US007319379B1

(12) **United States Patent**
Melvin

(10) **Patent No.: US 7,319,379 B1**
(45) **Date of Patent: Jan. 15, 2008**

(54) **PROFILE-BASED MESSAGING APPARATUS AND METHOD**

(75) Inventor: **Stephen Waller Melvin**, San Francisco, CA (US)

(73) Assignee: **Baglador S.A. LLC**, Wilmington, DE (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **11/161,168**

(22) Filed: **Jul. 25, 2005**

Related U.S. Application Data

(63) Continuation of application No. 10/249,904, filed on May 16, 2003, now Pat. No. 6,922,138.

(51) **Int. Cl.**

B60Q 1/00	(2006.01)
G08G 1/00	(2006.01)
G05D 1/00	(2006.01)
G06Q 30/00	(2006.01)
G06Q 40/00	(2006.01)

(52) **U.S. Cl.** **340/438**; 340/691.3; 340/928; 340/988; 701/1; 701/22; 701/23; 701/24; 705/14; 705/43

(58) **Field of Classification Search** 340/438, 340/928, 988, 691.6; 705/14, 43; 701/1, 701/22–24

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,934,079	A *	6/1990	Hoshi	40/427
6,060,993	A	5/2000	Cohen	
6,484,148	B1 *	11/2002	Boyd	705/14
6,587,755	B1	7/2003	Smith et al.	
6,690,286	B2	2/2004	Polyakov	
2002/0097193	A1	7/2002	Powers	
2002/0138433	A1 *	9/2002	Black et al.	705/43
2003/0088463	A1 *	5/2003	Kanevsky et al.	705/14

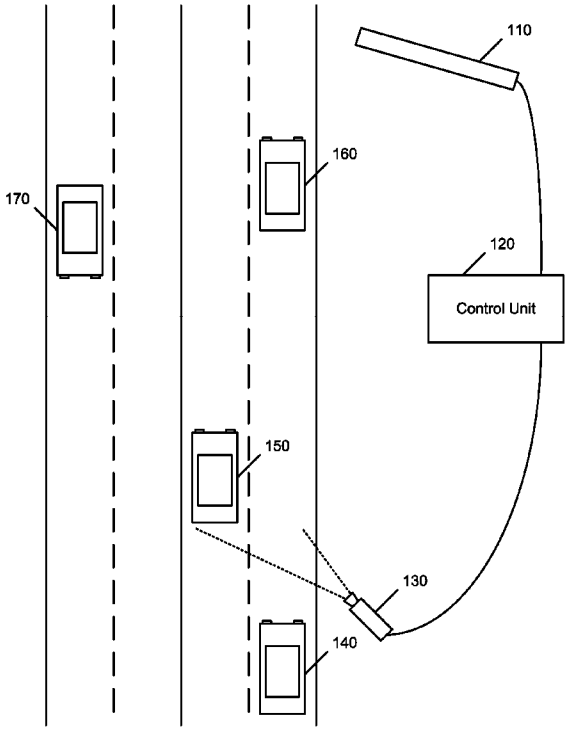
* cited by examiner

Primary Examiner—Benjamin C. Lee
Assistant Examiner—Lam Pham
(74) *Attorney, Agent, or Firm*—Sterne, Kessler, Goldstein & Fox P.L.L.C.

(57) **ABSTRACT**

A system for providing directed advertising or informational messages specific to individual persons or vehicles. The system encompasses a sensing and evaluation mechanism to detect persons or vehicles, in conjunction with a billboard or other display device capable of delivering a message specific to one or more individuals.

16 Claims, 3 Drawing Sheets



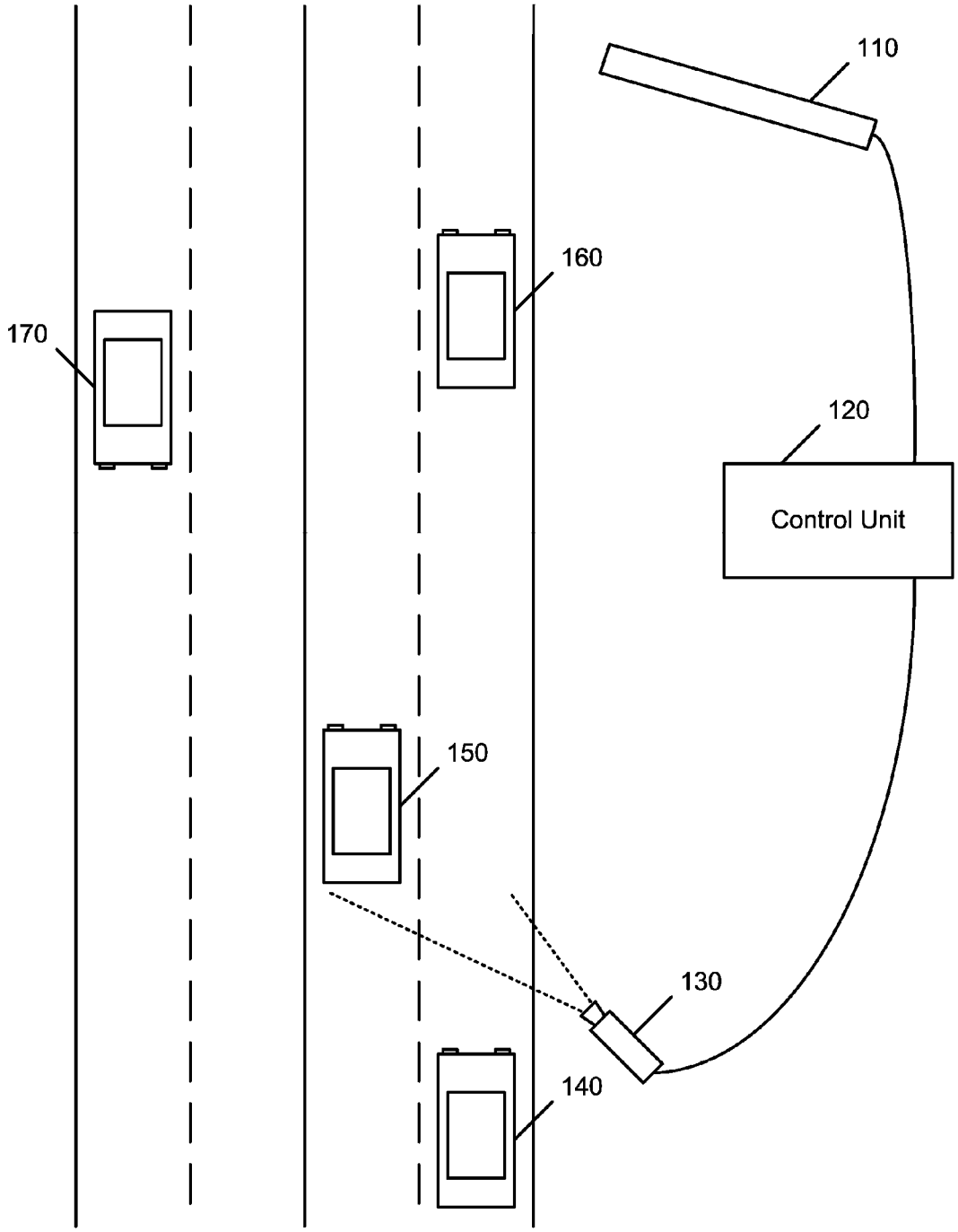


Fig. 1

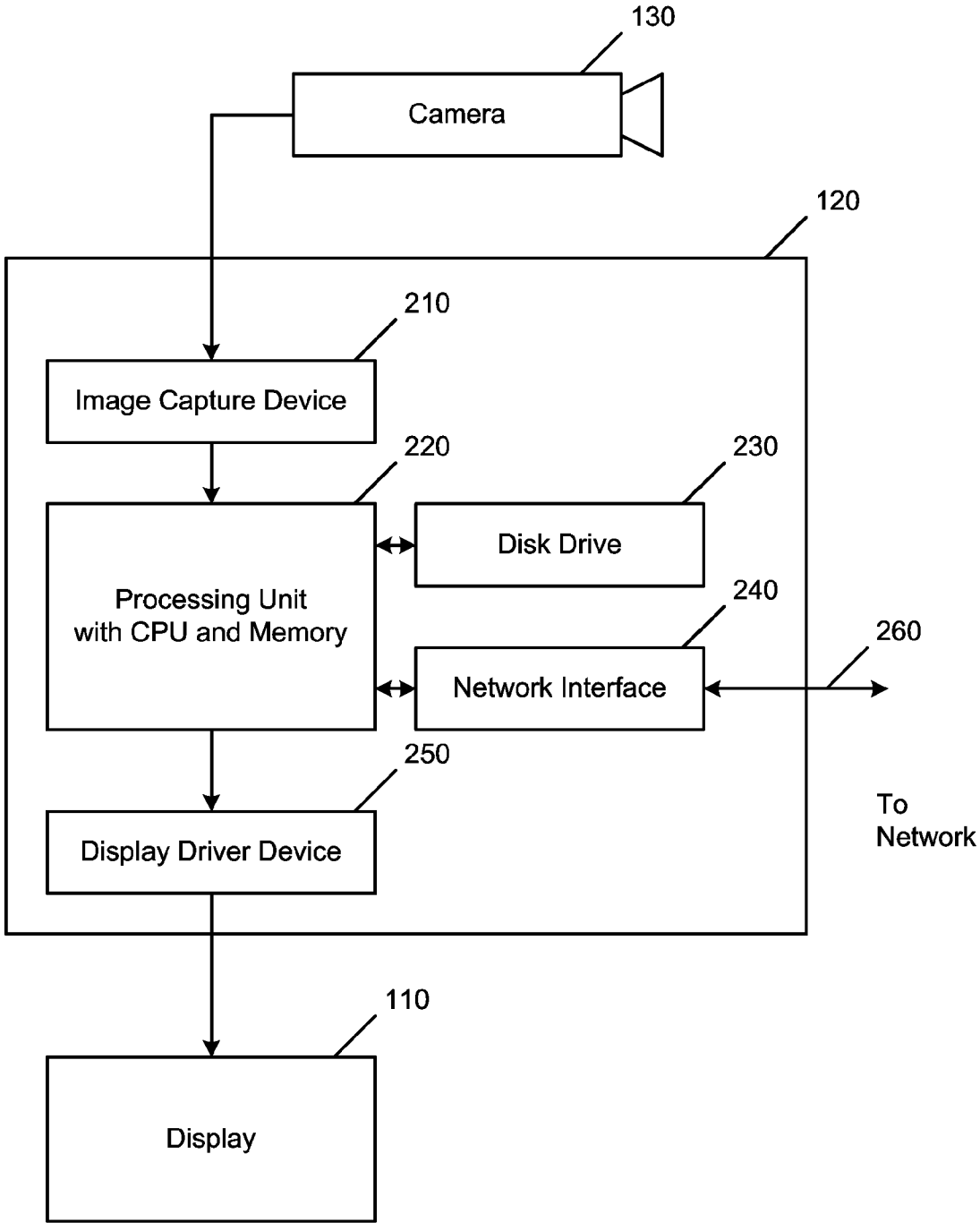

130
Camera
120
210
Image Capture Device
220
230
Disk Drive
Processing Unit
with CPU and Memory
240
260
Network Interface
250
To
Network
Display Driver Device
110
Display

Fig. 2

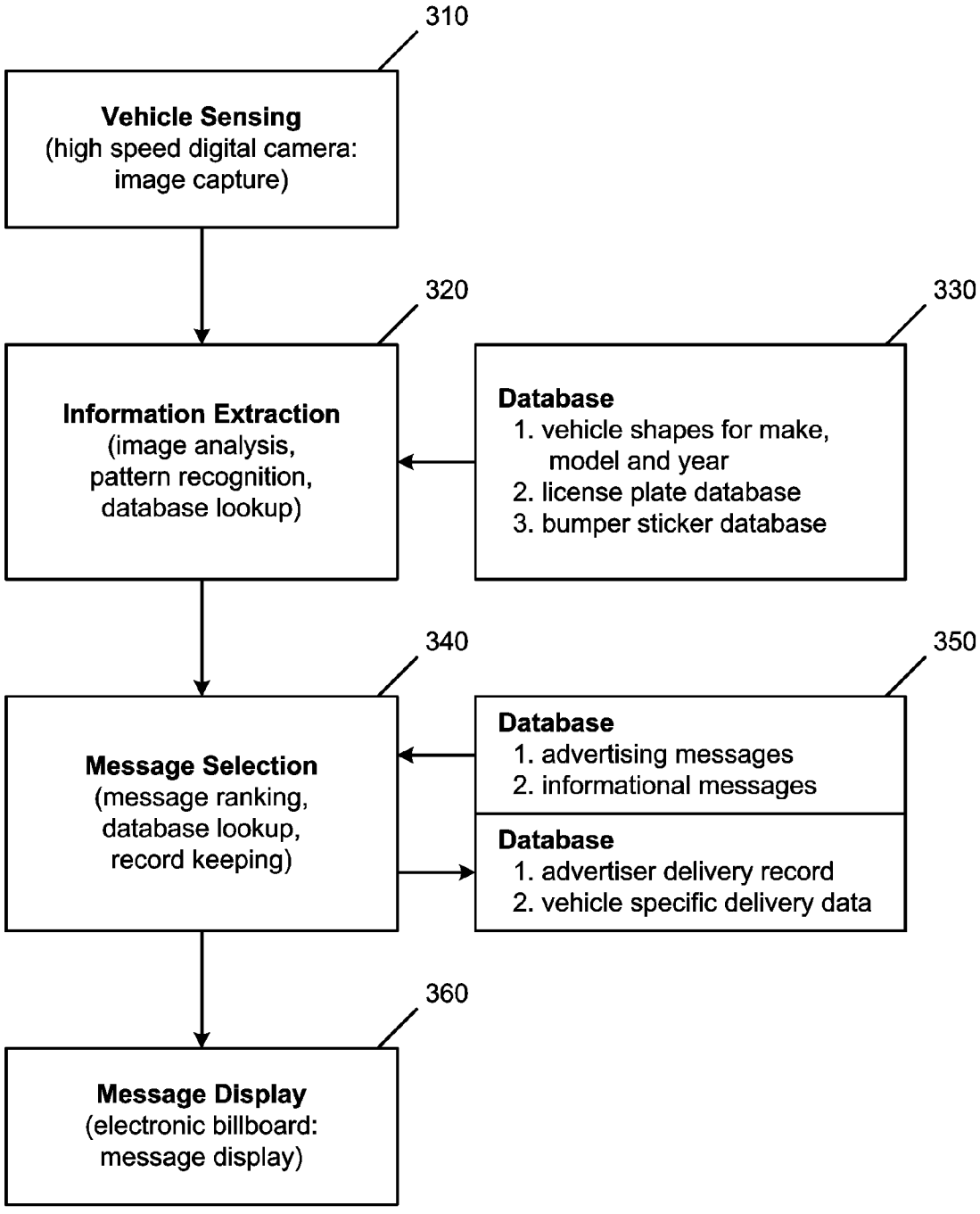

310
Vehicle Sensing
(high speed digital camera:
image capture)
320
Information Extraction
(image analysis,
pattern recognition,
database lookup)
330
Database
1. vehicle shapes for make,
model and year
2. license plate database
3. bumper sticker database
340
Message Selection
(message ranking,
database lookup,
record keeping)
350
Database
1. advertising messages
2. informational messages
Database
1. advertiser delivery record
2. vehicle specific delivery data
360
Message Display
(electronic billboard:
message display)

Fig. 3

PROFILE-BASED MESSAGING APPARATUS AND METHOD

RELATED U.S. APPLICATION DATA

This application is a continuation of application Ser. No. 10/249,904, filed on May 16, 2003, now U.S. Pat. No. 6,922,138. The entire content is hereby incorporated by reference.

FIELD OF THE INVENTION

The present invention relates to the field of advertising, and more specifically to the public display of unsolicited advertising and informational messages.

BACKGROUND OF THE INVENTION

Outdoor billboards are used to display advertising to occupants of vehicles in motion on public roadways. Typically billboards are changed infrequently, on the order of monthly. Furthermore, due to the lack of selectivity, the content of such billboards are limited to subject matters that apply to a large group of the driving public. It is not cost effective to display on such billboards advertisements or information directed to a small segment of the population. It is also impossible to display different messages to different vehicles, limiting the return on investment for billboard operators.

What is needed is a system where directed advertising can be made efficiently to vehicles in motion. Directed advertising provides a more cost effective solution for advertisers and an increased income for billboard operators. Furthermore, if it were possible to display different messages to different vehicles, based on occupant profiles, maximum flexibility would be afforded to advertisers to market specific products to customized markets. The foregoing limitations and desired solutions equally apply to billboards and other displays viewed by individuals on foot or using other modes of transportation, such as bicycles, motorcycles, or boats.

SUMMARY OF INVENTION

An aspect of the present invention is to provide a method for delivering advertising or information messages specific to the occupants of a certain vehicle. Each vehicle is sensed, information is extracted from the sensed data and a message is selected to display. The information extracted from the sensed information can be the make, model, year, color, number of passengers, physical condition of the vehicle, the license plate number, information from the license plate frame and/or information from bumper stickers.

In one aspect of the present invention, a profile of the occupants of a sensed vehicle is formed and this occupant profile is used in the process of selecting a message to display. The present invention can operate in real-time to display different messages to each vehicle traveling at high speed on a multi-lane freeway. A further aspect of the present invention is to maintain information regarding which messages have been displayed to which vehicles and how often, for purposes of billing or statistical analysis.

Another aspect of the present invention is to provide an apparatus for sensing vehicles in motion, processing sensed data, selecting a message to display to the sensed vehicle and delivering that message to a display device. The processing apparatus preferably analyzes sensed data to extract information and includes a database that is used to assist in the forming of an occupant profile based on the extracted information.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** illustrates a physical layout of an embodiment of the present invention.

FIG. **2** illustrates an embodiment of the control unit.

FIG. **3** illustrates a flow chart for an embodiment of the processing performed.

DETAILED DESCRIPTION

The present invention relates to a system in which vehicle specific or person specific advertising or other informational messages are provided automatically. In one embodiment, vehicles may be in motion, possibly at high speed. The system senses characteristics of each vehicle, processes that information, and displays one or more messages to the occupant or occupants of the sensed vehicle. The display device can consist of one or more electronic outdoor billboards or electronic display devices, oriented so as to be viewable by the operator and/or passengers of each vehicle.

It is intended that the sensing, processing and display of messages occur in real-time. If the vehicle is in motion, the time between when the sensing device sense the vehicle and when the vehicle comes into view of the display device determines the maximum processing time. For example, if a vehicle is traveling at 60 miles per hour and the vehicle is imaged 100 yards before the display is viewable, the processing must take less than approximately 3.4 seconds. The computational resources and complexity of the processing must be chosen appropriate to the time constraints given the physical layout of the overall system

FIG. **1** illustrates one embodiment and shows the physical layout of the present invention. Camera **130** is coupled to control unit **120**, which is coupled to display device **110**. Vehicles **140**, **150**, **160** and **170** represent vehicles, such as private automobiles, in motion on a road or highway. Camera **130** is a sensing device that is positioned to image vehicles as they pass. In FIG. **1**, the rear of vehicle **150** is positioned to be sensed by camera **130**. In alternative embodiments, the sensing mechanism can consist of multiple cameras at different positions or focused on different lanes. It may be desirable to observe both the front and rear of each vehicle, or just one or the other. A digital camera with a high speed electronic shutter feature attached to a digital image capture system can be used to retrieve the images from each vehicle. Camera **130** may be an infrared camera to reliably sense information at night. In alternative embodiments, other vehicles, such as boats or motorcycles may be sensed rather than automobiles. In still other embodiments, individual people, such as those walking on a public sidewalk, may be the subjects of the sensing device.

It is also possible to sense vehicles other than through optical means. For example, radio frequency transmitters could be used. This would require vehicles to be equipped with specific equipment. In certain circumstances it may be desirable to display messages only to specifically equipped vehicles rather than to the public at large. Audio detection of persons or vehicles would also be possible and sophisticated techniques could be used to extract information from detected sounds.

Display device **110** is provided such that the driver and/or other occupants of each vehicle can observe it. Display device **110** can be an electronic billboard capable of dis-

playing graphic images and text. The display can be oriented such that it is observable by a single vehicle at a time, or by several vehicles. In alternative embodiments, there could be a display device for each lane, rather than a single device viewable by all lanes.

Control unit **120** is responsible for processing the sensed data and driving the display device in real time. The processing may consist of several steps as described below. If the vehicle is in motion, the time between when the car is imaged and when it is positioned such that the display device is observable constitutes the allowable processing time. The time during which the driver and/or other occupant of the vehicle can observe the display device is the time during which the message must be displayed. Multiple messages can be displayed during the time in which the display device is viewable. In the case that multiple vehicles can view the display at the same time, messages can be displayed for each vehicle, or a different selection can be made based on a combined viewing audience.

Referring now to FIG. **2**, detail of one embodiment of control unit **120** is illustrated. Camera **130** is coupled to image capture device **210**, which is coupled to processing unit **220**. Processing unit **220** is coupled to disk drive **230**, network interface **240** and to display driver **250**. Display driver **250** is coupled to display device **110**. Network interface **240** is coupled through path **260** to a network.

Image capture device **210** receives sensed camera data and stores it for processing. Processing unit **220** processes the sensed camera data, utilizing local information stored in memory, local information stored on disk drive **230**, or remote information received via network interface **240**. After processing, messages are delivered to display device **110** through display drive **250**.

The purpose of control unit **120** is to process the image data captured by the sensing system and to select, based on the information extracted, one or more messages to be displayed to the person or vehicle. The processing system can be generally split into two mechanisms: information extraction and message selection.

FIG. **3** illustrates steps involved in the processing of one embodiment of the present invention. The first step **310** is the capture of sensed image data. The second step **320** is the extraction of information from the sensed vehicle data. This involves image analysis and pattern recognition and preferably a database lookup. Pattern recognition algorithms are used to determine the outline of the vehicle and locate other information for which further processing is required.

The information extracted from each vehicle can consist of any subset of the following: make, model, year of manufacture, color, condition, license plate number, information from license plate frame, parking stickers, other bumper stickers, number of occupants, and other similar information.

After pattern recognition, a query is made of database **330** that can contain any of the following: outlines for vehicle makes, models and years; vehicle license plate data; and other information relating to bumper stickers (such as patterns for city parking stickers). The result of this query will be information relating to which message or messages should be displayed. This could consist of the zip code, projected age, projected income level, and projected sex of driver, or any other similar information. In alternative embodiments, database **330** may include face recognition data to permit individual people to be recognized. Database **330** may be stored locally within control unit **120**, or may be queried remotely through network path **260**.

The goal of the information extraction step **320** is to determine relevant information regarding the occupants of the vehicle. This relevant information would differ depending on the nature of the messages being delivered. In the case of advertising messages, the sex, age, residence location and income level may be most significant. In other cases merely the number of occupants may be used. The processing of the imaged information to determine the occupant information could take a variety of forms. In one scenario, a database of car license plate numbers would be used to simply look up the required information. The captured image of a license plate would be analyzed to determine the number and state of issuance and this information would be used to query the database.

In another scenario, the make, model and year of the vehicle would be used to form a probable profile of the occupants. In this case the captured image or images would be analyzed, using pattern recognition techniques, to outline the vehicle shape and other defining characteristics. This information would be used to match against a database of makes, models and years of vehicles. Once the type of vehicle is determined, a profile of the occupants would be created to generate the relevant information. Other information such as parking stickers (indicating location of residence), license plate frame information (indicating where the vehicle was purchased or serviced), or political bumper stickers (indicating the political leaning of the owner) may be used to enhance this profile and come up with more accurate occupant information. The time of day and number of occupants may also be used for this purpose.

The next step in the processing is message selection **340**. Message selection determines which message or messages should be displayed to the person or vehicle. This can be done by scoring the various messages based on the characteristics determined in the previous step and selecting the top-ranking message. In the case of advertising messages, a given advertiser may which to display advertisements only to people of a specific income level and age, for example. The processing may additionally involve the recording of which messages were delivered such that the advertiser can be billed accordingly.

This message selection step would differ depending on the nature of the messages being delivered. In the case of advertising messages, the advertisers may have determined for each message a target audience. Also there may be multiple advertisements that overlap in their potential relevance to the sensed vehicle. One mechanism would be to rank all advertisements based on their relevance and show the vehicle the most relevant message. This mechanism could also include information about how often a particular message has been shown (in order to distribute message delivery across as many advertisements as possible, for example). Another mechanism would be to randomly select a message among the group that is considered relevant to the sensed vehicle.

Database **350** is used to store messages and to update delivery information. Database **350** may be store locally in control unit **120** or may be queried and updated over network path **260**. Message display step **360** is the final step and involves sending the selected message or messages at the appropriate times to display device **110**.

An enhancement to the message selection mechanism would be to maintain for each vehicle data on whether a particular message has already been shown. This would be used to control the variety and sequence of messages shown to a particular vehicle. For example, a certain vehicle that passes the display every weekday for commuting could be

given a different message each day. This feature would be accomplished by updating a database containing vehicle identifying information and advertisement delivery data every time a message is shown. With a large enough database, even a busy freeway in which several hundred thousand vehicles pass every day could be accommodated.

This message delivery database may need to contain more specific information than that used to come up with the occupant profile. For example, it may not be practical or legal to use the license plate number for information extraction, but it may be convenient to use this information in the message delivery database. It may also be necessary to record message delivery information in order to provide billing information to the advertisers, if a per-delivery charging model is used.

The foregoing description of preferred embodiments of the present invention has been provided for the purpose of illustration and description. It is not exhaustive or limiting of the invention. Many modifications and variations will be apparent to practitioners skilled in the art.

What is claimed is:

1. A method for providing unsolicited advertising or informational messages to one or more persons comprising the steps of: (a) sensing information from said one or more persons; (b) extracting information comprising face recognition using said sensed information; (c) forming a predicted profile based on said extracted information; (d) selecting a message to display based on said profile; (e) displaying said selected message; and (f) maintaining record information that identifies a set of said unsolicited advertising or informational messages that has been displayed to said one or more persons and how often said set of said unsolicited advertising or informational messages has been displayed to said one or more persons.

2. The method of claim **1** wherein said sensed information comprises audio information.

3. The method of claim **1** wherein said sensed information comprises video information.

4. The method of claim **1** wherein said predicted profile includes any subset of the following: sex, age, location of residence, and income level.

5. The method of claim **1** wherein said predicted profile is formed utilizing a statistical matching of said extracted information with individual characteristics.

6. The method of claim **1** wherein said potential viewer is on foot.

7. The method of claim **1** wherein said method operates in real-time to display messages to said one or more persons in motion.

8. An apparatus for providing unsolicited advertising or informational messages to individuals comprising: (a) a sensing device; (b) a display device; and (c) a processing system for establishing a predicted profile based on information received from said sensing device, selecting a message to display based on said predicted profile, controlling said display to display said selected message, and maintaining record information that identifies a set of said unsolicited advertising or informational messages that has been displayed to at least one of said individuals and how often said set of said unsolicited advertising or informational messages has been displayed to said at least one of said individuals, wherein said processing system further comprises processing capabilities for analyzing sensed data and extracting information from said sensed data comprises face recognition.

9. The apparatus of claim **8** wherein said predicted profile is formed utilizing a statistical matching of said extracted information with individual characteristics.

10. The apparatus of claim **8** wherein said sensed information comprises audio information.

11. The apparatus of claim **8** wherein said sensed information comprises video information.

12. The apparatus of claim **8** wherein said predicted profile includes any subset of the following: sex, age, location of residence, and income level.

13. The apparatus of claim **8** wherein at least some of said individuals are on foot.

14. The apparatus of claim **8** wherein said method operates in real-time to display messages to said individuals in motion.

15. A method for providing unsolicited advertising or informational messages to one or more persons comprising the steps of: (a) sensing information from said one or more persons; (b) extracting face recognition data from said sensed information; (c) forming a predicted profile based on said extracted face recognition data; (d) selecting a message to display based on said profile; and (e) displaying said selected message; wherein said face recognition data is configured to permit an individual person to be recognized.

16. An apparatus for providing unsolicited advertising or informational messages to individuals comprising: (a) a sensing device; (b) a display device; (c) a processing system for establishing a predicted profile based on face recognition data extracted from information received from said sensing device, selecting a message to display based on said predicted profile, and controlling said display to display said selected message; wherein said face recognition data is configured to permit an individual person to be recognized.

* * * * *