of software development by taking the large amount of application software written for UNIX-based systems. The system has been implemented on an LSI-11 micro-processor which has an instruction set compatible with members of the PDP-11 family of computers. Floppy disks have been used for secondary storage. The system has been developed with the belief that the power of today's mini-computer will be available in a micro-computer within 5 years. A number of LSX systems have been exported to other groups within Bell Labs in the last few months.

1.2. TV Terminal

A TV raster scan terminal complete with cursor and line scrolling capabilities has been built by H. G. Alles. The terminal displays 28 lines of 72 characters each. It uses a standard ascii keyboard for input but also has 16 user-labelled buttons directly below the TV screen, whose functions are user-programmable. This terminal is connected to the LSX system and has been programmed as an input device for general-purpose form entry programs. Some preliminary work has been done to use it as an input terminal for a two-dimensional text-editor.

1.3. A Language for Generating Pictures

For a period slightly less than a year, there has been sporadic work done by A. M. Usas on designing a language for describing line drawings. The goal has been to find a simple and natural way to talk about the primitive elements of simple drawings and their relationships in the desired figure. With such a system a user sitting at a typewriter keyboard would be able to completely describe the picture without relying on visual feedback. While interactive techniques have been demonstrated as being more efficient, this approach offers machine independence.

simple editing, low cost, and wide availability. Progress in this effort has included a literature survey and the design and partial implementation of some language primitives such as assignment and concatenation of rectangles.

2. Dept. 1353

2.1. Superimposed Coding

An algorithm, called superimposed coding, is being used for partial match retrieval from very large files of records. When a record is identified by a collection of keywords, it can be accessed by constructing a query containing any number of those keywords, in any order, and with as few initial letters in each word as desired. Although the technique has been currently implemented in software by C. S. Roberts, its greatest value lies in a simple but very fast hardware implementation. There are plans to build such a piece of hardware within the next year. J. Gabbe, C. N. Judice, and T. B. London are designing and coding a new software version of the system which will feature more computational parallelism, modularity, and user feedback.

Currently, a telephone directory data base, consisting of 50,000 business and professional listings, is being used as a test bed for these coding ideas. In this application, chosen as a vehicle for information retrieval, a telephone customer could easily access a directory data base directly. Such a system could essentially relieve the necessity for remembering or recording any telephone numbers, and in fact, make it possible to dial by name alone. Clearly there are other information retrieval applications which can benefit from the superimposed coding technique.

As a second application, work was started six months ago by R. E. Miller and C. S. Roberts on implementing a system that might be called an electronic file cabinet. Here the idea is to store the index of records describing, briefly, the contents of each document in the file cabinet. The document itself is kept in hardcopy, but there is a collection of 8-10 keywords which the system remembers and which the user can use to construct a query. When a record is found, the system tells the user where in the file cabinet the document can be found. Currently Lynn Levy is using this system, implemented on the PDP 11/45, in her day-to-day work.

2.2. Terminal Simulation

C. N. Judice is using simulation to search for the functional design of an information display telephone. Various designs have been simulated on a sophisticated graphics terminal, very similar to a PLATO IV terminal, with "computer-naive" subjects accessing a telephone directory database. This work takes the point of view of determining functionally, what is required of a display terminal in order to perform a limited information retrieval task. An attempt is being made to define the minimal augmentation of a telephone that would give the general public access to convenient informational services which only computer technology can provide. Four aspects of the terminal are defined as being essential to providing a friendly, people-oriented interface between the user and the computer. First, a small alphanumeric display is needed as a window into the data base. Second, an alphanumeric keypad, optimized for "hunt and peck" keying, is required for data entry. Third, a programmable button set is added to provide flexibility for various applications without compromising the human interface features. Finally, a small amount of processing and memory is needed to provide formatting, editing, and buffering of data while guaranteeing a minimum response time. Experience with "computer-naive" subjects using the simulated terminal will lead to improved terminal and system design.

3. Dept. 1354

3.1. Text Entry and Editing Terminal

W. Ninke is constructing a high resolution CRT based terminal capable of displaying a full 8 1/2 x 11 page of text. It will contain an LSI 11 microcomputer and a bit map memory. This memory scheme was chosen to enable display of graphics and to allow generation of a variety of type fonts and characters.

3.2. Display Phone

R. Brainard and T. Sosnowski have constructed a terminal which implements the concept of the shared visual space - that is, a common tablet upon which people in remote locations may communicate. The terminal contains an 8080 microcomputer which controls the interactions among the 512 x 512 element plasma panel display, a modified TV camera for imaging, a keyboard, light pen and a telephone data set. Such terminals may be connected to the switched network by 1200 baud modems or hard wired together to simulate bit rates up to 9600 baud. A run-length-coding scheme allows transmission of simple line drawings in one minute at 1200 baud.

The terminal is also useful for accessing time-shared computer systems allowing such services as software development, information retrieval and text generation.

A "Display Phone" having the above characteristics but based on a high resolution CRT is in the planning stage by W. Ninke.

3.3. Ring Organized Interconnections for Communications

Traditional star organized interconnection in communication systems waste transmission facilities, because most of the interconnections are idle at any given time. An alternative ring organized system much more sensibly utilizes transmission line capacity but switching requires complex electronics. Modern large scale integrated circuit technology, having provided a means to reliably and cheaply produce the necessary electronics, makes these systems attractive for interconnection. T. J. Pedersen is exploring ring system designs.

4. Dept. 1355

4.1. Business Communication Services (BCS)

Department 1355 is investigating research areas in BCS in which work can be done in the near future. We envisage a BCS package to provide three kinds of services : the first, to prepare documents and edit text: the second, to provide communication from a user either to himself via reminder, calendar services, etc., or to other users by leaving messages, scheduling meetings, etc.; the third, to organize, store and retrieve data.

Although the success of a BCS package vitally depends on how harmoniously the constituent services fit together, we will initially concentrate on the first two types of services, i.e., text handling and communications, with an emphasis on the interface between end-user and the services - a "function oriented" approach.

Crucial in providing the first type of service is a text editor. It is heavily used by the secretarial staff: therefore, it should be "friendly", and easily learned. One such editor is being designed in which text displayed on a screen terminal is edited by moving the curser, and giving appropriate commands to modify the text. The human interface is the prime consideration in its design, and it is hoped that nonprogrammers will be able to learn its commands necessary for day-to-day use in an afternoon. More advanced features can be learned gradually as the user develops familiarity with the editor.

The second type of service, i.e., communication, would be used to keep reminders, send messages, maintain calendar, diary and telephone book, schedule meetings, etc. The user would see these and many other services as parts of a "personal assistant" his friend behind the screen, who would respond to his specific requirements, and perhaps even entertain him at times with a joke or the like. We are now defining a possible package of services which could be provided by the "personal assistant".

Toward a different kind of communication service, namely, remote conferencing, an experimental video conferencing system has been developed which provides the "visual presence" of all the participants in a video- conference. In addition, this system allows presentation of still or continuous graphics without interrupting the "visual presence" of the participants. It uses three camera-monitor sets for people and one for graphics at each conferencing location, and a 4 MHz transmission channel.

5. Dept. 1356

5.1. Ye Compleat Phone

D. W. Hagelbarger is experimenting with adding a full ascii keyboard and a display to a telephone to provide both voice and data service. The final package should not be much larger than a 500 set. Since displays are large and expensive, a single line of about 50 characters which can be used as a window over a larger character buffer in memory, is being tried. The phone will contain a microprocessor. The current experiment is being done with an LSI-11 microprocessor.

6. Dept. 1358

6.1. Telephone - TV Interface

K. V. Mina and H. J. Schulte are exploring the problem of interfaces between the switched network and home TV receivers. Coupling of these two readily available systems could open the consumer market to word processing.

7. Dept. 1359

7.1. Experimental Digital Office

The latest version of the local digital switch which has evolved for a number of years at Murray Hill is being constructed as a research vehicle for experimentation with new services which can be provided through digital switching. The switch itself will handle only several dozen lines, but in an extremely flexible architectural arrangement using an "intelligent network" which can process signals as they are being switched via time slot interchanging. The switch itself will be used to interconnect phones, terminals and computers with each other and with the outside world for Lab 135 members at Murray Hill. The goal will be to provide new office services to Lab 135 members through the intelligent digital switch environment. Hopefully the digital switch could provide the Bell System with some unique capabilities in this area.