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How AI Helps in Emergency Services?

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Abstract

The emergency vehicle priority (EVP) system is a time necessity to reduce the transit time of emergency vehicles in cities. These cities are important economic centres and are therefore among the most densely populated cities in the world. Due to many such problems, ambulances cannot reach patients and hospitals on time. This white paper proposes a system that can help accurately identify ambulances and establish a makeshift hard shoulder on the route they should take. This system relies on a neural network-based siren classifier to detect ambulances using speech processing. The overall accuracy of the siren classifier was 97.2%. When an ambulance is detected, this information is relayed to a network of Internet of Things (iot) devices that activate visual indicators of the ambulance's route. Traffic on these roads may begin to form a temporary breakdown lane when the visual indicator is activated. A network of iot devices consists of host and station/node devices in a chain-like connection where all devices communicate over a local wifi network. The host gets information about the ambulance from neural networks and a mobile app. The host then sends this information up the chain to other node devices. It is hoped that our proposed system will reduce ambulance travel time, enabling more rapid treatment of accident victims, heart attack patients, etc.

Keyword:-emergency vehicle, traffic lights, traffic monitoring, priority.

Introduction:-

The main concept of the intelligent traffic control system is to Ensure a smooth flow for the ambulance to reach the hospital This minimizes traffic-related delays and Traffic jams. Today, street traffic in Indian cities is one of them. Of serious problems. [1] The number of vehicles on city streets although it is increasing day by day, the roads and infrastructure in the city are not gaining weight as expected [2]. Traffic light game control It plays a big role in avoiding road congestion. It rules A system that reduces the workload of police officers complete tasks for signals. The system is used to monitor the density of street traffic. For emergency vehicles such as ambulances, Image processing is recognized and communicated. A system that clears traffic at risk by turning it Green roads are used by emergency vehicles. Everything else The traffic light turns red. After passing this vehicle normally The signal continues as is. The system provides green corridors such as organ transplants.

A system to ensure communication between ambulances Different devices at traffic lights, hence the possibility congestion is reduced. In India, 33% and 99% of people die in road accidents and heart attacks respectively. Delays in the arrival of ambulances and hospitals due to traffic jams. For emergency vehicles such as ambulances And bridge fires.

The system provides green corridors such as organ transplants. A system to ensure communication

between ambulances and different devices at traffic lights, hence the possibility of congestion is reduced

How It's work:

An Dan Saffer, author and creative director of Smart Design, believes that only potential fines (and good conscience) stop you from driving at a red light (RLR) at a traffic-free intersection. New York City in 2021 will have more red light violations than any year since 2014. Intelligent traffic lights are equipped with sensors, video capture, and connectivity technologies to collect real-time data from the environment. The resulting data is either pre-processed on the device or sent to a cloud-based traffic management system and processed by predictive traffic light algorithms that generate signal adjustment instructions. A standard intelligent traffic lighting system consists of two elements: 1) Street unit2) Cloud Control Centre Emergency vehicles require priority access to roads. Every minute delay in emergency medical care reduces your chances of survival by 7% to 10%. Similarly, delays in the arrival of police, fire brigade, and other emergency services can have serious consequences. Nevertheless, emergency vehicles are often stuck in heavy traffic, requiring drivers to move sideways to create an emergency. Following a traffic light system with intelligent emergency vehicle traffic light changers, he can address this in four ways. Update signals to allow emergency vehicles to move faster modified grid signals to distract vehicles from affected area implement priority signals near emergency vehicle garages, parking lots, or stations Notify drivers before emergency vehicles pass, giving them extra time to drive

The Architecture of an Urban Traffic Management System (UTMS)

WSNs and VANETs for smart cities [35] are becoming a reality with increased options for area coverage and connectivity stemming from machine-to-machine communication [36] and the Internet-of-Things [37,38,39,40,41]. An Urban Traffic Management System (UTMS), depicted in Figure 2, refers to a system that integrates sensing technologies, data processing techniques, wireless communications and advanced technologies to reduce traffic congestion, travel time, fuel consumption and provide priority-based signaling. On obtaining the data of emergency vehicles from sensors, the Traffic Management Centre (TMC) follows the distance-based emergency vehicle dispatching (DBEVD) algorithm and provides signals to the emergency vehicle immediately. The TMC of the present intersection (TMCA) provides the TMC of next intersection (TMCB) with the velocity of emergency vehicle and vehicle count moving towards intersection-B. As the TMCB knows the velocity of the emergency vehicle, it can estimate its arrival time at intersection-B. The TMCB determines the green light sequence and green light duration based on the estimated arrival time of the emergency vehicle, and the vehicle count value sent by the TMCA. Therefore, the emergency vehicles passes through the intersections with no or little delay. On using the proposed algorithm, the UTMS can effectively handle the emergency vehicles and thus save lives and property.

Traffic Management Center

In this subsection, we describe the functionality of the Traffic Management Centre (TMC) and the role of each of its units. The schematic of a typical Traffic Management Centre (TMC) is presented in Figure 3. The presently used traffic light pre-emption systems can be categorised based on their operation as: optical systems, radio-controlled systems, GPS-based systems and acoustic sensor-based systems. Acoustic sensor-based systems outperform the other pre-emption systems in terms of accuracy and installation cost. Extensive work has been conducted on detecting emergency vehicles based on their siren sounds. We summarize the proposed approaches for emergency vehicle detection based on siren sounds in

The acoustic sensors collect the siren signals and forward them to the Road Side Unit (RSU). The Road Side Unit (RSU) includes a frequency measuring controller (Arduino UNO) to detect the emergency vehicles. The RSU collects the siren signals from the acoustic sensors and forwards them to the frequency measuring controller. The controller detects the emergency vehicle by its siren frequencies. The controller measures the frequencies of siren signals and computes the average of measured frequencies. The frequency measuring controller sends the alert signal to the traffic signal controller (Arduino Mega), if the frequency is between the range of yelp or wail. The traffic signal controller stops the fixed sequence and light length algorithm and executes the emergency vehicle dispatching algorithm on receipt of arriving emergency vehicle information. The data collection module gathers the data from all the RSU's and forwards it to Traffic Signal Control Module (TSCM). The TSCM has two units, namely traffic

analysis unit and traffic signal controller (Adriano mega). The camera sensor captures the real-time traffic video and inputs the traffic analysis unit, where the raw traffic data is processed and analyzed. The traffic controller unit gets the data like distance, velocity, traffic density, vehicle count, etc. from the traffic analysis unit. The controller executes the proposed algorithm and sends its decision to traffic lights. After the passage of an emergency vehicle, the system resumes its normal operation, i.e., fixed sequence and light length algorithm. In the following, we discuss distance measurement techniques, vehicle counting methods, a distance-based emergency vehicle dispatching algorithm and the simulation environment.

Distance Measurement Techniques

At present, the popular distance measurement techniques include ultrasonic, infrared, laser, machine vision and radar measurements. The distance measurement based on machine vision obtains the value of the distance by the real-time processing of visual signals. There are different techniques to measure the distance between the vehicle and the camera. We perform the distance measurement by computing the Euclidian distance, Manhattan distance and Canberra distance [49,50]. In the following we briefly discuss these distances:

Advantages

Many developed countries such as the United States, Australia, Russia, and the United Kingdom are developing intelligent traffic management systems. Even developing countries like India are working on intelligent traffic management systems. Automobile sales are increasing in developing countries, which leads to more traffic on the roads. In India, traffic management issues have become a significant issue in large cities such as Mumbai, Chennai, and Delhi compared to other cities. To manage traffic, countries like India look forward to adopting intelligent traffic solutions. Intelligent traffic management systems help identify congested areas and alleviate congestion accordingly. This action uses sensor data to analyse and synchronize in real-time. Given the input data, a traffic jam causes a traffic light to flash. This system can reduce pollution and increase road safety. Traffic control units are used to manage and control heavy traffic on roads. There is a video surveillance system that monitors traffic with installed cameras, and when vehicles increase in a particular location, traffic controllers are notified and action is taken to prevent congestion.

Disadvantages

1) Maybe. Clash with others. Same signal. Intersection.

2) Delays may occur.

3) Yes. Accidents happen. Intersection.

4) During heavy traffic. Jam before. Traffic lights, vehicles. Have to wait.

5) Possible vehicle. Communicate with only one is closest. Traffic lights.

Vehicular traffic is endlessly increasing everywhere in the world and can cause terrible traffic congestion at intersections. Most of the traffic lights today feature a fixed green light sequence, therefore the green light sequence is determined without taking the presence of the emergency vehicles into account. Therefore, emergency vehicles such as ambulances, police cars, fire engines, etc. stuck in a traffic jam and delayed in reaching their destination can lead to loss of property and valuable lives. This paper presents an approach to schedule emergency vehicles in traffic. The approach combines the measurement of the distance between the emergency vehicle and an intersection using visual sensing methods, vehicle counting and time sensitive alert transmission within the sensor network. The distance between the emergency vehicle and the intersection is calculated for comparison using Euclidean distance, Manhattan distance and Canberra distance techniques.

Al can help emergency services by providing automated services that can assist with emergency response, such as predictive analytics and machine learning algorithms to detect patterns in emergency situations and dispatch the appropriate resources. Al can also assist emergency services with tasks such as mapping, route optimization, and resource allocation. Al can also provide automated alerts and notifications to emergency services personnel in order to help them respond quickly and effectively.

LITERATURE SURVEY:-

In paper[1] presents an Internet-of-Things-based objective for emergency vehicle priority and self-organized traffic control (EVP-STC) management at intersections. The increase in number of motor

vehicles, traffic jams in urban areas are creating a major problems. Traffic jams, especially those at junction, not only increase waiting time for drivers additional algorithm based on Artificial Intelligence is used but also increase consumption of fuel and air pollution[1].called EVP-STC that contains three main systems. The first cameras b) and sensors, then control traffic signals. An congestion. Apart from this, fids are also used to controller then sets the timings of traffic signals based on delays, lane opening times, and delay for emergency detected real-time traffic. The second system is fixed at each effectiveness of the proposed platform, which reduces total Fire brigade vehicles during a traffic jam. Smoke sensors are In emergency vehicles and this provides GPS coordinates to In paper[2], author proposed a new platform and protocol In paper[3] system takes input from traffic density as a) Intersection controller via zig bee. The third system is fixed Locate vehicles. It sends the gathered information to the Prioritize the emergency vehicles such as ambulances and Road segment and this contains force resistive sensors to Segment proceeding towards junction. The intersection Signals and this gathers information about emergency System, called the intersection controller, is fixed at traffic The intersection controller to avoid delay for emergency To predict the traffic density for future to reduce the traffic

Vehicle position and vehicle density data at each road Vehicles at junctions. Simulation results show the Vehicles. Also part of this system to detect the situation in case of fire

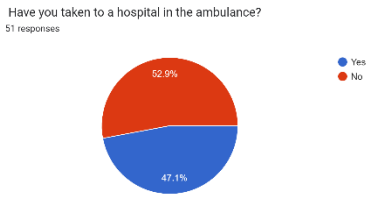
On the road. To demonstrate the effectiveness of the Proposed traffic management system, a prototype is Developed which not only optimizes the traffic flow but also Connects nearby rescue departments with a centralized Server. Traffic seems to be an adaptation problem rather than An optimization problem The paper aims at examining Methods to build an intelligent system that can combine and

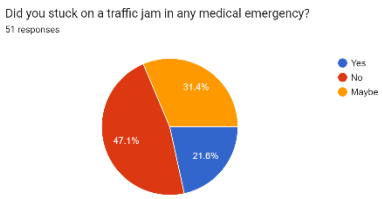
Support some of the existing technologies of traffic control And therefore reduce the average waiting time of vehicles on A junction. The proposed algorithms are adjustable to flow Of traffic at any junction point of roads. Simulations of the Real-life traffic scenarios are conducted in a simulated Platform called Green Light District Simulator (GLD) to Generate graph average waiting time versus cycles. The Results generated show that the proposed method is Effective for the traffic control in a real road intersection. In paper[4] author proposed the RFID tags for the traffic Density measurement which leads to the usage of RFID Readers to be mounted near every signal which is very cost Increasing solution. So this system leads to lot of Maintenance cost considering the real time use of readers 24x7 & also the system requires additional hardware Processors to be mounted at every signal for processing the RFID readers working. In paper[5] , the density of vehicles is checked by making

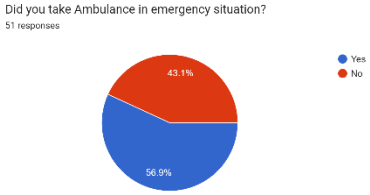
Use of IR sensors which are connected to the PIC controller. Which means that there will be a need of multiple IR sensors At every signal-connected road, which is not a feasible Solution because IR sensors have a very limited scope and Very limited lifespan.

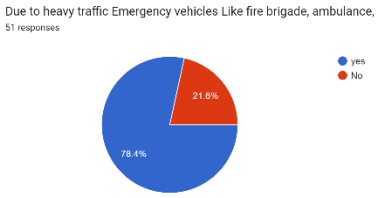
Public Survey

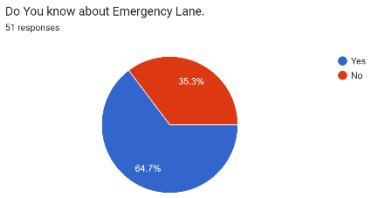
We first conducted a poll of people through Google form creator and data collection service to acquire information regarding people's awareness

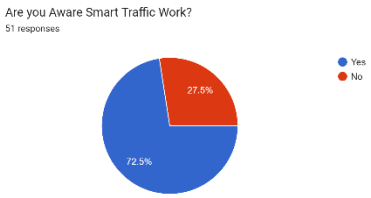












Descriptive Analysis

Descriptive statistics is a means of describing features of a data set by generating summaries about data samples.

Have you taken to a hospital in the ambulance?	
Mean	0.47619
Standard Error	0.077998
Median	0
Mode	0
Standard Deviation	0.505487
Sample Variance	0.255517
Kurtosis	-2.09229
Skewness	0.098915
Range	1
Minimum	0
Maximum	1
Sum	20
Count	42

Did you stuck on a traffic jam in any medical emergency?	
Mean	0.714286
Standard Error	0.12881
Median	0
Mode	0
Standard Deviation	0.834784
Sample Variance	0.696864
Kurtosis	-1.30695
Skewness	0.592968
Range	2
Minimum	0
Maximum	2
Sum	30
Count	42

Did you take Ambulance in emergency situation?	
Mean	0.619048
Standard Error	0.075841
Median	1
Mode	1
Standard Deviation	0.491507
Sample Variance	0.24158
Kurtosis	-1.8309
Skewness	-0.50864
Range	1
Minimum	0
Maximum	1
Sum	26
Count	42

Due to heavy traffic Emergency vehicles Like fire brigade, ambulance, police get stuck in traffic.?	
Mean	0.809524
Standard Error	0.061326
Median	1
Mode	1
Standard Deviation	0.397437
Sample Variance	0.157956
Kurtosis	0.706137
Skewness	-1.63548
Range	1

Minimum	0
Maximum	1
Sum	34
Count	42

Do You know about Emergency Lane.	
Mean	0.642857
Standard Error	0.074832
Median	1
Mode	1
Standard Deviation	0.484966
Sample Variance	0.235192
Kurtosis	-1.70074
Skewness	-0.6186
Range	1
Minimum	0
Maximum	1
Sum	27
Count	42

Are you Aware Smart Traffic Work?	
Mean	0.714286
Standard Error	0.070552
Median	1
Mode	1
Standard Deviation	0.45723
Sample Variance	0.209059
Kurtosis	-1.08545
Skewness	-0.98419
Range	1
Minimum	0
Maximum	1
Sum	30
Count	42

Conclusion

In conclusion, ambulances can be kept from saving lives by traffic jams, crashes, and unnecessary lengthening of ambulance travel times. Ambulances are incredibly important to the health and safety of citizens, so it is in everyone's best interest to make sure that they can safely reach emergency situations. Therefore, Ambulance Routes and alarm lights should be implemented along roads that lead from hospitals to major residential areas. They are small and worth any extra costs that they pose to communities. For these reasons, they should be implemented, not only in my community but in every community across the country. The results have proven that the proposed PE-MAC achieves lower end-to-end delay compared to the considered schemes. From our work, we can confirm that the emergency vehicle information is measured accurately by using visual sensing methods and the measured information is delivered to the TMC in less time by adopting the proposed PE-MAC protocol. The potential impact of the proposed work is extensive as, being an inexpensive, effective, and accurate, it can be effectively applied in practice. Further research should be done on distance measurement in bad weather and high traffic conditions.

References:-

[1] Ajmal Khan1, Farman Ullah1, Zeeshan Kaleem , Shams Ur

Rahman, Hafeez Anwar1, And You-Ze Cho, "EVP-STC:

Emergency Vehicle Priority and Self-Organising Traffic Control at

Intersections Using Internet-of-Things Platform", Digital Object

Identifier 10.1109/ACCESS.2018.2879644

[2] Sabeen Javaid, Ali Sufian, Saima Pervaiz, Mehak Tanveer, "Smart

Traffic Management System Using Internet of Things",

International Conference on Advanced Communications

Technology(ICACT)

[3] Juhi R Srivastava, Dr. T. S. B. Sudarshan "Intelligent Traffic

Management with Wireless Sensor Networks", 978-1-4799-0792-2/13/$31.00 ©2013 IEEE

[4] Tejas Naik, Roopalakshmi R, Divya Ravi N, Pawdhan Jain,

Sowmya B H and Manichandra, "RFID-Based Smart Traffic Control Framework for Emergency Vehicles", Proceedings of the

2nd International Conference on Inventive Communication and

Computational Technologies (ICICCT 2018)