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Position Based Routing in VANET Based on Geographic Approach

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Abstract

Vehicular Ad hoc Network (VANET) is a wireless network that is formed on the fly between a collection of cars connected by wireless links. VANET has gained a great amount of attention during recent years and is used for a large number of safety (accident warning, weather notification) and non-safety (multimedia, gaming) applications. Vehicular Network is one of the most growing type of wireless network. In such system lot work is being done. There are number of issues with Vanet like the security, congestion, intelligent system etc. We are also taking one of such problem of vanet called the intelligent system. In vehicular network the complete automation is always the main problem. While working with vanet the geographical area selection is also a problem. It can be a city, mountain area etc. We are trying to represent the solution for the same problem. We have proposed the system in a city area. In this system we have selected a 4x4 road area with 2 lane system. Automated traffic lights are present on each turn. We are providing the system to perform a vehicular traffic formation without any collision. Both the vehicle and light system is automated here.

Keywords: *VANET, Automated Traffic lights, Traffic Routing, Ad hoc Network, Automation.*

Introduction

Communication between vehicles by means of wireless technology has a large potential to improve traffic safety and travel comfort of drivers and passengers [1]. Vehicular Ad Hoc Network shares some common characteristics with general Mobile Ad Hoc Network (MANET). Both VANET and MANET are characterized by the movement and self-organization of the nodes. They are also different in some ways. MANET can contain many nodes that cannot recharge their power and have uncontrolled moving patterns. Vehicles in VANET can recharge frequently, however can be constrained by the road and traffic pattern [2].The characteristics of the network can affect the routing strategy. There are existing protocols designed for the characteristics of MANET, but further studies are required to evaluate the suitability of existing protocols for VANET. Existing routing protocols are generally categorized in *topological-based* and *position-based* routing. Topological based routing makes use of global path information and link information to forward packets. Position-based routing does not keep global network information but requires information on physical locations of the node.

There are two variations of mobile wireless networks. The first is known as infrastructure networks, i.e., those networks with fixed and wired gateways. The bridges for these networks are known as base stations. A mobile unit within these networks connects to, and communicates with, the nearest base station that is within its communication radius. The second type of mobile wireless network is the infrastructure less mobile network, commonly known as an ad-hoc network. Infrastructures less networks have no fixed routers; all nodes are capable of movement and can be connected dynamically in an arbitrary manner. Nodes of these networks function as routers which discover and maintain routes to other nodes in the network. Example applications of ad-hoc networks are emergency search-and-rescue operations, meetings or conventions in which persons wish to quickly share information, and data acquisition operations in inhospitable terrains.

Since the service discovery in the first type of mobile wireless network is simple, we will focus on the second type of mobile wireless network, especially the ad-hoc network. An ad-hoc mobile network is a collection of mobile nodes that are dynamically and arbitrarily located in such a manner that the interconnections between nodes are capable of changing on a continual basis. During the service finding process in ad hoc network, it needs many ad hoc routing protocols; the table driven type protocols

and the source-initiated on-demand driven type protocols. And we will discuss them respectively [3].

Related work

A huge amount of work is underway to solve traffic problems in metropolitan areas. iTransIT is working on urban traffic management by providing a real time congestion map for city of Dublin [4].

JETS is also working on a prototype implementation to provide a context aware journey time information [5]. This context aware system will index all journey times with the context (time, weather, road usage patterns) in which journey has occurred.

FleetNet [6] is an infrastructure less self-organizing traffic information system. Vehicles receive traffic information from other vehicles and analyze the information locally and then transmit information to other vehicles.

VGrid [7],[8] integrates Vehicular Ad hoc network along with Grid Computing technology to solve a large number of traffic related problems like lane merging, ramp metering etc.

The CarTel project[9] has explored stealing connections from open WiFi stations in Boston and Seattle. A couple of researchers have studied the problem of using VANETs to discover and disseminate congestion information [10],[11].

Marca et al [12] discussed ways of extending an existing centralized GPS traffic monitor to use VANETs. TrafficView [13] addresses the issue of estimating road congestion using a network of vehicle based GPS systems. The TrafficView [13] project focused the congestion of the road directly ahead. The TrafficView project was able to demonstrate that it is possible to monitor vehicle congestion using a real VANET. The idea was extended to both sides of the road by SOTIS [14].

In [15] , we constructed a simple spatial model to reflect traffic density. Source routing was executed based on the spatial model and a predictive location service was developed to track the movement of destination.

Proposed Work

We are representing automatic route finding in case of a Vehicular Adhoc Network. In this we use vehicles as a moving nodes to represent the proposed work. In this proposed work we used a concept of traffic light, traffic and the congestion. The vehicle will perform a automatic route finding by taking the observation of surrounding traffic, external interference and the traffic light. The vehicle will search their path by using effective shortest path routing.

In this network, we are taking a specific city area with one or two lane roads. At each junction there exists a traffic light which route the vehicles accordingly.

The major problems is to find the appropriate route path and a network or geographical area. The connectivity problem too depend on these two factors.

To resolve this problem there are some existing methods:-

- Wait for the traffic signal to get green.
- Find the appropriate alternate path.

The proposed algorithm we will use for finding the alternate path in VANET. In this algorithm we follow the following step:

Algorithm route discovery and route reply
Notation:
Source, Destination: ID of the source and destination
Path, TempPath: The best and temporary paths from nS to
|Path|: Path length
RS(ni): Road segment where node ni is located
_: Waiting time parameter
RDP: Route discovery packet
RRP: Route reply packet
Upon receiving RDP(Source,Destination, TempPath) from nj :
1: if (ni == destination)&(|TempPath| _ |Path|) then
2: Path = TempPath
3: Send RRP(Destination, Source, Path)
4: Return
5: end if
6: if RDP not seen before then
7: if RS(ni) = RS(nj) then
8: Add RS(ni) to TempPath
9: end if
10: Set timer = _ _ distance(nj , ni)
11: else
12: if RS(ni) == RS(nj) then
13: Cancel timer /_ nj is a better broadcast node_/
14: end if
15: end if
Upon timeout
16: Broadcast RDP(Source, Destination, TempPath)
Upon receiving RRP(Destination, Source, Path) from nj :
17: if ni == Destination then
18: Store Path
19: Forward Data(Path)
20: else
21: Forward RRP(Destination, Source, Path)
22: end if

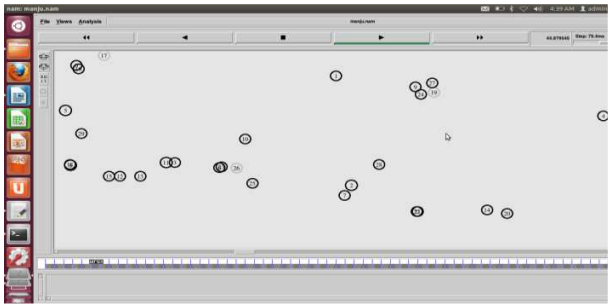

Fig: Implementation1

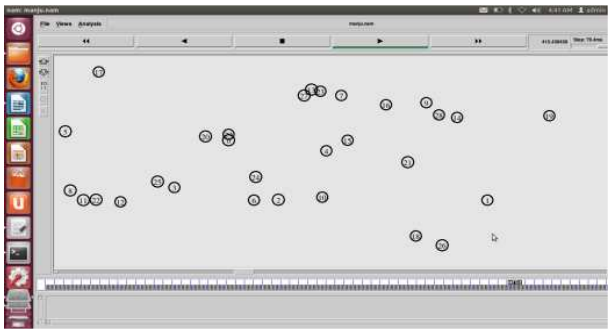

Fig: Implementation2

Conclusion

In this proposed work we defined the vehicle moved in a road area. The area is city area with one lane and 2 lane roads. There also exist the concept of traffic light, traffic and the congestion. The vehicle will perform a automatic route finding by taking the observation of surrounding traffic, external interference and the traffic light. The vehicle will search their path by using effective shortest path routing.

Future Work

In this proposed work we are working with single geographical area with a defined protocol. We can enhance our work by dynamic selection of the geographical area and the intelligent selection of appropriate protocol to work on it. The selection of the protocol and the geographical area can be dynamic and intelligent

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