An Advanced Traffic Assistance System for Warning Message Dissemination in VANET

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ABSTRACT

This novel concept of advanced traffic assistance systems (ATAS) with the assistance of automated traffic profile warning messages that was controlled by this proposed system. It includes the device that is not only already in abundance but portable enough as well to be one of the most effective multipurpose devices that are able to analyze and advise on safety conditions. Mobile smart phones today are equipped with numerous sensors that can help to aid in safety enhancements for drivers on the road.This model presents an adaptive algorithm ATAS designed to improve the warning message dissemination process. With respect to previous proposals, this proposed scheme uses a mapping technique based on adapting the dissemination strategy according to the characteristics of the street area where the vehicles are moving. It includes the reported a noticeable improvement in the performance of alert dissemination processes in simulated scenarios based on real city maps.

Keywords: Vehicular ad hoc networks, road maps, data uplink, downlink.

1. INTRODUCTION

Vehicular ad hoc networks (VANETs) are wireless networks that do not require any fixed infrastructure. These networks are considered essential for cooperative driving among cars on the road. VANETs are characterized by: (a) a constrained but highly variable network topology, (b) a great number of nodes with very specific speed patterns, (c) variable communication conditions (e.g., signal transmissions can be blocked by buildings), (d) road-constrained mobility patterns, and (d) no significant power constraints. Such features make standard networking protocols inefficient or unusable in VANETs; hence, there is a growing effort in the development of specific communication protocols and methodologies for vehicular networks. The development of VANETs is backed by strong economical interests since vehicle-to-vehicle (V2V) communication allows the sharing of wireless channels for mobile applications, thereby increasing the passengers' comfort, improving route planning, controlling traffic congestion, and improving traffic safety.In this work we focus on efficient warning message dissemination to be used in traffic safety applications. The main goal is to reduce the latency and to increase the accuracy of the information received by nearby vehicles when a dangerous situation occurs.In a VANET, any vehicle detecting an abnormal situation (i.e. accident, slippery road, etc.) should notify the anomaly to nearby vehicles that could face this problem in a short period.

2. RELATED WORK

Broadcast Storm problem [2] describes that the Counter-based scheme uses a counter to keep track of the number of times the broadcast message is received, inhibiting rebroadcast when it exceeds a threshold. When a host tries to rebroadcast a message, the rebroadcast message may be blocked by busy medium, backoff procedure, and other queued messages. There is a chance for the host to hear the same message again and again from other rebroadcasting hosts before the host actually starts transmitting the message. The Distance-based scheme calculates the distance between the sender and the receiver and only allows retransmission when the additional coverage area is large enough. The Location based scheme is similar to the previous one, though requiring more precise locations for the broadcasting vehicles to achieve an accurate geometrical estimation (with convex polygons) of the additional coverage of a warning message. If location information is available through devices such as GPS receivers, the location-based scheme is the best choice because the scheme can eliminate even more redundant rebroadcasts under all kinds of host distributions without compromising the reachability.

Forwarding mechanism for data dissemination [7] describes that the adaptive mechanism which uses a dynamic backfire algorithm, we have even better PDR, because the mechanism adjusts the area within which the forwarders have to be refrained from sending a particular message based on the density of neighbours.In the proposed adaptive mechanisms the refraining percentage becomes more for high density scenarios, because higher number of nodes are refrained from transmitting the same message and thus the number of messages that are put into the packet decreases.For active safety applications, freshness of the messages are considered as an important performance parameter. In our scenario, any location based routing protocol will need to have a fresher location information of a node in order to perform a more accurate location based routing. This algorithm exploits the density of nodes on the network for its functionality and will make an adaptive sector under which the redundant nodes will be refrained from sending the same message. The area of the sector for a particular node will be proportional to the density of its neighbors that are within the node's communication range.The proposal assumes that the nodes in the VANET are aware of their surroundings up to a certain area by periodic exchange of location information from each of the nodes. The mechanism will enable routing algorithms and/or beaconing systems to consume lesser bandwidth and thereby enhance the efficiency of the algorithm itself.

Impact of radio propogation on VANET [8] describes that signal attenuation due to the distance between vehicles as close as possible to reality. In general, ns-2 offers deterministic RPM, the function used determines the maximum distance a packet could reach. If the receiver is within this range, the packet will be successfully received otherwise, it will be lost. In order to increase realism, probabilistic approach is used to model packet losses due to collisions or other situations. So, probability density function is used in this is to determine the probability of a packet being successfully received at any given distance.The behavior in terms of percentage of blind vehicles and the number of packets received also highly depends on this factor. In fact, when simulating New York, the percentage of blind vehicles is almost negligible, while we find 60.92% of blind vehicles when simulating Rome when the simulated layout is more complex, the percentage of blind vehicles increases, and more time is needed to reach the same percentage of vehicles. This occurs mainly because the signal propagation is blocked by buildings. The main objective that a realistic visibility scheme should accomplish is to determine if there are obstacles between the sender and the receiver which may interfere with the radio signal. In most cases, when using the 5.9 GHz frequency band(used by the 802.11p standard), buildings absorb radio waves and so communication is not possible.

Real time distributed mac protocol[10] describes that the Cross Layer Broadcast Protocol (CLBP) [7]uses a metric based on channel condition, geographical locations and velocities of vehicles to select an appropriate relaying vehicle.This scheme also supports reliable transmissions exchanging Broadcast Request To Send (BRTS) and Broadcast Clear To Send (BCTS) frames. CLBP reduces the transmission delay but it is only conceived for single-direction environments (likehighway scenarios), and its performance in urban environments has not been tested.

Pattern recognition approach for driving[15] discussed that presented a pattern recognition approach to characterize drivers based on their skill level .Skill level was formed as a basic low, medium, or expert level, or a simple 1-to-10 number scale. Using a high-end vehicle simulator, they compare driver behavior such as steering control, lane changes, and traffic levels with an expert driver to help with category resolution. Learning and classification algorithms are then used to predict the driver's overall skill level freely available online, which provide an unbiased comparison of different network carriers and aid consumers in selecting carriers. In this paper, we are interested in personalized bandwidth maps, which store historical bandwidth measurements of individual mobile users that are relevant to their mobility patterns. It seeks to capitalize on the bandwidth information provided by such maps for improving the QoS experienced by mobile Internet applications that are run from moving vehicles. Several empirical studies have investigated the WWAN bandwidth performance in a vehicular scenario. **.** A common observation is that the WWAN bandwidth deteriorates significantly under vehicular mobility as compared to a stationary environment. The goal of our measurement campaign is different from these prior studies.

3. PROPOSED SYSTEM

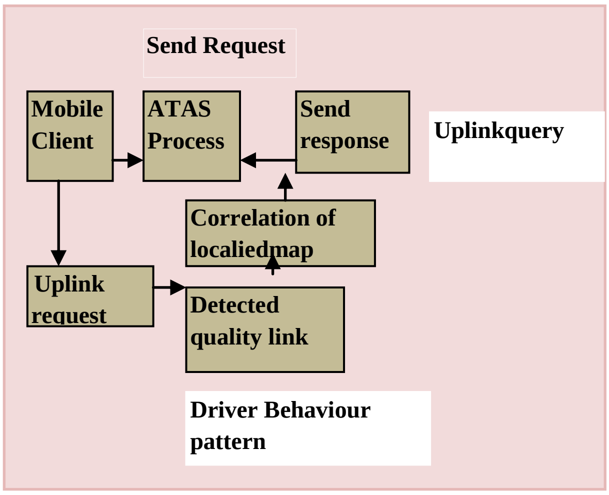
The proposed scheme presents an adaptive algorithm Advanced Traffic Assistance System (ATAS)designed to improve the warning message dissemination process. With respect to previous proposals, this proposed scheme uses a mapping technique based on adapting the dissemination strategy according to the characteristics of the street area where the vehicles are moving. It includes the reported a noticeable improvement in the performance of alert dissemination processes in simulated scenarios based on real city maps.There are three modes used full,standard and reduced performance mode.

4. ATAS DESIGN

4.1 ATAS algorithm

Step 1: Warining node Base ⟶ VANET Receiver
Send multicast–RTS
Step2: VANET Receivers ⟶ Base
If RTS received Successfully then Set BPSK Symbol 1
else
Set BPSK Symbol -1
Step3: Build VANET Symbol
Step4: Attach the VANET Symbol at the end of Send CTS Pkt.
Step5: Send new CTS packet
Step 6: Base ⟶ VANET Receivers
If BPSK Symbol is 1 then
Send multicast–DATA
Else Resend RTS
Step7: Receivers ⟶ Base
If Multicast DATA received Successfully then
Set BPSK Symbol 1
else
Set BPSK Symbol -1
Step8: Build VANET Symbol
Step9: Attach the Preamble in Front of Warning MSG symbol
Step10: Send new warning msg packet
Step11: Base ⟶ VANETReceivers
If BPSK Symbol is 1 then
Send next Multicast DATA
else Resend same DATA

4.2 ATAS Architechture



4.3 ATAS mechanism

4.3.1 *Adaptive mobile network setup*

This module carry out the process of setup the entire simulation mobile network setup by developed a simple client-server measurement system using off-the-shelf hardware. It is developed a lightweight packet-train program to measure the WWAN bandwidth, which achieves fast convergence and generates minimal network traffic for further details about the program and validations and collected one bandwidth sample for approximately every 200 m section of the route (by adjusting the sampling interval according to the vehicle speed as reported by the GPS). The samples are tagged with location coordinates and time, and stored in a repository. On occasions, some packets in the train were lost, leading to some missing samples. To deal with these missing samples, we used 500 m as the smallest location granularity (note that, no two successive samples were missing in our data). Thus, the bandwidth for a segment is represented by the average of all samples collected within system. To draw meaningful conclusions, it needs to ensure that the samples collected are sufficient to estimate the actual bandwidth characteristics at each location. In our measurements, each trip only yields one bandwidth sample for each location along a route. Collecting a large number of samples requires making repeated trips along the selected routes. However, conducting such measurements involves significant monetary cost (fuel, mobile bandwidth), manpower, and time.

4.3.2 *Driver Behaviour Pattern*

The main objective of this module is perform the search operations of mid network node data necessary to complete a request is too large to store at the history of drivers behavior patterns. In Mobile Augmented Reality applications, it is infeasible to store even part of the large database required. In the applications consider that the request must be transmitted uplink to an Application Server to detect the nearby bandwidth with the help of localized map application. it is to determine if historical bandwidth measurements can be helpful for future trips.

4.3.3 Correlated Atas Implementation

This modules is used to correlate the location is how it is very handy to achieve the high level of bandwidth. It has been reported that WWAN bandwidth fluctuates in both time and space in a stationary environment. So first investigate if similar observations can be confirmed in mobile patterns environments by analyzing our empirical bandwidth traces. To begin with the study of impact of location on bandwidth it computes the average bandwidth at each location, assuming 500 m as the location granularity. As a representative example, plots the average bandwidth for each location (loc. avg) along the inbound route for provider. Note that, we observe similar results (omitted for brevity) for the outbound route and other providers .Another observation is that the bandwidth conditions between consecutive locations can vary significantly (e.g., location #8 and #9). This highlights the fact that a fast-moving vehicle can experience drastic changes in bandwidth than any other vehicular model.

5. EXPERIMENTS AND RESULTS

This prototype experimental setup has been shown better quality of service by analyze the mobile user emergency pattern design can be interfaced with adaptive multimedia servers and the emerging vehicular communication systems using android based application that use onboard mobile routers to deliver Internet services to the drivers. Using simulation experiments driven by our measurement data. The waiting time will be displayed to the user. We are interested in the following performance metrics: (a)warning notification time, (b) percentage of blind vehicles, and (c) number of packets received per vehicle. The warning notification time is the time required by normal vehicles to receive a warning message sent by a warning mode vehicle.Moreover, it is very important to reduce the amount of messages generated when the density of vehicles is high, but with low densities it is a good idea to produce enough messages to reach as many vehicles as possible, as the probability of broadcast storms becomes small.The scenario used in our simulation is:

FIGURE 2 SHOW GOOGLE MAP ROADVIEW

TABLE 1

PARAMETER VALUES USED FOR OUR SIMULATION

PARAMETER	**VALUE**
Number of vehicles	100
Simulation area	23m/s≈ 83 *km/h*
Maximum speed of vehicles	2000*m* × 2000*m*
Warning message size	256*B*
Number of warning mode vehicles	3
Warning message priority	*AC*1
Maximum transmission range	400*m*

These parameters are processed in three modes full performance, standard performance and reduced performance mode. If the vehicle density is less than 25 mean it will be in reduced performance mode .if the vehicle density is greater than 75 mean it will be in standard performance mode. The result obtained by using ATAS algorithm.

TABLE 2

AVERAGE NUMBER OF MESSAGES RECEIVED PER VEHICLE WITH THE DIFFERENT WORKING MODES SIMULATING 100 VEHICLES BY USING OUR PROPOSED SCHEME

MAP	REDUCED MODE	STANDARD MODE	FULL MODE
Trichy	**160**	**199.99**	**567.89**
Kk nagar	**234.76**	**456.74**	**745.33**

6. CONCLUSION

This proposed design for ATAS using mobile smart phone have demonstrated with some innovative applications that are integrated inside an automobile to evaluate a vehicle's condition, such as gear shifts and overall road conditions, including bumps, potholes, rough road, uneven road, and smooth road. The road classification system resulted in high accuracy, making it possible to conclude on the state of a particular road. Along with these findings, an analysis of a driver behavior for safe and sudden maneuvers, such as vehicle accelerations and lane changes, has been identified, which can advise drivers who are unaware of the risks they are potentially creating for themselves and neighboring vehicles. The direction of lane change, as well as safe acceleration, compared with sudden acceleration, was easily distinguishable. In future the model ATAS will be further improved with the ready to use compact kit that can be installed in the any type of cars that support the different mobile OS (Windows, Simbiyan, Android, ioS) etc. Being fueled by demand, future advancements in embedded hardware will yield the smart phone and its sensors to be more powerful devices in terms of processing, sensitivity, and accuracy, paving the way for many more innovative applications. Unlocking its potential in intelligent transportation systems seems only logical as there are conceivably numerous of applications that can help reduce safety concerns on the road.

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