A Survey on Traffic Management System Using IoT

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Abstract

These days number of vehicles has expanded dramatically. Numerous individuals lean toward own vehicles to travel as opposed to utilizing government vehicles. This outcome in gridlock. Simultaneously number of mishaps happening in street expanded radically and the include in rush hour gridlock rule infringement additionally expanded. A static traffic light control framework may hinder crisis vehicles because of gridlocks, which is a danger to the human existence. In the entire world, the majority of the mishaps happen during vehicle path change. Mishaps additionally occur in the interstate driving, where driver have carelessness during path flight/exchanging of vehicles. Vehicle's vulnerable side back, has become a major issue. Consequently, recognizing the impediment close to the area of our vehicle during path exchanging/flight or during expressway driving is imperative and many innovative works is yet under cycle to make the vehicle more secure to drive and control it naturally during these circumstances. As the quantity of vehicles in the street expanded, criminal traffic offense, for example, signal bounce additionally expanded. Insights show that petty criminal offenses are the main source of the mishaps. Remote sensor organizations (WSNs) are utilized broadly in rush hour gridlock the executive's framework these days. WSNs are exceptionally recognizable because of their quicker exchange of data, simple establishment, less support, and more affordable contrasted with other organization choice. Recently researchers are using technologies like WSNs, RFID (Radio Frequency Identification), ZigBee, cameras to monitor the real time traffic to analyze the traffic congestion and accidents. WSNs in traffic management system is used to avoid traffic congestion, accidents due to blind spots in large vehicles, traffic signal control for ambulance and to monitor the traffic signal violations. This paper provides the survey on different traffic management systems and the technology used and its pros and cons.

Keywords- WSNs, blind spot, emergency vehicle, traffic congestion, traffic violation

1. INTRODUCTION

Today in excess of 50% of the total populace lives in metropolitan conditions. As an ever-increasing number of individuals move into urban areas, more vehicles are additionally hitting the streets and it prompts gridlock. As per the World Health Organization (WHO), with expanded urbanization and mechanization, street fatalities are relied upon to turn into the fifth driving reason for death by 2030. Around 1.35 million individuals kick the bucket every year because of streetcar accidents. As number of vehicles expanded throughout the long term, number of street mishaps expanded. Vulnerable side crashes in vehicles are more normal these days. As per National Highway Safety Administration, measurements report that more than 800,000 vulnerable side mishaps happen every year. Vulnerable side is the region encompassing the vehicle that can't be seen while the driver is looking forward or through either side mirrors or back see mirrors. To maintain a strategic distance from mishaps occurring in vulnerable sides, the driver ought to be alarmed if any vehicle is drawing nearer in vulnerable side region while changing the path.

A Blind Spot Detection and Warning framework ought to be introduced in each enormous vehicle like vehicles, trucks, transports. This framework ought to give the situation with vehicles in the vulnerable side zone prior to changing the path. Sensors like ultrasonic, infrared and radar sensors are utilized to distinguish vehicles in the vulnerable side zone. Remote Network Sensors are utilized in vulnerable side location and cautioning framework, where sensors gather information from the actual climate and utilizing miniature regulator the gathered information is moved to data set or transferred to cloud. The information is handled and the data is shipped off the client. In Blind spot, location and cautioning framework the sensors recognize the vehicles in the vulnerable side region and the miniature regulator will deal with the information and produce the yield to the driver.

Gridlocks regularly hinders the way of the crisis vehicle, which turns into a danger to the human existence. For the most part emergency vehicle stalled out in the red traffic light. As the traffic signals are yet working in the customary manner by which time term is fixed for every Road Segment (RS). Street Segments are the various ways or streets, which meet at a traffic signal

intersection. Perhaps the greatest worry with gridlock is postponed emergency vehicle administrations. It turns out to be exceptionally hard for ambulances to arrive at objective on schedule in metro urban communities. The Golden Hour hypothesis has been outlined by World Health Organization (WHO), which is followed everywhere on the world.

According to the said hypothesis if a patient of street incident or a heart patient is hurried to an emergency clinic inside 60 minutes, his odds of endurance go up by 70 to 80 percent. As per National Institute of Emergency medicine(NIEM) uncovered in excess of 25% of patients, requiring prompt clinical consideration kicked the bucket seriously because of traffic delays from rustic areas. An equal arrangement of managing traffic, alarming nearness clinics in regards to the clinical necessities of the patient and data to the particular authorities is the need of great importance. Execution of this thought guarantees smooth versatility of crisis vehicles on street. A mechanized sign diminishes human mistake and setbacks. To defeat this issue an Intelligent Traffic Signal Control System ought to supplant the customary traffic light control framework. Advancements like RFID (Radio Frequency Identification), ZigBee conventions are utilized to identify rescue vehicle. RFID utilizes electromagnetic fields to naturally recognize and follow labels appended to objects. A RFID framework comprises of a small transponder, a radio recipient and transmitter. ZigBee is a remote innovation and its convention permits gadgets to impart in an assortment of organization geographies.

Portable Applications are likewise evolved in which residents can enlist and store their clinical data. Rescue vehicle driver ought to send a crisis message to the cloud worker through the portable application and the worker will change the sign from red to green. Utilizing the GPS global positioning framework in the application, closest emergency clinic is recommended and patient detail is shipped off the clinic before the patient shows up.

In agricultural nations like India populace is essentially developing. As the populace develops, the quantity of vehicles on the streets are likewise dramatically expanding, simultaneously the include in criminal traffic offense additionally expanded. Notwithstanding the presence of cops, signal bouncing in the city are on the ascent. It has become a constant offense for drivers, auto cart drivers and transport drivers to bounce signals. These outcomes in jumble up with different vehicles coming the other way causing mishaps. On a normal, 110 instances of petty criminal offenses were enlisted each day. Of which around 20 cases are for signal hopping. Traffic Management Center information shows in 2019 until October 9, 23,468 cases were enrolled for traffic light bouncing as to contrast with 6, 36,825 a year ago. As indicated by the National Highway Traffic Safety Administration of the US, almost 50 % of the deadly crashes at crossing points are brought about by signal bouncing by the drivers.

Criminal traffic offense discovery frameworks are being created as the quantity of vehicles out and about is expanding at a huge rate. This expansion in number makes it hard for trigger base criminal traffic offense location framework to stay aware of the great volume of traffic and it isn't intended to recognize different petty criminal offense simultaneously for a given vehicle accordingly for an increment in rush hour gridlock rule infringement because of the absence of advance recognition. Manual checking of vehicles is irksome, and botch slanted because of weak human memory. To defeat this issue a red light infringement location framework that catch occasions of over speeding and red sign light hopping is introduced at traffic lights on blood vessel streets. Cameras are introduced in the traffic light post to catch the traffic light infringement and picture-preparing calculations are utilized to extricate the tag number from the caught picture. This framework utilizes Machine- learning strategies, Image handling calculations, Bounding box techniques and Morphological activity. Automatic Number Plate Recognition (ANPR) algorithm, You Only Look Once (YOLO) algorithm are used.

Traffic Management System utilizing IoT has a few downsides in the strategy and innovation utilized. This paper gives an overview of three issues in rush hour gridlock area they are mishaps happening in vulnerable side zone, rescue vehicle stalled out in red traffic light and traffic light bounce. In Blind Spot Detection and Warning System, the current frameworks for distinguishing vehicles in the vulnerable side territory are need alarming the drivers that is they are not effectively showing the yield to the driver. Therefore, there is greater chance that the driver can't see the yield (ready message) and mishaps may occur. The driver needs to continue to take a gander at the LCD show and have regular interruptions from the street. LCD shows can't be

seen obviously at the daytime because of the glare. Handling time and capacity needed for the RCNN calculation is high. Driven light isn't that much obvious in sunlight. The alert sound can't be heard by the driver while driving in weighty rush hour gridlock and tuning in to music. Radar sensors are influenced by materials like metal and fluid.

The current frameworks for making way for crisis vehicle like rescue vehicle, fire motor, and so on, by changing, the traffic light from red to green in the specific way has different impediments. ZigBee frameworks are costly. ZigBee transmitters will have low transmission and low organization security. The current traffic framework is more manual than programmed. The current frameworks for distinguishing traffic light infringement, for example, signal hop for the most part utilizes camera to catch the picture of the abused vehicle and utilizations different picture preparing strategies and ANPR (Automatic Number Plate Recognition) calculation to separate the tag number from the caught picture has impediments. Framework doesn't work around evening time. ANPR calculation doesn't give precise outcomes if vehicles are going over 30mph. Unreasonable slant points in caught picture will cause acknowledgment issues for example hard to perceive the number plate in the caught picture of the vehicle. Calculations set aside High Computational effort to handle the information and to create the outcomes in light of the fact that there will be enormous measure of information.

2. RELATED WORKS

2.1 Impact Avoidance System in Heavy Traffic and Blind Spot Assist Using Ultrasonic Sensor

Babu et.al (2014) proposed a strategy to recognize vehicles in the vulnerable side while changing the paths and to plan an impact evasion framework, which is solid for drivers in substantial rush hour gridlock. This framework depends on Arduino microcontroller. They utilize ultrasonic sensor to identify the hindrance vehicle and to gauge the distance between the obstruction and the client vehicle. This framework cautions the driver utilizing LED and ringer.

2.2 Gatekeeper Preventing Blind Spot Accident utilizing Arduino

Yaashwanth et.al (2015) proposed a framework called GUARD (Guiding You and Reporting Disturbance). This venture assists with extemporizing the natural perceivability of a bicycle rider. It portrays the presence of an article or vehicle in the vulnerable side zone of the rider and helps for a protected ride over the span of movement. This framework depends on Arduino microcontroller. They utilize ultrasonic sensor to distinguish the snag vehicle and to quantify the distance between the impediment and the client vehicle. A TFT shading LCD show gives graphical yield of the presence of vehicle in the vulnerable side zone.

2.3 Detecting Blind Spot by Using Ultrasonic Sensor

Ajay et.al built up a technique to recognize vehicles in the vulnerable side utilizing ultrasonic sensor and to control the course of the vehicle via programmed controlling idea. The framework depends on Arduino microcontroller. The ultrasonic sensor estimates the time distinction of the deterrent nearby the vehicle and afterward figures the distance with time. The innovation implanted in the framework is prepared to do naturally control the vehicle away from an obstruction if the framework discovers that a crash is looming or if the vehicle is nearby our vehicle.

2.4 A Radar-based Blind Spot Detection and Warning System for Driver Assistance

Guiru et.al (2017) proposed a vulnerable side recognition and cautioning framework (BSDWS) for daytime and evening conditions. The framework depends on Arduino miniature regulator. This framework utilizes Range, speed, Angle and Target identification calculation. Radar sensor is utilized to recognize vehicles in the vulnerable side region. Radar sensor discharges radio waves, which recognizes the impediment in its manner, and furthermore it estimates the distance between the snag vehicle and the client vehicle. In the event that any vehicle is distinguished in the vulnerable side territory, an alarm message is ship off the driver through the miniature controller (Arduino). Driven lights and bell sound are utilized for cautioning the driver.

2.5 Automatic Traffic Rule Violation Detection and Number Plate recognition

Amey et.al (2017) built up a framework to control the traffic rule infringement precisely and cost adequately. This framework utilizes Automatic Number Plate Recognition (ANPR) methods to recognize the tag number of the disregarded vehicle. This framework utilizes Image preparing calculation, Edge Detection calculation, Hough Transform calculation and K-Nearest Neighbor calculation. This framework identifies the petty criminal offense. The identification time is lower for high thick traffic stream. In this manner, the framework activity speed isreliant on the thickness of traffic.

2.6 RFID-Based Smart Traffic Control Framework for Emergency Vehicles

Tejas et.al (2018) proposed a system that will provide a solution for emergency vehicle halted due to traffic signals. This system is based on Arduino microcontroller. They use RFID technology to detect ambulance halted in traffic signal. When an ambulance is detected then micro controller(Arduino) will send a message to traffic controller, then traffic incharge officer will change the signal from red to green in the particular path where ambulance is halted.

2.7 Intelligent Traffic Signal Control System for Ambulance

Manjiri et al (2018) developed a system to reduce the delay for the ambulance and to smoothen the ambulance movement in traffic congestion. This system is based on Arduino microcontroller. They use GPS Tracking System to locate the ambulance. RFID technology is used to detect the ambulance halted in traffic signal. Radio Frequency transmitter and receiver is mounted in traffic signal post and in ambulance wind shied respectively. They created an online website called "Healthcard" in which Citizens can register and store their medicalinformation. The nearest hospital is suggested from the current location of the ambulance.

2.8 Low cost traffic control system for emergency vehicles using ZigBee

Harikumar et. al (2018) proposed a system to provide a solution for emergency vehicle halted due to traffic signals. This system uses ZigBee transmitter and receiver for Vehicle-to-Vehicle communication. This system is based on Arduino micro controller. If an ambulance is detected, then using ZigBee protocol vehicle to vehicle communication will be done and the vehicles in the path of the ambulance will be cleared. The particular path traffic signal will be changed to green if there is an indication of an ambulance. So ambulance will reach in time.

2.9 Intelligent Traffic Control System for Smart ambulance

Deepali et.al (2018) built up a framework that clears the gridlock by turning every one of the red lights to green on the way of the emergency vehicle, henceforth helping in clearing the traffic and giving route towards its objective. This framework depends on Arduino microcontroller. GPS (Global situating System) Tracking System is utilized to find the rescue vehicle. Most limited distance calculation is utilized to track down the briefest way to arrive at the emergency clinic on schedule. Contingent upon the area of emergency vehicle, closest sign will change to green so the way will be cleared and emergency vehicle could arrive at clinic on schedule immediately in traffic light.

2.10 AI Enabled Blind Spot Detection Using Rcnn Based Image Processing

Elizabeth et.al (2019) built up a framework to identify vehicles in the vulnerable side territory and to suggest the driver. This framework utilizes RCNN calculation for vehicle recognition and assessing the overall distance between the vehicles. A LCD show is mounted close to the vehicle controlling. A camera is fitted in the vehicle back guard to cover the vulnerable side regions. The ongoing video feed of the vulnerable side region with the vital data about the vehicle is shown on a LCD show. Therefore, driver will see the vulnerable side territories through the LCD show.

2.11 Arduino Based traffic congestion control with automatic signal clearance for emergency vehicles and Stolen Vehicle Detection

Prakash et al (2020) proposed a framework to control substantial gridlock and to make way for crisis vehicle, for example, emergency vehicle that stalled out in red sign. This framework additionally gives an answer for find taken vehicles. RFID (Radio Frequency Identification) innovation is utilized. IR (Infrared) sensor is utilized to recognize vehicles for blockage control. Radio recurrence transmitter and beneficiary are utilized to recognize rescue vehicle in the traffic light. The specific way sign will change from red to blue for crisis vehicle. Taken vehicles can be recognized utilizing RFID innovation.

2.12 Traffic Violation Detection

Kailasam et al (2020) proposed a framework to control traffic rule infringement. This paper bargains about the petty criminal offense discovery predominantly centered around the vehicles, which are not after the sign in the rush hour gridlock. This framework utilizes Machine-learning calculation, Image handling strategy, Bounding box techniques and Morphological activity. This framework distinguishes the petty criminal offense. This framework catches the picture of the abused vehicle and utilizing the calculation the tag number is separated from the picture. The GSM Module sends the message to the enrolled number of the authorized number plate of the abused vehicle.

2.13 Traffic Signal Violation Detection using Artificial Intelligence and Deep Learning

Ruben and Mohana (2020) built up a framework to distinguish petty criminal offenses like sign bounce, vehicle speed and the quantity of vehicles. This framework utilizes YOLOv3(You Only Look Once) Algorithm- Conventional Neural Network and Image handling strategy. Here camera is utilized as an information gadget to catch the picture of the vehicle and to record the video. From the caught picture tag number is extricated. This framework identifies the petty criminal offense. The identification time is lower for high thick traffic stream. Inthis manner, the framework activity speed is subject to the thickness of traffic.

2.14 Traffic Violation Detection Using Image Processing

Nikhil et al (2020) proposed a framework to notice the traffic and distinguish criminal traffic offenses like head protector recognition, signal bounce identification and furthermore recognizes the number plate all the more immediately when the infringement is distinguished. This framework utilizes Machine learning calculation and Image handling method. This framework identifies if an individual isn't wearing a head protector and furthermore a sign hop which are the primary purposes behind street mishaps. Here GSM (Global System Mobile correspondence) is utilized to send messages. In the wake of distinguishing the infringement, it records the number plate and sends the alarm message to the vehicle proprietor.

3. CONCLUSION

In this paper problems occurring in traffic sector is discussed. As discussed above many life has been lost due to accidents happening in blind spot areas while changing the lane and ambulance got stuck in the red traffic signal which causes delay to reach the hospital in time. And many people violating the traffic rules such as signal jump are difficult to detect by the traffic police officer and they are facing different problems to maintain a database about the violated information. This paper discusses the drawbacks in existing Traffic Management Systems using IoT. A Smart and Safety Traffic System should be developed by overcoming the drawbacks in the existing systems.

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