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Speed Control Of Vehicles According To Road Speed By Service Provider

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***Abstract*—It is the duty of the driver to have enough distance to slow down and break safely to prevent an accident. If a driver fails to do so, it will result in an accident. Normally accidents happening in roads is mainly due to the over speeding of vehicles even in the slow zone areas**

The development of new vehicular technologies has favored companies, researchers and institutions to focus their e orts on prevention of such accidents. During the last decades, the evolution of wire-less technologies has allowed researchers to design communication systems where vehicles participate in the communication networks. Thus, new types of networks, such as Vehicular Ad Hoc Networks (VANETs), have been created to facilitate communication between vehicles themselves and between vehicles and infrastructure.

The main aim of the project is, the service provider has to guide the vehicles to vary the speed limit in the different zones of the city. So that control on speed of vehicles can be achieved which helps in the prevention of accidents in the slow zone areas like schools, colleges and hospitals thereby saving many lives.

The goal of my framework is the base station has to send the message to the vehicles to reduce the speed when the vehicle enters the low speed zone. Hence the driver is informed much before he enters the low speed zone and the speed can be controlled.It helps in saving many lives of many people who are walking in the low speed zones like schools, hospitals and junctions in highways. Goal of my framework is to use VANETs for this process which will allow vehicles within a certain range of the Base station to immediately receive an alert from the base station for the reduction of speed that could prevent them from accidents.

1.INTRODUCTION

Road fatalities are a major concern in the developed world. Recent studies show that a third of the number of fatal or serious accidents are associated with excessive or inappropriate speed, as well as changes in the roadway (like the presence of road-work or unexpected obstacles). Reduction of the number of accidents and mitigation of their consequences are a big concern for track authorities, the automotive industry and transport research groups. One important line of action consists in the use of advanced driver assistance systems, which are acoustic, haptic or visual signals produced by the vehicle itself to communicate to the driver the possibility of a collision. These systems are somewhat available in commercial vehicles today, and future trends indicate that higher safety will be achieved by automatic driving controls and a growing number of sensors both on the road infrastructure and the vehicle itself.

A prime example of driver assistance systems is cruise control, which has the capability of maintaining a constant user predefined speed, and its evolution, the adaptive cruise control, which adds to CC the capability of keeping a safe distance from the preceding vehicle. A drawback of these systems is that they are not independently capable of distinguishing between straight and curved parts of the road, where the speed has to be lowered to avoid accidents. However, curve warning systems, have been recently developed that use a combination of global positioning systems (GPS) and digital maps obtained from a Geographical Information System, to assess threat levels for a driver approaching a curve too quickly likewise, intelligent speed assistance systems warn the driver when the vehicles velocity is inappropriate, using GPS in combination with a digital road map containing information about the speed limits.

However useful, these systems are inoperative in case of unexpected road circumstances (like road-work, road diversions, accidents, etc.), which would need the use of dynamically-generated digital maps. The functionality described above is implemented as follows rst the detector placed at the road side or on the road identities the vehicle that is entering the low speed zones. After identifying the vehicle that is entering the low speed zone the detector sends the message to the nearest base station regarding the entry of vehicle. The base station then sends the message to the vehicle to reduce the speed. Like this the base station guides the vehicle much before it is entering the low speed zone thus the vehicle can reduce the speed and move with the low speed .Hence it helps in prevention of accidents in low speed zones.

2.MANETS AND VANETS

2.1 Mobile Ad-Hoc Network (MANET)

Mobile Ad-Hoc Network (MANET) is a wireless technology where all nodes are one level topology and can communicate directly with each other through a single hop or multi-hop without the need of centralized nodes. The crucial usefulness of this technology arises when it is required to build a network with a very fast deployment time and when is di cult to have static centralized nodes such in cases of battle ends, forests or in natural catastrophes.

Before discussing why Ad-Hocus the preferred topology for vehicular networks, it is suitable to mention other forms of MANET that took much research e orts with a wide range of remarkable applications. These forms are Wireless Sensor Networks and Wireless Mesh Networks. Distinguishable characteristics of VANETs will be highlighted based on this brief introduction.

In wireless sensor networks a large set of sensors are thrown randomly in a large area using an air-plane or any other throwing sort. Each sensor is only of a coin size and equipped with a transceiver, small battery and any of temperature, vibration, light or humidity sensors and even a microphone or camera. In circumstances where mobile telephony awe know it is not possible or di cult, perhaps internet technology can be of help. The dependency on a costly telecommunication infrastructure could thereby be decreased, which would be quite welcome considering the current situation in the telecom world.

The technology that is to make this possible is MANET, or Mobile Ad hoc Networking. Mobile Ad Hoc Networks (MANETs) are wireless mobile nodes that cooperatively form a network with-out infrastructure. Because there is no coordination configuration prior to setup of a MANET, there are several challenges which include: routing packets in an environment where the topology is changing frequently, wireless communications issues, and resource issues such as limited power and storage. The leading way to research solutions to these’d cult MANET challenges is simulation. In a MANET, the quality or even availability of a mobile connection strongly relies on the position of the receiver relative to the end of other antennas.

We can think of such a network like a honeycomb, where every antenna covers one of the cells. Almost by definition, a network like that has weak spots once it is built, because in the real world it has to coexist with geographical hindrances as forests, roads and rivers. In some areas it is not even realistic to try to build such a network, if only because it is impossible to supply the required amount of energy to the antennas (not to mention the uplink to the telecom infrastructure). Even satellite telephony - though very useful in certain situations - is not the definite answer to this problem, as the capacity is limited and there are situations (for instance underground or up in the air) where the phone cannot see the satellite.

Here we come to the point where we can learn a number of things from the internet: when two computers are communicating with each other on the internet, neither one is more important than the other. Well, in a cellular network the phone is subservient to the network: even if two phones are used right next to each other, any connection they make is always via the network and the end antennas and, yet, a mobile phone is as much a broadcast device as it is a receiver (we can talk and listen at the same time).

A second useful attribute is the aspect of edibility of the connections for information owes: nodes on the internet (routers) continually learn what connections other nodes are available. With a mobile network perhaps this information exchange should happen at a higher frequency because the individual nodes are free to move, and the availability of connections would therefore vary faster, but the method is still valid.

Now we should get a reasonably good idea of how MANET will eventually be used: mobile devices that form a peer-to-peer network for the exchange of data, or channel through speech or data to the telecom network when there is no other route available.

2.2 Vehicular Ad-hoc Network (VANET)

Furthermore, this technology could generate interesting new business models, because the end users could under certain conditions bypass commercial networks (as when you are standing next to each other). For le sharing and other peer-to-peer services MANET can surely add something to the possibilities of the currently available technologies such as 3G . Obviously, MANET itself as a technology is still young and its nil impact strongly relies on the way in which both the world of telecommunications and the hardware suppliers will act on its appearance on the scene. The basic concept of VANET is straightforward: take the widely adopted and inexpensive wireless local area network (WLAN) technology that connects notebook computers to each other and the Internet, and, with a few tweaks, install it on vehicles.

If vehicles can directly communicate with each other and with infrastructure, an entirely new paradigm for vehicle safety applications can be created. Even other non-safety applications can greatly enhance road and vehicle efficiency. New challenges are created by high vehicle speeds and highly dynamic operating environments. New requirements, required by new safety-of-life applications, include new expectations for high packet delivery rates and low packet latency. Further, customer acceptance and governmental oversight bring very high expectations of privacy and security.

Even today, vehicles generate and analyze large amounts of data, although typically this data is self-contained within a single vehicle and with a VANET, the horizon of awareness for the vehicle or driver drastically increase. Communication in

VANET scan be either done directly between vehicles as one-hop communication, or vehicles can retransmit messages, thereby enabling the so called multichip communication. In order to increase coverage or robustness of communication, relays at the roadside can be deployed. Roadside infrastructure can also be used as a gateway to the Internet and, thus, data and context information can be collected, stored and processed somewhere.

It warrants repeating that the interest in vehicular inter-networks is strongly motivated by the wealth of applications that could be enabled. First of all, active safety applications, i.e., accident prevention applications, would bene t from this most direct form of communication. Second, by collecting track status data from a wider area, track could be improved, travel times could be reduced as well as emissions from the vehicles. As it was concisely stated as the rule of the Intelligent Transportation System World Congress in 2008: save time, save lives.

The application classes Safety and Efficiency can be used to classify applications based on their primary purpose . However, the aspects of safety and efficiency cannot be seen as completely disjoint sets of features. Obviously, vehicle crashes can lead to track jams. A message reporting an accident can be seen as a safety message from the perspective of near-by vehicles. The same message can be seen by further-away vehicles as an input to calculate an alternative route within a transport efficiency application. While being conceptually straightforward, design and deployment of VANET is a technically and economically challenging endeavor. The key technical challenges include the following issues:

Inherent characteristics of the radio channel. VANET present scenarios with unfavorable characteristics for developing wireless communications, i.e., multiple rejecting objects able to degrade the strength and quality of the received signal. Additionally, owing to the mobility of the surrounding objects and/or the sender and receiver themselves, fading effects have to be taken into account.

Lack of an online centralized management and coordination entity. The fair and efficient use of the available bandwidth of the wireless channel is a hard task in a totally decentralized and self-organizing network. The lack of an entity, able to synchronize and manage the transmission events of the different nodes might result in a less efficient usage of the channel and in a large number of packet collisions. High mobility, scalability requirements, and the wide variety of environmental conditions. The challenges of a decentralized self-organizing network are particularly stressed by the high speeds that nodes in VANET can experience. Their high mobility presents a challenge to most iterative optimization algorithms aimed at making better use of the channel bandwidth or the use of predefined routes to forward information.

Security and privacy. There is a challenge in balancing security and privacy needs. On the one hand, the receivers want to make sure that they can trust the source of information. On the other hand, the availability of such trust might contradict the privacy requirements of a sender. Standardization versus edibility. Without any doubt, there is a need for standardizing communications to allow VANET to work across the various makes and brands of original equipment manufacturers (OEMs). Yet, it is likely that OEMs will want to create some product differentiation with their VANET assets. These goals are somewhat in tension. From an application and socio-economic perspective, key challenges are as follows:
Analyzing and quantifying the bene t of VANET for track safety and transport efficiency. So far, relatively little work has been done to assess the impact of VANET as a new source of information on driving behavior. Clearly, the associated challenge in addressing the issue of impact assessment is the modeling of the related human factor aspects.
Analyzing and quantifying the cost/bene t relationship of VANET. Because of the lack of studies on the benefits of VANET, a cost/bene t analysis can hardly be done.
Designing deployment strategies for this type of VANET that are not based on a single infrastructure and/or service provider. Owing to the network effect, there is the challenge of convincing early adopters to buy VANET equipment when they will rarely a communication partner.

Embedding VANET in intelligent transportation systems architectures. VANET will be a part of an intelligent transportation system where other elements are given by track light control or variable message signs. Also public and individual transportation have to be taken into account in a joint fashion. Therefore, truly cooperative systems need to be developed. As can be seen from the above lists of technical, application, and socio-economic aspects, the eld of vehicular application and inter-networking technologies is based on an interdisciplinary e ort in the cross section of communication and networking, automotive electronics, road operation and management, and information and service provisioning. VANET can therefore be seen as a vital part of Intelligent Transportation Systems (ITS).

3.ROUTING PROTOCOLS UNDER STUDY

3.1 Ad-hoc On-demand Distance Vector

AODV can be called a pure on-demand route acquisition system; nodes that do not lie on active paths neither maintain any routing information nor participate in any periodic routing table exchanges. Further, a node does not have to discover and maintain a route to another node until the two need to communicate, unless the former node is o ering its services as an intermediate forwarding station to maintain connectivity between two other nodes. When the local connectivity of the mobile node is of interest, each mobile node can become aware of the other nodes in its neighborhood by the use of several techniques, including local (not system-wide) broadcasts known as hello messages. The routing tables of the nodes within the neighborhood are organized to optimize response time to local movements and provide quick response time for requests for establishment of new routes. The algorithms primary objectives are:

To broadcast discovery packets only when necessary

To distinguish between local connectivity management (neighborhood detection) and general topology maintenance

To disseminate information about changes in local connectivity to those neighboring mobile nodes that is likely to need the information.

AODV uses a broadcast route discovery mechanism, as is also used (with modifications) in the Dynamic Source Routing (DSR) algorithm. Instead of source routing, however, AODV relies on dynamically establishing route table entries at intermediate nodes. This difference pays o in net-works with many nodes, where a larger overhead is incurred by carrying source routes in each data packet. To maintain the most recent routing information between nodes, the concept of destination sequence numbers from DSDV is borrowed. Unlike in DSDV, however, each ad-hoc node maintains a monotonically increasing sequence number counter which is used to supersede stale cached routes. The combination of these techniques yields an algorithm that uses bandwidth efficiently (by minimizing the network load for control and data track), is responsive to changes in topology, and ensures loop-free routing.

3.1.1 Path Discovery:

The Path Discovery process is initiated whenever a source node needs to communicate with an- other node for which it has no routing information in its table. Every node maintains two separate counters: a node sequence number and a broadcast id. The source node initiates path discovery by broadcasting a route request (R.REQ) packet to its neighbors. The RREQ contains the following fields: source, sources sequence, broadcasted, dastard, data sequence .EQ Destination IP address. Source IP address Broadcast id. Expiration time for reverse path route entry Also Source nodes sequence number.

There are two sequence numbers (in addition to the broadcast id) included in a RREQ: the source sequence number and the last estimation sequence number known to the source. The source sequence number is used to maintain freshness information about the reverse route to the source, and the destination sequence number specie how fresh a route to the destination must be before it can be accepted by the source. As the RREQ travels from a source to various destinations, it automatically sets up the reverse path from all nodes back to the source, as illustrated . To set up a reverse path, a node records the address of the neighbor from which it received the rst copy of the RREQ. These reverse path route entries are maintained for at least enough time for the RREQ to traverse the network and produce a reply to the sender.

3.1.2 Forward Path Setup:

Eventually, a RREQ will arrive at a node (possibly the destination itself) that possesses a current route to the destination. The receiving node rst checks that the RREQ was received over a bi-directional link. If an intermediate node has a route entry for the desired destination, it determines whether the route is current by comparing the destination sequence number in its own route entry to the destination sequence number in the RREQ. If the RREQs sequence number for the destination is greater than that recorded by the intermediate node, the intermediate node must not use its recorded route to respond to the RREQ. Instead, the intermediate node rebroadcasts the RREQ. The intermediate node can reply only when it has a route with a sequence number that is greater than or equal to that contained in the RREQ. If it does have a current route to the destination, and if the RREQ has not been processed previously, the node then unicasts a route re ply packet (RREP) back to its neighbor from which it received the RREQ. A RREP contains the following information: source addr, desta ddr, dests equence, hopcnt, lif etime > By the time abroad cast packet.

3.1.3 Routing Management Table

In addition to the source and destination sequence numbers, other useful information is also stored in the route table entries, and is called the soft-state associated with the entry. Associated with reverse path routing entries is a timer, called the route request expiration timer. The purpose of this timer is to purge reverse path routing entries from those nodes that do not lie on the path from the source to the destination. The expiration time depends upon the size of the ad-hoc network. Another important parameter associated with routing entries is the route caching timeout, or the time after which the route is considered to be invalid. In each routing table entry, the address of active neighbors through which packets for the given destination are received is also maintained. A neighbor is considered active (for that destination) if it originates or relays at least one packet for that destination within the most recent active timeout period. This information is maintained so that all active source node scan be notified when a link along a path to the destination breaks. A route entry is considered active if it is in use by any active neighbors. The path from a source to a destination, which is followed by packets along active route entries, is called an active path. Note that, as with DSDV, all routes in the route table are tagged with destination sequence numbers, which guarantee that no routing loops can form, even under extreme conditions of out-of-order packet delivery and high node mobility (see Appendix A).A mobile node maintains a route table entry for each destination of interest. Each route table entry contains the following information:

Destination Next Hop Number of hops (metric) Sequence number for the destination Active neighbors for this route

3.1.4 Path Maintenance:

Movement of nodes not lying along an active path does not affect the routing to that paths destination. If the source node moves during an active session, it can reinitiate the route discovery procedure to establish a new route to the destination. When either the destination or some inter-mediate node moves, a special RREP is sent to the affected source nodes. Periodic hello messages can be used to ensure symmetric links, as well as to detect link failures. Alternatively, and with far less latency, such failures could be detected by using link-layer acknowledgments (LLACKS). A link failure is also indicated if attempts to forward a packet to the next hop fail. Once the next hop becomes unreachable, the node upstream of the break propagates an unsolicited RREP with a fresh sequence number (i.e., a sequence number that is one greater than the previously known sequence number) and hop count of to all active upstream neighbors. Those nodes subsequently relay that message to their active neighbors and so on. This process continues until all active source nodes are notified; it terminates because AODV maintains only loop-free routes and there are only a note number of nodes in the ad-hoc network.

Upon receiving notification of a broken link, source nodes can restart the discovery process if they still require a route to the destination. To determine whether a route is still needed, a node may check whether the route has been used recently, as well as inspect upper level protocol control blocks to see whether connections remain open using the indicated destination. if the source node (or any other node along the previous route) decides it would like to rebuild the route to the destination, it sends out an RREQ with a destination sequence number of one greater than the previously known sequence number, to ensure that it builds a new, viable route, and that no nodes reply if they still regard the previous route as valid.

3.1.5 Destination Sequence Distance Vector

Packets are transmitted between the stations of the network by using routing tables which are stored at each station of the network. Each routing table, at each of the stations, lists all available destinations, and the number of hops to each. Each route table entry is tagged with a sequence number which is originated by the destination station. To maintain the consistency of routing tables in a dynamically varying topology, each station periodically transmits updates, and transmits updates immediately when significant new information is available. Since we do not assume that the mobile hosts are maintaining any sort of time synchronization, we also make no assumption about the phase relationship of the update periods between the mobile hosts. These packets indicate which stations are accessible from each station and the number of hops necessary to reach these accessible stat ions, as is often done in distant e-vector routing algorithms. It is not the purpose of this paper to propose any new metrics for route selection other than the freshness of the sequence numbers associated with the route; cost or other metrics might easily replace the number of hops in other implementations. The packets may be transmitted containing either layer 2 (MAC) addresses or layer 3 (network) addresses.

Routing information is advertised by broadcasting or multicasting the packets which are transmitted periodically and incrementally as topological changes are detected for instance, when stations move within the network. Data is also kept about the length of time between arrival of the rst and the arrival of the best route for each particular destination. Based on this data, a decision may be made to delay advertising routes which are about to change soon, thus damping actuations of the route tables. The advertisement of routes which may not have stabilized yet is delayed in order to reduce the number of rebroadcasts of possible route entries that normally arrive with the same sequence number. The DSDV protocol requires each mobile station to advertise, to each of its current neighbors, its own routing table (for instance, by broadcasting its entries). The entries in this list may change fairly dynamically over time, so the advertisement must be made often enough to ensure that every mobile computer can almost always locate every other mobile computer of the collection. In addition, each mobile miner agrees to relay data packets to other computers upon request. This agreement places a premium on the ability to determine the shortest number of hops for a route to a destination; we would like to avoid unnecessarily disturbing mobile hosts if they are in sleep mode. In this way a mobile computer may exchange data with any other mobile computer in the group even if the target of the data is not within range for direct communication. If the notification of which other mobile computers are accessible from any particular computer in the collection is done at layer 2, then DSDV will work with whatever higher layer (e.g., Network Layer) protocol might be in use.

4. PROPOSED WORK

In the proposed work Vanes are used to locate vehicles. The system contains vehicles as mobile nodes, the base stations placed along the roadside and the data base nodes for data storage. The database contains information like the number of vehicles on road, speed of the vehicle and also any event that has happened like an accident etc., in its database.

Each vehicle is considered as a node, and they are constantly communicating with the base station within their range of communication. The Nodes which are placed on the road side are the stationary nodes, which act as detectors detecting the entry of vehicles near low speed zone. These detectors have wireless communication with the Base Station.
If a vehicle comes near the low speed zone, it is detected by the detector. The detector then sends the message to the base station regarding the entry of vehicle in the low speed zone. In response to this the base station sen+ ds the message to the vehicle to reduce the speed.

For communication, the protocol that is used is dsdv, which is Destination-Sequenced Distance-Vector Routing; a sequence number is linked to a destination node, and usually is originated by that node (the owner). The only case that a non-owner node updates a sequence number of a route is when it

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detects a link break on that route. An owner node always uses even-numbers as sequence numbers, and a non-owner node always uses odd-numbers. The above work is implemented as follows, the node acting as the base station sends message to the vehicle using udp protocol. In response to this node acting as base station sends message to the vehicle to reduce the speed, again the base station uses the udp protocol to send message to the vehicle. In this way the base station guides the vehicles when they enter the low speed zones and thus it is very helpful for drivers to drive the vehicles accordingly.

5. SIMULATION RESULTS

Network Simulator, a discrete event simulator was developed in Lawrence Berkeley National Lab-oratory (LBNL), widely used for testing the research results in communication networks. The simulator is supported on LINUX(Ubuntu 12.04) and Windows platforms. Low cost of development and implementation are the main advantage of simulations in comparison to experimental tests in real-time environment. A textual representation of the events occurring during the simulation is written into a trace le. The events are sorted by time in ascending order. Network Animator(nam-1.15) is used for visualization of the simulation output and for graphical configuration of simulation scenarios.

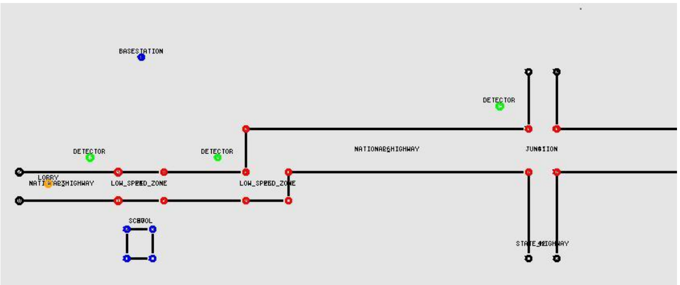

Figure 5.1: VEHICLE MOVING AT HIGH SPEED IN HIGHWAY

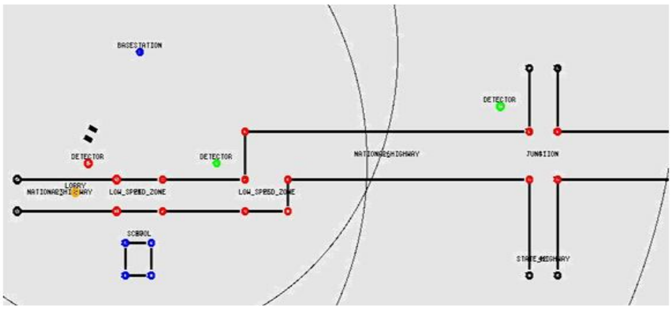

Figure 5.2: DETECTOR SENDING MESSAGE TO BASE STATION AFTER DETECTING VE-HICLE NEAR SCHOOL

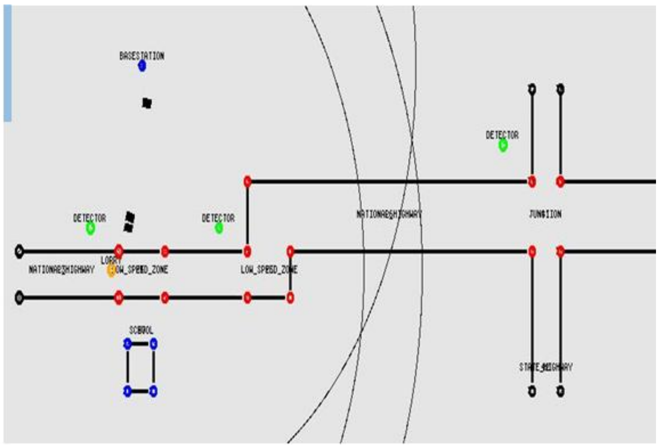

Figure 5.3: BASE STATION SENDING MESSAGE TO THE VEHICLE TO REDUCE SPEED

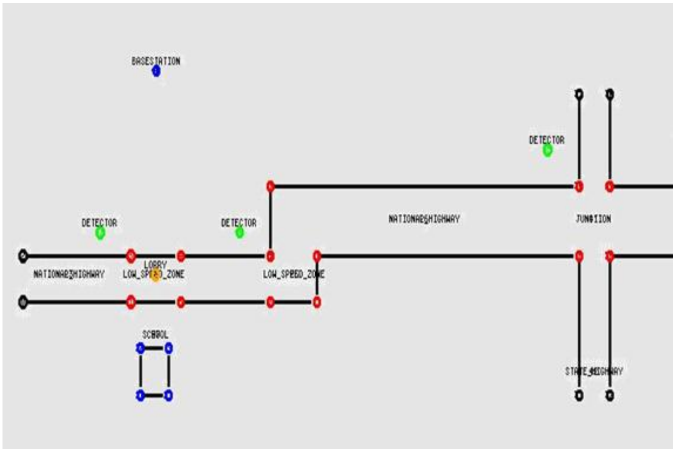

Figure 5.4: VEHICLE MOVING AT LOW SPEED IN LOW SPEED ZONE NEAR SCHOOL

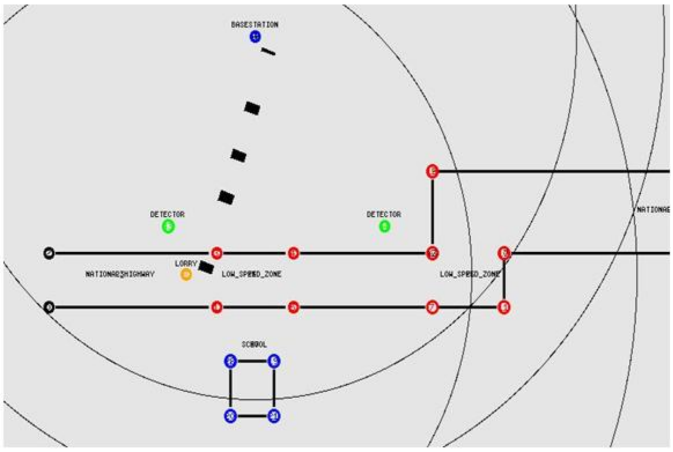

Figure 5.5: DETECTOR SENDING MESSAGE TO BASE STATION REGARDING ENTRY OF VEHICLE IN CURVE

CONCLUSION

In conclusion, the project explored the feasibility of a VANET based Speed control of vehicle system application. Although this simple implementation gave desirable results, a real implementation of this application has several other challenges that need to be addressed.

Since the mobility of vehicles can be very sporadic, connections between them will be constantly changing. Consequently, the physical layer, routing protocol, and topology of the network must be carefully constructed in order to maintain high performance in a constantly changing network. Currently, one IEEE task group is developing the 802.11p revision for wireless access in vehicular environments (WAVE). This revision attempts to provide the minimum set of specifications required in rapidly changing communications environments

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