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A study on the integration of the Global Positioning System (GPS) in emergency service vehicles.

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ABSTRACT

The integration of GPS technology and traffic signal control in emergency vehicles, particularly ambulances, can significantly improve response times and save precious minutes in critical situations. By connecting the GPS systems of emergency vehicles with traffic signals, the signals can automatically change to green when an ambulance is approaching, creating a clear path for the ambulance to pass through intersections without delay. This system relies on a network of sensors and communication equipment that are able to detect the ambulance's location and adjust traffic signals in real-time. The benefits of this technology are numerous as it not only helps save lives by reducing response times but also reduces traffic congestion by optimizing traffic flow. This innovative approach to ambulance transportation can make a tremendous impact in emergency situations, particularly in densely populated areas where traffic congestion can impede the progress of emergency vehicles. In short, the integration of GPS-connected traffic signals can be a game-changer for emergency vehicle transportation and help ensure that ambulances reach their destination quickly and safely ultimately saving lives while improving efficiency in emergency response systems.

Keywords: GPS, Ambulance, Integration, Technology, Vehicle Tracking

1. INTRODUCTION

Every second counts in emergency situations, and efficient ambulance transportation can make the difference between life and death. To address this need, modern technology has equipped ambulances with GPS systems that enable them to navigate through traffic with ease. But what if the traffic itself could be optimized to accommodate the fast movement of ambulances? That's where GPS-connected traffic signals come in.

The idea behind this technology is simple: by connecting the GPS systems of emergency vehicles with traffic signals, the signals can automatically change to green when an ambulance is approaching, creating a clear path for the ambulance to pass through intersections without delay. This system can also help reduce the risk of accidents by ensuring that other vehicles are aware of the ambulance's presence and can move out of the way.

This system relies on a network of sensors and communication equipment that are able to detect the ambulance's location and adjust traffic signals in real-time. By optimizing the movement of emergency vehicles, this technology can significantly improve response times and save precious minutes in critical situations.

This innovative approach to ambulance transportation can make a tremendous impact in emergency situations, particularly in densely populated areas where traffic congestion can impede the progress of emergency vehicles. The integration of GPS technology and traffic signal control can help ensure that ambulances can get to their destination quickly and safely, ultimately saving lives.

The benefits of this technology are numerous. Not only can it help save lives by reducing response times and ensuring that emergency vehicles can navigate through traffic quickly and safely, but it can also help reduce traffic congestion by optimizing traffic flow. This can have a positive impact on the environment, as fewer idling vehicles means less air pollution.

In short, the integration of GPS-connected traffic signals can be a game-changer for emergency vehicle transportation. By providing a clear path for ambulances to move through intersections quickly and safely, this technology can help save lives and improve the efficiency of emergency response systems.

2. LITERATURE REVIEW

Literature on topic

Advanced ambulance services and smooth movement are critical factors in providing effective emergency medical care in India. In recent years, there has been a growing emphasis on upgrading ambulance services and improving road infrastructure to ensure quick and efficient transport of patients to healthcare facilities.

Advanced ambulance services typically feature equipped with state-of-the-art medical equipment and staffed by trained medical professionals, allowing for on-site treatment and stabilization patients in route to the hospital.

Literature on method

Some advanced ambulance services also offer air ambulance services for patients who require immediate transportation over long distances. In terms of smooth movement, the Indian government has taken various steps to improve the country's road infrastructure and traffic management systems.

This includes the construction of new highways, the upgrading of existing roads, and the implementation of intelligent traffic management systems to reduce congestion and improve the flow of traffic.

Additionally, there have been efforts to improve emergency medical services response times by establishing dedicated lanes for ambulances and emergency vehicles, and by implementing real-time traffic monitoring systems that can quickly route ambulances around traffic delays.

While much progress has been made in recent years, there is still a long way to go to ensure that all parts of India have access to advanced ambulance services and smooth movement. Nevertheless, these efforts represent a significant step forward in improving the delivery of emergency medical care in India.

3. THEORETICAL APPROACH

An advanced ambulance can employ several theoretical approaches to achieve smooth movement, including:

Suspension Systems: An advanced ambulance can be equipped with a high-performance suspension system that can effectively absorb shocks and vibrations from the road, providing a smooth and stable ride for both the patient and the medical staff. This can be achieved through the use of hydraulic, air, or pneumatic suspension systems.

Active Chassis Control: This technology can dynamically adjust the suspension of the ambulance in real-time, based on road conditions and driving behavior, to ensure a smooth and stable ride. This can be accomplished through the use of sensors and algorithms that can detect and respond to road conditions in real-time.

Vehicle Stability Control: This technology helps the ambulance to maintain its stability during sudden maneuvers, such as evasive driving or sharp turns. It does this by applying brakes to individual wheels and reducing engine power, if necessary, to keep the vehicle under control.

Power Steering: A power steering system can provide improved maneuverability and a smoother driving experience, especially when navigating tight corners and sharp turns.

Tire Technology: An advanced ambulance can be equipped with high-performance tires designed specifically for smooth and stable movement. This can include low-profile tires with a softer sidewall, or tires with a specialized tread pattern that can reduce road noise and vibrations.

These are some of the theoretical approaches that can be employed to achieve smooth movement in an ambulance. By combining these technologies and carefully tuning them to work together, an advanced ambulance can provide a safe and comfortable ride for both patients and medical staff.

4. METHODOLOGY

Fast life has its special purpose for serving people. So, as the name "Fast life" it's all about saving life. The purpose of this App is to indicate the traffic police regarding arrival of ambulance within nearby distance to avoid traffic jam and make a clear way for ambulance. This works in a way the app will need a username and password mandatory to proceed and it will be given only to the police officials and only they are given access to the app. After police gets access to app, they can't use that all times, they will receive a particular notification when ambulance arrives near them. It will be as a special notification like an alarm to alert them. It's set this way so that there's no need for them to see phone always and get distracted. It would be available on both play store and apple store

This is one of the most important aspects of AIS 140 GPS Device, so fleetx has made real-time vehicle tracking very easy that will help you monitoring the route taken by the vehicle, the time taken by the vehicle and Route Optimization.

This chip will be inserted in ambulances which helps in the process of tracking them and sharing locations to police officials. The app will be like a map it will have the ambulance icons at the location they are present and moves when the vehicle moves.

Example: When the ambulance is 6 km away from the officials they get alarm and they clear traffic on the route for ambulance to move away, it has different alarms according to the distance the ambulance to help the official's is away and helps in such way. Like red alarm would be indicating the vehicle is near, whereas blue would 3 km away would reach soon. For the design for the initial phase for trial we would be getting 2-3 old ambulances and modify it with all the necessary structures inside, once its ready will try it out.

5. RESEARCH DATA'S

AIS 140 GPS Helps in GPS Location Tracking: Real-time vehicle tracking very easy that will help you monitoring the route taken by the vehicle, the time taken by the vehicle and Route Optimization.

Emergency Request Button (PANIC/SOS): The vehicles which will be equipped with AIS 140 Certified devices will also be fitted with Emergency Request Button(s). Pressing the Emergency Button will send location information to the emergency server. The location packet which consists of Latitude and Longitude will be sent to the server every 5 seconds and this process will continue until the IP with this information isn't cleared. This will help the department in tracking the vehicle in case of an emergency and also enable the driver or passengers to apprise the control room of any kind of mishap or other emergencies.

Monitoring and Controlling Traffic Lights on Specified Path to Hospital: When the emergency sirens are turned on and the vehicle approaches within about 1,500 feet of an equipped traffic light, the traffic signals will change or remain green for the emergency vehicle to pass.

To identify possibility of ambulance on the road by using GPS: There is loss of life due to the delay in the arrival of ambulance to the hospital in the golden hour. This delay is mainly caused by the waiting of the ambulance in the traffic signals. GPS tracking will help in giving the best and the fastest routes. With all these it would be easy to track the Ambulance and can save life's.

Why this project? According to our research.

In 2017, Approximately 30% of emergency patient's deaths were caused by the traffic jams in the whole nation in 2017. This is something that we can't accept, we could have saved those life's but we failed because of our traffic, but we aren't going to make same mistakes in upcoming years. We are here FAST-LIFE has got your back in this. By our FAST-LIFE we can reduce this 20% to around straight away 5-8 % and obviously reducing one death itself is a great achievement. As days will move around, we can take help of advanced technology and can straight away flatten the curve to 0% and make our nation the great nations.

Other than these

At times some accidents do happen while paving way for ambulance in rush and this is also loss of life's and our app will reduce this ratio as well as. From 1990 – 2009 there were a total of 84,810 ambulance crashes

It will make life easier.

It will be simple to monitor the location of the ambulance.

This will suggest the nearest hospital and optimum route

As we could get the location near by this will be more helpful to the ambulance driver.

This will also help police officials in their busy schedule while managing traffic.

As this app come in move it will make people understand the importance of ambulance in their life.

This gives privacy by only accessible by police officials.

At an indirect way it assures the safety of life of the person inside as the police can track the location.

Ambulance drives can drive safely without any chaos.

It will be easy to use by both police and ambulance driver.

The App will have 2 parts: The police can access both; and the ambulance driver can have access to single part only

It will save lots of life's

There's nothing better than that.

Market value

Road traffic congestion becomes a major issue for highly crowded metropolitan cities. India is the second most populated country in the world and is a fast-growing economy. It is facing a terrible road congestion in the cities. According to Times of India about 30 percent of deaths are caused due to delayed ambulance to reach at hospital. Human life is affected due to delay in the arrival of ambulance. The ambulance is not able to reach the hospital in the golden hour. It gets stuck in the traffic signals. It would be of great use to the patient if the traffic signals in the path of the ambulance are ON. In proposed system we are trying to reduce the delay for the ambulance by giving A notification to the nearest traffic police so that he can, change the traffic signal or let it remain green for the emergency vehicle to pass.

Road traffic Congestion is one of the problems that needs to be noticed but goes unnoticed always, people mind saving life's by

calling ambulance but then they forgot that ambulance needs to reach hospital within time, our app full-fills that need.

According to the market value, we could say it does fulfil route specially for ambulance and traffic control. This map would be different from rest as these concentrate on ambulance and shortcuts from them to travel. We've researched and collected all data from google and compiled it and formed our own design for ambulance regarding the map we would make a few changes with the easiest routes visible for the drivers and police.

Our ethics is nothing but "Save human life's". Once our project gets finalized, we are keen on visiting investors regarding funding for our project. We would also be trying to collaborate this project with government as priority.

6. PRELIMINARY DATA

Importance

The response and transport intervals of an ambulance dispatch are affected by various factors. The present ambulance system relies on the driver's experience, knowledge of local road map and estimations of directions. These may contribute to delays, misdirection and inefficient utilization of resources. The objectives of this study were to assess the effects of GPS navigation nearby 1km radius signal opens automatically gives way to the ambulance device on the response and transport time intervals of an ambulance service operating in urban setting.

7. METHODOLOGY

We are on the process of creating an app, it will be known as "Fast life". It has it special purpose for serving people. It will be made available on both platform Google play and App store.

So, as the name "Fast life" it's all about saving life. The purpose of this App is to indicate the traffic police regarding arrival of ambulance within nearby distance to avoid traffic jam and make a clear way for ambulance. This works in a way the app will need a username and password mandatory to proceed and it will be given only to the police officials and only they are given access to the app. After police gets access to app, they can't use that all times, they will receive a particular notification when ambulance arrives near them. It will be as a special notification like an alarm to alert them. It's set this way so that there's no need for them to see phone always and get distracted.

Statement of Limitations

Alternative

An alternative idea to GPS-connected traffic signals for fast movement of ambulances could be the creation of dedicated ambulance lanes on major roads and highways. Similar to bus-only lanes, these lanes would be reserved exclusively for use by emergency vehicles and would be designed to allow for swift and efficient travel, free from the constraints of regular traffic.

These dedicated lanes could be implemented using physical barriers, such as dividers or concrete blocks, to ensure that other vehicles cannot enter the lane, or through the use of digital technology that enables automatic lane allocation based on the location of the ambulance. Traffic lights at intersections could also be programmed to prioritize the ambulance lane, allowing for smooth and uninterrupted movement.

This approach has several potential benefits. First, it eliminates the need for complicated and costly network of sensors and communication equipment required for GPS-connected traffic signals. Second, it provides a dedicated and protected space for emergency vehicles, reducing the risk of accidents and improving safety. Finally, it can offer faster and more reliable response times for emergency services, improving the overall quality of emergency care and potentially saving lives.

However, the implementation of dedicated ambulance lanes may require significant infrastructure investment and could result in increased traffic congestion in non-ambulance lanes, particularly during peak traffic periods. Careful planning and coordination with local authorities and traffic management systems would be necessary to ensure that the benefits of the ambulance lanes outweigh the potential drawbacks.

Weakness

While the idea of using GPS-connected traffic signals to facilitate fast movement of ambulances has many potential benefits, there are also several drawbacks and challenges to consider. Here are five major ones:

Limited Coverage: Implementing a GPS-connected traffic signal system would require significant infrastructure investment to cover all major roads and highways, and even then, it may not be possible to cover all areas, particularly in rural or remote locations.

Technical Challenges: The system's success depends on the accuracy and reliability of the GPS and communication technology used. Any technical failures or malfunctions could delay emergency response times, potentially leading to serious consequences.

Coordination with Other Vehicles: The system requires other vehicles to recognize the priority of the ambulance and move out of the way. Not all drivers may be aware of or follow the protocol, potentially impeding the ambulance's progress.

Implementation Challenges: Coordinating with local authorities, city planning, and transportation agencies would be necessary for successful implementation. There may be challenges in terms of funding, project management, and potential resistance from the public or other stakeholders.

Safety Concerns: Some may argue that the system's prioritization of ambulances could lead to an increased risk of accidents involving other vehicles, particularly in situations where drivers are rushing to clear intersections or move out of the way. Balancing the safety of all road users is a critical consideration when implementing such a system.

What Will Our Research Do?

Here are five major points on what research on the idea for a fast movement of ambulance with GPS-connected traffic signals could achieve:

Feasibility Assessment: Research can determine the technical feasibility and practicality of implementing a GPS-connected traffic signal system, as well as the required infrastructure and associated costs.

Safety Analysis: Research can assess the safety implications of prioritizing ambulances on the road, as well as identify potential risks and concerns for other road users.

Optimization Analysis: Research can analyze how the system can be optimized to improve response times for ambulances and reduce delays in emergency situations, as well as explore how the system can be integrated with other transportation technologies and systems.

Public Perception Analysis: Research can investigate public attitudes and perceptions towards the use of GPS-connected traffic signals to facilitate fast movement of ambulances, as well as explore potential barriers and facilitators to the adoption and use of the technology.

Impact Evaluation: Research can evaluate the overall impact of the GPS-connected traffic signal system on emergency response times, patient outcomes, traffic flow, and environmental outcomes, providing evidence on the effectiveness of the system and identifying areas for improvement.

8. CONCLUSION

There has been an alteration in the global pathogen range, spreading more infections, primarily vector borne. These infections have accelerated over the years due to climate change. Thus, at present, you can witness a sudden increase in medical ailments within the last few decades.

Rapid urbanization and change in land-use patterns have remained a primary factor for ages. With that, societal behavior steadily contributed to people adopting a sedentary lifestyle. This gave rise to costly long-term health problems.

However, there has also been growth in medical assistants and services provided by hospitals. Emergency ambulance service in Kolkata is getting infused with the latest technology to support patients during emergencies.

The most life-saving act is done by an ambulance – which aids the patient to reach the hospital on time and works as a life-saving solution. Let's see how!

Contribution of ambulance service to our society

Both public and private emergency ambulance services in Kolkata are available for the patient to save them during critical conditions. Usually, every hospital and private EMS has its ambulance operating system for immediate medical care. Thus, there has been a consistent rise in the life-saving graph after the development of ambulance transportation.

Patients with physical disabilities cannot use a regular vehicle to travel to the hospital. They won't even be able to go for treatment or examination – here emergency ambulance service in Kolkata is the adequate support.

Ambulance services can be termed prehospital medical care or reaction to emergency response. When an individual needs medical help, particularly during late hours, an ambulance is an ideal line that maintains a continuum with the hospital facilities. They follow two definite programs: "treat and transfer" and "treat and leave."

While shifting a patient from their house to hospital or from one hospital to another, specific emergency protocols must be followed. And only the paramedics available in the ambulance service have the core knowledge to cater to immediate medical care. They can provide the medical aid that is the need of the hour.

The backbone of any ambulance service is the medical professionals who treat the patient first. They ensure to keep the vitals stable until they reach the hospital, and the doctors proceed with the treatment.

They are certified and professional healthcare individuals who receive training to assist patients and provide them with the required medication during an emergency.

They are trained to deliver the most functional medical support, such as PCR, cardiac arrest restriction, treating bone fractures, pain control, paralysis, complication during childbirth, blood loss management, etc. Based on the latest reports, there have been more intervention activities and minimization of fatal incidents due to improvement in ambulance service. The latest development has made the facilities seamless and removed the patient block.

The initiatives of an electronic booking system, status board, tracking patient discharge movements, and timely alerts have maintained a continuum. The ambulance service works as a natural extension when the patient community is inaccessible or at a site with limited health practice.

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