Intelligent Traffic Management System for Prioritizing Emergency Vehicles in Smart City

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ABSTRACT

Traffic worldwide has led to tremendous loss of lives because of failure in transporting accident victims, critical patients, medical, equipment's and medicines on time. With the unending growth in vehicle traffic everywhere, the fusion of Internet of Things (IoT) and Vehicular AD Hoc Network (VANET) has embarked as a promising platform for an Intelligent Traffic Management System (ITMS). Within the literature, several researchers have given the solutions, but without taking into consideration a way to prioritize emergency vehicles when traffic system is collapsed because of hacking. This paper proposes a completely unique intelligent traffic management system for a developing city after considering the research gaps which are yet to be explored within the current scenario. Our proposed solution presents a solution for handling the traffic in the various scenarios automatically. The system gives the output according to the environment. This project mainly focuses on prioritizing the emergency vehicles in the signal so that the emergency vehicles (by sound detection) do not have to wait for too long at the signals. To present the benefits of proposed system a simulated environment has created so that the various scenarios can be explained with the help of the dummy roads and vehicles which are used to implement the project.

Keywords: Sound detection, Automatic, Prioritizing emergency vehicles.

INTRODUCTION

Traffic congestion and current management were recognized as major problems. In India as the population is increasing day by day the number of vehicles are also increasing accordingly. So the traffic signals needs to be a good coordination for the smooth flow of traffic during the rush hours. Moreover road accidents within the city are incessant and to bar the loss of life because of the accidents is even more crucial during this fast-paced world, the people during a compulsion to rush this self which makes the hold up and accident an inevitable one. In foreign countries, they successfully save human life, because whenever an ambulance comes they move aside to filter out the route till the ambulance passes through. On the opposite hand in INDIA, whenever an ambulance comes it's controlled manually at the traffic junction by a traffic officer. Nowadays all systems are working automatically. So, the proposed system called "Intelligent Traffic Management System for Prioritizing Emergency Vehicles in Smart City".

In period, the traffic is controlled manually by policeman. They decide when the vehicle has got to cross the road and also provide importance to the emergency vehicle. Then in Intelligent Traffic Management System, the traffic is controlled automatically by each lane with n seconds of green light is ready on. Before green light, traffic light flashes for few second, signifying to start out your vehicle and be able to go. The disadvantages of this method is it doesn't provide timing supported priority due to that folks has got to anticipate very long time although there's no traffic and also doesn't recognize and prioritize the emergency vehicle. They consists of two parts sensors network and an impact box during this they collected traffic data with help of sensors and control the traffic. Several researches are applied on intelligent traffic monitoring system, but a secure and efficient solution for emergency vehicles is yet to debate. Therefore, it's been proposed to prioritize emergency vehicle with an endeavor to ease the flow for ambulances in urban areas. It also presents a way to detect

and counter hacking of traffic signals which may be a quite common problem nowadays the proposed system eliminates the time delay in transportation of critical patient, medicines, medical assistance for accident victims, fire fighters and police. For future directions, different priority levels for multiple incidents and scenarios may be considered the most issue with IoT is that the protection of the complete system should be focused on and not a specific IoT layer, device or software. Hence, integrating the complete traffic management system with multiple layer security for various data generated from various sources may be another subject of future scope.

LITERATURE REVIEW

In existing technology the path of emergency vehicle will be cleared by just turning all the red light of that path into green light. In this technology the main drawback of this system is synchronization. If the synchronization not takes place properly, the mob of vehicles increases and it will form a long queue due to which traffic grow in size until it becomes too large due to which some vehicles get struck in the traffic and they cannot reach in time. This is called over-saturation road junction areas. This system will definitely provide very effective time management system. It will provide a dynamic time depends upon the density of traffic. The disadvantage of green wave is it does mention the method which is used for communication between the emergency vehicle and the traffic signal controller

In this the systems the lane switching is finished manually i.e the emergency vehicles aren't given the priority the traffic signal are turned on and off manually whenever the emergency vehicles hit the signal. The time between switching the signal is incredibly crucial at that moment, if the user fails there could also be fatal results it's quite obvious, going by the present state of affairs, that our roads aren't desirable places to be and an answer dedicated to make sure smooth flow of traffic will go a protracted way in making road travel plenty more convenient it's been identified that the challenge mainly lies in channelizing traffic from heavy traffic zones into alternate routes thereby making optimum use of road space, successively ensuring smooth flow of traffic during this regard a straight forward mechanism which makes use of RFID technology has been described. The add on applications of this method like tracing of stolen cars, vehicles that evade traffic signals/tickets, toll collection or vehicle taxes also make this method even more important because many other equally relevant road traffic issues are addressed.

PROPOSED SYSTEM

This section presents this proposed architecture for an ITMS (integrated test management system) inspired by the fused concepts that prioritizes the emergency vehicles on roads. The system measures the gap between an intersection and the emergency vehicle. This main motivation is to allow the emergency cars to bypass heavy traffic and reach their destinations on time as well as ensuring minimum transmission delay for emergency messages. Every emergency vehicle has a different frequency that distinguishes it from the rest of the vehicles on the road. When the information of emergency vehicles is obtained from sensors, it estimates distance of emergency vehicles from an intersection and gives access to the emergency vehicle.
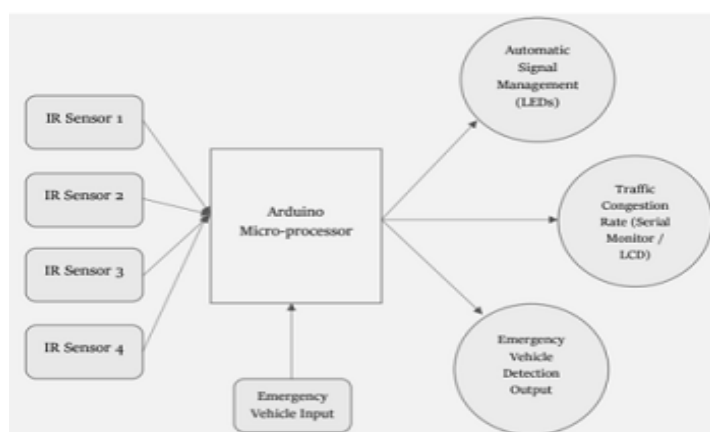

Figure-1. System Architecture

Here we are proposing a system with IR (Infrared) Sensors where it will installed a cross roads/lanes which will detect if there is any vehicle present in the lane and number of vehicles crossing the sensor, which basically gives the congestion rate on the road which will help us design the algorithm for the Traffic lights. In this project, we will cover following things Here we are proposing a system with IR (Infrared) Sensors where it will installed a cross roads/lanes which will detect if there is any vehicle present in the lane which basically gives the congestion rate on the road which will help us design the algorithm for the Traffic lights. In this project, we will cover following things which will manage traffic smartly and monitor it and based on the data captured, we can make/adapt better technique in future:

Project has a junction where three lights (green, yellow and red) are arranged on all four lanes. It has two types of sensors in each lane IR sensor and sound sensor. The project mainly works in three modes. In first mode the system works in normal way that is the all signals are given equal time slices. In second mode the system works as density based traffic controller that is when the IR sensor detects obstacles that particular lane is made congestion free and in last mode the priority of the emergency vehicles that is when the emergency vehicles are detected by sound sensor that particular lane is given the maximum priority. When vehicles crosses the IR sensor then there will be an obstacle between transmitter and receiver and thus leads to a (low or high) digital signal. Emergency vehicle is given priority based on the sound that is produced by emergency vehicle and that sound is taken in sound sensors and then that lane is given priority.

RESULTS AND DISCUSSION
This section includes the snapshots of the actual outputs that were seen by the user and this section also contains the results of the proposed system.
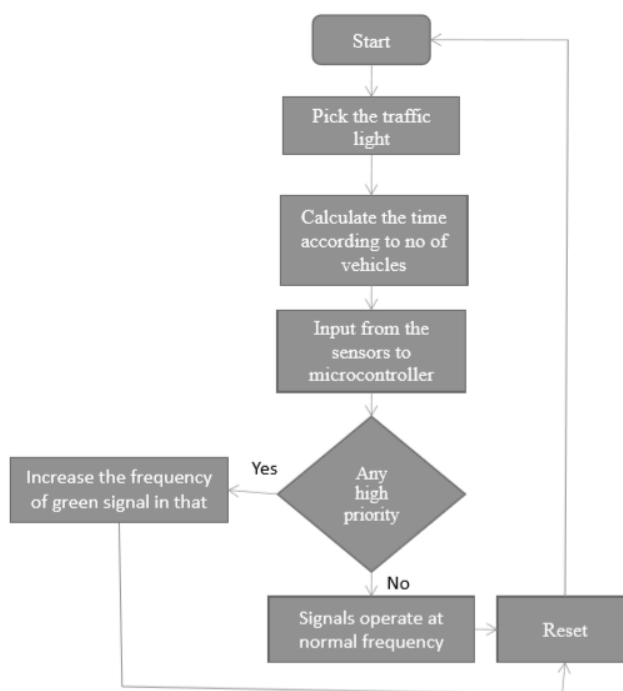

Figure: Flowchart

In the current situation, controlling traffic becomes a major problem because of the rapid increase in automobiles and also because of large time delays between traffic lights. So, in order to solve this problem, we will use density based traffic lights system with an IR sensor and to detect emergency vehicle we will use the sound sensor. In this system, we will use infrared sensor to measure the traffic density in a particular lane. We have to mount one IR sensor for each side of the road; these sensors always sense the traffic on that particular road. All these sensors are interfaced to the microcontroller. Based on these sensors, the controller detects the traffic and controls the traffic system and we will use sound sensors in each lane to detect the emergency vehicles.
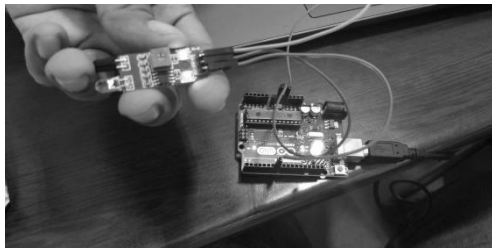
Figure: Sensor Detection

CONCLUSION

There are many research are proposed on the intelligent traffic monitoring system, but an efficient and secure solution for emergency vehicles is yet to discuss. Therefore, an Intelligent Traffic Management System (ITMS) has been proposed to prioritize emergency vehicles with an effort to ease the flow for ambulances in urban areas. The distance between emergency vehicles and intersections were estimated to achieve the target travel time of emergency vehicles with minimal delay time. This system is designed for achieving the goal of allowing emergency services to be met at the shortest possible time. The proposed system eliminates the time delay in an emergency situation like accidents.

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