VEHICLE LOCATION AND NAVIGATION SYSTEM

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ABSTRACT

Nowdays, due to rapid increase in population and economy, the requirement of transportation systems and roads increases continuously. To achieve correct destination with the measure of safety,an automatic vehicle navigation (AVS) system is designed. In today's scenario automatic vehicle navigation (AVS)is totally based on application of LED's and GPS system. Light Emitting Diodes (LEDs) were replaced all the traffic lights, message display boards, traffic signal devices. LEDs can be used as a communication device for the transmission and broadcasting of information and data. AVS have become an important tool in the urban transportation network. The objective of this technical paper is to present an overview of automatic vehicle navigation system (AVS) that how it works to determine the correct location of the vehicle and helps to determine the position of the destination.

I INTRODUCTION

In vehicle location and navigation system traffic light, traffic signal device or message display boards works as a transmitter and the vehicle is equipped with the receiving system including basic components of navigation systems, which were composed of a GPS system, digital map module, a digital compass, positioning module, map-matching module, route planning module etc. This automatic route guidance system could decrease travel time for all users. However, with the increasing demand and the cheaper cost of this system, navigational systems have now become daily necessities to make travel easier. To find the correct location users start up the navigator and enter the destination address according to multiple choices (post code, suburb, street or historical place), then the system determines the route for the users based on the electronic map, and using real-time information stored in the memory space, and current vehicle position with the help of Global Positioning System (GPS). This paper is based on the use of visible light waves from LEDs as a medium for wireless, short-range optical communication. This paper contains the process of working of vehicle location and navigation systems. Some of the advantages and the applications are explained [1-3]. Some of the main components of the vehicle location and navigation systems and the future work in this area are also explained.

II BRIEF HISTORY OF NAVIGATION SYSTEM

The first in-vehicle navigation system appeared in 1960's in the electronic route guidance system(ERGS) developed by the US federal highway association. It's aim was to provide guidance to vehicles.

Since 1990, Global Positioning System (GPS) used to improve navigation system. These advances have made GPS receivers affordable and have led to comprehensive research in the field. In general, vehicle navigation

system provides current position of the vehicle by observing both latitude and altitude directions of the vehicle position and match it with a digital map inside the system.

III HOW TO LOCATE THE POSITION?

For locating a vehicle position, dead reckoning method can be use in which the vehicle with dead reckoning method must set its coordinates before moving. Position sensor and distance sensors, based on the coordinates, could measure the turning degree and tracking movement. At Last, the current position could be determined.

For example, as shown in Figure 1, the starting point (xo, yo), the based point also, multiplied by each distance di and aspect is θi the terminal point (xn, yn).The formula becomes as follows:

$$x = xo + \sum_{i=0}^{n} di\, T \cos \theta i$$

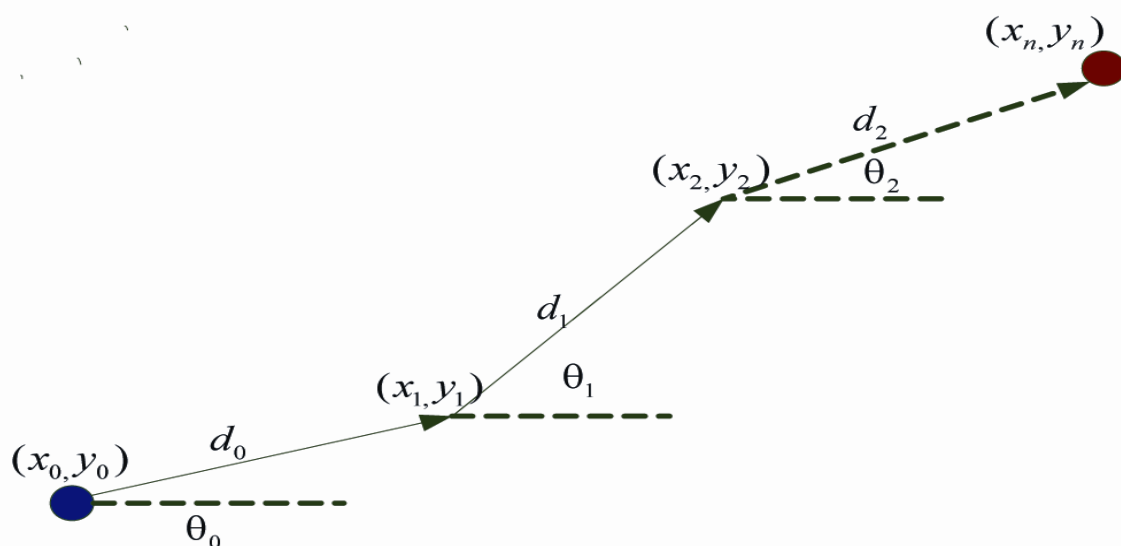$$y = yo + \sum_{i=0}^{n} di\, T \sin \theta i$$

Fig.1 dead reckoning method

Distance and position sensors are applied by dead reckoning method. Distance sensors are normally used to calculate the distance and position sensor is used to measure the position of the vehicle .Sensors are used to calculate distance travelled, by calculating the number of turns rotated by the wheel axle, which is multiplied by the circumference of the wheel to give distance travelled by the wheel.

IV INTELLIGENT TRAFFIC LIGHT CONTROLLER

To reduce the waiting time and loss of fuel due to conventional traffic light controller (TLC), intelligent traffic light controllers are employed. This makes the use of sensor network along with embedded technology which automatically decides the timings of red, green and yellow colour according to the total traffic on each adjacent roads. If the vehicle is equipped with a navigation system, the location can be identified on the coordinates which are made for the study of map, with road segment heading. When used in conjunction with a dead-

reckoning navigation device (a directional and distance sensor), the navigation system can determine the present location in real time and corrects any error when a location signal is received from an ''intelligent'' traffic light.
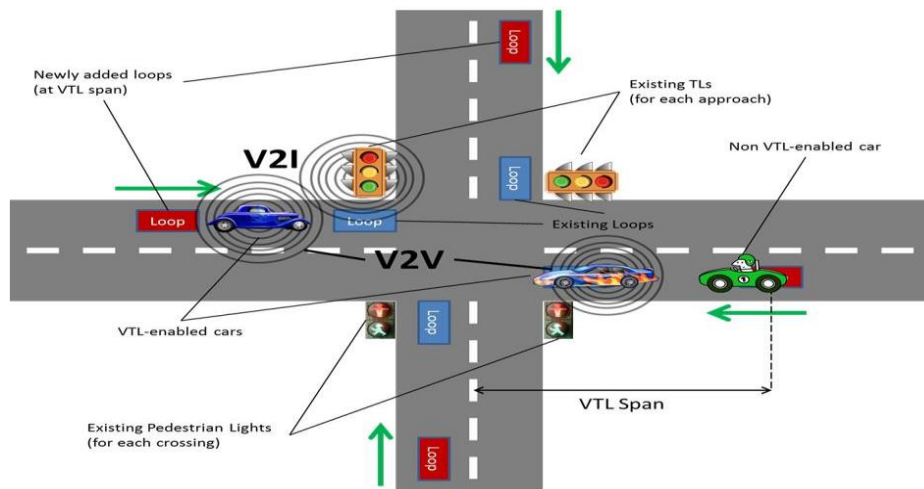

FIG.2 INTELLIGENT TRAFFIC CONTROLLED NETWORK

It is observed that the Intelligent Traffic Light Controller is more efficient than the conventional controller in respect of less waiting time, distance traveled by average vehicles and efficient operation during emergency mode and GSM interface. The designed system has simple architecture and fast response time.

V WORKING PROCESS

The process of working of a vehicle location and navigation system can be explained easily by a car navigation system. Car navigation systems receive signals from satellites and identify the vehicle's position and direction by combining that data with information obtained from various onboard sensors. Initially, the current location is identified and indicated on the map display. At the same time, the configurations and the locations of nearby roads, intersections, and connecting routes between roads are determined from the system database. Next, the destination address can be found. Information about destination address, properties (hotel, park, etc.) and other representative features is obtained. After confirming the current location and the vicinity of the destination, system confirms the route that connects those two locations and determines their connection status, intersections, turns etc. The system determines various possible routes from the current location to the destination, then verifies the optimum route. The route with minimum cost is decided for one way streets, narrow road etc. After the route and driving directions are decided, information on buildings and roads along the route is confirmed and displayed. While route directions are provided, information about the location of car is displayed. In this way, roads, buildings and other topographical features, along the way are identified.
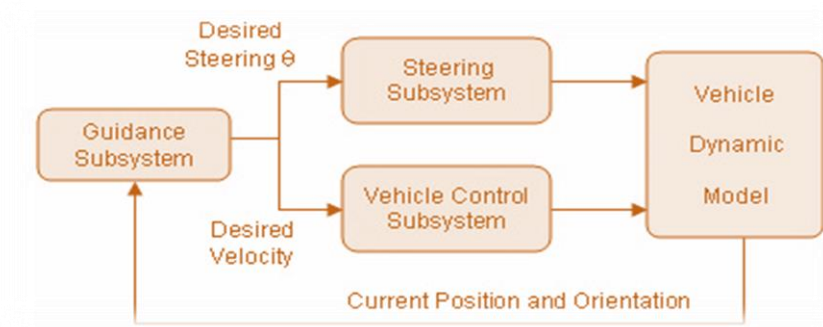
VI CONCLUSION

With the increase in technological development of navigation system and wireless positioning method , life of individuals becomes somewhat more safe and easier. This technology will improve further development of navigation system and enhances travel experience. Some more future research is require to improve the existing method and to enhance the efficiency. It is essentially a new kind of short-range beacon to support vehicle-to-roadside communications. This paper has presented on the development work from this dual use of traffic lights because it can broadcast local traffic information, vehicle location and navigation information, in addition to its normal function of being a traffic signaling device. The simulation study shows that traffic light corrections could reduce accumulated errors in a dead reckoning positioning system. The bit error rate (BER) measurements show that the BER is comparable with those using infra-red beacons. Thus, there is a potential for the wide-spread use of LED traffic lights for vehicle location and navigation.

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