A Review on Minimization of Ambulance Response Time Using Image Processing and Critical path Mapping Based on Traffic Control

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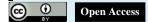shuja.shujarafiq@gmail.com[1], akheela@iul.ac.in[2]

Abstract

India is a developing country; the population of India is growing exponentially. India ranks 2nd in the world in terms of population. As there will be a gradual increase in population there will be an increase in the number of vehicles, as a result of which traffic congestion is increasing and as a result, emergency vehicles such as ambulances, fire-fighters, etc. are having difficulty getting to their destination on time. Vehicle use is growing rapidly due to recent technological and economic developments, and at the same time, the lack of infrastructure against demand is leading to an increase in the number of accidents and fatalities. Minor problems in our health system have prompted us to come up with a petition to make this process work and save lives. Through book reviews and reflections, I have proposed a project in a smart traffic management system using image processing. The aim of this project is to improve simulation to determine traffic congestion, to detect a crash/accident, and to obtain an ambulance using image processing and machine learning techniques. The proposed independent work is simulated in the form of an experimental setup using Arduino and LED displays that mimic real-time traffic. These simulation results reflect the terms of the acquisition as it provides an emergency vehicle pass to catch up on peak hours.

Keywords

LED, traffic signal management, traffic congestion

1. Introduction

Population in developing countries such as India is increasing significantly. This result in a number of problems such as heavy traffic jams, violation of the traffic rules and sometimes even accidents. For example, the number of road accidents in major cities such as Chennai, Hyderabad and Delhi increased to 16 deaths per hour, as stated by the Indian Government. Additionally, traffic congestion leads to long waiting times, fuel depletion and even money waste. In particular, traffic congestion contributes to high rates of emissions impacting the health of the local population, shuttles and animals. Traffic congestion is often commonly associated with some other traffic issues, such as the blocking of emergency vehicles. Precisely, the traffic congestion often blocks the path of the emergency vehicles which may Human Life is a very valuable thing for any country. The regular occurrence of incidents and medical emergencies such as fire, road accidents, medical emergencies etc. It is very necessary that emergency vehicles arrive on time to prevent serious loss of humans. Thus, hospitals and fire stations are throughout the city to reduce response time in case of such emergencies. A very rapid population growth in cities has resulted in tremendous road traffic within the city. In addition, in recent times the number of deaths due to delays in the arrival of emergency vehicle has risen to greater extent. Hence emergency services such as ambulances and fire engines must be on time to avoid loss of human life. In the current traffic situation, therefore, helping an emergency vehicle move out of traffic congestion is very much important. To solve the problems given above. In this paper, we have come up with the 'Smart Ambulance and traffic controlling system'. The main purpose of this device is to allow the ambulance to reach a specific location without making it stop somewhere before it reaches the destination.

2. Proposed System

The objective of the proposed project is to develop a simulator to determine the traffic density, ambulance, and accident incidents using image processing and machine learning techniques. In the first phase, we determined traffic density to minimize the delay caused by traffic congestion and to provide the smooth flow of vehicles. The density of vehicles on each side can be identified by using datasets. If the density is low on a particular side, the time for that side is normal and if the density is high the time will automatically increase compared to normal density. The second phase work simulates a crash or accident detection and for the prototype consideration, used static accidental image and trained model. During the third phase, analyzed the ambulance detection using a dataset, for the prototype consideration used static ambulance image and trained dataset. On detection of an ambulance, the traffic light is automatically changed to green.

3. Literature Survey

Vanjale et al [1] proposed a RFID-based system, which controls and controls road signals at the intersection of an emergency vehicle, by allowing direct traffic to exit traffic congestion. This paper proposes a road traffic control system so that when an emergency vehicle is on its way to a designated destination. The ambulance case is being tracked using GPS. This place is being sent to the app. The app creates an algorithm with the help of this data and therefore google map. It controls the signals in its path. They also introduced the current blue light to the stop light to avoid confusion in the minds of people waiting at the stop. Program performance depends on two key modules.

- GPS system
- Application Server

An ambulance for any emergency vehicle must be equipped with a GPS System. This GPS System will always send car links to the Server application. Each car must be logged into the android app. This application keeps tracking car and track tracks. The route has already been selected for the root cause of this route which is further accessed by the server. The application server receives all the information, depending on the information the server receives the car location and the selected route

to your destination. This helps to monitor the next stop light in the vicinity. Whenever a vehicle enters a certain distance from the signal server the server must send the required action so that the vehicle does not wait for the signal. A sign is also sent to the hospital where we are going so that the hospital management can treat the patient. Hospitals also provide the most important thing for the patient to support his or her condition. It helps when two ambulances arrive at a well-known signal at the same time. There is also a certain rule that the software should take the support of signal lights. The range of these possibilities is next if the signal is already green it will remain the same as long as the ambulance does not pass. there is also the threat that people may think it is a technical error if it is only green for a long time on a single track and may break the law to avoid this blue-green light being inserted into the signal, whenever other red signals give a car emergency.

Dang et al [2] have done a proposed work that provides a priority approach. This aims to create an integrated user HPV system where the HPV driver can send requests to the system where the system responds intelligently. The priority of the Road Segment (RS) is determined at the intersection of the road and the light ends up green with a moving car. They tested the algorithm in SUMO (Simulation of Urban Mobility) and showed good results by saving more than 50% of the time in various road forces (low, medium, high). The program is primarily aimed at addressing HPV traffic congestion problems. It is an interactive system where the user (i.e. the HPV driver) first attaches to the system before moving on to the phone. It then sends an invitation to turn blue on the system at the crossroads to recall the green signal. The plan calculates the prioritization of the entire RS downhill road. The system converts the bright light of the RS at a very high value. The system is progressing well by calculating the priority of all intersections after the TLDC period. Traffic Light Time (TLDC) can be a time cycle 1 that consists of a red and green wavelength at a crossroads. The model takes two states into consideration: Imagine that there is no ambulance where a bright light is found in any RS and the light runs automatically. Keep in mind that there are ambulances on all RS at intersections as his system prioritizes any RS traffic intersection and RS with the highest value converts gre over other RS across TLDC in this way -system prioritizes ambulances and other essential vehicles.

Meera et al [3] explored different light systems and other navigation systems and came to the conclusion that this method allows the android mobile device (emergency vehicle) to override the traditional stoplight functionality. The android and cloud-based control system using the GSM module is an effective and affordable solution that can solve this problem. The program contains 5 categories which are android mobile device, GSM module, MQTT (IoT) for Arduino IDE, Arduino Uno microcontroller and road signs. The upgraded system has allowed the android mobile device (emergency vehicle) to override the traditional functionality of the station. In this paper they developed an android-based control system and cloud using the GSM module. Travel debates probably only involve performance analysis of how special mobile technology can reduce the barriers to a particular area of activity. The upgraded version within this paper has allowed the Android mobile device (emergency vehicle) to bypass traditional stoplight functionality. They are using an android and cloud-based control system using the GSM module. The system contains an Android mobile device, GSM module, MQTT (IoT) for Arduino IDE, Arduino Uno microcontroller and road signs this method will be very useful for the safety and security of the public, thus ensuring that no current adherence is present. MQTT is a "Internet of Things" tracking system and is used for sensors that connect to home automation devices and small device environments, which explains how the system works. The stop unit will be built and controlled by Arduino Uno microcontroller with proper pro. In this paper they developed an android and cloud-based control system using the GSM module.

Smith et al [4] have proposed the system which comprises of 5 stages which are Android mobile device, GSM module, MQTT (IoT) for Arduino IDE, Arduino Uno microcontroller and traffic signals this paper, they need proposed an adaptive Traffic Management System (TMS) combined with a symbolic logic-based scheme so as to require appropriate actions to hurry up the progress of emergency vehicles while avoiding the creation of bottlenecks around their routes. This is often achieved through. The TMS has multiple steps at its disposal to ensure the quickest possible response to an emergency; a number of these will

be performed at dispatch time whereas others must be performed dynamically while the EV is on the way toward the emergency location.

Faldu et al [5] announced a paper on constant versatile control framework. In present world, the matter of gridlock has become a huge concern. It's limited to megacities or metropolitans as well as in any event, for little urban communities; thus they require a savvy or insightful control framework. Their current control framework isn't versatile yet depends on schedule and autonomous of the traffic thickness. This static nature makes it loud, flimsy and wasteful. A genuine time traffic data preparing and observing expert gram is proposed for tending to this issue of controlling traffic paths. This model screens the leeway season of every path consecutively and depends on the real-time thickness of traffic. Leeway time computation is versatile and insightful, also to the current prioritization for crisis vehicles and location or following of the taken vehicles makes it more brilliant. The crossover approach utilized in this model makes a grasp over different strategies. The data is gathered at both nearby and focal level subsequently improves it for circumstance when one taking all things together them fizzles. The combined thickness determined gives exact leeway time since both the individual strategies have a few downsides in specific conditions that the crossover model attempts to downsize mistakes in a single strategy and subsequently give more precise outcomes. All the information gathered and remaining of the traffic is accounted for to the room and will be gotten to by basic GUI. These might be additionally reached out to show traffic status to the clients. The information gathered of traffic thickness at various occasions of day is utilized for investigation reason and expectation of the traffic at various occasions of every day. The broke down information at that point might be acclimated anticipate gridlocks at various areas of town. Subsequently the model could be a finished bundle for savvy control framework which might be reached out for making total transportation smart.

Bhat et al [6] have done the investigation that the most noticeably awful foe of people carrying on with a metropolitan way of life is drive. The dramatic increment inside the quantity of vehicles and transport alternatives has prompted an unavoidable expansion in clog of pathways, which has required the necessity for a proficient hold up control technique. The framework is pointed toward accomplishing control in non-industrial nations like India, where extra boundaries should be viewed as like street quality. It works on the rule that at any moment of your time, no vehicle should be permitted to go to for more than the average vehicle holding up time, right then and there. It additionally focuses on hardware, for example, ambulances, and perceives uncommon occurrences, for example, ro promotion accidents. The focus of the framework is to scale back the normal holding up time that each vehicle should stand by, before it's permitted to pass, while likewise guaranteeing consistency inside the holding up occasions. The framework is a proficient and profoundly monetary answer for traffic issues in metropolitan urban communities in India, where dramatically expanding traffic might be a developing concern. The framework is straight forward to actualize, doesn't include a decent arrangement of complex calculation, thinks about of boundaries and precisely decides ideal normal vehicle holding up time.

Punit et al [7] has introduced the autonomic processing suggest as a self-overseeing highlight that autonomic framework, deals with the body. A framework is autonomic in the event that it can screen changes without help from anyone else dissect, plan activities according to it and execute them consequently in order to turn into a solid framework. The current work centers around a genuine life contextual investigation of light administration framework, assumes a pivotal part in our everyday lives. In many spots, particularly in non-industrial nations the light framework is time limited, which once in a while doesn't permit an emergency vehicle conveying a patient to have light red light. Consequently, there ought to be a savvy light sign framework which may defeat with such issues, permit the emergency vehicle to have stoplight whether it's red or green. This might be finished utilizing a remote sensor organization and voice acknowledgment innovation. Execution of this idea in rush hour gridlock the executives by dealing with the traffic thickness on streets permits smooth and uniform float of traffic. Making traffic lights autonomic, permits perceiving the accustomed traffic thickness and voice of a particular vehicle and likewise courses the traffic. Each approach has some preferred position and inconvenience as during this methodology it ought to be conceivable

that voice acknowledgment framework may neglect to recognize the emergency vehicle alarm hence distinguishing it as a standard vehicle or may some of the time perceive an ordinary vehicle as a rescue vehicle, presently days different types of sounds are getting utilized as a horn sound on streets. Other factor which is characterized as constraint, that in the event that vehicles include just in sensor-initiated region clearing other span, at that point the sign may accept it as expanded thickness of traffic and can decrease the backup time while there's less thickness. Every one of them realized that rules are for people, yet people aren't for rules. Lifetime of a person's being is definitely more significant than keeping a standard which can bring about most exceedingly awful circumstances. Subsequently, passing emergency vehicle in this way, that it can arrive at the medical clinic quickly and save lifetime of humans. The since quite a while ago run scope incorporates the reproduction of the methodology utilizing NS2, OMNeT++ or the other reenactment programming's and breaking down it for traffic the board.

Janani et al [8] has done examination concentrate on street gridlock turns into a difficult issue for exceptionally jam-packed metropolitan urban areas like, Chennai. Emergency vehicle is perhaps the most basic administrations influenced by gridlock. This paper has thought of the arrangement of astute programmed control of emergency vehicle to streamline the rescue vehicle development. Their program creates a cloud-based android application that joins both the rescue vehicle and the traffic signal station. Plan framework makes utilizes oftenest Identification (RFID) innovation to actualize the smart traffic signal control. The key idea driving the proposed framework is to follow the RFID labeled rescue vehicle and send the subtleties to the cloud if the rescue vehicle stops on the route because of a traffic signal. After the client's affirmation through the portable application, the genuine sign is molded green for commonly and after the rescue vehicle cruises by, it recovers its unique flagging succession stream If this plan is totally robotized, the emergency vehicle spot is recognized, the traffic signals are overseen. Their framework controls the traffic signals and save the time in crisis periods. It along these lines fills in as a venture for lifelines. Human existence is valuable and should follow wellbeing estimates cognizant on the whole perspectives this after all incorporates ambulances benefits as well. In this, by utilizing clever rescue vehicle framework they'll accomplish the continuous help of the control framework by executing the substitute strategies for signal change to allow stream control. The exactness of the RFID is very camera's so this additionally improves the presentation of stoplight infringement discovery framework. Plan framework is financially savvy, different uses and sent utilizing moving IOT, which is more productive.

Singh et al [9] have done examination concentrate on tie up and flowing on current traffic the board, which is dealing with two significant issues in present day metropolitan zones which cause street mishap and death toll. To conquer this, they presented Automatic Ambulance Rescue System (AARS). The primary thought behind this plan is that via consequently observing traffic Signals on the course, emergency vehicle can enter the clinic effectively as expected. The emergency vehicle is worked by a control unit that gives the briefest course to the medical clinic and control traffic signals. The sensor detects the spot and furthermore the closest rescue vehicle arrives at the mishap spot. The traffic signals inside the way of the rescue vehicle are controlled. The emergency vehicle is driven along the most limited course to clinic by worker. The vehicle unit introduced in vehicle detects the mishap and sends the situation of the mishap to the worker inside the rescue vehicle area. The worker recognizes the emergency vehicle, nearest to the spot of the mishap and furthermore the briefest way between the rescue vehicle, the spot of the mishap and the closest clinic. In this paper, they need portrayed a plan for naturally controlling the traffic lights so the emergency vehicle would be prepared to cross all the traffic intersections and arrive at clinic immediately. Human existence is influenced to hazard by the deferral inside the appearance of rescue vehicle. The rescue vehicle isn't prepared to arrive at the medical clinic inside the brilliant hour. The predominant framework has numerous impediments. It relies upon the method of checking individuals to be manual which finishes in time delay and since of that wellbeing administrations cannot be given to the patient on time which brings about loss of human existence [12 -15]. The emergency vehicle is guided to the medical clinic by the focal unit through the most limited course. The sensor introduced inside the vehicle detects the mishap and Global Positioning System (GPS) tracks the situation of the mishap. It sends the occurrence area to the crisis segment through Global System for Mobile Communications (GSM). The focal unit finds the emergency vehicle, closest to the

mishap spot and furthermore the most limited way between the situation of the mishap, emergency vehicle and subsequently the closest medical clinic. Here, remote advancements are acclimated move data.

Bhilawade et al [10] has done investigation concentrate on over the globe, there has been a fast expansion in vehicle numbers. There are roughly 1 million authorized vehicles inside the most recent year so that traffic issues have expanded inside the several years and along these lines the current light regulators have constraints since it utilizes the fixed equipment which don't have the flexibleness of change on ongoing premise. Consequently, the time timespans, orange and red sign s are set, so the holding up time is more noteworthy. To shape this light controlling more effective they arise new procedure called as insightful control framework. This uses sensors along with installed innovation. The timings of the red and green lights are shrewdly settled upheld the traffic on streets. When contrasted with past fixed mode light regulator this new framework is more proficient and adaptable. It additionally has office to pass the crisis vehicles like rescue vehicle, fire detachment and so on so distinguishing and furthermore recording taken vehicles. The look additionally has scope for additional extension. Green wave framework was acclimated give freedom to any crisis vehicle by turning all the red lights to green on the path of the crisis vehicle, the biggest weakness For the green waves, the disturbance will mess traffic up when might be heightened by the synchronization. In such cases, the line of vehicles during a green wave fills in size until it gets overlarge and a couple of the vehicles can't arrive at the green lights this is brought excess as expected, and should dodge.

Sudhakara H M et al. [11] India is an agricultural nation; populace of India is altogether developing. India remains inside the second spot on the planet as far as populace. As there will be increment in populace steadily there will be increment in number of vehicles, because of which the gridlock increments and due to which the crisis vehicles like emergency vehicle, fire motor and so on face hard to arrive at the objective as expected. Under these conditions, a promising framework that can clear the traffic light particularly I n top hours and accordingly give a protected course to crisis vehicles is critical. In existing writing there's less spotlight show on the crisis vehicles to clear the path, to defeat this issue a RFID based framework is proposed by utilizing this method we will oversee and manage the traffic lights at intersection which crisis vehicle draws near. Accordingly, there'll be simple dropping for the crisis vehicles in gridlock. The proposed outline work is demonstrated by the methods for a trial arrangement utilizing Arduino and LED shows which mimics a genuine time traffic situation. This reenactment results represent the terms of identification still as is giving.

4. Conclusions

The existing system doesn't provide a transparent path for emergency vehicles during traffic congestion. Traffic Density Analysis, Ambulance, and Accident detection System Using Image Processing has been discussed in this proposed system. From the literature survey, we've found that RFID-based smart traffic control system provides an answer to the traffic congestion problem and this can be also an efficient method to supply a transparent path for the emergency vehicles when identified within the lane, as we also implemented sharing of patient's vital data with hospital we updated Arduino uno with Arduino mega board so it'd be sufficient for storing of patient vital parameter and simultaneously it performs capturing of present status of traffic signal present in different path and we also added another system in the junction which repeatedly scans the density of the lanes so that the system can automatically allow the lane which has high density by this technique the emergency vehicles experience less congestion and reach faster to the destination and thus many life's were been saved.

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