Advanced Ambulance Emergency Services Using GPS Navigation

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Abstract:- **Now-a-days the number of patients has significantly increased and in emergency case the patients will have to be rushed to the hospital as early as possible so that they can be treated. Due to significant increase in the number of patients, the requirement of ambulance were also increased. Today there are thousand ambulance services running yet to unknown people. Every hospital has its own contact number for the ambulance , even ever private and government service has its own contact number for the ambulance . It become really hectic for a person to find out nearest ambulance in that particular area..**

So we took this opportunity and thought of bringing these Ambulance under one roof. Using of Google map we are going to bring forth will bring all ambulance available in the city under one roof. On a click of a button the patient will get the nearest available ambulance to his service. Even though the patient was unconscious the automatic sensor will send a alert message to nearest hospital and to ambulance.

This paper describe a model to track the nearest free ambulance in the area using global positioning system GPS , the device continuously move with the ambulance and will calculate the co-ordinate of each position to obtain the shortest path to reach the patient with minimal time.

Keywords: **GPS Module, Ambulance, Maps, Tracking, Latitude, Longitude, VANET, NS Tools**

1. INTRODUCTION

To detect emergency case and to send ambulance to the patient so that the patient can reach the hospital with in stipulated time. In the existing system when the hospital or Government sector receives call for an emergency case they will sends ambulance which goes from the hospital to the patient's location and then takes the patient to the hospital, the factors like distance and traffic can affect the time taken by ambulance and in case of emergency anything can be happen even in a small time period. The main aim of this project is to make sure that the patients reaches the hospital as soon as possible.

The main intention of this project is to create a GPS System in which the GPS tracker is set up in the ambulance so that even a common people can keep tracking all the ambulance in the surrounding and in case of an emergency we can fetch a nearest ambulance and directly send to the patient's location. This will help save time. This System is implemented to overcome the drawbacks of the existing system GPS technology is used to help patients to reach the hospital with minimal time using by obtaining of shortest path algorithm.

2. LITERATURE SURVEY

S.NO	TITLE	AUTHOR, YEAR OF PUBLICATION	TECHNIQUES OR ALGORITHM USED	PARAMETERS	LIMITATION
1	Call Ambulance Smart Elderly Monitoring System With Nearest Ambulance Detection Using Android and Bluetooth	S.Pradeep Kumar, D.Akash, K.Murali, R.Shriram. 2016	Human Monitoring sensors	Alert time	Manual operation needed if sensors failed. The algorithm used for find the ambulance is not optimal.
2	Expected Shortest Paths In Dynamic And Stochastic Traffic Networks	Liping fu	Dynamic and Stochastic Shortest Path Problem	time	Takes too much time for calculations
3	Analysis of VANET geographic routing protocols on real city map	Harinder Kaur, Meenakshi,2017	A-STAR routing and GPSR	Time and Distance	Every routing types has its own mistakes
4	Ad-hoc on demand distance vector routing protocol using Dijkstra's algorithm (AODV-D).	Chandresh Pathak, Anurag Shrivastava, Anjana Jain,2016	AODV-D Based On Dijkstra's Algorithm	Safe and Time	AODV-D is not efficient if there is no node in a range
5	Study of Application of Network Simulator to Comparing Performances of Network Protocols	Hauli Wang	Network simulators functions	Tools usage	NS simulators can add more functions to simulate VANET effectively
6	Ambulance Assistance for Emergency Services Using GPS Navigation	Shantanu Sarkar,2016	GPS Based Ambulance System	Response time	It can only used by management
7	Movement of Emergency Vehicles - Using Shortest Path Simulation Method	Guddi Singh, Jyoti Singh, Richa,2017	Shortest path algorithm based on Dijkstra's algorithm	time	It can be updated by using A-STAR rounting
8	Traffic Accident Automatic Detection And Remote Alarm Device	Wang wei, Fan hanbo,2011	Sensors detects collision	Alert time	Accident detection sensors can be updated by new collision techniques
9	Emergency services using GPS tracking	Pavan Wadhe,Rutuja Pandharkar,Rohan Raut,Devansh Modi,2016	Haversine formula, Trilateration	Response Time	Need to access higher authority process
10	Finding the Cost-Optimal Path with Time Constraint over Time-Dependent Graphs	Yajun Yang, Hong gao, Jeffery xu yu, Jianzhong li	Time Dependant Shortest Path Algorithms	Travel time	2 S algorithm takes much time for choose the path

TABLE 1: Literature Survey

3. SYSTEM ARCHIECTURE

GPS system:

The architecture of the system proposed: illustrated in the Fig.1, consist of two sides. First is the user's side which is basically a smart phone owned by the person in distress or any user. The user's side uses

internet connection to request for an ambulance. Thus, it requires telephony and internet services to be enabled in the user's phone for the system to function.

The second is the ambulance side. The ambulance side is a dedicated device or an android smartphone owned by the driver or fixed in the ambulance. It uses internet and maps. Maps are used to locate the person in distress.

When a user request for ambulance, he must open the Google map it will search the ambulance in the area around the user's location. As soon as its show all the ambulance near by that particular area. And we can send a request to vacant ambulance to serve the patient who need medical attendance. If the request is accepted then the ambulance fetch the GPS location of the mobile network of the requested person.

The driver can see the exact location the person who requested the ambulance. If the ambulance rejects the request, the request will send to next free and nearest ambulance to service. Mean while the user can see the numbers of all the nearest hospitals and their addresses. There is a GPS chip inside in every smartphone, which uses the satellite data to get its exact location which services such as Google maps as map. When GPS signal is not available, then the smartphone use the cell tower information to triangulate your location.

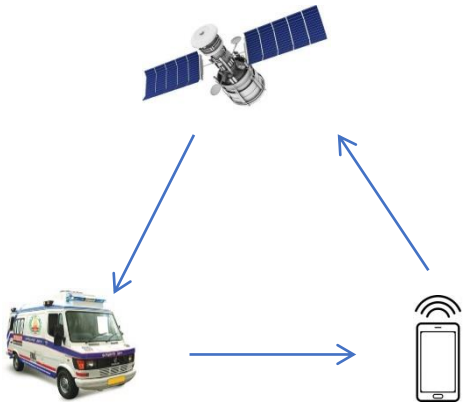

Figure 1.1:GPS location Sharing

The accuracy of this location is lower then GPS, but it has greatly improved in recent years. Some geo-location systems use GPS and cell site triangulation (and in some instances, local Wi-Fi networks) in combination to zero in on the location of a device.

To calculate the distance to the distance to the satellite, the amount of delay caused by receiver can be use. Simple triangulation determines the position on the earth surface . This takes a look at the time of course because the GPS system you have in your hand or in your vehicle is not going to have a strengthen signal one clock, which is a type of clock provide by the satellite. So synchronization is necessary with the clock on the satellite before current position can be detected on the surface of the earth.

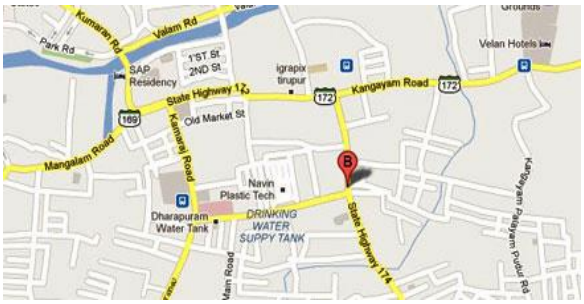

Figure 1.2: GPS location on Map.

There are two sides of this project :

1. User Side
2. Ambulance Side

The user side GPS is used just to get the location of the user

The ambulance device is tracked by the GPS sensor. Using the Google Matrix API the nearest distance from the user's location where the ambulance is located is found and sent the information of the user.

Trilateration and Haversine formula are used by Google to triangulate the location of a particular object or person on ground or in air.

VANET System :

The growth of the increased number of vehicles are equipped with wireless transceivers to communicate with other vehicles to form a special class of wireless networks, known as vehicular ad hoc Network or VANETs . VANET is a special class of Mobile Ad hoc Network (MANET) to provide communication among near by vehicles and between vehicles and near by roadside equipment. As mobile wireless devices and networks become increasingly important the demand for Vehicle-to-Vehicle (V2V) and Vehicle-to-Roadside (VRC) or Vehicle-to-Infrastructure (V2I) communication will continue to grow. It is supposed that each vehicle has a wireless communication equipment to provide ad hoc network connectivity. Such networks comprise of sensors and On Board Units (OBU) installed in the car as well as Road Side Units (RSU). The data collected from the sensors on the vehicles can be displayed to the driver, send to the RSU or even broadcasted to other vehicles depending on its nature and importance. VANETs offer the potential for fast and accurate driving information (e.g. traffic, accident and emissions) that would otherwise be more difficult to disseminate. Possible applications for such networks can be generally classified as safety and Non-safety applications include traffic information, toll service, Internet access, cooperative entertainment, etc.

VANETs have several properties that distinguish them from other MANETs. Nodes (vehicles) in VANETs are highly mobile, the probability of network partitions is higher, and end-to-end connectivity is not guaranteed. However, although VANETs do have dynamic topologies, they are not completely random.

Inter-vehicle communication:

This is also known as vehicle-to-vehicle (V2V) communication or pure ad hoc networking. In this category, the vehicles communicate among each other without infrastructure support. Any valuable information collected from sensors on a vehicle, or communicated to a vehicle, can be directed to neighboring vehicles.

Vehicle-to-roadside communication:

This is also known as vehicle-to-infrastructure (V2I) communication. In this category, the vehicles can use cellular gateways and wireless local area network access points to connect to the Internet and enable vehicular applications.

Inter-roadside communication:

This is also known as hybrid vehicles-to-roadside communication (VRC). Vehicles can use infrastructure to communicate with each and exchange information received from infrastructure or from other vehicles can communicate with infrastructure either in single-hop or multi-hop fashion depending on their location during moving or stationary. This architecture includes V2V commination and provides greater flexibility in content sharing and increase network reliability.

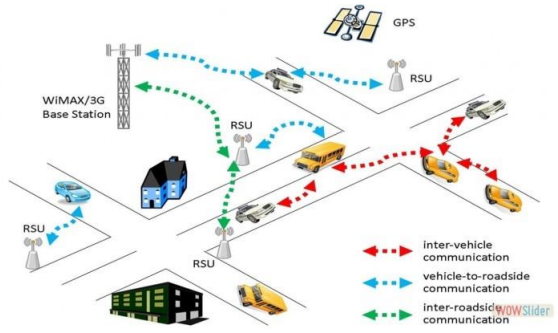

Figure 1.3: VANET Scenario

Simulation:

The Key Components of designing the simulation codebase can be divided into generating the road network data structure, creating the vehicles, controlling vehicles movement, implementing and controlling traffic lights and preventing collisions.

NS Tools:

Imagine a situation in which a vehicles shares its beacon information such as position, speed, direction, etc. In addition safety message such as traffic, slippery, road condition etc. with other near by vehicle can know the status of traffic, accident information, road accidents, decrease the waiting at traffic signals, save the life of people. We are initiated to design and analysis of the transmitter of a vehicle node which communicates the in high dynamic environment.

4. TOOLS USED:

1. GPS Module – It gives the location i.e. Latitude and Longitude of any particular area
2. Arduino Tool- It acquire the GPS location in ambulance.

5. SYSTEM DESIGN:

5.1) GPS Based Ambulances:

Our Project is based on providing medical facility to the people who, need medical attendance It uses both automatic and manual alert methods.

Sensors are used in the roadside to detect the collisions and alert the nearest ambulance automatically.

Manually a person can locate the ambulance and send the alert message. Arduino tool used in the ambulance can obtain the GPS location automatically.

Arduino tool can be implement by the codes.

5.2) 2S Search Algorithm:

It is a more efficient algorithm to address the TDSP problem. This algorithm includes two phases: (1) time-refinement phase; and (2) path-selection phase. In the first phase, the algorithm refines the earliest arrival time for every vertex vi by the following equation:

$$g_i(t) = \min_{v_j \in N^-(v_i), \omega(v_j)} \{(g_j(t)+\omega(v_j))+w_{j,i}(g_j(t)+\omega(v_j))\} \quad (1)$$

Here, gi(t) is the earliest arrival time for vi, if departing from source vs at starting time t. N−(vi) is vi's incoming neighbor set, i.e., N−(vi) = {vj|(vj,vi) ∈ E}. The algorithm utilizes a priority queue Q to maintain the earliest arrival time function gi(t) and a time interval [ts,τi] for all the vertices in GT . The value of gi(t) for t ∈ [ts,τi] is corrected. In each iteration, a vertex vi with the minimum gi(τi) is dequeued from Q. The algorithm refines gi(t) and [ts,τi] by Eq. (1). Let I denote the user-given starting time interval. If [ts,τi] 6= I, then vi is inserted into Q again. The algorithm terminates when the earliest arrival time function ge(t) of destination ve has been refined in the whole time interval I. The main problem of the 2S algorithm is that this algorithm needs to compute the earliest arrival time function by Eq. (1). However, the rationale Eq. (1) based on does not hold for the cost optimal path problem proposed in this paper.

Activity Diagram:

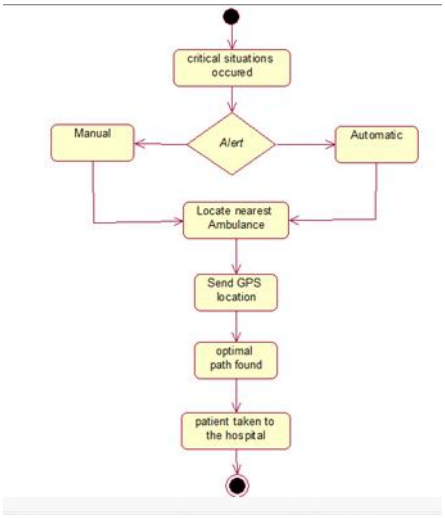

Figure 1.4: Activity Diagram

6.CONCLUSION & FUTURE WORKS

CONCLUSION

In this paper, we have presented that using of GPS navigation software from smartphones to help the people who are all need medical attention at critical situation, to reach the hospital as soon as possible with minimal time duration Also we should overcome that finding the shortest path to reach the hospital with the help of the VANET's Network data transaction, to find out traffic range of that particular area .

If we are using the shortest path algorithm in that particular area network the restrictions in number of devices in a wireless network can be overcome

As, each user having the smartphones with different configuration we have to provide a mechanism of selecting the nearest ambulance and hospitals by manually by the users.

Future works:

The project can be updated by automatic detection.

(1) By using RFID, we can moniter the human status, and if any cricitical readings appeared the RFID will inform the ambulance.

(2) Using traffic light monitering, the ambulance can be much faster by reaching the location

7. REFERENCES

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