Iot- Embedded Based Traffic and Accident Detection Module Lightweight Management for Smooth Emergency Vehicle

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Abstract:-Road bridges around the world have led to the deaths of people due to failure to comply with timely traffic accidents, critical patients, doctors, equipment and medicines. With endless increased ubiquitous traffic, it has become a promising platform for integrated intelligent traffic management (ITMS) of the Internet of Things (IoT) and special vehicle networks (VANET). Researchers have suggested several solutions in the literature, but do not consider how the ambulance is preferred when the highway system has abandoned the piracy. In this article, the current scenario suggests a new smart traffic management system for smart cities after filling the gap in research that has not yet been investigated. Our solution not only moves the ambulance to find the most possible route to the destination, but also measures to solve the problem when the signalling system breaks down during operation. To illustrate the advantages of the proposed solution compared to the one already proposed, we have a simulation environment (CupCarbon simulator) to simulate various scenarios representing the actual trajectory and movement of the vehicle being implemented. The observed results show the advantages of our solution over advanced solutions.

Keywords*:-ArduinoUno,GPS module,GSM module,IOT, Accelerometer,Accidentdetection.*

I. INTRODUCTION

The Internet of Things is a technique in which we connect various physical devices, such as vehicles, toasters, road signs and many other devices, to wired and wireless electronic devices and software to exchange data and sometimes commands. This is a network of devices used to collect data. Every day, just like the fan switch, you can connect to the Internet, so you can control the fan speed and turn it on or off via a website or a mobile app, you can also know how long it stays on and off. The admirer. If you forget to turn off the fan when you leave the house, you can check the status and, if you leave it on, you can disconnect it from your mobile phone or from another device connected to the Internet.

There are many other examples of the Internet of Things application: how to monitor the temperature in your room by connecting a digital thermometer to the Internet. IoT also ranks in the medical and defence sectors. The data collected by the devices use data analysis to improve services.

It is very sad to write, but many people get lost every day because of road accidents. Many people can be saved if emergency services can arrive on the scene early and receive early medical attention. You can do it with IoT.

In intelligent traffic management for emergency vehicles, traffic lights are connected to the Internet and can be controlled from the website to provide a smooth passage for the emergency vehicle, forcing the green signal into the desired lane of the vehicle.

2.RELATED WORKS

Shekheretal.[3]introduced an effective VANET-based navigation system for ambulances. This solves the problem of determining the shortest route to the destination, eliminating real-time traffic information updates and eliminating historical congestion based on historical data. A dynamic routing system has been proposed that integrates a real-time traffic scenario with a satellite positioning system (GPS). The system also includes a metro rail network with a road traffic system that manages ambulances in real time.

Djahelet al.[4] An adaptive structure for the efficient management of ambulance vehicles was also presented, which not only dynamically adjusts traffic signals, but also recommends the necessary changes in behaviour, changes in management policies and the implementation of measures. Safety Necessary for Drivers. Sunder et al. [5] proposed a rational way to control traffic, clean ambulances, detect stolen vehicles and control traffic congestion. This is done by counting the number of vehicles driving on a particular route, inserting radio frequency identification (RFID) tags into the vehicle to detect stolen vehicles and send messages to the police station. It also uses the ZigBee module

to contact the traffic controller for priority to the ambulance. The author of the reference literature [6] used a different approach to launch a priority intelligent traffic control system for ambulances. In other words, ambulances are classified by priority and type of accident. They also came up with a safe way to detect and respond to pirate traffic signals. The ITS system was introduced in accordance with the reference [7] Green Wave system. Then the traffic light system can receive all green signals along the way in green whenever it hits an emergency vehicle. The project's signalling system also detects stolen vehicles that resolve green signals. The main drawback of 'Green Wave' is that it can cause strong interference if the timing of the signal is matted.

Although some researchers have developed many approaches to offering clear paths for ambulances after an ambulance was supposed to travel from one direction. Until now, very few of the existing ITMS have considered the case of possible attacks in which the traffic signal system may also be vulnerable. Some researchers investigated possible cyber-attacks on autonomous vehicles and listed the types of attacks that can be carried out on these vehicles. Autonomous vehicles can identify their surroundings with the help of various sensors [8]. Important research has focused on reducing collisions or collisions on roads [9, 10] and managing traffic jams using various concepts such as Machine to Machine (M2M), IoT and VANET [11, 12]. Optimal route planning to guarantee the shortest travel time was presented in [13, 14], while the transmission of traffic information, such as traffic statistics, vehicle density and weather conditions, etc., was proposed in references [11 15]. Therefore, it is appropriate to say that several jobs were done for the traffic control system, but not many focused on setting priorities for ambulances..

3.PROPOSED SYSTEM

In India, all emergency vehicles have a present siren sound and follow a similar pattern. The siren sound repeats at 2t. The tone repeats at 960 Hz and 770 Hz at 1.3 second intervals. The siren sound is influenced by the Doppler effect, and the frequency changes according to the movement of the emergency vehicle..

The proposed system works in two phases. The first phase concerns the detection of the emergency vehicle and the second phase concerns the action at the intersection.

The system uses the sound detection sensor, the camera and the microcontroller to process the data. The proposed system uses LoRa technology for communication. The dataset of different emergency vehicle models will be stored in the smart object, which will be used to compare the current emergency vehicle with the existing dataset. The camera will be installed on the smart object and

It will be well positioned to capture only the required part of the path.

In the first phase, the intelligent object detects the emergency vehicle on the road through:

If the emergency vehicle is reaching the signal, the intelligent object positioned (within 200 m) of the signal junction will detect the sound of the emergency vehicle siren using the sound detection sensor.

The next process in the smart object is to match the moving object on the road with the stored data set. The camera will be configured to capture images of vehicles on the road as soon as the smart object detects the sound.

If both conditions meet, the smart object sends the message to the decision support system that it is centralized in Union signal.

The second phase concerns the decision. Signal merge will be installed with the decision support system. This system receives signals from intelligent objects that are positioned on the different roads they cross at the intersection. All smart objects and the decision support system will be organized in star topology. The central decision support system is responsible for making the appropriate traffic compensation decision in the lane in which the emergency vehicle travels.

The decision support system will be installed with acoustic sensors near the intersection that operates on the reverse Doppler

Effect, to ensure that the emergency vehicle has crossed the intersection so that it can return to normal operation.

Fig1: System architecture

BASICBLOCKDIAGRAM

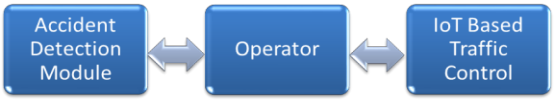

Fig2:-BasicBlockDiagram

4. PROPOSED CIRCUIT DIAGRAM OF ACCIDENT DETECTION MODULE

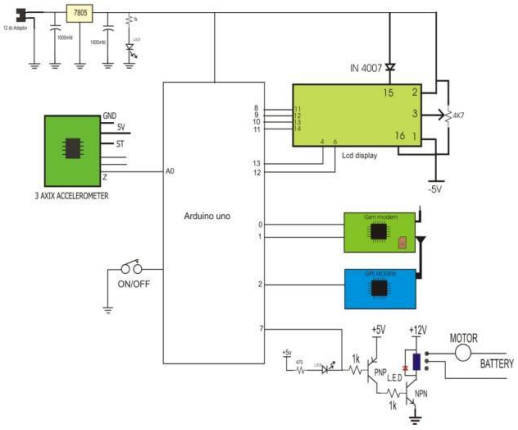

Fig3: Proposedcircuitdiagramofaccidentdetectionmodule

The accident detection module is installed in the vehicle. This module contains accelerometer, GPS module, GSM module, Arduino Uno and some other components. At the time of the crash, the accelerometer detects the sudden change in axis values and sends these analog values to the Arduino Uno. The Arduino Uno controller then converts the analog signal to a digital signal. If the values are greater than the default values threshold in Arduino Uno programming, then Arduino Uno sends a signal to stop the vehicle and send the position as a text message to the registered emergency service number. The position is continuously updated with the help of the GPS module.

When an accident occurs, the operator receives a message containing the vehicle's location from the GSM module of the accident detection module. The operator then informs the nearest emergency vehicle at that location and then clears the lane for that vehicle using the IOT-based traffic control system.

5. PROPOSEDCIRCUITDIAGRAMOFIOT BASEDTRAFFICLIGHTCONTROL

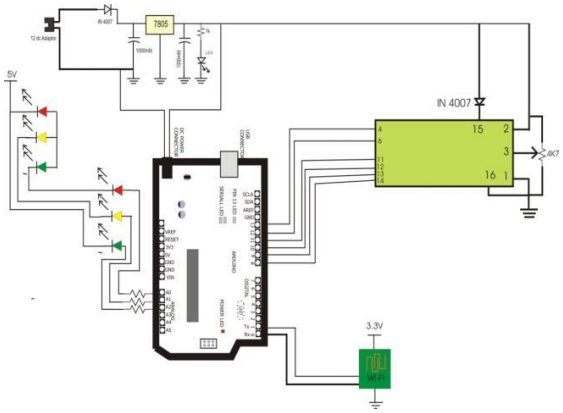

Fig4: ProposedcircuitdiagramofIOTbasedTrafficlight control

This module consists of a Wi-Fi module, Arduino Uno board, LCD screen, traffic lights, a website and some other components. The traffic light system based on IOT is connected to the Internet via the Wi-Fi module and can be controlled via the Internet via a Web page containing specific commands with which it is possible to force the green and red traffic signals in the traffic lane. The desired road so that the emergency vehicle does not find red marks on the way to the hospital. The LCD screen shows the status of the traffic lights

6. CONCLUSION AND FUTURE WORK

The system is dedicated to solving the most important problem in case of emergency vehicle delay due to slow traffic or staying parked for a long time. The proposed method is applicable to detect a siren from a police car, a siren from an emergency vehicle or a siren from a fire engine.

The reference documents considered during the bibliographic survey included sensors in each vehicle, after the arrival of the emergency vehicle a fixed quantum of time was established to restore normal operation that has many demerits. The above problems are cost-effectively solved by installing smart objects at the intersection and using long-range, low-power LoRa. Sound detection sensors are used to detect the exit of emergency vehicles and finally return the traffic lights to normal operation. The system can be extended to any number of lanes. The decision support system monitors traffic and also stores data in the cloud. Therefore, this data can be accessed and reviewed for future improvements.

The system could be further developed in the future by developing a dynamic web or mobile application as an interface through which the system can be controlled, both automatically and manually in a smarter way. It is also possible to include an automated messaging system that can be used to warn the driver of the next free lane from the intersection leading to the destination. Communication can be established between decision support systems in highly populated areas to alert upcoming junctions of immediate action.

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