

**TECHNIQUE FOR EFFICIENTLY
ACCESSING TELEPHONE MESSAGES**

Field of the Invention

The invention relates to communications systems and methods, and more particularly to telephone answering systems and methods for storing and retrieving messages.

Background of the Invention

It is well-known that a telephone answering machine allows for recording of messages from callers in response to an announcement previously recorded by the called party. The called party may retrieve the messages from the machine in the order of receipt.

Analog answering machines are common which incorporate cassette tape recording equipment for recording the announcement and messages. With the advent of technology, digital answering machines have emerged. A digital answering machine includes a coder for converting an analog speech to digital data representative thereof, and a voice synthesizer for synthesizing the analog speech based on the digital data. Using the coder, the machine can digitize the announcement and messages, and store the corresponding digital data in a memory. By retrieving the stored data and using the voice synthesizer, the machine can play back the corresponding announcement to callers and messages to the called party. Unlike an analog answering machine, a digital answering machine has no moving tape recording part, thereby affording a quieter operation and faster access to the announcement and messages.

Systems using information in voice messages to help process transactions such as taking customers' orders are known. One such system is disclosed in U.S. Patent No. 5,003,574 issued March 26, 1991 to Deng et al. The Deng system records and digitizes voice messages by

customer-callers containing order information. Certain recognized terminology in the digitized messages is stored in file records corresponding thereto. In processing the customers' orders, as each digitized message is retrieved
5 in the order of receipt, the corresponding file record terminology is displayed on a transcribing terminal in the system, filling part of a predefined order template. The digitized message is received by an operator at the transcribing terminal as an audio message, and the
10 operator completes the rest of the template using information contained in the audio message.

Summary of the Invention

The telephone answering systems just described are helpful in communicating information by leaving
15 messages to a called party who is unavailable to answer calls. With such prior art systems, the called party retrieves the messages by playing them back in the order of receipt. Specifically, the called party has to listen to a substantial portion, if not the entirety, of each
20 message in a queue to understand its context before he/she skips to the next message. The prior art systems are adequate only if the messages are of equal importance, which however is unusual. Thus, with such systems, it may take too long for the called party to reach and respond to
25 messages of particular interest or urgency if such messages are not close to the beginning of the queue or if the intervening messages are lengthy.

The present invention overcomes the prior art limitations by allowing the called party to retrieve
30 selected messages based on at least one attribute thereof. For example, the attribute may contain information on the identity of a caller. The attribute of each message and the message details may be elicited from the caller and stored in different pre-selected memory spaces. In

accordance with the invention, each attribute is retrievable separately from the details of the message associated therewith. The called party is able to review each attribute to decide whether he/she wants to retrieve
5 the associated message details or skip same. Thus, with the invention, the called party can efficiently locate and access any message of interest.

Brief Description of the Drawing

In the drawing,
10 Fig. 1 illustrates an operating portion of a telephone answering system in accordance with the invention;
Fig. 2 is a schematic of the inventive system;
Fig. 3 is a flow chart depicting the steps of an
15 operating routine in the inventive system; and
Fig. 4 illustrates a memory space for storing telephone messages in the inventive system.

Detailed Description

Figs. 1 and 2 jointly illustrate telephone
20 answering system 100 embodying the principles of the invention. Fig. 1 shows an operating portion of system 100, and Fig. 2 shows a schematic of the system. In system 100, line connector 101 in Fig. 1 provides an interface for telephone circuitry 201 in Fig. 2 to be
25 connected to an external telephone line (not shown). Telephone connector 103 provides an interface for telephone equipment such as a conventional analog telephone set (not shown) to be connected to system 100. Telephone connector 103 is also connected to telephone
30 connector 101 to allow the telephone equipment to transmit and receive calls through the external telephone line.

Traditionally, when the telephone equipment connected to an answering machine is not answering a call,

the machine intervenes and picks up the call. In response to a pre-recorded announcement played by the answering machine, the caller may record thereon a message for the called party. The number of messages on the machine
5 increases over time. The called party is able to retrieve the recorded messages by playing them back in the order of receipt. However, the called party normally has to listen to a substantial portion, if not the entirety, of each message in a queue to understand its context before he/she
10 skips to the next message. As a result, it may take too long for the called party to reach and respond to messages of particular interest or urgency if such messages are not close to the beginning of the queue or if the intervening messages are lengthy. Thus, this prior art message
15 retrieval practice proves to be inefficient.

In accordance with the invention, system 100 is designed to be capable of eliciting from a caller certain attributes of a message which a caller is about to leave, along with the message details. Such attributes may
20 include, for example, information on the name of the caller, the purpose of the call, etc. System 100 also allows the called party to retrieve selected messages by first reviewing one or more of the attributes thereof. In order to more appreciate the invention, an exemplary
25 calling session wherein system 100 elicits from a caller attributes and details of a message is illustrated as follows:

1. The telephone equipment connected to system 100 rings and the called party does not answer the call.
- 30 2. System 100 answers the call with a greeting including a question on a first attribute of the message, "We cannot come to the phone right now. Please respond to the following questions if you want to leave

a message. [Pause.] Who is calling please?"

3. The caller identifies himself/herself, e.g.,
"Mary."

5 4. System 100 stores the information on the first
attribute of the message, i.e., the caller identity
information.

5. System 100 optionally continues with a second
attribute question, "What is this call about?"

10 6. The caller states the purpose of the call, e.g.,
"Home insurance."

7. System 100 stores the information on the second
attribute of the message, i.e., the call purpose
information.

15 8. System 100 then prompts for message details,
"Please leave the details of the message now."

9. The caller leaves the message details.

10. System 100 stores the message details.

While the above sequence of operations is
representative, still other options may be included, or
20 various portions omitted, as will be apparent in the
following discussion. In any event, to realize such a
sequence, system 100 in accordance with the invention
provides Attribute 1 (A1) key 131 associated with a first
attribute of the message, Attribute 2 (A2) key 135
25 associated with a second attribute of the message, and
Message Details (MD) key 137 associated with the details

of the message, all of which are connected to operating circuitry 203. For example, by pressing A1 key 131, followed by Record key 105 also connected to circuitry 203, the user is able to record the greeting including the
5 first attribute question, "We cannot come to the phone ... Who is calling please?" in step 2.

Specifically, upon detecting the sequential depression of keys 131 and 105 through circuitry 203, processor 205 causes the circuitry to be receptive to an
10 audio signal representative of the greeting by the user through microphone 107. The received audio signal in an analog form is digitized by a conventional coder (not shown) in circuitry 203 in a well-known manner. The resulting digital data representing the greeting is then
15 stored in data memory 207 for a later retrieval. Illustratively, data memory 207 is a conventional volatile or non-volatile static random access memory (SRAM).

Similarly, by pressing A2 key 135, followed by key 105, the user is able to record the second attribute
20 question, "What is this call about?" in step 5. By pressing MD key 137, followed by key 105, the user is able to record the prompt, "Please leave the details of the message now." in step 8.

To verify or re-listen to one of the above
25 recorded announcements, the user may press the corresponding one of keys 131, 135 and 137, followed by Announce key 109 connected to operating circuitry 203. Upon detecting the depression of one such key combination, processor 205 retrieves from memory 207 the digital data
30 representing the recorded announcement associated with the leading key (i.e., key 131, 135 or 137). The retrieved data is fed to a conventional voice synthesizer (not shown) in circuitry 203. A synthesized version of the announcement is then generated through speaker 111.

35 Fig. 3 is a flow chart depicting operating

routine 300 stored in program memory 209 for carrying out the aforementioned sequence of operations.

Illustratively, program memory 209 is a conventional read-only memory (ROM). Instructed by operating routine 300,

5 processor 205 monitors any call unanswered by the connected telephone equipment, as indicated at step 303. Specifically, telephone circuitry 201 in a well-known manner senses from the telephone line a ringing signal associated with an incoming call. Upon detection of a
10 predetermined number of occurrences of the ringing signal through circuitry 201, processor 205 determines that the telephone equipment is not being answered. If that is the case, routine 300 proceeds to step 305 where processor 205 causes telephone circuitry 201 to answer the call with the
15 recorded greeting in a synthesized voice, including the first attribute question (i.e., "We cannot come to the phone ... Who is calling please?").

In response to such a greeting, the caller in this example answers, "Mary." Operating circuitry 203
20 receives from telephone circuitry 201 an audio signal representing the name attribute of the message, and digitizes same, as indicated at step 307. The resulting digital data representing "Mary" is stored in memory 207, as indicated at step 309.

25 Fig. 4 illustrates a portion of memory 207 for storing the caller's attribute and message details information. In accordance with the invention, memory blocks 401, 403 and 405 are allocated for storing the first attribute, second attribute and message details
30 information, respectively. Memory segments, denoted I, J and K, are defined in each block such that the ensemble of segments I across the blocks corresponds to a first message; the ensemble of segments J thereacross corresponds to a second message; and the ensemble of
35 segments K thereacross corresponds to a third message.

In this illustration, the message being recorded is preceded by two earlier messages. The data representing the name attribute of the first message (in this instance "Bob") is stored in segment I of memory block 401. The data representing the name attribute of the second message ("Alex") is stored in segment J of the same block. The above name attribute data representing "Mary" is stored in segment K of same.

After step 309, upon detecting by operating circuitry 203 silence following the first attribute response, "Mary.", processor 205 at step 311 announces the pre-recorded, second attribute question in a synthesized voice, "What is this call about?" In response to such a question, the caller in this example answers, "Home insurance." In the manner described above, the audio signal representing the call purpose attribute of the message is received and digitized, as indicated at step 313. Similarly, the resulting digital data representing "Home insurance" at step 315 is stored in segment K of memory block 403. As mentioned before, block 403 corresponds to the second, call purpose attribute of a message. In this instance, the data representing the call purpose attribute of the first message (in this instance "Homework") and that of the second message ("Auto repair") are stored in segments I and J of memory block 403, respectively.

Again, upon detecting by operating circuitry 203 silence following the second attribute response, processor 205 at step 317 announces the pre-recorded message details prompt in a synthesized voice, "Please leave the details of the message now." In response to such a prompt, the caller in this example utters the message details, denoted MD #3. In the manner described above, the audio signal representing MD #3 is received and digitized, as indicated at step 319. Similarly, the resulting digital data

representing MD #3 is stored in segment K of memory block 405, as indicated at step 321. As mentioned before, block 405 corresponds to the details of a message. In this instance, the data representing the message details of the first message, denoted MD #1, and that of second message, denoted MD #2, are stored in segments I and J of memory block 405, respectively. It should be noted at this point that each memory segment of block 405 is allocated more memory space than that of block 401 or block 403, in anticipation of a larger amount of data to be stored there. However, the actual memory allocation may be fixed or dynamic.

Additional messages, if any, subsequent to the current message are similarly saved by system 100 in accordance with routine 300. The total number of messages thus saved by system 100 is indicated by display 113a (e.g., a conventional seven-segment display or liquid crystal display (LCD)) connected to operating circuitry 203. In this instance, display 113a shows a numeral "3", indicating that three messages (i.e., Bob's, Alex's and Mary's) have been saved by system 100. Display 113b, structurally similar to display 113a, identifies the current message ready to be retrieved. In this instance, display 113b displays a numeral "1", indicating that the first message is ready to be retrieved.

With system 100, the user is able to access the messages in an efficient manner. For example, the user in this instance expects an important message left by a garage on system 100 about his/her car repair. In addition, the user does not know the name of the mechanic who might call. Thus, in this example, the user would want to review the call purpose attribute of each stored message to identify any such message. As mentioned before, the call purpose attribute corresponds to the second attribute of a message. In accordance with the

invention, system 100 allows the user to play back the second attribute information by pressing A2 key 135, followed by Play key 115. In response to such a key combination, processor 205 retrieves data from segment I
5 (corresponding to the count shown on display 113b) of memory block 403 (corresponding to the second, call purpose attribute). System 100 then announces through speaker 111 in a synthesized voice, "One. Homework."
Immediately thereafter, the count shown on display 113b
10 increments from "1" to "2". Accordingly, system 100 announces, "Two. Auto repair."

As soon as the user identifies the second message as the message of interest, the user may press Stop key 117 connected to operating circuitry 203 to halt
15 the on-going call purpose announcement process. As a result, display 113b stops at the current count (i.e., "2"). Otherwise, the process continues until the count shown on display 113b matches that on display 113a to allow the user to review the call purpose of each message.
20 If that is the case, the count shown on display 113b increments from "2" to "3", corresponding to the last message in this example. System 100 then announces, "Three. Home insurance." The call purpose announcement process thereafter comes to an end. Since the user at
25 this point has found out that the second message is the message of interest, he/she wants to retrieve that message. To that end, the user needs to press Backward key 119 once to decrease the count on display 113b from "3" to "2" corresponding to the second message.

30 In any event, once display 113b shows the count "2", the user may listen to the details of the second message by pressing MD key 137, followed by Play key 115. Accordingly, processor 205 retrieves the data representing MD #2 from segment J (corresponding to the second message)
35 of memory block 405 (corresponding to the details part of

a message). The message details MD #2 are then announced in a synthesized voice. In the event that the message details do not reveal the caller's name and the user wants to know it, the user may review the first, name attribute
5 of the message by pressing A1 key 131 corresponding thereto, followed by Play key 115. Accordingly, processor 205 retrieves the data representing "Alex" from segment J of memory block 401 (corresponding to the first attribute of a message). The announcement "2. Alex." is then
10 synthesized. As an alternative, the user may press Play key 115 alone in the first place to listen to the complete message including the first attribute, second attribute and message details, in that order. If that is the case, processor 205 retrieves the data from segment J of each of
15 memory blocks 401, 403 and 405. The complete message is then announced in a synthesized voice.

Other keys on system 100 include Forward key 121 and Delete key 123. Key 121 performs an inverse function to Backward key 119. Key 123 enables the user to delete
20 the current message identified by display 113b. When a message is deleted, the respective counts on displays 113a and 113b would decrease by one. In addition, the ensemble of memory segments corresponding to the deleted message would be relinquished and overwritten by a new message.

25 The foregoing merely illustrates the principles of the invention. It will thus be appreciated that a person skilled in the art will be able to devise numerous systems which, although not explicitly shown or described herein, embody the principles of the invention and are
30 thus within its spirit and scope.

For example, it is disclosed that system 100 includes A1 key 131 and A2 key 135 to implement the invention based on two message attributes. It will be appreciated that system 100 will include more or fewer
35 such attribute keys to realize more or fewer message

attributes. Moreover, it will be appreciated that the actual number of message attributes used may be selected, and thus perhaps different from the number of available attribute keys. For example, the selected number of
5 attributes used in the daytime may be one or more, in anticipation of a high volume of messages. By contrast, it may be one or even none at night, in anticipation of much fewer messages.

In addition, in the illustrative embodiment,
10 program memory 209 and data memory 207 in system 100 are physically separate. Alternatively, they may be a shared memory space.

Moreover, although program memory 209 is illustratively a ROM, it may alternatively be an electrically erasable programmable read-only memory (EEPROM) to allow for software version updates. The
5 program memory may also include a RAM to boost speed.

Further, although data memory 207 is illustrated as an SRAM, it may include a ROM or EEPROM for storing announcements, and may include an EEPROM for storing callers' messages. The use of a conventional "audio RAM"
10 (ARAM) in lieu of the present SRAM is also a possibility.

Still further, the messages and announcements may be stored in system 100 in any suitable speech format, typically a compressed format to save memory space. The messages and announcements may alternatively be stored in
15 ASCII format, for example, to allow for entering the desired information from a keyboard or other input device.

In addition, in the illustrative embodiment, system 100 is a stand-alone system. It will be appreciated that a person skilled in the art will
20 incorporate the hardware and/or software of system 100, in whole or in part, into a telephone unit or a personal computer (PC) affording the telephone functionality. In the latter case, a microphone and speakers are included in the video monitor for example. The invention may then be
25 conveniently implemented using the memory and logic available in the PC, either on the main circuit board or as a plug in unit.

While a conventional analog telephone indicated above may be used as the telephone equipment connected to
30 system 100, a digital telephone comprising analog-to-digital and digital-to-analog converters may alternatively be used. For example, an ISDN (integrated services digital network) phone may be used, or alternatively a phone connected to a broadband network or an Internet
35 provider. The "ringing" and incoming call receipt

functions may be modified from those provided by a conventional analog phone, if desired. For example, an incoming call may be recognized as a particular digital bit sequence rather than an analog ringing voltage, as
5 appropriate to the particular implementation.

Finally, although system 100 as disclosed is embodied in the form of various discrete functional blocks, the system could equally well be embodied in an arrangement in which the functions of any one or more of
10 those blocks or indeed, all of the functions thereof, are realized, for example, by one or more appropriately programmed processors or devices.

I Claim:

1. A system for answering a telephone call comprising:
an interface for eliciting from a caller of the
5 call a message including at least one attribute of the message;
a processor for separating the attribute from the rest of the message;
an operating element for reviewing the
10 attribute; and
a selecting element for retrieving a selected part of the message based on the attribute.
2. The system of claim 1 wherein said interface includes an audio interface for
15 prompting the caller for said attribute.
3. The system of claim 1 wherein said attribute includes information on an identity of the caller.
4. The system of claim 1 wherein said
20 attribute includes information on a purpose of the call.
5. The system of claim 1 wherein said processor stores the attribute in a first selected memory space, and the rest of the
25 message in a second selected memory space.
6. The system of claim 5 wherein the first selected memory space and second selected memory space are associated with the message.



7. The system of claim 1 wherein the operating element includes a selector for selecting the attribute to be reviewed.
- 5 8. The system of claim 1 wherein the selected part of the message includes a second attribute of the message.
9. The system of claim 1 further comprising telephone equipment for transmitting and receiving telephone calls.
- 10 10. The system of claim 9 wherein said telephone equipment is a digital telephone comprising an analog-to-digital converter and a digital-to-analog converter.
- 15 11. The system of claim 1 further comprises a personal computer (PC).
12. A telephone answering system comprising:
an interface for receiving a plurality of messages including attributes and details thereof;
a processor for retrieving one or more of the
20 attributes apart from the details associated therewith;
an operating element for identifying any one of the retrieved attributes as being of interest; and
a controller for accessing a selected part of the message having the attribute of interest.
- 25 13. The system of claim 12 wherein said interface receives for each message at least one attribute of the message.



14. The system of claim 13 wherein said at least one attribute includes information on an identity of a provider of the message.
- 5 15. The system of claim 12 further comprising a first selected memory space for storing said attributes and a second selected memory space for storing the associated message details.
- 10 16. The system of claim 12 wherein said processor retrieves the attributes in the order of receipt thereof.
- 15 17. The system of claim 12 wherein said operating element includes an audio interface for announcing information concerning the retrieved attributes.
18. The system of claim 12 further comprising telephone equipment for transmitting and receiving telephone calls.
- 20 19. The system of claim 18 wherein said telephone equipment is a digital telephone comprising an analog-to-digital converter and a digital-to-analog converter.
- 25 20. The system of claim 12 further comprises a personal computer (PC).
21. A method for use in a telephone answering system comprising the steps of:
eliciting from a caller of a telephone call a message including at least one attribute of the message;



separating the attribute from the rest of the
message;

reviewing the attribute; and

retrieving a selected part of the message based
5 on the attribute.

22. The method of claim 21 wherein the
eliciting step includes the step of
prompting the caller for said attribute.

10 23. The method of claim 21 wherein said
attribute includes information on an
identity of the caller.

24. The method of claim 21 wherein said
attribute includes information on a purpose
of the call.

15 25. The method of claim 21 wherein the
separating step includes the step of
storing the attribute in a first selected
memory space associated with the message,
and the rest of the message in a second
20 selected memory space associated with the
message.

26. The method of claim 21 wherein the
reviewing step includes the step of
selecting the attribute to be reviewed.

25 27. The method of claim 21 wherein the
selected part of the message includes a
second attribute of the message.

28. A method for use in a telephone answering



system comprising the steps of:
receiving a plurality of messages including
attributes and details thereof;
retrieving one or more of the attributes apart
5 from the details associated therewith;
identifying any one of the retrieved attributes
as being of interest; and
accessing a selected part of the message having
the attribute of interest.

- 10 29. The method of claim 28 wherein for each
 message at least one attribute of the
 message is received in the receiving step.
30. The method of claim 29 wherein said at
 least one attribute includes information on
15 an identity of a provider of the message.
31. The method of claim 28 further comprising
 the step of storing said attributes in a
 first selected memory space and the
 associated message details in a second
20 selected memory space.
32. The method of claim 28 wherein the
 attributes are retrieved in the retrieving
 step in the order of receipt thereof.
- 25 33. The method of claim 28 wherein the
 identifying step includes the step of
 announcing information concerning the
 retrieved attributes.

