SECURING ROUTING PROTOCOL IN VANET

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Abstract: Intelligent Transportation Systems (ITS) include a huge applications that aim to use progressive communication and knowledge technologies to reinforce and management the flow of traffic. The ability to speak with cars while movement on the road is crucial to the success of those systems and therefore needs careful finding out. This research aims to study the practicability of deploying wireless communication networks that square measure capable of grouping knowledge from cars additionally as providing them with data regarding this traffic state of affairs. We gift a platform that integrates a traffic simulation, Paramics, and a communication network simulator. The integration of each simulators may be a key answer to many analysis issues both on the communications facet and on the transportation facet. The combined simulator can enable planning and testing ITS Applications, which believe on communication between vehicles, before they are enforced on the streets. We here additionally integrate prime algorithmic program for style of frame work that may offer analysis of facility in time domain that will solve traffic issues additionally offer security from attackers.
Key Words: ITS, Traffic Network, Secure routing protocol, MATLAB, VANET

I. INTRODUCTION

Wireless communication is the transfer of data and information without using wires. When the transmitter or receiver or both are moving during communication, this is called mobile communication. A wireless network is a network that consists of two or more nodes exchanging information wirelessly. A node can be a device or a computer that has a wireless interface and is thus able to send and receive messages through the medium of air. A newly introduced type of wireless network is called a vehicular network. Vehicular networks are wireless communication systems in which the nodes are either collaborating vehicles communicating with each other or vehicles communicating with roadside units. Due to the interdisciplinary nature of these systems, it is necessary to be able to model their behavior from two distinct points of view, the communications perspective and the traffic perspective. In other words, we need to simulate the combined performance of wireless system specifications and traffic conditions. Hence, we need a wireless network simulator, a traffic network simulator and, in addition, we need an interface between the two simulators to allow for their intercommunication and exchange of information as illustrated in Figure below.

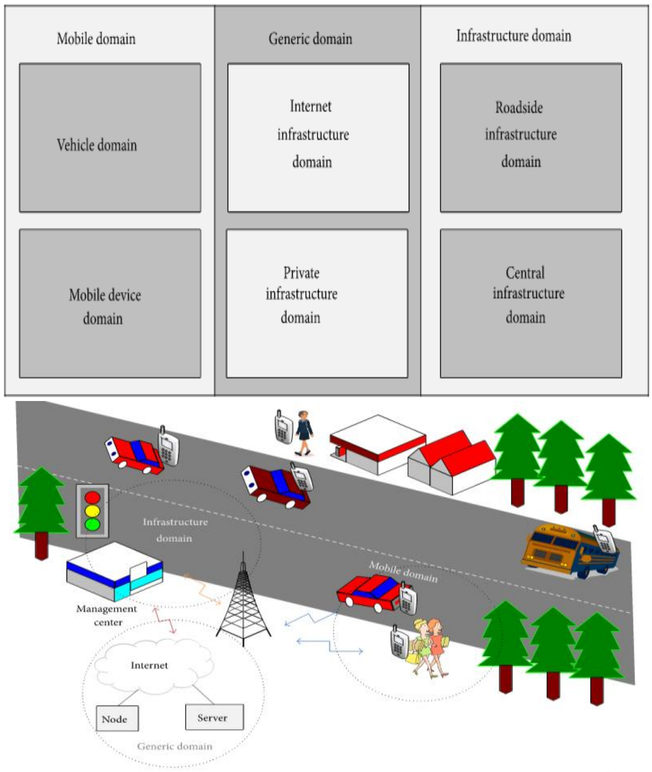

Figure 1 : VANETs system domains. (Both)

II. TRAFFIC NETWORKS

A traffic network, also called a transportation network, is a network of arterial roads and highways that allows for vehicular movement. The flow of vehicles within a transportation network is modeled mathematically by several theories. These theories aim to represent the interaction between vehicles and the network infrastructure such as highways, traffic signs, traffic signals and control and information systems. Besides, some theories also extend the models to include the cognitive behavior of drivers.

2.1 Traffic Flow Modeling:

The objective of modeling traffic flow is to design and manage an optimum traffic network which transports people and goods efficiently. This includes infrastructure design as well as control and information systems design. Similarly, the management includes intersection operations, network operations and performance (highways, arterial streets and whole networks) and Advanced Traffic Management Systems (ATMS). A traffic flow model must prove logical and mathematical consistency and completeness against real transportation performance. Therefore, traffic models must be tested to ensure that they don't contradict essential phenomena and to ensure accuracy and transferability. Traffic flow theory models the free flow of traffic found on freeways or expressways at off-peak times of the day. The three variables that represent traffic are flow, density and speed. The traffic flow (q) is simply the number of vehicles per unit time, the traffic density (ρ) is the number of vehicles per unit length and the speed (v) is the distance covered per unit time which is dependent on flow and density as shown in Equation

$q = \rho . v$ …………………………………………(1)

This spatiotemporal representation can be explained by the steady state fundamental diagram in Figure. The top left diagram shows that, at off-peak times, with ideally zero density, the average speed is equal to the free flow speed (vf).

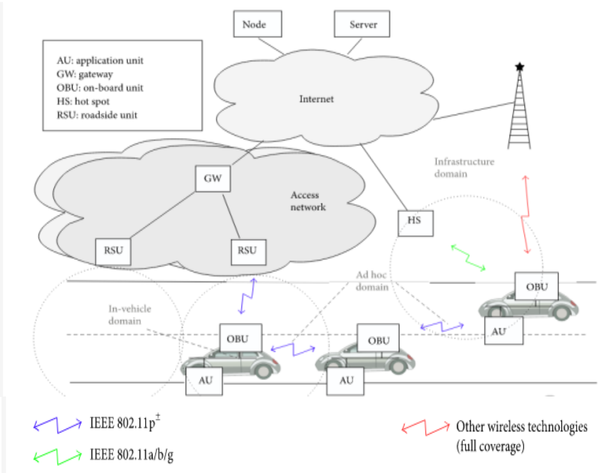

Fig 2: C2C-CC Reference Architecture

As the number of cars per unit length increases, the average speed decreases linearly until it reaches (v0) which represents the point of critical density (ρ0). The bottom left diagram shows that at this critical density (ρ0), the flow reaches its maximum possible value (qm) When the density exceeds its critical value, the flow drops and continues to drop until the jam density (ρj) is reached. At this point, the traffic flow and speed drop to zero and the traffic is stopped (traffic jam). Congestion occurs when the density exceeds the critical density and thus the flow is unstable and the road capacity decreases.

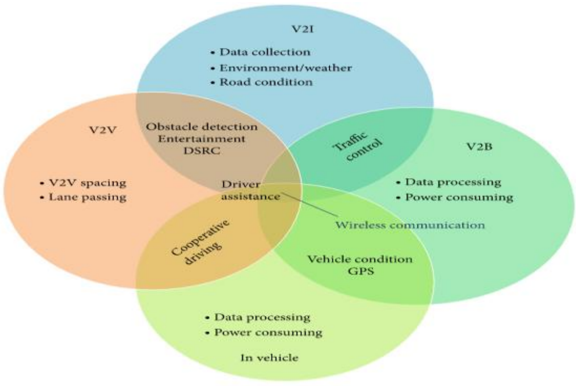

Fig 3: Key Function of each communication type

2.2 Traffic Network Simulation Categories

Simulation models differ according to the level of details being simulated, which depends on the purpose of the simulation. Traffic network simulation programs fall under three main categories, Macroscopic, Mesoscopic and Microscopic Traffic models, running either in a continuous approach or a discretized approach . In addition, the components that make up the simulation can range from a single intersection or freeway to the complete network of a transportation system. The primary difference between these simulation platforms is the method used to represent traffic flow. Generally, macroscopic models represent the traffic at a high level, where platoons of cars are modeled rather than individual cars, while microscopic models are more concerned with the behavior of each vehicle on the network. In a macroscopic simulation, the continuous approach is used to model the flow of cars in bundles, in contrast to a microscopic simulation were the flow is discretized. Mesoscopic simulators fall in between these categories and aim to benefit from the advantages of both worlds, for example it includes a high level of detail like microscopic models and at the same time allows to scale up to large networks like in the macroscopic approach. Mesoscopic simulators are said to have a discretized flow with macroscopic dynamics. Figure shows the classification of traffic simulation models with respect to dynamics and flow

		Dynamics	
		Microscopic	Macroscopic
Flow	Discrete	Microscopic simulation	Mesoscopic simulation
	Continuous	-	Macroscopic simulation

Figure 4: Traffic Simulation Software Classification.

Depending on the field of application and the resolution required, the most suitable simulation platform is selected. For instance, macroscopic simulators are mostly used in traffic planning and traffic flow analysis, while microscopic simulators are used for traffic engineering problems where the behavior of each single vehicle is important or applications where driver behavior is of special interest.

III. WIRELESS NETWORKS

3.1 Wireless Network Modeling

A wireless communication network is a telecommunications network where the end nodes communicating together are not connected by wires. A telecommunications network consists of end nodes communicating together, data processing devices in between these nodes and communication channels connecting the nodes and devices. Wireless communication devices are capable of transmitting and receiving signals through the air (Communication channel).

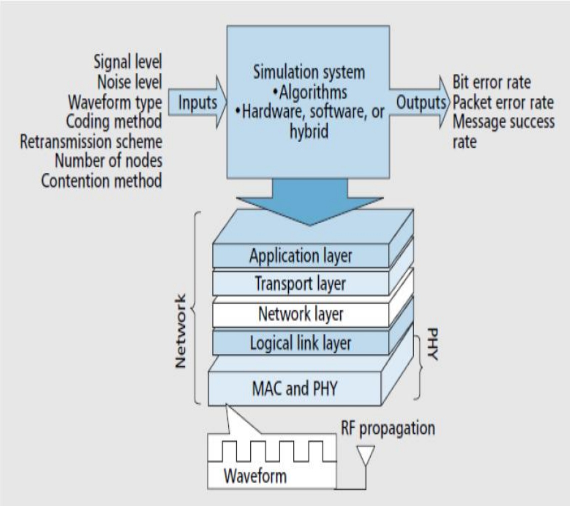

Figure 5: Wireless Network Modeling.

Modeling a wireless network is divided into three main parts: (i) input data such as Signal level, Noise level, etc., (ii) simulation system which replicates the functionalities of the communication devices and (iii) outputs which judge the performance of the network such as bit error rate, packet error rate or message success rate, throughput or any other performance metric. This is shown in Figure Modeling the communication devices and network performance can be broken down into several important elements, as shown below.

3.2 Related Work:

Vehicular networks are a recently proposed class of wireless networks, in which the nodes communicating with each other are either collaborating vehicles or vehicles with roadside units. The information exchanged between these nodes can be either traffic-related information or non-traffic -related information. The former includes information about accidents, route conditions, safety information, or any other type of information that could change driver behavior according to its content. On the other hand, examples of non-traffic-related information include entertainment applications where a driver or a person riding in a moving vehicle wishes to download a video or audio file or to browse the internet while traveling from home to work. Recently, many researchers have been exploring the idea of vehicular internet access. The facility of providing internet access to moving vehicles requires the use of fixed WLAN networks such as 802.11 to support it have studied how handover or roaming is not directly supported by the 802.11 standard in the context of vehicular network access. In the authors developed a "ViFi" protocol which allows mobile stations to be connected to multiple access points at the same time. Their design allows for the support of interactive applications such as voice over IP (VoIP) and web browsing while traveling in the vehicle. Another approach in is to design a session protocol that offers disconnection-tolerant transmission. Their protocol, called Persistent Connectivity Management Protocol, is implemented in a Drive-thru client and server which act as a link between multiple clients and servers, ensuring connection reliability. In the authors propose "iMesh", an 802.11-based protocol that uses mesh routers at 802.11 access points such that a layer-2 handover between APs appears directly in the routing protocol and thus can be thought of as a layer-3 handover. This connection replaces the need for having a wired infrastructure (Distributed System) as in normal 802.11 setups. On the other hand, studied the possibility of using open access points for vehicular network access rather than deploying their own network. This approach assumes that there are multiple open APs in a district which is not completely true. In another ITS application, a system called CarTel is proposed which uses embedded mobile sensors in moving cars to collect data about traffic. This data is then opportunistically sent either through open access points or through other CarTel nodes to a central server for further processing. After processing, this data is available on a web portal for other users interested in knowing data about the traffic in certain districts. However, testing the performance of wireless networking in ITS and traffic applications is not an easy task. Researchers in all the previously mentioned works had to perform many drive tests and often to buy physical hardware equipment so as to validate their work.

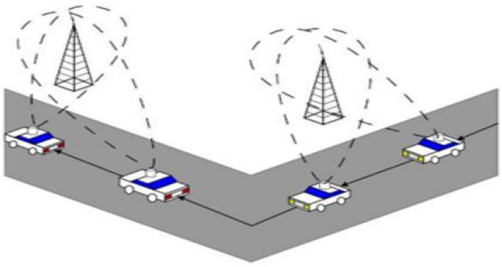

Figure 6: Using Steerable Beam Directional Antenna for Vehicular Network Access

Figure 7: Antenna mounted on top of car to enhance network connectivity

For example, Figure 7 shows an actual antenna mounted on top of the car to validate the theoretical results of the work done in and the authors had to perform several drive tests to get empirical results. Although the cost incurred in a single experiment might not be very high, performing several experiments with different parameters and possibly different hardware would be prohibitively expensive. Alternatively, the option of using wireless network simulators would definitely save time, money and allow for more experiments to be performed and thus the results to be more accurately validated. But, most of these simulators are not capable of modeling actual traffic conditions and therefore their results might be erroneous or misleading. Likewise, all traffic network simulators lack wireless protocol modeling.

3.3 Objective

This research aims to study the feasibility of deploying wireless communication networks that are capable of collecting data from cars as well as providing them with information about the current traffic situation.

IV. SIMULATION

MATLAB (matrix laboratory) is a multi-paradigm numerical computing environment and fourth-generation programming language. A proprietary programming language developed by Matlab that allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages, including C, C++, Java, Fortran and Python.

V. SIMULATION WORK AND RESULT

The proposed work include A* algorithm and improved TEEN algorithm which is simulating on MATLAB and result come out in graphical and numeric as below.

5.1 PARAMETER CONSIDERATION

5.1.1 LEACH

numNodes = 100
Yard.Length = 100;
% default of the yard is 100 in x cordination
Yard.Width = 100;
% default of the yard is 100 in y cordination
Initial Energy Energy.init = 0.5;
NetRound.numRound = 9999;
% default of the maximum round is 9999
NetRound.packetLength = 6400;
% default of the packet length is 6400
5.1.2 a* star
%DEFINE THE ARRAY
MAX_X=10;
MAX_Y=10;
MAX_VAL=1;
5.1.3 Transport
Axis ([0 101 0 101]);
NumOfNodes = 40;
Range = 2;
Breadth = 2;
display_node_numbers = 1;

5.2 Simulation Output from proposed GUI

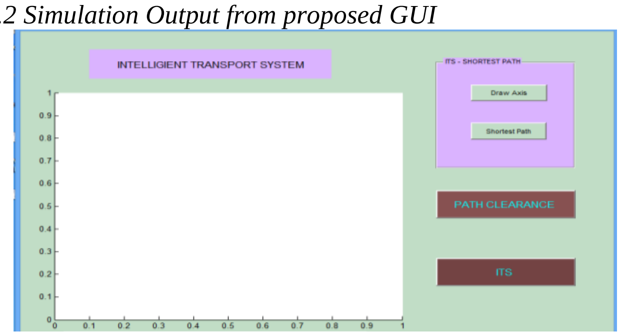

Fig 5.1 First GUI of proposed Simulation

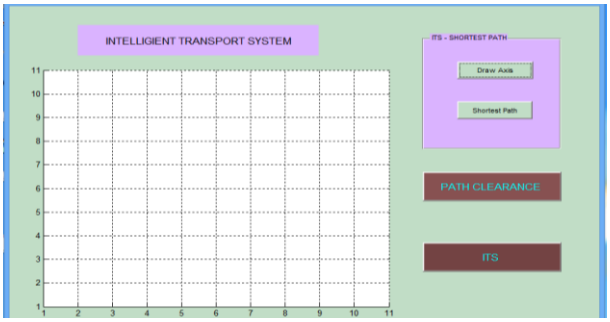

Fig 5.2: Click on Draw Axis Button on GUI

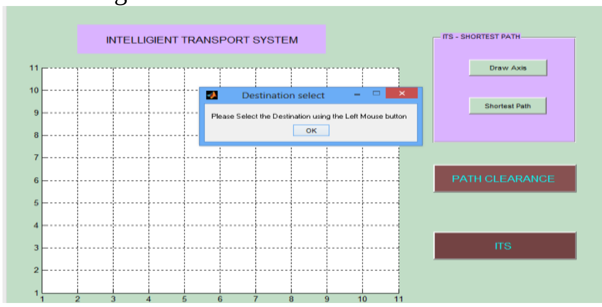

Fig 5.3: A pop up dialogue box come out

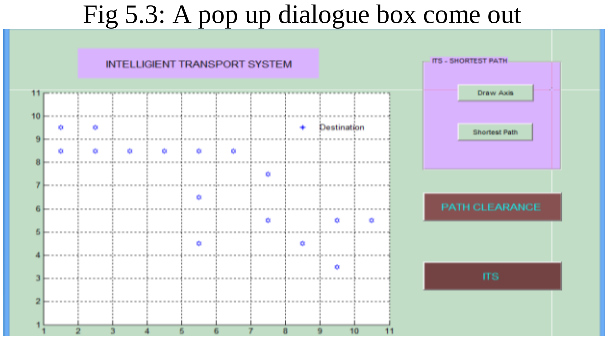

Fig 5.4: Next dialogue box will for obstacle That will tell to select the destination

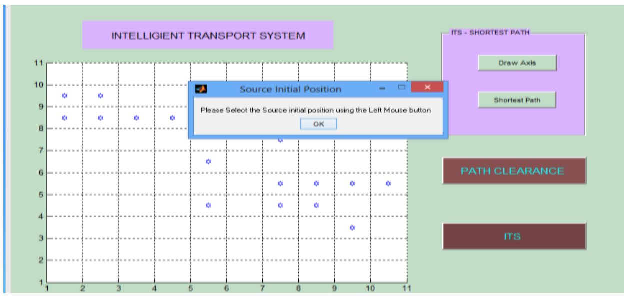

Fig 5.5: This figure shows for selecting the

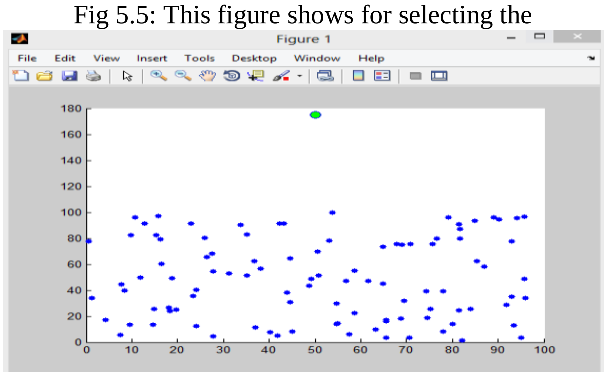

Fig 5.6: WSN node has been randomly placed

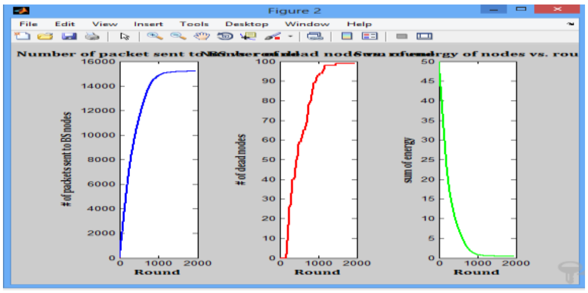

Fig 5.7: Middle phase of simulation showing On Arena Energy vs. round

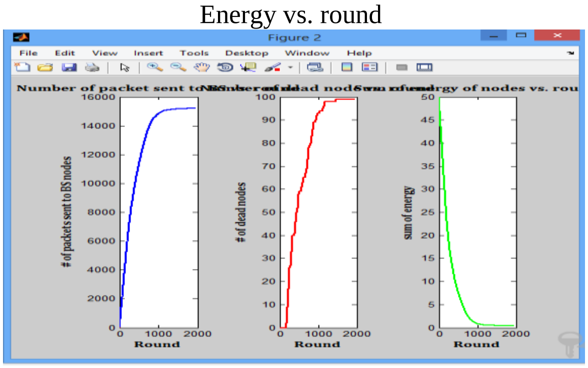

Fig 5.8: Last phase of Simulation energy simulation

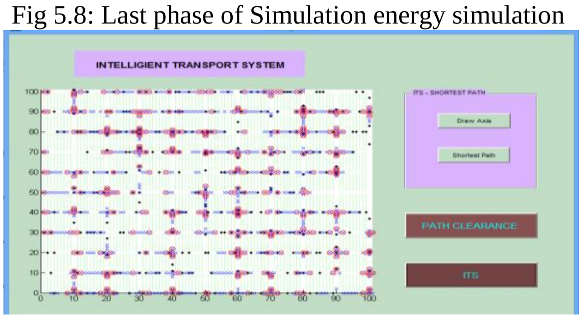

Fig 5.9: Main GUI of transport system, black is node indicating the vehicles, while space is indicating the road.

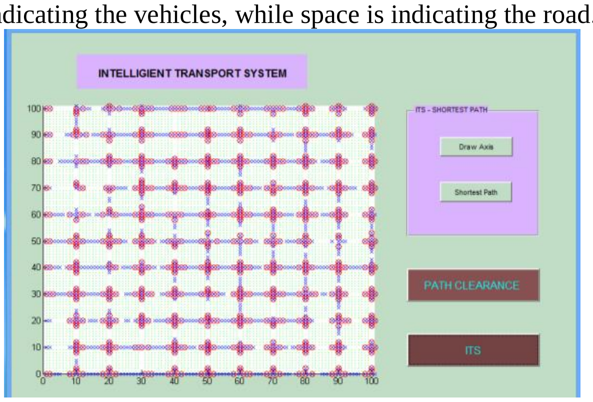

Fig 5.10: Figure shows the all black node has been cleared or out of arena.

5.3 Result

ans =1 Position of optimized point of node: X= 12 Y= 90
ans = 2 Position of optimized point of node: X= 9 Y= 60
ans = 3 Position of optimized point of node: X= 96 Y= 60
ans = 4 Position of optimized point of node: X= 98 Y= 10
ans = 5 Position of optimized point of node: X= 80 Y= 50
ans = 6 Position of optimized point of node: X= 92 Y= 40
ans = 7 IF: X=80 Y=96
ans = 8 Position of optimized point of node: X= 85 Y= 0
ans = 9 Position of optimized point of node: X= 76 Y= 70
.
.
.
.
ans = 399 Position of optimized point of node: X= 73 Y= 10
ans = 400 Position of optimized point of node: X= 40 Y= 90
All nodes are optimized within or outside the arena of WSN. Here it has 400 nodes are being optimized with position of X, Y co-ordinate points on WSN.

VI. CONCLUSION AND FUTURE SCOPE

In this present work a new flexible ITS that in the framework of a research project was tuned to manage the transport and it jamming situations. Owing to the complexity of the proposed system in this research the attention was focused on two aspects of this system: the shortest path module and the LEACH Module. This system proposes an integrated solution to the problem of shortest path among various alternatives and jamming problems. It is able to plan for each vehicle the route that minimizes or, in the worst case reduces, the impact of this kind of transport on humans and environment. The system provides also the instruments to monitor the actual position of each vehicle. Route planning is a very complex problem involving a large number of parameters. In this work, the LEACH algorithm does this work. The adoption of a Integrated paradigm gives a great flexibility and scalability to the system. Future work will be in various place like the deployment in defense purpose and robotics. Various new protocol and algorithm will strengthen the present situation of speed as well more feature capabilities.

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