

StarCaster[®] **Automated Text-to-Speech System**

StarCaster[®] is an operationally proven PC-based software system that offers a fully automated, superior quality Text-to-Speech capability. StarCaster is designed to meet the needs of agencies and corporations that provide timely information to the public via telephone or radio broadcast. The StarCaster system was originally developed for the complex requirements of weather broadcasting, meeting the established requirement for rapid conversion of weather text to a natural, high-quality voice ready for broadcast. StarCaster offers a cost-effective automated solution for information providers, while allowing easy access to essential information to the public.

StarCaster uses a "speech concatenation" process to automatically convert text information into a natural voice for audio transmission. The resulting speech is a much higher quality than that of existing text-to-speech (TTS) synthesis systems, which typically have a "robot-like" sound that is not suitable for high-profile applications. The TTS component of the system uses a pre-recorded digitized voice database to produce the high-quality voice output. The optional telephony capability provides standard Interactive Voice Response (IVR) features. The system can guide callers to the right information using prompts from a voice "menu tree". Voice information is played in response to the caller's touchtone commands. When finished, callers can select other information or menus, leave messages or be transferred to a live operator.

Applications where StarCaster is currently used include: automated air terminal information systems, pilot weather advisory services, and marine navigation system support over telephone or radio. With the introduction of new applications, new processes for scheduling and user interfacing are added to the StarCaster system. The system also has an optional third-party speech recognition system, which can be integrated with the IVR capabilities to assist users in making requests for specific information over the telephone. The StarCaster system easily adapts to new applications, such as providing detailed municipal transit information in response to user requests.

The software for the StarCaster system has been designed to allow for optimum flexibility. The StarCaster system uses hardware components that are all commercial off-the-shelf (COTS) items, and will work with telephony cards, and sound cards. The system runs on a Windows-based desktop computer; other hardware components vary depending on the application being used.

Overview of the StarCaster Speech Concatenation Process:

The StarCaster system produces its high-quality speech output by accessing a voice database that contains digitized units of speech, known as "intonational phrases". Intonational phrases are words or phrases that are determined through the analysis of various speech pattern aspects of a particular language. Speech concatenation systems that do not employ the expertise that takes these phonetic aspects into account will produce an output that sounds "choppy" or disjointed.

The speech concatenation process involves the selection of the appropriate words or phrases from the database and uses digital processes to link them together to form the spoken message, which is either written to a digitized speech file for scheduled access and output, or sent directly to the digital-to-analog converter. Processes are also in place for accessing the text and producing the concatenated speech message according to predefined conditions or schedules, without saving the files to disk.

During text to speech processing, the selection of the appropriate "intonational phrases" depends upon the analysis of the corresponding text string through text parsing and processing rules. These rules are responsible

for selecting the words and phrases from the database that contain the correct stress and intonation patterns required to produce a smooth and natural speech message.

In a speech concatenation process, a string of text may be produced that does not match any text held in the voice database. Because new speech items cannot be generated on the fly by a speech concatenation system, the StarCaster strategy is to flag the unknown text string as a missing vocabulary item. The operator is then presented with a list of alternatives from which to construct an equivalent message. Given a large and comprehensive voice database such as one used in weather broadcasting, an alternative term is usually available. However, rules can also be developed to allow the system to skip the unknown word and continue broadcasting the message.

Summary of the StarCaster Automated Text-to-Speech System:

- Highest quality Text-to-Speech capability available
- Proven performance from over 20 years of successful and reliable operations
- Flexible design in a Windows environment provides immediate configuration to meet specific applications
- COTS hardware for scalable solutions
- Depth of experience in producing voice databases assures high-quality and rapid development of vocabulary for specific requirements