US006944533B2

(12) United States Patent
Kozak et al.

(10) Patent No.: **US 6,944,533 B2**
(45) Date of Patent: **Sep. 13, 2005**

(54) **METHOD OF OPERATION OF A NAVIGATION SYSTEM TO REDUCE EXPENSES ON FUTURE TRIPS AND TO PROVIDE OTHER FUNCTIONS**

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(*) 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.: **10/427,552**

(22) Filed: **Apr. 30, 2003**

(65) **Prior Publication Data**

US 2003/0195694 A1 Oct. 16, 2003

Related U.S. Application Data

(63) Continuation of application No. 09/875,402, filed on Jun. 6, 2001, now Pat. No. 6,629,034.

(51) **Int. Cl.**[7] **G01C 21/34**; G01C 21/36; G06F 17/60; G08B 11/23

(52) **U.S. Cl.** .... **701/200**; 701/24; 701/25; 701/201; 705/404; 705/80; 725/74; 73/178 R; 340/994

(58) **Field of Search** .... 701/200, 204, 701/209, 211, 24; 340/995.16, 995.24; 73/178 R; 705/13, 16, 17, 18, 20, 21, 410, 500, 80, 50, 51, 52

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,919,246	A		7/1999	Waizmann et al.	701/209
5,948,040	A	*	9/1999	DeLorme et al.	701/201
6,098,048	A	*	8/2000	Dashefsky et al.	705/10
6,144,916	A		11/2000	Wood, Jr. et al.	701/200
6,178,378	B1	*	1/2001	Leibold	701/202
6,256,577	B1		7/2001	Graunke	701/117
6,266,612	B1		7/2001	Dussell et al.	701/207
6,356,838	B1	*	3/2002	Paul	701/209
6,480,783	B1		11/2002	Myr	701/117
6,584,401	B2		6/2003	Kirshenbaum et al.	701/702
6,587,127	B1	*	7/2003	Leeke et al.	345/765
6,591,188	B1	*	7/2003	Ohler	701/209
6,594,580	B1	*	7/2003	Tada et al.	701/211
6,622,083	B1	*	9/2003	Knockeart et al.	701/202
6,629,034	B1	*	9/2003	Kozak et al.	701/200
6,721,654	B2	*	4/2004	Akiyama	701/209
6,741,841	B1	*	5/2004	Mitchell	455/188.1
2002/0095249	A1		7/2002	Lang	701/29

FOREIGN PATENT DOCUMENTS

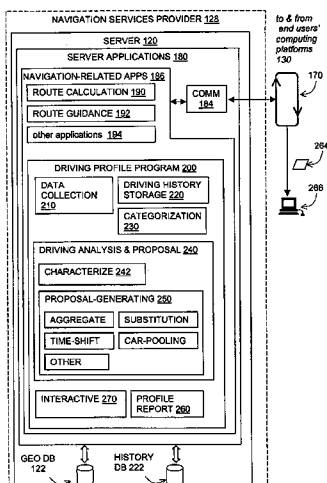|					
EP		0803705	A2	10/1997	G01C/21/20
EP		0967460	A1	12/1999	G01C/21/20
EP		1265206	A2 *	12/2002	G08G/1/0968

* cited by examiner

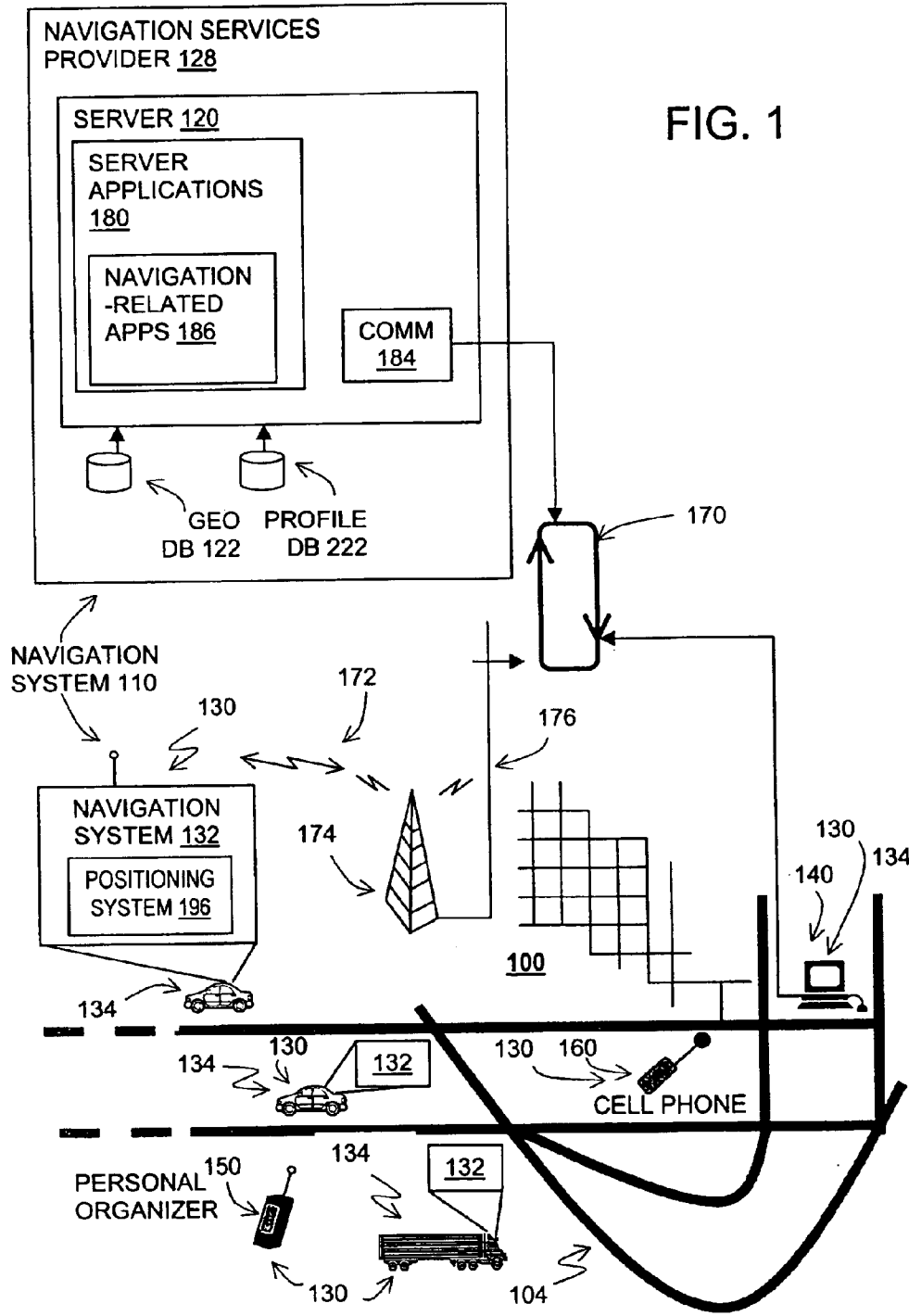*Primary Examiner*—Olga Hernandez
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(57) **ABSTRACT**

A navigation system includes a driving profile program. The driving profile program collects information about an end user's driving activity. The information relates to trips made by the end user. The information includes departure times, intermediate stops, arrival times, purposes of the trips, and so on. After collecting this information over a period of time, the driving profile program analyzes the end user's driving activity. The driving profile program provides the end user with a driving activity profile. In addition, the driving profile program determines ways to reduce the amount of time and/or expense that the end user spends traveling in his/her vehicle and suggests modifications to the end user's driving activity that would save the end user time or expense.
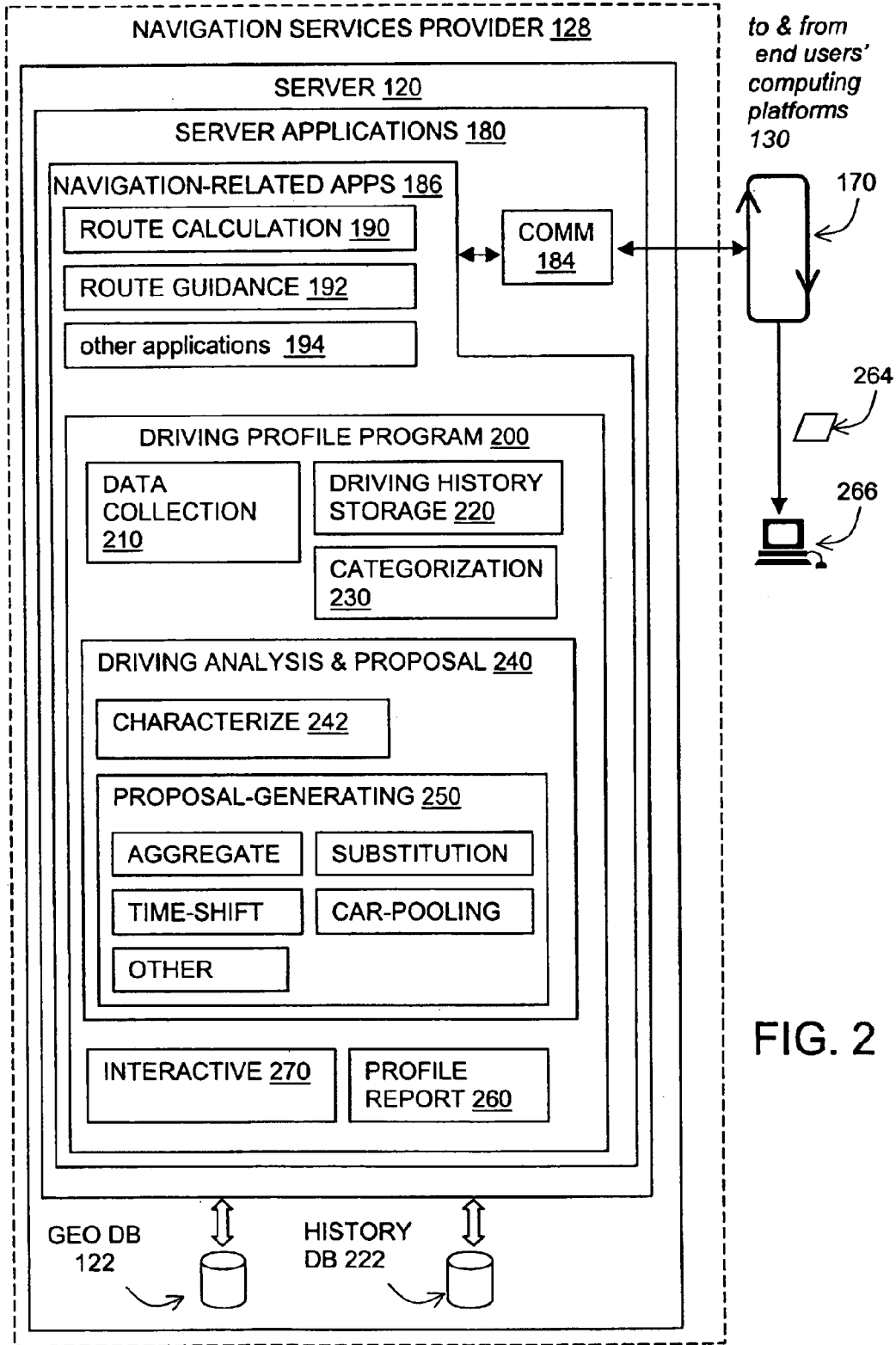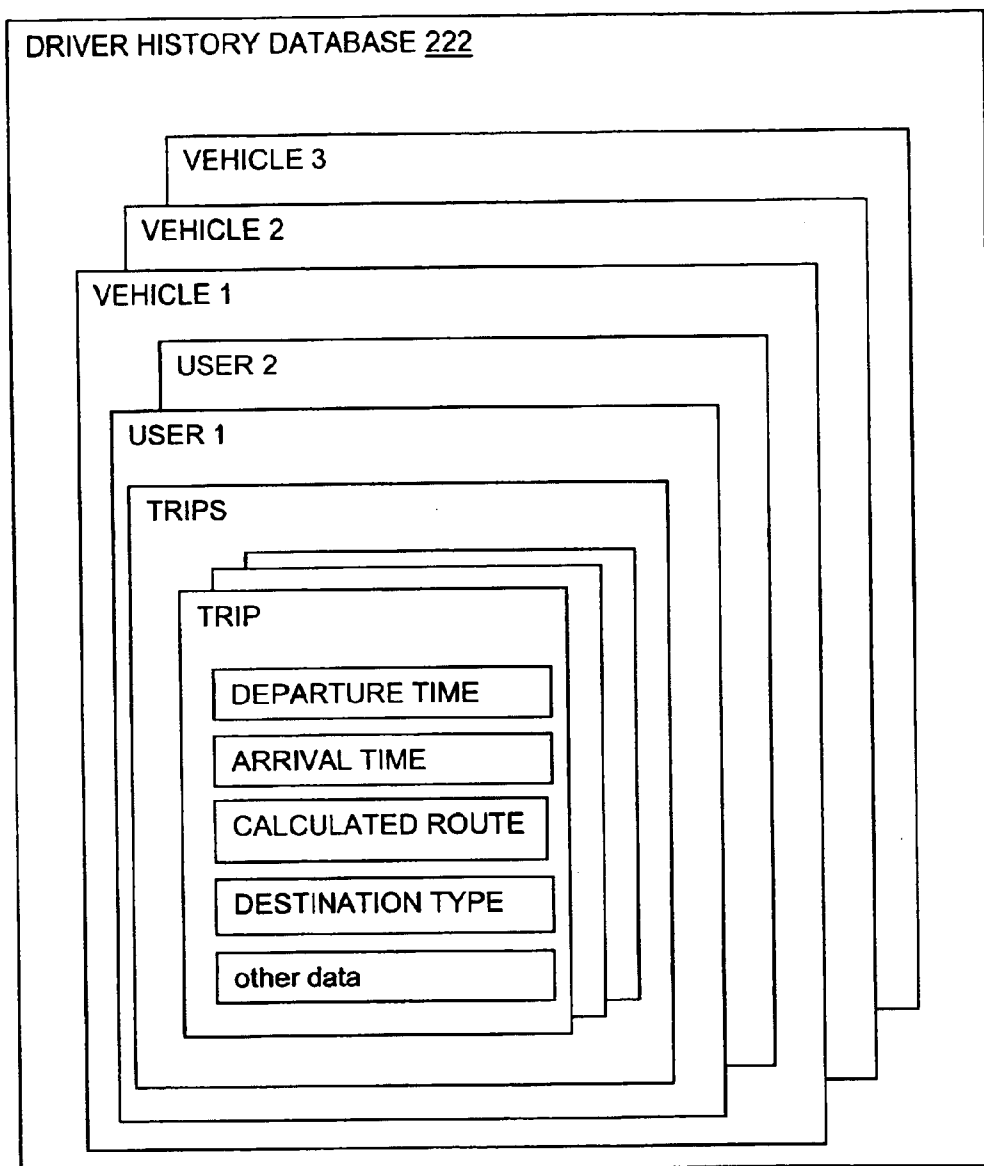
29 Claims, 3 Drawing Sheets

FIG. 1

NAVIGATION SERVICES PROVIDER 128

to & from end users' computing platforms 130

SERVER 120

SERVER APPLICATIONS 180

NAVIGATION-RELATED APPS 186

ROUTE CALCULATION 190

ROUTE GUIDANCE 192

other applications 194

COMM 184

170

264

266

DRIVING PROFILE PROGRAM 200

DATA COLLECTION 210

DRIVING HISTORY STORAGE 220

CATEGORIZATION 230

DRIVING ANALYSIS & PROPOSAL 240

CHARACTERIZE 242

PROPOSAL-GENERATING 250

AGGREGATE

SUBSTITUTION

TIME-SHIFT

CAR-POOLING

OTHER

INTERACTIVE 270

PROFILE REPORT 260

FIG. 2

GEO DB 122

HISTORY DB 222

FIG. 3

DRIVER HISTORY DATABASE <u>222</u>

VEHICLE 3

VEHICLE 2

VEHICLE 1

USER 2

USER 1

TRIPS

TRIP

DEPARTURE TIME

ARRIVAL TIME

CALCULATED ROUTE

DESTINATION TYPE

other data

METHOD OF OPERATION OF A NAVIGATION SYSTEM TO REDUCE EXPENSES ON FUTURE TRIPS AND TO PROVIDE OTHER FUNCTIONS

The present application is a continuation of Ser. No. 09/875,402 filed Jun. 6, 2001, now U.S. Pat. No. 6,629,034, the entire disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

The present invention relates to a feature provided by a navigation system that reduces the amount of unnecessary travel by an end user thereby saving the end user time and expense.

Navigation systems are available that provide end users (such as drivers and passengers of the vehicles in which the in-vehicle navigation systems are installed) with various navigation-related features and functions. For example, some navigation systems are able to determine an optimum route to travel by roads between locations in a geographic region. Using input from the end user, and optionally from equipment that can determine the end user's physical location (such as a GPS system), a navigation system can examine various paths between two locations to determine an optimum (i.e., fastest) route to travel from a starting location to a destination location in the geographic region. After determining the optimum route to a destination, the navigation system may then provide the end user with information about the optimum route in the form of guidance that identifies the driving maneuvers required to be taken by the end user to travel from the starting location to the destination location. The guidance may take the form of visual and/or audio instructions that are provided along the way as the end user is traveling the route. Some navigation systems are able to show detailed maps on display screens outlining routes to destinations, the types of maneuvers to be taken at various locations along the routes, locations of certain types of features, and so on. With some navigation systems, traffic conditions are taken into account when determining optimum routes.

One of the benefits provided by navigation systems is that they save time for users. Navigation systems achieve this benefit in several ways. Navigation systems help users locate desired destinations quickly. Navigation systems also provide users with the fastest routes to desired destinations. Although navigation systems save time for people who use them, there continues to be room for improvements. For example, drivers still encounter traffic congestion and delays. Therefore, there continues to be a need to find ways to save time for users of navigation systems.

SUMMARY OF THE INVENTION

To address these and other objectives, the present invention comprises a driving profile program. The driving profile program collects information about an end user's driving activity. The information collected by the driving profile program relates to trips made by the end user. The information about trips includes the departure times, the stops along the way, the arrival times, and the purposes of the trips, as well as other types of information. After collecting this information over a period of time, such as one or more months, the driving profile program analyzes the end user's driving activity. The driving profile program then provides

activity, the driving profile program identifies ways to reduce the amount of time and/or expense that the end user spends traveling in his/her vehicle. The driving profile program suggests modifications to the end user's driving activity that would save the end user time or expense.

In a further aspect, the driving profile program uses traffic information relating to routes along which the end user travels in order to suggest ways that the driver can reduce the amount of time spent traveling.

In another aspect, the driving profile program takes into account other end users' driving activities in order to suggest ways that a driver can reduce the amount of time or expense spent traveling.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an illustration of a navigation system according to a first embodiment.

FIG. **2** is a block diagram showing components of the navigation services server of FIG. **1**.

FIG. **3** is a block diagram showing some of the kinds of data that are stored by the driving profile program of FIG. **2**.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

I. Overview of Navigation System

FIG. **1** shows a geographic region **100**. The geographic region **100** may correspond to a metropolitan or rural area, a state, a country, or combinations thereof, or any other area of comparable size. Located in the geographic region **100** is a road network **104**.

A navigation system **110** serves end users (e.g., vehicle drivers and passengers, as well as other persons) in the geographic region **100**. The navigation system **110** is used by the end users to obtain navigation-related services (including map-related services) with respect to the geographic region **100**. The navigation-related services include information about travel along the road network **104**, including route calculation and guidance, people and business finding services (e.g., electronic yellow and white pages), maps, point of interest searching, destination selection, and so on.

The navigation system **110** is a combination of hardware, software and data. The navigation system **110** includes remote components (i.e., hardware, software or data located at a central location remote from the end users) and local components (i.e., hardware, software, or data located physically with each end user).

Included among the remote components of the navigation system **110** is a navigation services server **120**. The navigation services server **120** includes appropriate computer hardware and software to run network applications. Associated with the navigation services server **120** is a geographic database **122**. The navigation services server **120** and the geographic database **122** are maintained and operated by a navigation services provider **128**.

The local components of the navigation system **110** include the various computer platforms **130** operated by the end users to request and obtain navigation-related and map-related features and geographic data from the navigation services provider **128**. These various computer platforms **130** (also referred to as "end user computing platforms" or "client computing platforms") may include navigation system units **132** located in vehicles **134**, personal computers **140**, personal organizers (e.g., PDAs,

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