

Review of Vehicle Tracking In Intelligent Transportation System (ITS)

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Abstract—Intelligent Transport Systems (ITS) gives the solution on the safety of people during travelling by providing vehicle location. This paper aims to give information of vehicle localization techniques which is used in a vehicle transportation system.

Keywords —Vehicular Localization, GPS, ITS

I. INTRODUCTION

The significant growth of population and increasing need of vehicle results in traffic. A smart city^[1] broadly includes a smart vehicle system which uses high end information and communication technologies to distribute better traffic handling conditions on the road and to reduce number of accidents which is a major problem of the India in present days.

Now day's automobile industries all over the world worked hard to introduce smart vehicle communication models. The Intelligent Transport Systems (ITS) exploiting different technologies to enhance safety and quality of transportation networks. ITS gives accurate location information of vehicles from the traffic and provides safety.

Global Positioning System (GPS) is the technique used to recognize the vehicle position. However in dense and indoor environment GPS doesn't give accurate vehicle position .VANET (VEHICULAR

ADHOC NETWORK) is a part of a MANET. These Networks used in Intelligent Transport. Several studies suggest the use of additional resource as V2I, V2V, RFID and DR technologies along with^[3] GPS to give information of location in all situations. So there is a need of localization technique depending on the different applications which can deliver the required localization accuracy at the required latency.

This section consist brief introduction of intelligent transport system for vehicle transportation systems. The second section review of all localization services. The Conclusion and References are thereafter covered in next sections respectively.

II. LOCALIZATION TECHNIQUES:

During a travelling accurate locations information is necessary in today's time for time saving. According to time management and safety purpose we need positioning techniques which gives us accurate position of our vehicles and also a person where we are. Many more localization techniques are discovered to decide a position of person and vehicles. GPS, Map Matching^[11] Dead Reckoning, image/video processing are used to determine a location. Vanet (vehicular ad hoc network) is a part of MANET. These all techniques are depending on a Vanet area.

Localization Techniques we briefly explain in this paper which is used in Intelligent Transport System.

GLOBAL POSITIONING SYSTEM (GPS)

GPS, the Global Positioning System, is made of 24 satellites which can operate in orbit around the earth. Each satellite circles the earth at a height of 20.200 km and every day makes two complete rotations .At least 4 satellite can observed^[10] the earths surface in that way orbit is defined .using the satellite gps receiver get the information. The GPS receiver uses the Time of Arrival technique (ToA)^[6] to estimate its distance to the four known satellites, and trilateration technique to compute its position. Once these procedures have been executed, the receiver should know its latitude, longitude and altitude.

The main idea for VANET localization^[4] is to equip each vehicle node with a GPS receiver. This is a very logical solution; since the GPS receivers can be installed easily in vehicles. But as VANET advance into critical fields which are dependent on localization system.

MAP MATCHING

Map Matching is technology which is used to get map information. map information is used for to find address of a particular location and also for vehicle navigation. Map matching is used mostly for vehicle navigation. By using this technique we minimize the predicted position error .To create a estimated trajectory several positions are used which is obtained over a regular period of time using a map matching technique. To get most appropriate path geometry, digital map data is compared with estimated^[5] trajectory. Map matching method is used with GPS for to recognize vehicle position.

DEAD RECKONING

This technique is used to recognize the current position of a vehicle using its last known location. Dead Reckoning is also used a speed, acceleration, direction, time etc information . for instance by using GPS receivers last known position, also known as a fix, can be obtained.^[10] or by locating a known reference (road crossing, parking lots, home, etc) on a digital map. Using sensors including odometers displacement data can be obtained, while

direction can be recognized easily using such other sensors as digital compasses and gyroscopes. Practically for short period of time dead reckoning is used if GPS is not available. Number of errors can be accumulating easily by using this technique so that dead reckoning avoided. For instance, after the last position fix, positioning errors from 10 to 20 m can be reached in only 30s when traveling at about 100 km/h. When a vehicle enters into a tunnel, vehicle loses its connection, errors are accumulated quickly over time and distance in dead reckoning, it is considered^[12] only as a backup system for periods of GPS outage. In this example, a position fix is a last computed GPS location. Another practical application of Dead Reckoning, as noted above, is to join it with Map Knowledge. In these cases, the positions restrictions can be applied to decrease dead Reckoning errors, along with the traffic patterns can be used to match the estimated path within the known map information (map matching).

CELLULAR LOCALIZATION

Cellular localization obtains benefit of the mobile cellular infrastructure present in most urban environments to find^[9] the position of an object. Vehicle localization, tracking domestic animals, mobile phones location can be obtained by cellular localization. These are the application of cellular localization.

In order to work properly, mobile cellular systems require the installation of a communication infrastructure made of number of cellular base stations distributed through the covered area.

Each base station is responsible for providing communication to mobile phones located in its area. As mobile^[13] phones are used in city everywhere so that they changing base station as mobile move around a city when the signal strength from a new base station becomes greater than the one in use. This procedure is called handoff. Cellular localization is usually less precise than GPS. The number of base stations detecting the signal, and the positioning algorithm used, etc all these factors are considered for correctness. Also, signals from the Cellular infrastructure have more availability in urban environments than signals from satellite (used by GPS receivers) which can be useful for indoor environments such as parking lots and even tunnels.

IMAGE/VIDEO PROCESSING

Especially in mobile robot guidance systems image and video information sources and data processing techniques can be used for location purposes. Cameras are available^[7] in many places for a security purpose. In tunnels parking areas always ready with cameras so lots of vehicles information we obtained by this method. To estimate and predict a vehicle's location^[8] Image/Video Processing techniques are used to feed Data Fusion algorithms. The vehicle's geometrical parameters in a local reference system, as well as lane width, road lateral curvature, and distance of the vehicle from the left side of the lane, vehicle's^[14] direction angle, and the camera inclination angle are estimated using a image video processing technique. These local data are transformed in order to express in a precise digital map^[2] of the environment. Such information is used to feed a Data Fusion module that estimates vehicle's position. In fact, both image and video

information are actual sources from which we can compute the location parameters of a vehicle.

III. CONCLUSION

In this paper, we studied GPS, Dead reckoning, Map Matching etc. techniques which is used in ITS. Some of advantages and disadvantages are there in techniques. Integrated and smart localization system also used for localization information that used in future.

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