

System for computer-based stenographing of sessions and archiving of stenographed files (STENOCOM)

A. Rudžionis, V. Rudžionis, K. Ratkevičius
Kaunas University of Technology, Lithuania
Address: 3031 Studentu 56-302, Kaunas, Lithuania
Phone: (3027) 35 41 91
E-mail: alrud@mmlab.ktu.lt

Abstract - STENOCOM is aimed to assist stenography process by controlling playback of prerecorded speech simultaneously with text collection from Word text editor. It involves direct speech input to the computer from microphone or translation line, exchange of audio and text files between the stenographers, editors and publishing center, flexible control of audio output, fast and easy access to the collected audio-textual information. Application area of such system: teleconferencing, phone-meals, conferences, seminars, meetings, courts, parliaments, etc

I. INTRODUCTION

There are three versions of STENOCOM:

- **SMALL** (single computer): the speech input, stenography and access to audio-textual data are carried out consequently by separate programs;
- **MEDIUM** (two computers, network): this version allows to perform speech input and stenography simultaneously within network. First (INPUT) computer is used for speech input as audio tape and

as server. The stenography and editing are carried out on second (STENO) computer. The access to audio-textual data is carried out on STENO computer by separate program independently when data are prepared;

- **LARGE** (unrestricted number of computers, network): this version suppose the simultaneous activity of stenographers and editors groups. The audio-textual data preparation delay is minimised. The stenography and editing are carried out on unrestricted number of computers. The access to audio-textual data is carried out on every network computer by separate program independently when data are prepared.

II. DESCRIPTION OF STENOCOM

The LARGE version of STENOCOM is implemented as a computer network in Lithuanian parliament (Seimas) for computer-based stenographing of sessions and archiving of stenographed files. Fig. 1 shows the structure of STENOCOM.

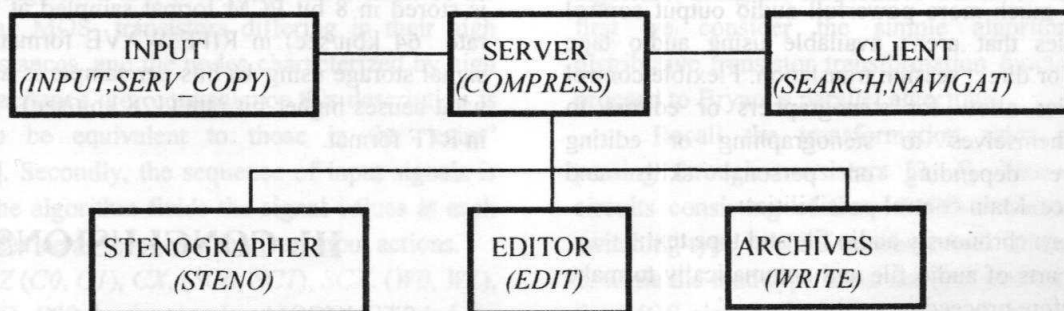


Fig. 1. The structure of STENOCOM

STENOCOM consists of server (SERVER), voice input computer (INPUT), some computers for stenographing (STENOGRAPHER), editing (EDITOR), searching of information (CLIENT) and archiving of information (ARCHIVES).

The software of system consists of seven main

programs: *INPUT*, *SERV_COPY*, *STENO*, *EDIT*, *SEARCH*, *NAVIGAT*, *COMPRESS* and some auxiliary ones. Program *INPUT* records the audio signal from microphone or translation line via audio adapter card to INPUT computer. Continuous audio file of session and short temporary audio files (the size can be selected) are

formed during the session. Program *SERV_COPY* sends short audio files to the server computer via network. Stenographer receives short audio file and using installed playback program *STENO* and Microsoft Word text editor could synchronously listen audio data and type the appropriate text file. Prepared text file is sent to the server and is available for editing. Editors receive short audio files together with the corresponding text files. Using playback control program *EDIT* he/she listens audio data and introduces corrections where necessary. As soon as text is prepared by editors, the sound and text are offered immediately to access for any interested people by program *SEARCH*. It enables to find text and corresponding audio according the name of speaker or the topic of report. Continuous audio file, corresponding edited text file and additional files are recorded to CD-ROM by standard program in ARCHIVES computer.

Additional index files are used for text and audio searching. The user can choose CD-ROM or computer files as the source of information. Fast audio search by graphic control units and options for printer, font selection, text justification, copying to clipboard, text scrolling are available in program *SEARCH*.

The features of STENOCOM:

1. *Circulation and automatic distribution of audio and text files in the network*: the computer network connects all persons responsible for a preparation of stenographed materials. It involves direct input of session debates to the computer from microphone or translation line, exchange of audio and text files between the stenographers, editors and publishing center in the network and fast and easy access to the collected audio-textual information.
2. *Synchronous stenographing and editing*: the stenographing and editing are performed simultaneously. It means that audio data are distributed automatically among stenographers and editors chunk by chunk (for example, 10 - 20 minutes). Computerisation of audio output provides new and much more powerful audio output control capabilities that aren't available using audio tape recorder or direct session translation. Flexible control capabilities allow for stenographers or editors to adopt themselves to stenographing or editing procedure depending on personal skills and experience. Main control possibilities:
 - to listen synchronously audio file and type text;
 - to play parts of audio file and automatically to make pause before proceeding next part;
 - to repeat fragment one or some times;
 - to make pause and restart from the place where it was stopped;
 - to make steps forward or backward in audio file simply by key pressing and without exit from text editor window.

The length of steps, length of fragment to play and pause to make are fully user selectable. Embedded dynamic

libraries are used to exchange information between text editor and playback program. This allows to control playback procedure without exiting from editor what makes stenographing procedure more convenient for the stenographer.

1. *Fast access to prepared material*: implementation of computerised system allows to speed up availability of prepared materials, i.e., audio material is available just after short part (5 -30 minutes typically) of session was written, draft text version is available just after stenographer finished to process the part of session, edited version is available just after editor finished to process material. Another important characteristic is the possibility to access audio and textual material simultaneously. It is possible to find text and corresponding audio according the person name, time and the theme of session.
2. *Long term storage of audio-textual data on CD ROM*: materials of some sessions are placed in CD-ROM. Each CD-ROM has its own number. The numbers of CD-ROM's together with topic names and dates of sessions are placed in the data basis. Program *NAVIGAT* enables directly to find the text of session and corresponding audio according the topic and the date of session using the data basis of CD-ROM's.
3. *Compression of audio data*: one of speech compression algorithms (ADPCM-40, ADPCM-32, ADPCM-24 or DFCD) can be selected in program *COMPRESS* to decrease the size of memory space for audio data. Standard ADPCM algorithms provide 40 kbps, 32 kbps and 24 kbps, correspondingly. Fast algorithm of differential encoding DFCD compresses the speech to 20-32 kbps depending on the selected threshold.

STENOCOM operates under Windows 95 and WindowsNT. Microsoft Word for Windows 7.0 is used for stenographing and editing procedures. 8 bit or 16 bit audio adapters can be used for voice input. Audio signal is stored in 8 bit PCM format sampled at 8000 Hz (bit rate 64 kbit/sec) in RIFF WAVE format files. Audio signal storage using 16 bits per sample is also available what causes higher bit rate (128 kbit/sec). Text is stored in RTF format.

III. CONCLUSIONS

STENOCOM operates about one year in Lithuanian parliament. The SMALL version of STENOCOM is used for stenographing of separate sessions. Voice-controlled stenographing is under development: some speech commands (stop, continue, go, back, etc.) will create additional conveniences for stenographers.