



Shortest Route Finding Ambulance System

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Abstract: Such a large number of patients in India lose their lives because the ambulance does not arrive on time or delay in the treatment. Also, in view of the increasing technology and other factors, it is necessary to be aware of such technologies to reduce this problem. A survey conducted in St Petersburg found that the rest of the countries are aware of the technology to find out where the ambulance is and alert the patient to get the crisis vehicle at the ideal time. For this, algorithms like weighted graphs, Dijkstra's algorithm, ant colony algorithm, dynamic shortest path have been used in that system. These algorithms are reduced the traveling time by 20%. Therefore, the chances of patient saving increased. In this system only 2 smartphones will have for conversation between patient and ambulance and it is fully automated. As we have found in India, if there is a accident at any spot, we are called complementary number or crisis number. After informing where the accident took place on that call, the ambulance is then dispatched from the control room at that particular place, and then the control room gives the details of the nearest hospital and then informs to the hospital. With this proposed system, the ambulance can be transported without delay from the accident site to the hospital we can easily find the shortest route between the accident site and the hospital reduce wasting time. The user no longer need to call and check the availability of the ambulance. So basically this system uses IoT, GPS and GSM, Dijkstra's algorithm. It uses IoT principle using rest API to check traffic, as well as IoT for traffic signal checking. The RF transmitter is installed in the ambulance and the RF receiver is installed in the traffic light. This changes the signal for a short time to get to the ambulance. In addition, the ambulance finding route is helps by the dijkstra's algorithm to find the shortest path. In this, the android app understands the location of the patient or the crash site, then the system checks which ambulance is within 5 kilometers and sends an alert or request to one of the ambulances and then after accepting the request, the driver understands the location of the crash site.

Keywords - Dijkstras algorithm, GPS, GSM, IoT, Path Finding

I. INTRODUCTION

The current population knows how long it takes for an ambulance to reach a hospital or a patient's location. Quite possibly the most troublesome and requesting occupations is improving proficiency in the health or medical sector. In our system, research is done on how to do this work faster. So for that Short and safe routes are important for ambulances. This helps the ambulance to find the shortest path in this system. In the present vehicle, this system can be seen but multiple paths are shown in it. This incorporates a few perspectives, for example, acquiring a rescue vehicle in at least time, giving sufficient treatment to the patient. Traffic blockage is one of the principle issues in metropolitan zones, which has caused numerous issues for the ambulance. In expansion, car crashes in the city have expanded and it is much more vital to forestall death toll because of accidents. System can beat these limits by utilizing the following innovation dependent on your utilitarian and conduct usage. The two modules work on the IOT rule utilizing the REST APIs. The primary module is utilized to look for emergency vehicle areas inside 5 km of the accident area. Here, the area of the client is followed utilizing the equipment GPS device. There is death toll because of the holding up in the entrance of the rescue vehicle to the clinic during the peak hour. This postponement is fundamentally because of the holding up of the emergency vehicle at the traffic signals. It would be exceptionally helpful for the rescue vehicle if the signs while in transit to the emergency clinic are lit. Thusly, we are proposing another plan to naturally control all traffic signals and achieve the above errand so the emergency vehicle can cross all level intersections without pausing.

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Each traffic light will have control of the RF transmitter and recipient. This RF transmitter is put in a rescue vehicle and the RF recipient is put on the traffic signal. We utilize the organic sensor in the rescue vehicle segment to discover the patient condition during an excursion and send him to the clinic utilizing the rescue vehicle.

The GPS looks for the accident site and the area of the accident when sending the GSM modem. Accordingly, the medical clinic organization can follow the emergency vehicle nearest to the patient's area and divert it to the patient as opposed to sending the rescue vehicle present to the clinic. This will assist the patient with getting to the emergency clinic straightaway, particularly in basic conditions. The server will likewise discover the closest clinic and figure the most limited course from the current area of the rescue vehicle, from the area of the accident and from the closest emergency clinic.

II. LITERATURE SURVEY

Varsha Shingade, Priyanka Talape, Torade Pallavi & Sayali Vetal. [1]- India's emergency medical reaction falls behind different nations. This is part of the way because of the absence of innovation usage in Ground Zero. To tackle the issue, we presented an astute emergency vehicle framework. This would acquire India to a serious position crisis administrations around the globe. Lately, there has been a progressive advancement in the field of Internet of Things (IoT). It very well may be effectively and generally utilized on countless end frameworks where a subset of a lot of information can be effectively and intensely got to and handled. IoT and cell phone advancements help to make a stage that serves all cell phone clients. The application gathers area data from Global Positioning System (GPS) equipment and utilizes the Google Map application programming interface.

K. Athavan, G. Balasubramanian, S. Jagadeeshwaran and N. Dinesh. [2]- Current health systems frameworks are widely concentrated in examination. The vast majority of these examinations center on checking individuals' health systems to give reports to health surveillance system, for example, available to come in to work, experts, and mentors for an assortment of reasons. Generally utilized indispensable signs are pulse, internal heat level, and electrocardiography. The assortment and spread of issues have been examined in countless examination papers. Many proposed models have been recommended; some of them highlight general models and others highlight explicit frameworks. Moreover, scientists are contemplating the issue of heterogeneity of the health systems reconnaissance framework. Middleware systems and configuration are examined in other exploration papers. Most examination on current health systems frameworks, particularly in health systems checking, is recommended for long haul observing of patients to gather health systems status data or find and track data. This gathered information can be prepared locally or conveyed to a distant objective for additional handling utilizing AI calculations, or just put away and afterward saw by medical services experts.

Wei Yan, Ma Zhigang and Qiu Sihai. [3]- Programming interface to follow rescue vehicle details in cell phone application Google Map customer. A similar usefulness can be utilized for the other module that permits the client to discover the medical clinics with the quantity of administrations that it gives in a short manner. With the assistance of an actually prepared and in fact progressed emergency vehicle, data about the patient's health can be shipped off the medical clinic for additional activity. The communication between the Google cell phone has built up an API for client comfort. Google Maps gives data on close by emergency clinics, alongside their rating and distance from the client's present area. The disadvantage of Google Maps is that it just sets emergency clinics yet doesn't give definite data. Thusly, the client may have to get to the emergency clinic data by going to the specific emergency clinic site. The rescue vehicle framework application defeats this weakness and gives clinic data identified with the client's health related crisis.

Elgarej Mouhcine, Yassine Karouani, Khalifa Mansouri, Youssfi Mohamed. [4]- The optimal routing problem has consistently been the headliner of city crisis salvage. Its examination object has created from looking for "the most limited course" to looking "the shortest route". The connected calculations and strategies contrast in various circumstances. Notwithstanding distance issue, the impact of different boundaries elements ought to likewise be broke down under the muddled conditions. The measure of the accidents on the planet is startling and it is seen as the most noteworthy on the planet. So in the present circumstance, System need a proficient strategy for quick intercession that will react in such circumstances. Accordingly, it is critical to support the examination in emergency vehicle the executives and directing by presenting another technique for managing rescue vehicle

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toward the situation of the accident in an effective manner. A circulated arrangement is proposed dependent on the subterranean insect province framework calculation model. The improved technique depends on an appropriated engineering to register and locate the optimal path for the emergency vehicles.

Advay Thakur, Naveen Yadav, Pawan Gupta, Ajay Sirsat. [5]- The population of vehicles on road has become too much especially in cities. We can encounter traffic throughout the road because of which Ambulance service is one of the major services which gets affected by traffic jams. To smoothen the ambulance movement in traffic we are implementing “Ambulance Tracking and Route Clearing Using GPS, GSM, RFID”. In these we use of an android app that connects both the ambulance and the traffic signal station using GSM network. This system makes use of GPS to track and to get actual location of the Ambulance.

A. Palanisamy, S. Praveen Kumar, K. Santhosh Kumar, S. Vaitheswari, D. Nithyanandhan. [6]- The paper is used to describe the ambulance tracking with health monitoring system. With the assistance of this venture we can discover the area of rescue vehicle. At the same time, System can also monitor various health parameter of a patient like temperature, humidity and heart beat rate, blood pressure, Electro cardiogram, sugar. These boundaries of patient are sending to clinic or hospital and furthermore specialists portable. At the some point the emergency vehicle area and emergency vehicle number is send to the clinic. GPS is used to track the ambulance location. GSM is used to send the message to the hospital. By using these parameters, doctor can do the necessary preparation for treatment of patient.

Shantanu Sarkar. [7]- Presently a-days the quantity of patients has altogether expanded and in crisis cases the patients should be raced to the clinic as right on time as conceivable so they can be dealt with. Due to significant increase in the number of patients the hospital finds it difficult to send an ambulance from the hospital to every patient's location and if there is a genuine case then the patient may even die if not taken to the medical clinic as expected. This paper is to propose a GPS system in which the GPS tracker will be set up in the ambulance so that the hospital management can track down the location of the ambulance at any time and if they get a call for an emergency case they can track down the ambulance nearest to that location and send the ambulance to that location to pick up the patient, this will save time and will help the patient to reach the hospital as early as possible

Karthika K, Lavanya G, Pavithra M, Periyathambi P. [8] - In India every minute's one person dies because he can't arrive at the medical clinic as expected. The fundamental capacity of this venture will lessen the travel in respective time among emergency vehicle and medical clinic. It saves somebody's life. When the ambulance driver or patient's relative open the application on his smart phone it will send request to the hospital. In hospital, at present the doctors, rooms and medicines are available means they accept the request and also monitor the patient's condition.

Sarbpreet, Somanath Tripathy, Jimson Mathew. [9]- The Internet of Things (IoT) systems enable the communication of a diverse suite of devices and objects, however it is known that security is one of the major problems in these systems. This is mainly due to the fact that IOT devices work with very limited computational power and energy budget and conventional cryptographic techniques will be too expensive. To this end, we propose a novel cross breed security convention and show its reasonableness through a constant rescue vehicle administration following application. First, System discuss practical problem that is of lack of information shared during transfer of a patient in ambulance to hospital. System provide a solution to this with an IOT enabled ambulance tracking system. Second, System provide a secure protocol for IoT devices specific to the tracking system. The protocol uses implementation of AES-CCM optimized for IoT devices. It provides the basic communication requirements such as confidentiality, authentication and data integrity.

Divya D. Nanwani, Puja R. Kshirsagar, Bhavana P. Kawalkar, Pritish Deshmukh. [10]- This project performs three main functions. Initial one shows restraint health observing; second one is following the Ambulance which is conveying the Patient and third one is to send over two subtleties to the Hospital or Doctor utilizing a GSM innovation. With the assistance of this venture System can discover the area of emergency vehicle and simultaneously System can screen different health boundary of a patient. These boundaries are temperature, moistness and heart beat rate. A book SMS containing area and estimations of the relative multitude of sensors is sending to a Doctor's versatile. Or System can send this text SMS to any authorized person in hospital. Then that person can intimate Doctor about ambulance location and health.

III. ANALYSIS TABLE

The Table 1 is a summary of research paper on Smart Ambulance System. It states the different techniques and advantages.

Table 1. Analysis Table

Sr. No	Title of Paper	Summary	Advantages	Techniques Used
1.	Smart Phone Based Enhancement in Health Services using GPS. [1]	Implement to solve the problem, System introduced an intelligent ambulance system.	When Internet correction is available and android application works according to the specification.	GPS, Google Map Interface Services, IoT.
2.	Automatic Ambulance Rescue System. [2]	Provide a smooth flow for the emergency vehicles like ambulance to reach the hospitals in time and thus minimizing the delay caused by traffic congestion.	With the help of GPS System get the latitude and longitude of the detected position.	GSM Module, GPS module, Sensors.
3.	System of medical emergency ambulance for community based on Zigbee. [3]	The front-end sensors monitor vital physiological data and diagnosis. When the patient needs help, rescue request is send to rescue centers through the wireless sensor network.	system is safe and effective, and communication network is reliable	Wireless Sensor and GPS Networks
4.	Toward A Distributed Strategy For Emergency Ambulance Routing Problem. [4]	The main objective of this system to generate the optimal path planning for ambulance to achieve the location of an accident.	By the help of this paper System can find route for the ambulance.	In this paper they used ant colony system and Ant Colony Optimization technique.
5.	A Study On Design Of Ambulance Tracking And Route Clearing Using GPS, GSM, RFID. [5]	The proposed system is used for controlling the traffic signals in favor of ambulances.	This system save time to reach hospital, and This system is more accurate with no loss of time.	For Ambulance Tracking and Route Clearing using GPS, GSM, RFID technique.
6.	Design GPS And GSM Based Ambulance Tracking With Health Monitoring System.[6]	The paper is used to describe the ambulance tracking with health monitoring system. With the help of this project system can find out the location of ambulance.	This paper is used to save the human life for few critical minutes of tracking the location of ambulance using GPS.	In this paper they used GPS and GSM technique.
7.	Ambulance Assistance For Emergency Services using GPS Navigation. [7]	The main aim of the project is to minimize the deaths of critical patients by making sure that they reach hospital in time for treatment.	This system is accurate and the main advantage is that it saves a lot of time.	In this paper they used GPS Technique and GSM Technique for sending messages to hospital.

8.	Advanced Ambulance Monitoring System Using IOT.[8]	The main function of this project will reduce the time travel between ambulance and hospital. It saves someone's life.	Advanced Ambulance Monitoring System Using IOT.	In this system they used internet of thing (IOT) technique.
9.	Design And Evaluation Of An IOT Enabled Secure Multi-Service Ambulance Tracking System.[9]	The Internet of Things systems enable the communication of a diverse suite of devices and objects, however it is known that security is one of the major problems in these systems.	By the help of this system we can easily track ambulance location. And this system provided security also.	In this paper they used IOT and GSM Technique.
10.	Ambulance Tracking And Patient Health Monitoring Using GPS And GSM.[10]	This project performs three main functions Patient health monitoring, tracking the Ambulance which is carrying the Patient and send above two details to the Hospital or Doctor using a GSM Technology.	By the help of this system we can track path for ambulance and save time plus patients life.	In this paper they used GPS and GSM technique.

IV. METHODOLOGY

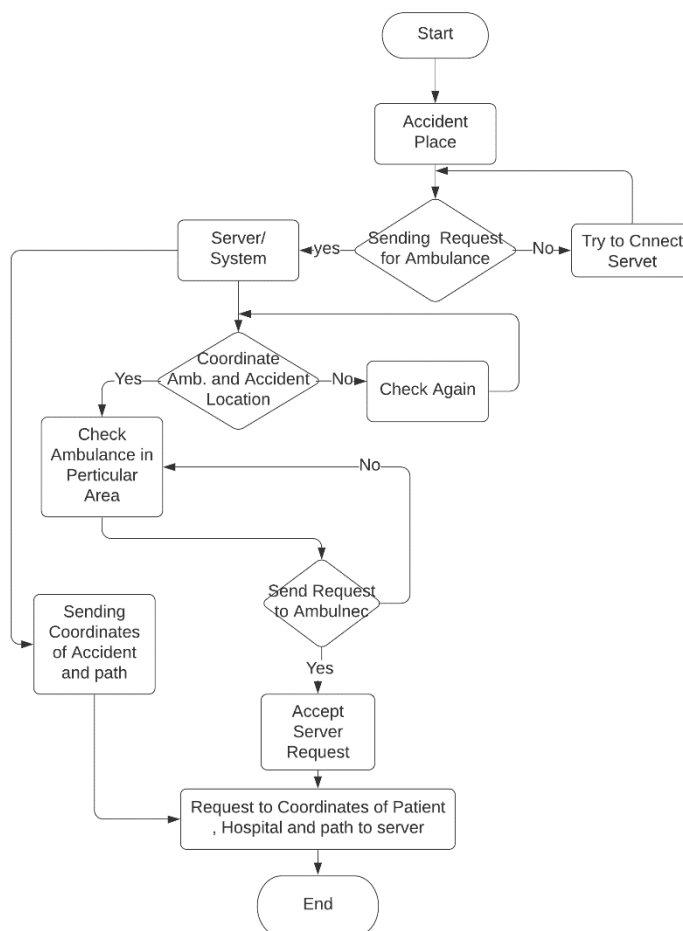


Fig. 1: System Flow Diagram

At the point when a vehicle experiences accident, it promptly sends its GPS position to the server. The server can maintain the complete information about the ambulance and other data like traffic, hospitals, etc. the server can select the ambulance of the closest to the accident spot and send request to the ambulance by GPS signal. Figure out the distance of accident site to every emergency vehicle. At that point analyze every determined distance and select the closest emergency vehicle. The rescue vehicle administration is that convergence in a given territory is fixed focuses and the distance between node is fixed, the most brief distance between the node can be chosen utilizing the Dijkstra's calculation.

The signal segment contains the RF receiver, while the choosing rescue vehicle that communicates the RF transmitter will send the message to the RF receiver, at that point the RF receiver will give the green signal to rescue vehicle that sends the RF transmitter will send the message to the RF receiver, at that point the RF receiver will give the green sign. The System will maintain a strategic distance from these issues, the patient will utilize an Android application with incorporated GPS innovation to send the client's directions and subtleties to the emergency vehicle driver's smartphone that will be introduced on all the emergency vehicle smartphone, this permitting them to find and arrive at the client in a matter of moments. The server will likewise locate the nearest clinic and compute the most limited course from the rescue vehicle's present position, the area of the accident, and the nearest clinic. The briefest way will hold node in the way. The server takes the GPS directions of all node on the briefest way from the nodes information base and with the GPS directions of the accident site and the medical clinic communicates it to be the emergency vehicle unit in a configuration determined underneath.

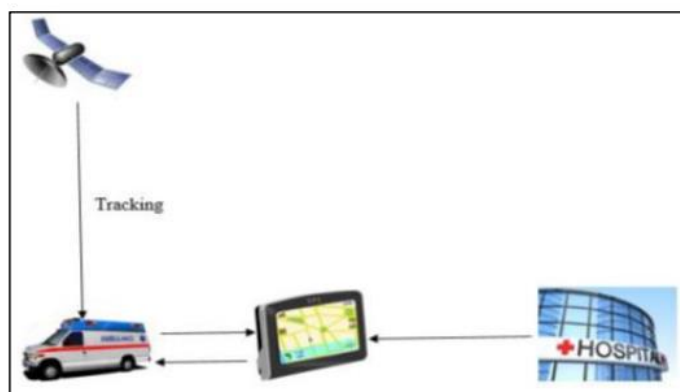


Fig. 2: System Architecture

The node directions one are sent it figures the distance between the accident spot and every rescue vehicle. At that point it looks at all the distances ascertain and select the closest rescue vehicle. The health status of the remote sensor networks is generally obscure to the organization executives, and they are conveyed to screen the climate. This venture gives identification of disappointment and side effect alarms too. The current rescue vehicle framework is locally overseen and actuated by call. All current emergency vehicle frameworks rely upon client calls that give data on a naughtiness. Most human administrators utilize a customary or PC supported dispatch framework to dispatch an emergency vehicle. These kinds of frameworks can record. Wrong data of the guest, or erroneous information move and section to the dispatch framework. The client should call the emergency vehicle administration to check the accessibility of ambulances in their nearest area and make a request to send one to an assigned area that has been assigned by the client. The proposed emergency vehicle framework expects to incredibly decrease passing's from car crashes, guarantee that the emergency vehicle shows up on time via consequently answering to the close by clinic, and in this way to emergency vehicle that has the web association given by hardware PC expected to send information to the specialist's organization page with IOT network. Basically, there are two modules in this emergency vehicle framework, that is, the vehicle module that is put in the patient's vehicle with smartphone viable with GSM and GPS and the recipient module that is a smartphone to get a short message.

V. CONCLUSION

Proposed framework to control traffic signals for ambulances during accidents. With this framework, the emergency vehicle can be shipped immediately from the accident site to the medical clinic. Therefore, the ambulance rescue system finds the shortest route algorithm if implemented in countries with large populations such as INDIA. Be that as it may, there might be a deferral brought about by GSM messages as it is a line based strategy which can be diminished by giving greater need to messages conveyed through the server.

Acknowledgements

System would like to express a deep sense of gratitude towards our mentor Prof. Umesh Mohite, Department of Computer Engineering for his constant encouragement and valuable suggestions. The work that System have been able to present is possible because of timely guidance and support.

REFERENCES

- [1]Varsha Shingade, Priyanka Talape, Torade Pallavi & Sayali Vetal. "Smart Phone Based Enhancement in Health Services using GPS." Imperial Journal of Interdisciplinary Research (IJIR), 2016, pp. 433-435.
- [2] K. Athavan, G. Balasubramanian, S. Jagadeeshwaran and N. Dinesh, "Automatic Ambulance Rescue System," 2012 Second International Conference on Advanced Computing & Communication Technologies, Rohtak, Haryana, 2012, pp. 190-195.
- [3] Wei Yan, Ma Zhigang and Qiu Sihai, "System of medical emergency ambulance for community based on Zigbee," The 2nd International Conference on Information Science and Engineering, Hangzhou, 2010, pp. 6983-6985.
- [4] Elgarej Mouhcine, Yassine Karouani, Khalifa Mansouri, Youssfi Mohamed, "Toward a Distributed Strategy for Emergency Ambulance Routing Problem", IEEE, 2018, pp. 978-1-5386-4225.
- [5] Advay Thakur, Naveen Yadav, Pawan Gupta, Ajay Sirsat, "A Study on Design of Ambulance Tracking and Route Clearing using GPS, GSM, RFID", International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCCE), 2018, pp. 2320-9801.
- [6] A. Palanisamy, S. Praveen Kumar, K. Santhosh Kumar, S. Vaitheswari, D. Nithyanandhan, "Design GPS and GSM based Ambulance Tracking with Health Monitoring System", International Journal of Engineering Research & Technology (IJERT), 2016, pp. 2278-0181.
- [7] Shantanu Sarkar, "Ambulance Assistance for Emergency Services Using GPS Navigation", International Research Journal of Engineering and Technology (IRJET), 2016, pp. 2395 -0056.
- [8] Karthika K, Lavanya G, Pavithra M, Periyathambi P, "Advanced Ambulance Monitoring System using IoT", International Research Journal of Engineering and Technology (IRJET), 2020, pp. 2395-0056.
- [9] Sarbpreet, Somanath Tripathy, K. Jimson Mathew, "Design and Evaluation of an IoT enabled Secure Multi-service Ambulance Tracking System", IEEE, 2016, pp. 978-1-5090-2597.
- [10] Divya D. Nanwani, Puja R. Kshirsagar, Bhavana P. Kawalkar, Pritish Deshmukh, "Ambulance Tracking and Patient Health Monitoring Using GPS and GSM", International Journal of Emerging Technologies in Engineering Research (IJETER), 2017, pp. 2454-6410.
- [11] Arunmozhi, P and Puech William. "Automatic Ambulance Rescue System Using Shortest Path Finding Algorithm." (2014).
- [12] R. Zhang, D. Yuan and Y. Wang, "A Health Monitoring System for Wireless Sensor Networks," 2007 2nd IEEE Conference on Industrial Electronics and Applications, Harbin, 2007, pp. 1648-1652, doi: 10.1109/ICIEA.2007.4318689.
- [13] J. Whipple, W. Arensman and M. S. Boler, "A public safety application of GPS-enabled smartphones and the android operating system," 2009 IEEE International Conference on Systems, Man and Cybernetics, San Antonio, TX, 2009, pp. 2059-2061.
- [14] M. A. Fera, R. Aswini, M. Santhiya, K. R. G. Deepa and M. Thangaprabha, "HEAL-health monitoring in emergency vehicles with their authentication by RFID and location tracking by GPS," 2015 Seventh International Conference on Advanced Computing (ICoAC), Chennai, 2015, pp. 1-6.
- [15] K. Aziz, S. Tarapiyah, S. H. Ismail and S. Atalla, "Smart real-time healthcare monitoring and tracking system using GSM/GPS technologies," 2016 3rd MEC International Conference on Big Data and Smart City (ICBDSC), Muscat, 2016, pp. 1-7.