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(54) **LOCATION-BASED VEHICLE MESSAGING SYSTEM**

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(52) **U.S. Cl.**
USPC **455/456.2**; 455/456.3; 455/457; 701/484; 701/516

(58) **Field of Classification Search**
None
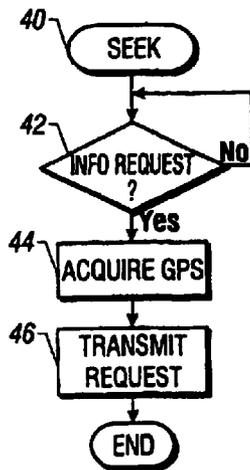See application file for complete search history.

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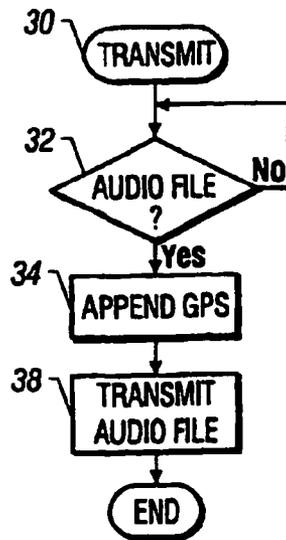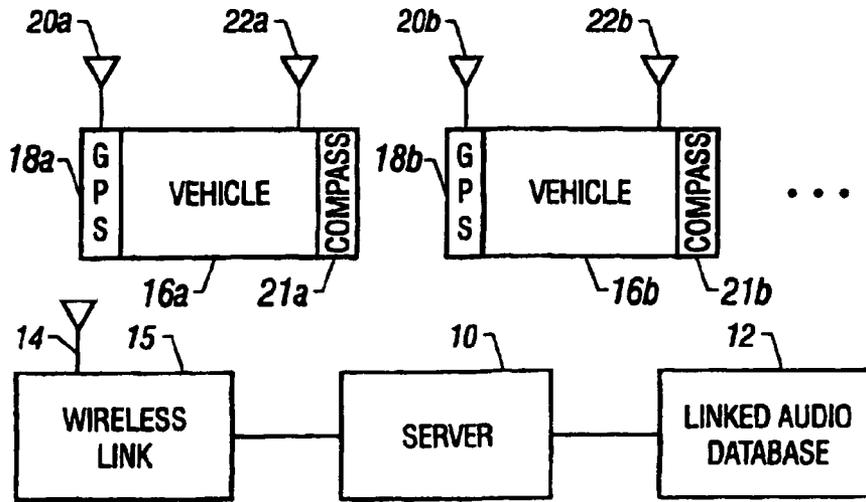|				
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(57) **ABSTRACT**

A system may enable vehicle operators to request information automatically along the route of travel by transmitting information requests, tied to the vehicle's current position, to a server. The server may store a plurality of informational files associated with particular global positioning system coordinates. Upon receipt of a request, the files associated with a particular position may be located and transmitted to the vehicle. The files may be stored as audio files so the user may listen to the files without being distracted while driving the vehicle.
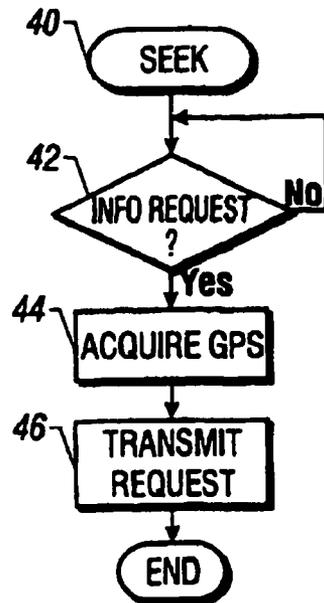
24 Claims, 4 Drawing Sheets

FIG. 1

FIG. 2

FIG. 3

40 — SEEK

42 — INFO REQUEST ? — No

Yes

44 — ACQUIRE GPS

46 — TRANSMIT REQUEST

END

FIG. 4

50 — SERVER REQUEST

52 — RECEIVE REQUEST

56 — SEARCH DATABASE

60 — TRANSMIT AUDIO FILE

END

FIG. 5

62 — SERVER INPUT

64 — RECEIVE AUDIO FILE

68 — STORE FILE BY GPS COORDINATES

END

FIG. 6

70 — RECEIVE

72 — RECEIVE AUDIO FILE

76 — PLAY AUDIO FILE

END
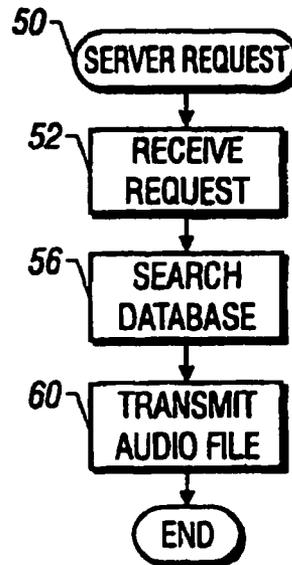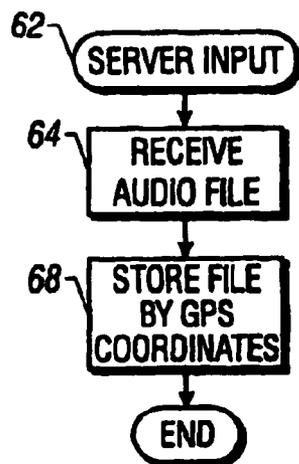
FIG. 7

FIG. 8

FIG. 9

LOCATION-BASED VEHICLE MESSAGING SYSTEM

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

BACKGROUND

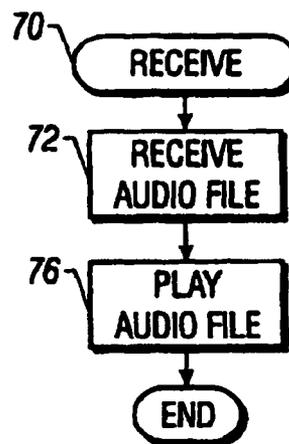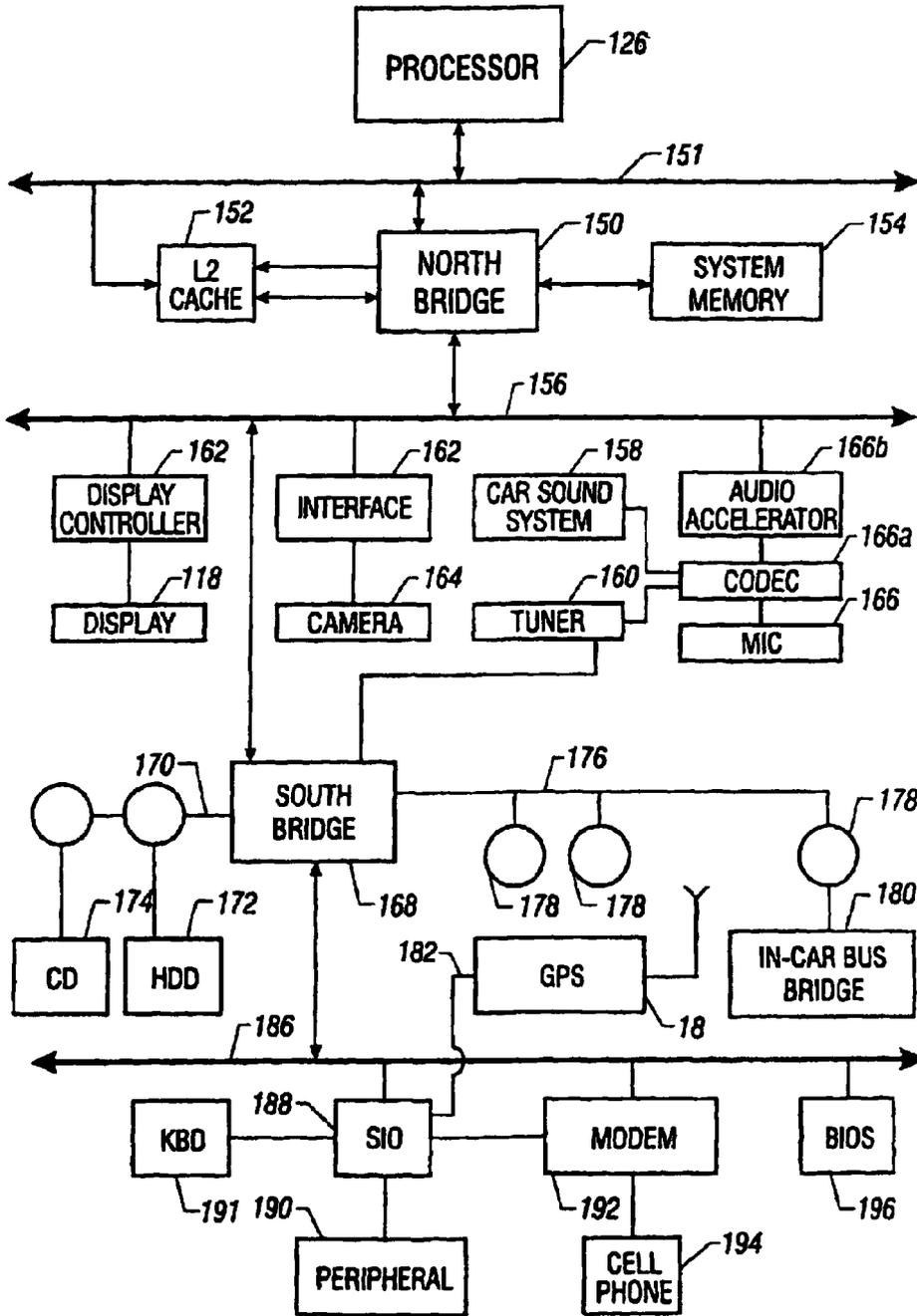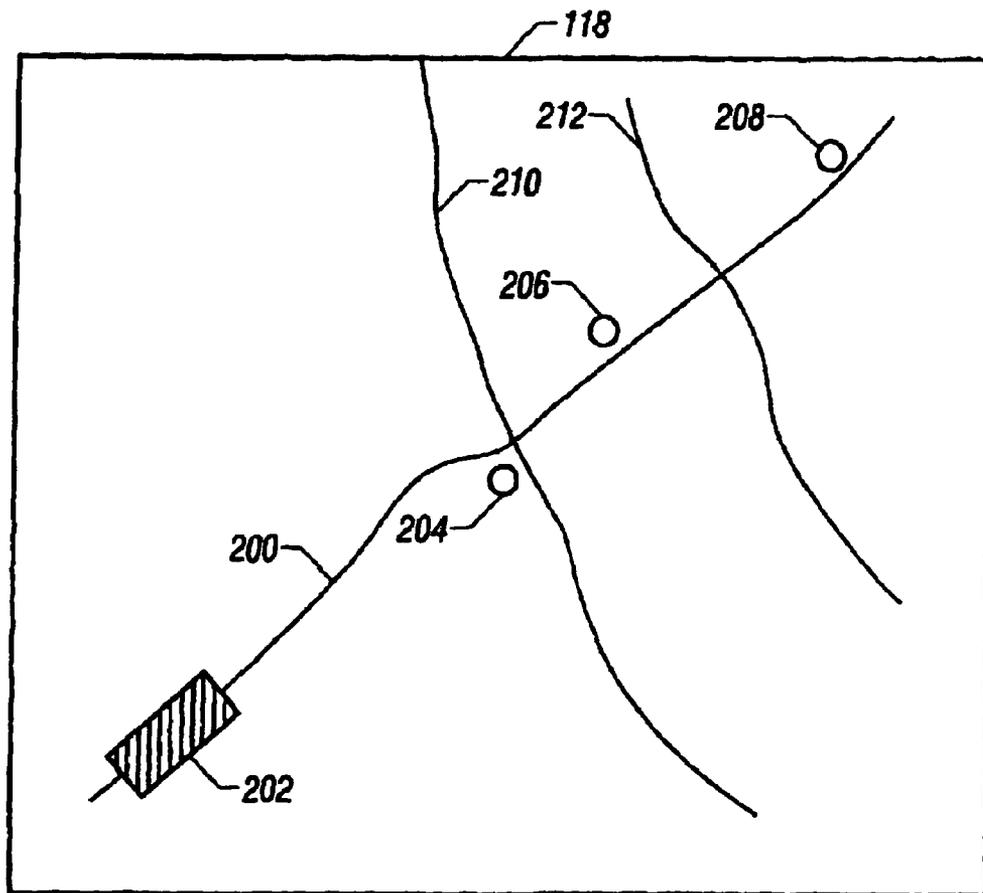This invention relates generally to providing information to vehicles, based on their position.

As the vehicles move down highways and other roads, they encounter a variety of circumstances which may be relevant to other drivers. For example, one driver may pass a location where traffic is congested, an accident has occurred or road construction is ongoing. A driver currently has no way to broadcast that information to other drivers traversing the same route.

If other drivers were aware of the conditions ahead, they could make alternate routing plans to avoid the problem. Armed with this information, other drivers could make on-the-go decisions about the best route to take.

Existing systems provide information related to particular locations. For example, radio stations and television stations may provide information about road conditions, which tends to become outdated. Given the limited time that these stations have to broadcast this type of information, they are limited in how much information they can provide about the plethora of driving locations around their urban broadcast area.

Thus, there is a need for better ways to provide more information to more vehicle operators.

SUMMARY

In accordance with one embodiment, a method of obtaining information includes generating a signal indicative of a vehicle's position. The signal is transmitted to a base station. Information, stored at the base station in association with the vehicle's position, is then received from the base station.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block depiction of one system for implementing the present invention;

FIG. 2 is a depiction of a file structure useful in connection with the embodiment shown in FIG. 1;

FIG. 3 is a flow chart for software implementing a transmit function at a vehicle in one embodiment;

FIG. 4 is a flow chart for software implementing the seek function at a vehicle in one embodiment;

FIG. 5 is a flow chart of software at the server for handling a request from a vehicle for position-linked information in one embodiment;

FIG. 6 is a flow chart of software on a server for receiving input information from a vehicle;

FIG. 7 is a flow chart of software at the vehicle for receiving information from the server;

FIG. 8 is a block diagram of one embodiment for a processor-based system located in the vehicle in accordance with the embodiment shown in FIG. 1; and

FIG. 9 is a depiction of a screen display in one embodiment of the present invention.

DETAILED DESCRIPTION

Referring to FIG. 1, a system for providing information to a plurality of vehicle operators, keyed to the location of those

vehicles, includes a server 10 coupled with a wireless link 15 having an antenna 14. The wireless link 15 may implement a radio frequency based transmission system, such as that used in connection with digital cellular telephones. The wireless link 15 may be part of the server 10 or may be at a separate location. The wireless link 15 may be a telephone base station coupled to the server 10 over a network such as the Internet.

The server 10 may have associated with it a linked audio database 12, which includes information about a plurality of different locations tied to particular location coordinate information. For example, each of the database entries may, in one embodiment of the present invention, be an audio file linked to coordinates that may, for example, have been generated by the global positioning system (GPS).

The server 10 may communicate, for example, by radio or cellular telephone, with a plurality of vehicles 16, e.g., vehicles 16a and 16b shown in FIG. 1. Each of the vehicles may include an appropriate receiving antenna 22a or 22b. In addition, each vehicle may include its own position location system, e.g., a GPS system 18a and 18b, together with the appropriate antennas 20a and 20b.

In this way, the vehicles may request information from the server. Those requests may have appended GPS coordinate information. The server may then search its database 12 to find any audio files associated with the GPS position of the vehicle 16a, for example. If it finds such files, the server may transmit those files to the vehicle 16a so the operator can have the benefit of what others have recorded for a particular position along the roadway.

The information associated with a particular location may include descriptions of various driving conditions or information about sites along the way. In addition, messages may be stored for other drivers who may be known by a particular operator. For example, one operator may leave a message for another operator to turn at the next right turn.

In one embodiment of the present invention, each of the vehicles 16 may also include a compass, e.g., a digital compass 21, which provides direction information. In this way, only information associated with a given position and vehicle heading direction may be provided by the server. For example, vehicles traveling northbound on a given highway will receive information that was stored by northbound traveling vehicles and not by southbound traveling vehicles.

Referring to FIG. 2, in accordance with one embodiment of the invention, the server may include a database 12, which includes data files 24. The files 24 may include text, video, or other data. For example, the files 24 may include audio files 26, which are essentially digital recordings of voice communications received from a variety of vehicles. Each of the audio files 26 may have associated coordinate information 28, which, in one embodiment of the present invention, may be GPS coordinate information.

In this way, each of the files 24 may be searched for particular GPS coordinates. All the files 26 associated with those coordinates which match the current position of a requesting vehicle may be transmitted to the vehicle.

Each of the files may also have a time stamp 25 so that after an amount of time, a file may be discarded. Thus, only relatively current information will be received by the vehicle for a given position. The files may also include a user name or a reply field to facilitate a response to the submitter. Other techniques used in bulletin board systems may also be used here.

Advantageously, the files 26 may also include a vehicle identifier 27, e.g., a telephone number. The file 24 may include not only the GPS coordinates 28, but also direction or

compass information **29**, which may also be transmitted by the vehicle **16** to the server **10**.

While the present invention has been described with respect to a server which serves audio files, the server may also serve text-based files as well. Thus, a server may actually receive and send text-based files. If desired, these files may then be converted, using conventional text-to-speech or speech-to-text software to and from a spoken format.

In each case, it is not necessary for the coordinates to match exactly, but instead, a given tolerance can be provided for both the GPS coordinate information and the compass information. That is, if the position of the requesting vehicle is within a given tolerance of the position and direction of a file stored in the server, that information may be provided.

Referring now to FIG. **3**, software **30** for enabling a vehicle **16** to transmit information to the server **10** is illustrated. Initially, a check at diamond **32** determines whether an audio file has been prepared by the operator of the vehicle. If so, the current GPS coordinates may be appended to the file, as indicated at block **34**. In addition, compass information may be appended as well, if desired. The file may then compressed and transmitted, as indicated in block **38**, for receipt by the server **10**. The transmission may be undertaken over a radio or cellular telephone communication link. Other communication links can be used as well.

Referring now to FIG. **4**, software **40** for enabling a vehicle operator to request information associated with a given file begins by determining whether or not an information request has been initiated, as indicated in diamond **42**. If so, the current GPS coordinate position is acquired as indicated in block **44**. The request is then transmitted, as indicated in block **46**, together with the present position information, and if desired, the directional information.

Turning now to FIG. **5**, the server may respond to a request for information linked to a particular location using the software **50**. Initially, a check determines whether a request has been received from a vehicle as indicated in block **52**. The database **12** is then searched (block **56**) for other files which have matching GPS and compass/direction information.

The audio file (with or without the identifier) may then be compressed and transmitted to the vehicle as indicated in block **60**. In a cellular phone system, the request may include the requester's cellular telephone number. Alternatively, the caller's telephone number may be obtained using a caller identity delivery (CID) system. The audio file may be subsequently transmitted using the telephone information without tying up the user's telephone any more than necessary.

Moving on to FIG. **6**, software **62** begins by receiving an audio file, as indicated in block **64**, from a vehicle. The audio file may be decompressed. The file is then stored by GPS coordinates and/or compass direction information associated with the audio file, as indicated in block **68**. Time stamp data may be appended or may be obtained from the GPS system in one embodiment.

The vehicle may then receive audio information in response to a previous request using the software **70** shown in FIG. **7**. The audio file is received, as indicated in block **72**, and may be decompressed.

In one embodiment, the server may continuously broadcast information to the vehicles. The vehicles may store this information, for example using a first in first out archiving system. A vehicle based processor may then be used to sort through the location information to identify files associated with the vehicle's current position. Those files may then be identified to the vehicle operator.

As another alternative, the vehicle may periodically send its position to the server. The server may then send files associated with the area the vehicle is currently moving through. A vehicle based processor may then identify files associated with adjacent locations.

In one embodiment, illustrated in FIG. **9**, the server may send information that may be displayed on a digital map, showing locations with associated files. Those files may then be selected when the vehicle reaches those locations or at any other time. The messages may also be played automatically based on the vehicle's position.

For example, the map that appears on a display **118** may indicate the vehicle's current position **202**, and the locations **204**, **206** and **208** having associated files. It may also show roads **200**, **210** and **212**.

In one embodiment of the present invention, the audio file may be automatically played over the vehicle's sound system (block **76**). If the sound system is already in use, if desired, the existing audio may be muted in favor of an incoming audio file.

One embodiment of a processor-based system for implementing the capabilities previously described on a vehicle may use a processor-based system located in the vehicle's dashboard. The system illustrated in FIG. **8** may be implemented, for example, by the Intel 82430TX PCI chipset. Other processor/chipset combinations may be used as well.

The processor **126** communicates across a host bus **151** to a bridge **150**, an L2 cache **152**, and system memory **154**. The bridge **150** may communicate with a bus **156**, which could, for example, be a Peripheral Component Interconnect (PCI) bus in accordance with the revision 2.1 of the PCI electrical specification available from the PCI Special Interest Group, Portland, Oreg. 97214. The bus **156**, in turn, may be coupled to a display controller **162**, which may drive a display **118** in one embodiment in the invention. A digital camera **164** may be coupled through an interface **162** to the bus **156**. The camera may be used to create digital images that may be sent to the server **10** which may then send them with other data to other vehicles.

A microphone input **166** may feed to the Audio Codec (AC'97) **166a**, where it may be digitized and sent to memory through the audio accelerator **166b**. The AC'97 specification is available from Intel Corporation (www.developer.intel-.com/pc-supp/platform/ac97). A tuner **160** may be controlled from a south bridge **168**. The output of the tuner may be sent to system memory **154** or mixed in the Codec and sent to the car sound system **158**. Sounds generated by the processor **126** may be sent through the audio accelerator **166b** and the AC'97 Codec **166a** to the car sound system **158**.

The bus **156** may be coupled to a south bridge **168**, which may have an Extended Integrated Drive Electronics (EIDE) coupling **170** and Universal Serial Bus (USB) coupling **176** (i.e., a device compliant with the Universal Serial Bus Implementers Forum Specification Version 1.0 [www.usb.org.]). Finally, the USB connection **176** may couple to a series of USB hubs **178**. One of these hubs may couple to an in-car bus bridge **180** as illustrated. The in-car bus bridge **80** may, for example use the Controller Area Network (CAN) protocol or the Society of Automotive Engineers J1850 standard. The in-car bus provides communication between microcontrollers that control vehicle operation. The other hubs may be available for implementing additional functionality.

The EIDE connection **170** may couple to a hard disk drive **172** and a CD-ROM player **174**. In some systems, it may be desirable to replace the hard disk drive with other memory forms. For example, a flash memory may be used in place of the drive **172**. The GPS receiver **18** may be attached by a cable **182** to a serial port or on a serial I/O device **188** attached to the bus **186**, as are the keyboard **191** and modem **192**.

The bridge **168** in turn may be coupled to an additional bus **186**, which may couple to a serial interface **188**, which drives a peripheral **190**, a keyboard **191**, a modem **192** coupled to a cellular phone **194**, and a basic input/output system (BIOS) memory **196**.

The memory may be implemented, for example, by a 28F200 two megabyte flash memory, available from Intel Corporation. The USB hubs may be implemented using 8093HX microcontrollers, available from Intel Corporation. Local firmware may be stored on EPROM memory (e.g., the 27C256 EPROM, available from Intel Corporation).

While the present invention has been described with respect to a limited number of embodiments, those skilled in the art will appreciate numerous modifications and variations therefrom. It is intended that the appended claims cover all such modifications and variations, as fall within the true spirit and scope of the present invention.

What is claimed is:

[1. A processor based system mountable in a vehicle, said system comprising:

a processor;

a position locating device coupled to said processor;

a transmitter to transmit requests for information with appended position information; and

wherein said processor to determine the vehicle's current location, sort information received in response to said request based on appended position information, and identify information with appended position information corresponding to the vehicle's current location.]

[2. The system of claim 1 wherein said transmitter is a radio frequency transceiver.]

[3. The system of claim 1 wherein said transmitter is adapted to append compass information.]

[4. The system of claim 1 wherein said system is adapted to receive information previously transmitted and stored and then relayed to the vehicle, based on the vehicle's position.]

[5. The system of claim 1 wherein said transmitter is adapted to append information that identifies the transmitter.]

[6. The system of claim 1 adapted to transmit audio files.]

[7. The system of claim 1 adapted to receive audio files.]

[8. The system of claim 1 wherein said system only displays said information when the vehicle becomes proximate to a location corresponding to said appended position information.]

9. A processor based system mountable in a vehicle, said system comprising:

a processor;

a position locating device coupled to said processor;

a transmitter to transmit a request for information with appended position information; and

wherein said processor to determine the vehicle's current location, sort information received in response to said request based on appended position information, and identify information with appended position information corresponding to the vehicle's current location.

10. The system of claim 9 wherein said transmitter is a radio frequency transceiver.

11. The system of claim 9 wherein said transmitter is adapted to append compass information.

12. The system of claim 9 wherein said system is adapted to receive information previously transmitted and stored and then relayed to the vehicle, based on the vehicle's position.

13. The system of claim 9 wherein said transmitter is adapted to append information that identifies the transmitter.

14. The system of claim 9 adapted to transmit audio files.

15. The system of claim 9 adapted to receive audio files.

16. The system of claim 9 wherein said system only displays said information when the vehicle becomes proximate to a location corresponding to said appended position information.

17. A processor based system mountable in a vehicle, said system comprising:

a processor;

a position locating device coupled to said processor;

a transmitter to transmit a request for information with associated position information; and

wherein said processor to determine the vehicle's current location, sort information received in response to said request based on associated position information, and identify information with associated position information corresponding to the vehicle's current location.

18. The system of claim 17 wherein said transmitter is a radio frequency transceiver.

19. The system of claim 17 wherein said transmitter is adapted to append compass information.

20. The system of claim 17 wherein said system is adapted to receive information previously transmitted and stored and then relayed to the vehicle, based on the vehicle's position.

21. The system of claim 17 wherein said transmitter is adapted to append information that identifies the transmitter.

22. The system of claim 17 adapted to transmit audio files.

23. The system of claim 17 adapted to receive audio files.

24. The system of claim 17 wherein said system only displays said information when the vehicle becomes proximate to a location corresponding to said appended position information.

25. A method of obtaining information comprising:

developing a signal indicative of a vehicle's position;

transmitting said signal to a base station;

receiving information stored at said base station associated with the vehicle's position;

sorting information received from said base station based on vehicle position; and

identifying information received from said base station associated with the vehicle's current position.

26. The method of claim 25 wherein receiving information includes receiving an audio file.

27. The method of claim 26, further including developing a signal indicative of the direction of travel of the vehicle and transmitting said signal to a base station.

28. The method of claim 26, further including transmitting a message to said base station and automatically appending position information on said message.

29. The method of claim 28, further including automatically appending a vehicle identifier on said message.

30. The method of claim 26 including automatically playing said audio file over the vehicle's sound system.

31. The method of claim 25 including causing a vehicle based processor to identify information received from the base station associated with the vehicle's position.

32. The method of claim 25 including displaying information about locations that have associated information.

* * * * *