



(12) **United States Patent**
Khavakh et al.

(10) **Patent No.:** **US 7,054,742 B2**
(45) **Date of Patent:** ***May 30, 2006**

(54) **METHOD AND SYSTEM FOR ROUTE CALCULATION IN A NAVIGATION APPLICATION**

(56) **References Cited**

U.S. PATENT DOCUMENTS

(75) Inventors: **Asta Khavakh**, Lake Zurich, IL (US);
William McDonough, Glen Ellyn, IL (US);
Oleg Voloshin, Deerfield, IL (US);
Yaoguang Wang, Rosemont, IL (US)

(73) Assignee: **Navteq North America, LLC**,
Chicago, IL (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.

This patent is subject to a terminal disclaimer.

4,570,227 A	2/1986	Tachi et al.
4,763,270 A	8/1988	Itoh et al.
4,782,447 A	11/1988	Ueno et al.
4,794,528 A	12/1988	Hirose et al.
4,796,189 A	1/1989	Nakayama et al.
4,812,990 A	3/1989	Adams et al.
4,926,336 A	5/1990	Yamada
4,937,753 A	6/1990	Yamada
5,031,104 A	7/1991	Ikeda et al.
5,041,983 A	8/1991	Nakahara et al.
5,103,400 A	4/1992	Yamada et al.
5,168,452 A	12/1992	Yamada et al.
5,184,303 A	2/1993	Link
5,187,667 A	2/1993	Short
5,204,817 A	4/1993	Yoshida
5,262,775 A	11/1993	Tamai et al.
5,272,638 A	12/1993	Martin et al.
5,291,412 A	3/1994	Tamai et al.
5,291,413 A	3/1994	Tamai et al.
5,291,414 A	3/1994	Tamai et al.
5,303,159 A	4/1994	Tamai et al.
5,311,434 A	5/1994	Tamai

(Continued)

(21) Appl. No.: **10/651,091**

(22) Filed: **Aug. 28, 2003**

(65) **Prior Publication Data**

US 2004/0039520 A1 Feb. 26, 2004

Related U.S. Application Data

(62) Division of application No. 10/259,897, filed on Sep. 27, 2002, now Pat. No. 6,678,611, which is a division of application No. 09/920,493, filed on Aug. 1, 2001, now Pat. No. 6,487,497, which is a division of application No. 09/714,314, filed on Nov. 16, 2000, now Pat. No. 6,298,303, which is a division of application No. 09/047,698, filed on Mar. 25, 1998, now Pat. No. 6,192,314.

(51) **Int. Cl.**
G01C 21/36 (2006.01)

(52) **U.S. Cl.** **701/209**

(58) **Field of Classification Search** 701/200-201, 701/208-209, 207; 342/357.01, 357.13, 454-457; 340/988, 990

See application file for complete search history.

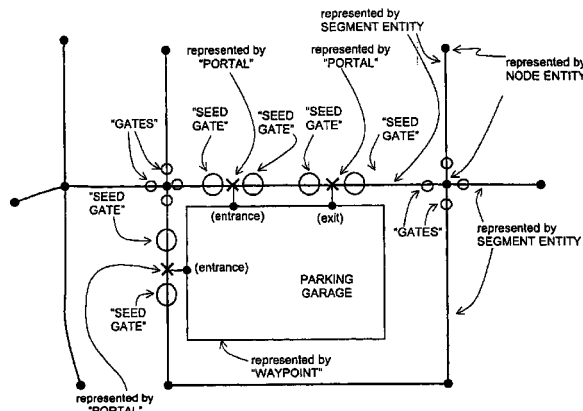
Primary Examiner—Thu V. Nguyen

(74) *Attorney, Agent, or Firm*—Frank J. Kozak; Jon D. Shutter; Lawrence M. Kaplan

(57) **ABSTRACT**

A method for route calculation using real time traffic conditions is disclosed. A transmission that includes weightings indicative of traffic conditions on roads is received. Then, a solution route is calculated by forming a list of road segments. The list is formed by expanding a search tree comprised of gates. Each gate represents a physical location on a road segment and an accessible direction relative thereto. Each gate to which a weighting applies is incremented by an amount indicated in the transmission. The solution route is determined by expanding the search tree, which includes determining and evaluating successor gates.

10 Claims, 13 Drawing Sheets

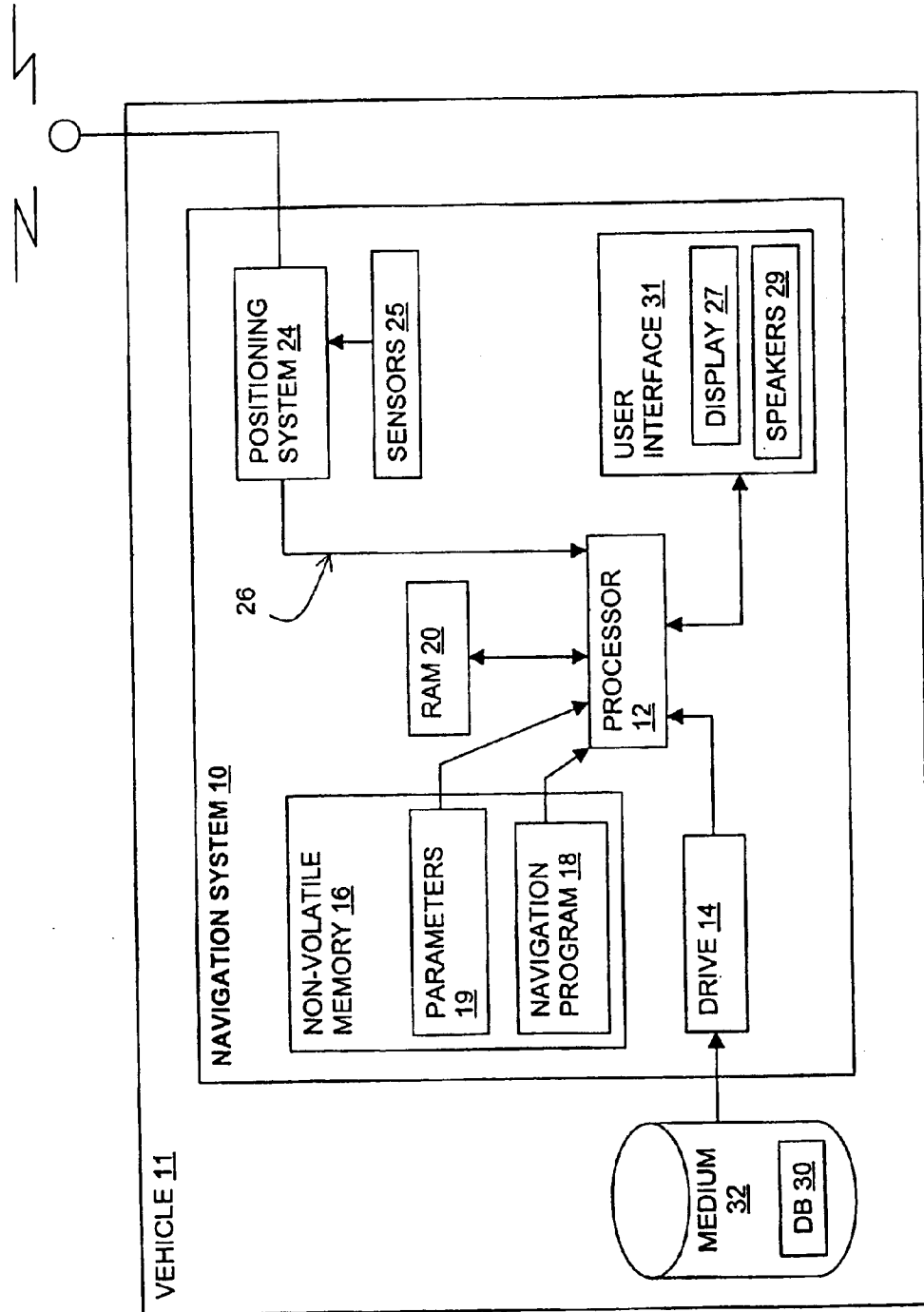


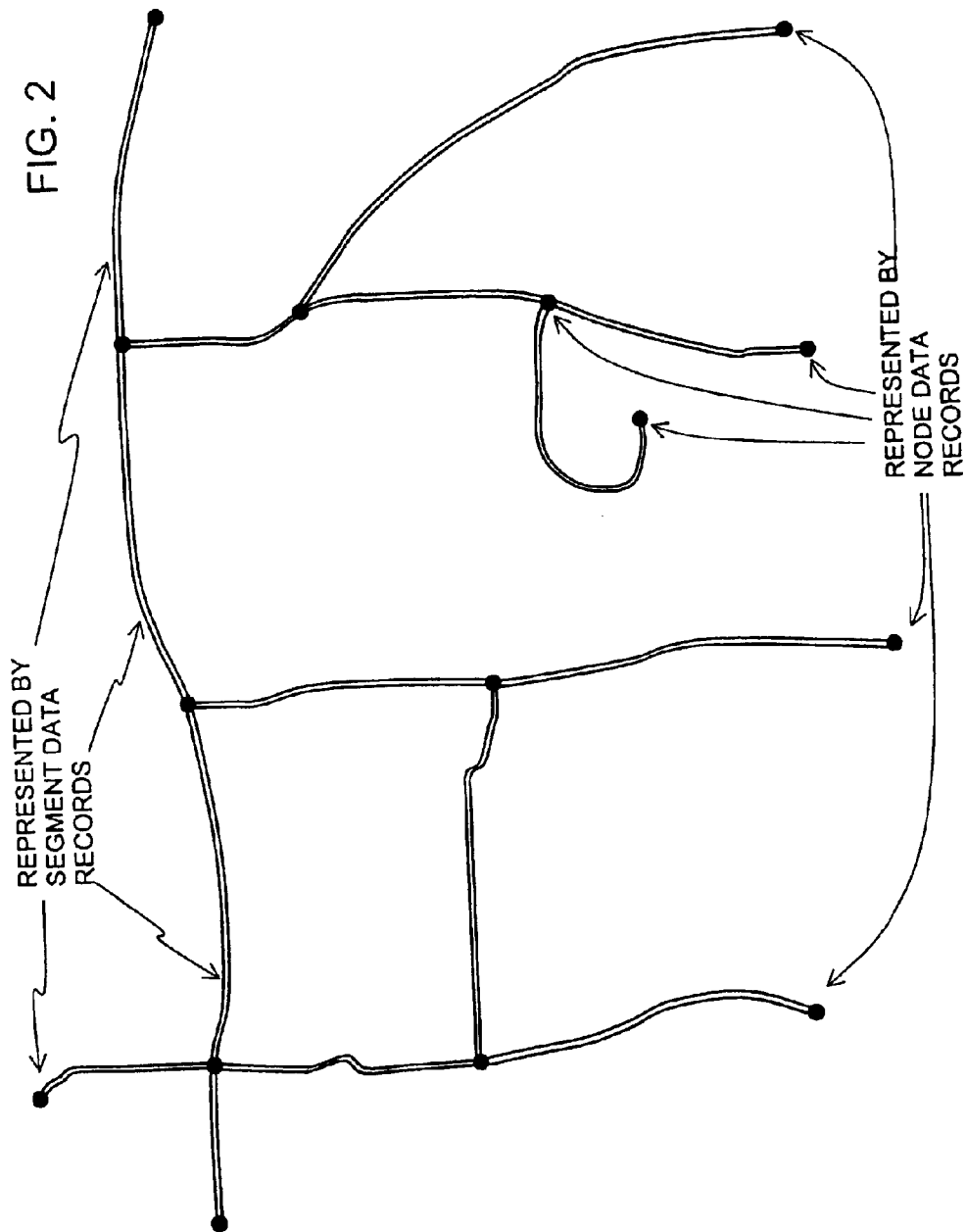
U.S. PATENT DOCUMENTS

5,369,588 A	11/1994	Hayami et al.	5,521,826 A	5/1996	Matsumoto
5,371,678 A	12/1994	Nomura	5,550,538 A	8/1996	Fujii et al.
5,410,485 A	4/1995	Ichikawa	5,557,522 A	9/1996	Nakayama et al.
5,428,545 A	6/1995	Maegawa et al.	5,559,511 A	9/1996	Ito et al.
5,442,349 A	8/1995	Inoue et al.	5,608,635 A	3/1997	Tamai
5,459,667 A	10/1995	Odagaki et al.	5,612,881 A	3/1997	Moroto et al.
5,467,276 A	11/1995	Tsuyuki	5,638,280 A	6/1997	Nishimura et al.
5,475,387 A	12/1995	Matsumoto	5,652,706 A	7/1997	Morimoto et al.
5,502,640 A	3/1996	Yagyu et al.	5,659,476 A	8/1997	LeFebvre et al.
5,506,774 A	4/1996	Nobe et al.	5,899,955 A	5/1999	Yagyu et al.
5,506,779 A	4/1996	Kanki	5,938,720 A	8/1999	Tamai
5,508,930 A	4/1996	Smith, Jr.	6,038,509 A	3/2000	Poppen et al.
5,513,110 A	4/1996	Fujita et al.	6,128,571 A	10/2000	Ito et al.
5,519,619 A	5/1996	Seda	6,751,609 B1 *	6/2004	Nomura 707/3

* cited by examiner

FIG. 1





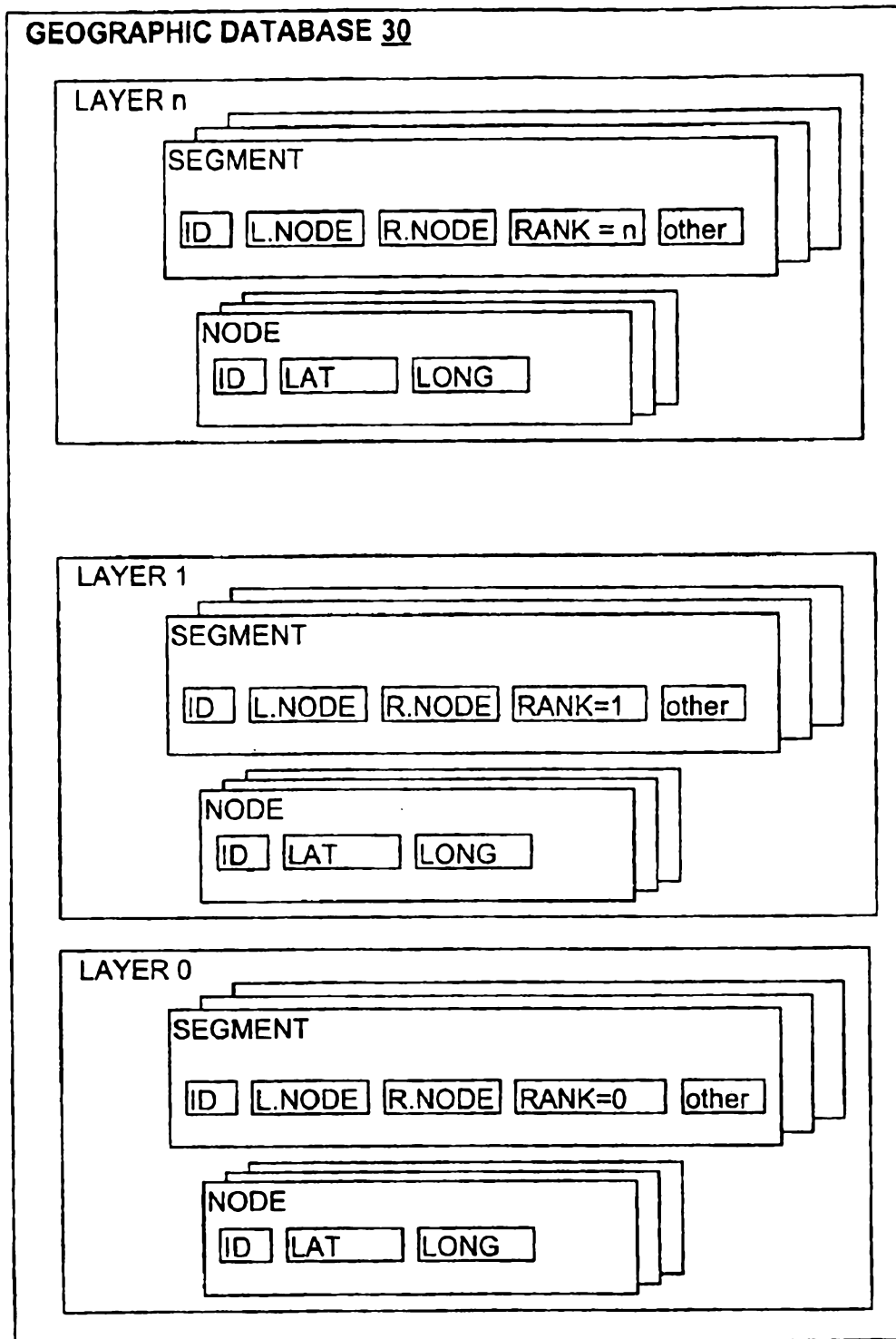


FIG. 3

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.