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

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(*) Notice: This patent is subject to a terminal disclaimer.

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(22) Filed: **Mar. 7, 2011**

Related U.S. Patent Documents

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Appl. No.: **09/243,701**
Filed: **Feb. 2, 1999**

U.S. Applications:

(63) Continuation of application No. 11/901,689, filed on Sep. 18, 2007, which is an application for the reissue of Pat. No. 7,174,173.

(51) **Int. Cl.**
H04W 24/00 (2009.01)

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

(58) **Field of Classification Search**
USPC 455/432, 433, 456.2, 456.3, 457, 561; 701/211
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,428,544	A *	6/1995	Shyu	701/117
5,699,056	A *	12/1997	Yoshida	340/905
5,727,057	A	3/1998	Emery et al.	
5,933,100	A *	8/1999	Golding	340/995.13
5,950,123	A *	9/1999	Schwelb et al.	455/414
5,999,126	A *	12/1999	Ito	342/357.1
6,012,012	A *	1/2000	Fleck et al.	701/117
6,028,537	A	2/2000	Suman et al.	
6,029,069	A *	2/2000	Takaki	455/456
6,061,561	A *	5/2000	Alanara et al.	455/422
6,073,075	A *	6/2000	Kondou et al.	701/203
6,108,534	A *	8/2000	Bourgeois et al.	455/419
6,125,279	A *	9/2000	Hyziak et al.	455/445
6,150,961	A *	11/2000	Alewine et al.	340/995.1
6,169,955	B1	1/2001	Fultz	
6,519,463	B2	2/2003	Tendler	
6,791,472	B1 *	9/2004	Hoffberg	340/905
2002/0082770	A1	6/2002	Jones	
2002/0198632	A1	12/2002	Breed et al.	
2003/0060211	A1	3/2003	Chern et al.	
2003/0069029	A1	4/2003	Dowling et al.	
2008/0194240	A1 *	8/2008	Dowling et al.	455/414.3

* cited by examiner

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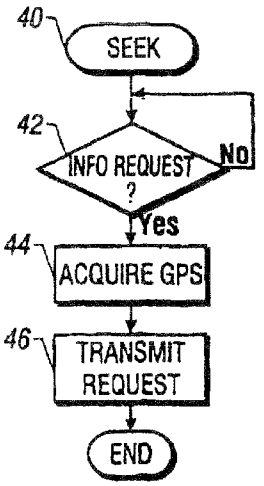
(57) **ABSTRACT**

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.

55 Claims, 4 Drawing Sheets



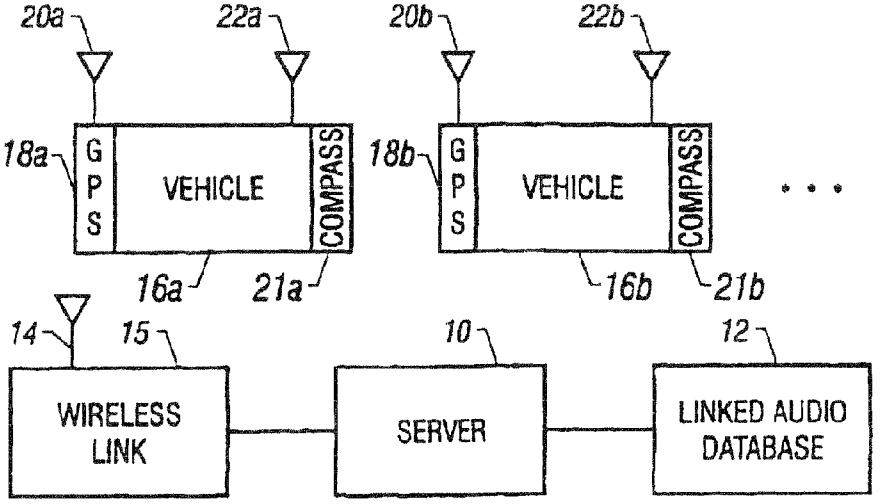


FIG. 1

FIG. 2

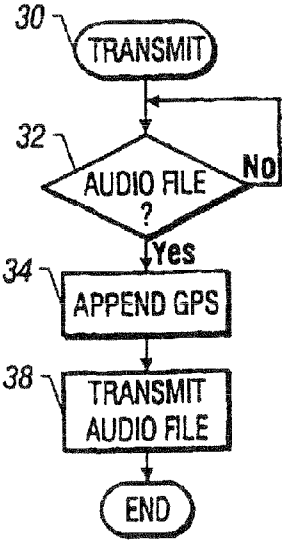


FIG. 3

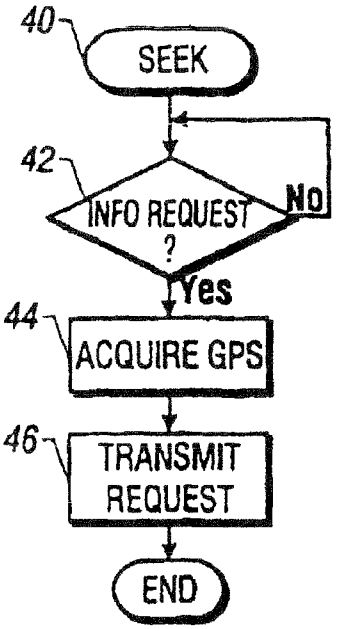


FIG. 4

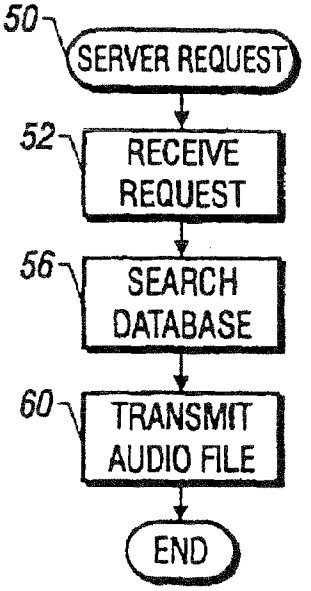


FIG. 5

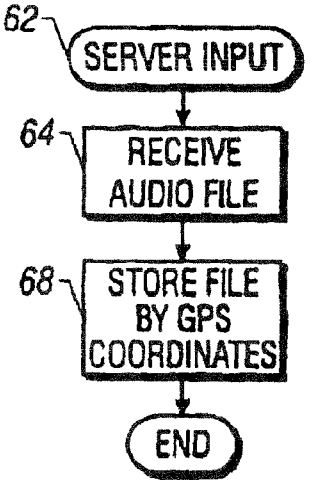


FIG. 6

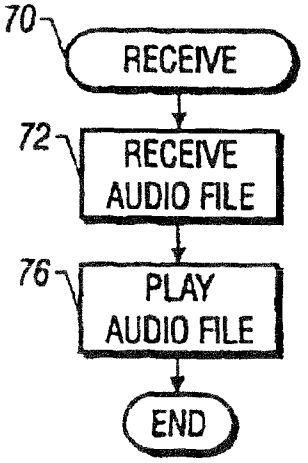


FIG. 7

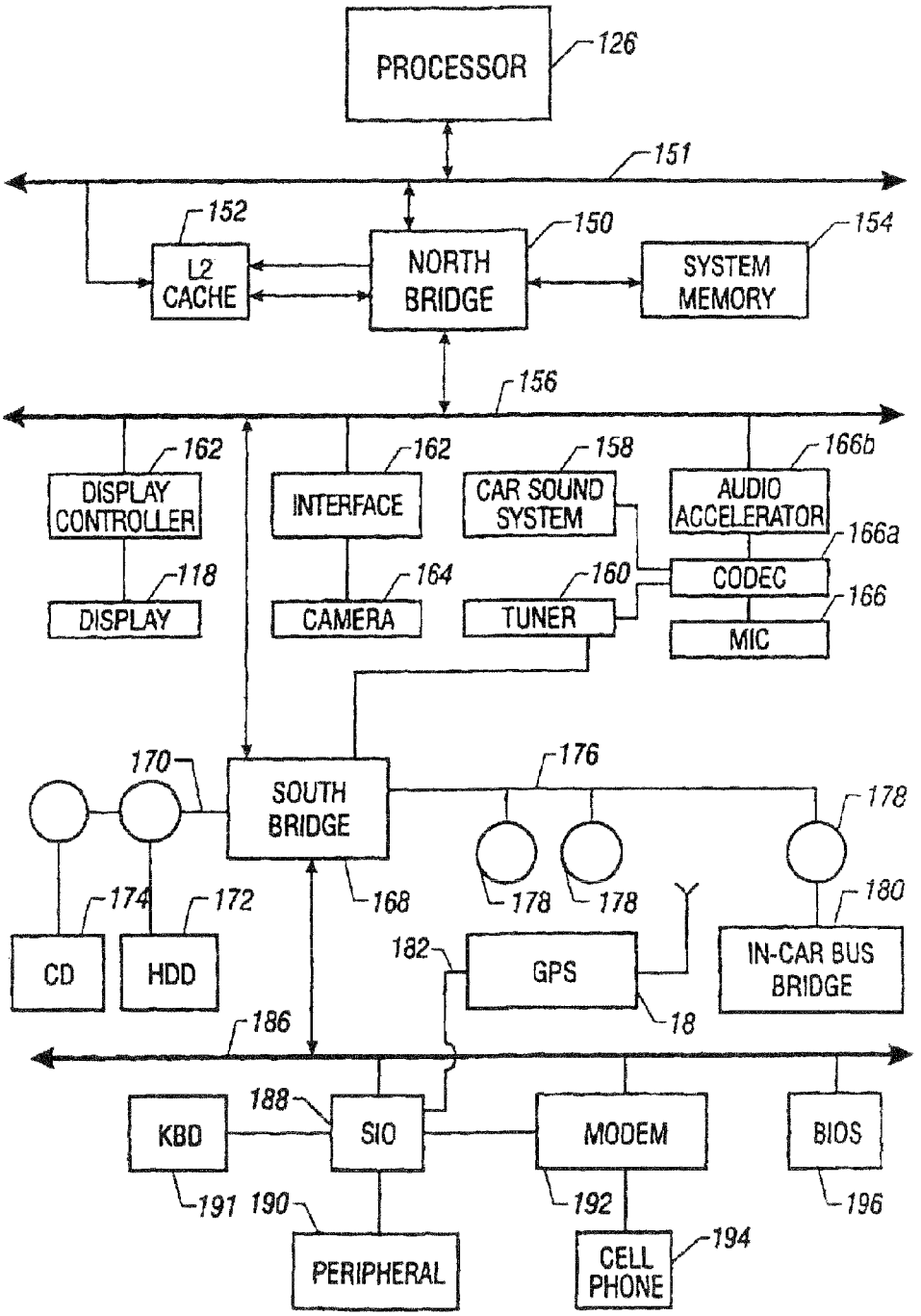

PROCESSOR
126
151
152
L2 CACHE
150
NORTH BRIDGE
154
SYSTEM MEMORY
156
162
DISPLAY CONTROLLER
162
INTERFACE
158
CAR SOUND SYSTEM
166b
AUDIO ACCELERATOR
166a
CODEC
118
DISPLAY
164
CAMERA
160
TUNER
166
MIC
170
SOUTH BRIDGE
176
178
178
178
168
174
172
CD
HDD
182
GPS
18
180
IN-CAR BUS BRIDGE
186
188
KBD
SIO
MODEM
BIOS
191
190
192
196
PERIPHERAL
CELL PHONE
194

FIG. 8

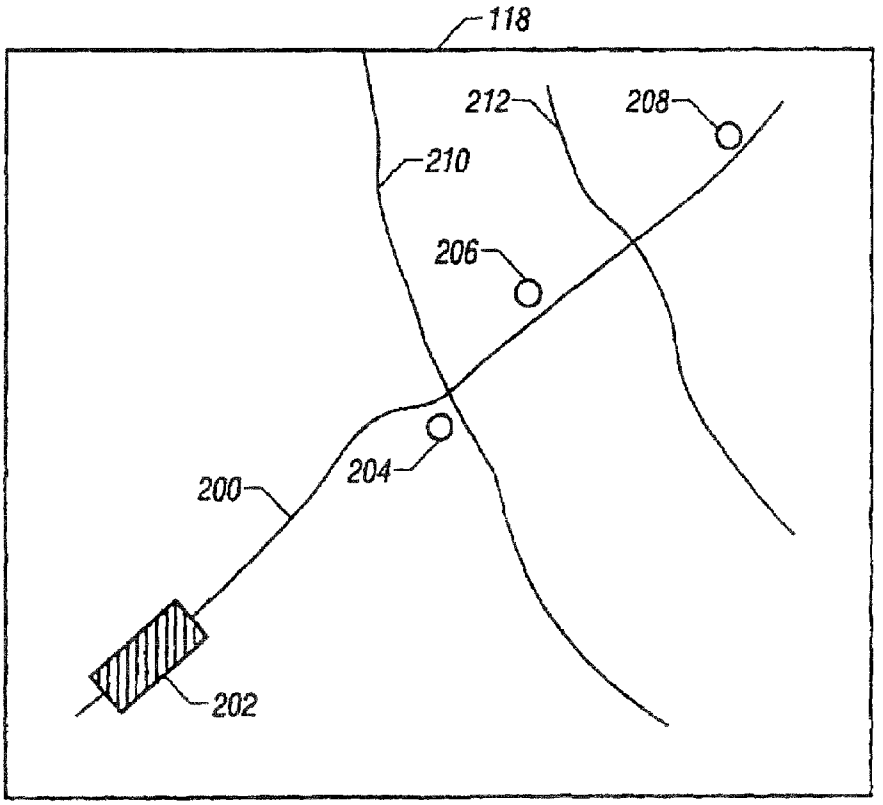


FIG. 9

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.

CROSS-REFERENCE TO RELATED APPLICATIONS

Notice: More than one reissue application has been filed for the reissue of U.S. Pat. No. 7,174,173. This application and Ser. No. 12/505,776 and Ser. No. 12/700,920 are continuations of U.S. patent application Ser. No. 11/901,689, filed on Sep. 18, 2007. U.S. patent application Ser. No. 13/975,760 is a continuation of this application and U.S. patent application Ser. No. 11/901,689.

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 chose 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 **16**a and **16**b shown in FIG. **1**. Each of the vehicles may include an appropriate receiving antenna **22**a or **22**b. In addition, each vehicle may include its own position location system, e.g., a GPS system **18**a and **18**b, together with the appropriate antennas **20**a and **20**b.

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 **16**a, for example. If it finds such files, the server may transmit those files to the vehicle **16**a 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) **166**a, where it may be digitized and sent to memory through the audio accelerator **166**b. The AC'97 specification is available from hotel 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 **166**b and the AC'97 Codec **166**a 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 Imple-

menters 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 chum **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 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 a vehicle's current location, sort information received in response to said request based on associated position information, and identify information with associated position information related to a location ahead of 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 digital 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 associated position information.

17. The system of claim 9 wherein said information related to a location ahead of the vehicle's current location including information about driving conditions.

18. The system of claim 9 wherein said information related to a location ahead of the vehicle's current location including information about sites.

19. The system of claim 9 wherein said position information includes global positioning system coordinates.

20. The system of claim 19, said processor to sort information about road conditions or information about en-route sites.

21. The system of claim 20, said system including a device to determine the direction of vehicle travel, said processor to sort information to find information related to sites ahead of the vehicle in the direction of travel.

22. The system of claim 21 including a display on said processor to depict the vehicle's location and associate position information on a map depiction.

23. The system of claim 9 adapted to transmit video.

24. The system of claim 9 adapted to receive video.

25. The system of claim 9 including a display, said processor to indicate the position of said vehicle and said location ahead of the vehicle's current location on said display.

26. The system of claim 9 wherein said system is mountable in a vehicle.

27. A method comprising:

using a computer to determine a vehicle's current position;

using said computer to sort information received in response to a request for information with associated position information based on associated position information; and

identifying, using said computer, information with associated position information related to a location ahead of the vehicle's current location.

28. The method of claim 27 including using said computer to determine the vehicle's direction of travel.

29. The method of claim 28 including using the computer to sort information received in response to said request based on said direction of travel.

30. A non-transitory computer readable medium storing instructions that when executed enable a computer to:

transmit a request for information with associated position information;

determine a vehicle's current location;

sort information received in response to said request based on associated position information; and

identify information with associated position information related to a location ahead of the vehicle's current location.

31. The medium of claim 30 storing instructions to determine the vehicle's direction of travel.

32. The medium of claim 31 storing instructions to sort information received in response to said request based on said direction of travel.

33. A server comprising:

a processor to receive a request for information with associated position information and provide information in response to said request based on said associated position information including providing information with associated position information related to a location ahead of the associated position in the vehicle's direction of travel; and

a storage coupled to said processor.

34. A processor based 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 and direction of travel, sort information received in response to said request based on associated position information and said direction of travel, and identify information with associated position information.

35. The system of claim 34 wherein said transmitter is a radio frequency transceiver.

36. The system of claim 34 wherein said transmitter is adapted to append digital compass information.

37. The system of claim 34 wherein said system is adapted to receive information previously transmitted and stored and then relayed to the vehicle, based on the vehicle's position.

38. The system of claim 34 wherein said transmitter is adapted to append information that identifies the transmitter.

39. The system of claim 34 adapted to transmit audio files.

40. The system of claim 34 adapted to receive audio files.

41. The system of claim 34 wherein said system only displays said information when the vehicle becomes proximate to a location corresponding to said associated position information.

42. The system of claim 34 wherein said information related to a location ahead of the vehicle's current location including information about driving conditions.

43. The system of claim 34 wherein said information related to a location ahead of the vehicle's current location including information about sites.

44. The system of claim 34 wherein said position information includes global positioning system coordinates.

45. The system of claim 44, said processor to sort information about road conditions or information about en-route sites.

46. The system of claim 45, said system including a device to determine the direction of vehicle travel, said processor to sort information to find information related to sites ahead of the vehicle in the direction of travel.

47. The system of claim 46 including a display on said processor to depict the vehicle's location and associate position information on a map depiction.

48. The system of claim 34 adapted to transmit video.

49. The system of claim 34 adapted to receive video.

50. The system of claim 34 including a display, said processor to indicate the position of said vehicle and said location ahead of the vehicle's current location on said display.

51. The system of claim 34 wherein said system is mountable in a vehicle.

52. A processor based system comprising:

a processor;

a position locating device coupled to said processor;

a transmitter to transmit a request for information with associated position information together with user 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 appended position information corresponding to the vehicle's current location.

53. The system of claim 52, said processor to determine the vehicle's direction of travel.

54. The system of claim 53, said processor to identify information with appended position information related to a location ahead of the vehicle's current location.

55. The system of claim 52 wherein said user information includes information about a driving condition at a location.

56. The system of claim 52 wherein said user information includes information about a site and its location.

57. The system of claim 52 wherein said system is mountable in a vehicle.

58. A method comprising:

using a computer to transmit a request for information with associated position information together with user information;

using a computer to determine a vehicle's current location;

using a computer to sort information received in response to said request based on associated position information; and

using a computer to identify information with appended position information corresponding to the vehicle's current location.

59. The method of claim 58 including determining the vehicle's direction of travel.

60. The method of claim 59 including identifying information with appended position information related to a location ahead of the vehicle's current location.

61. A non-transitory computer readable medium storing instructions that when executed enable a computer to:

transmit a request for information with associated position information together with user information;

determine a vehicle's current location;

sort information received in response to said request based on associated position information; and

identify information with appended position information corresponding to the vehicle's current location.

62. The medium of claim 61 further storing instructions to determine the vehicle's direction of travel.

63. The medium of claim 61 further storing instructions to identify information with appended position information related to a location ahead of the vehicle's current location.

* * * * *