

Appraisal on Smart Road Traffic Controlling Systems

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Abstract

This paper is an abstract about the smart way of traffic controlling during traffic hours in urban areas and all metro Politian cities. The proposed system is based on various concept of internet of things an intelligent way of traffic controller is designed with components like raspberry pi, Arduino, Microcontroller, pi camera RFID, IR sensor, here the raspberry pi is the main component in the complete model as the controlling of the traffic is took place in this only. The density of the traffic is recorded by the IR sensors. RFID tags are given to the ambulances. These RFID tags are also used in detecting stolen vehicles. This is appraisal-based paper and the methodology, parameters of various methods are observed.

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1. Introduction

IoT is an emerging technology in which internet is used to manage the physical items like controlling and movement of the items by IoT the data can be accessed fast and clear data is obtained.[2] The data is stored in the system and accessed through the internet, the data base stored can be used for application which is related in real time situation and the devices used in the system can be directly operated through IoT by reducing the human to machine interface, by this way the usage of systems for continuous monitoring can be avoided and direct control of device is achieved. The traffic can be controlled if the controlling of the traffic is done based on the number of vehicles present in the signal by this the clearance of vehicle during peak traffic could be managed and easily vehicles can commute without any delay.[3] The emergency vehicles must be given the more importance apart from other vehicles.

2. Literature Survey

Bilal Ghazal et al[1]

In their work, the traffic controlling is implemented in various ways and here the pic microcontroller is been used. The microcontroller is equipped such that it can change the signals accordingly by usage of the IR sensor which detects the traffic density. After the detection it sends the command to the controller if the traffic is high in one particular lane that lane is given

the first priority. If the traffic is less the command given is different and also it can be controlled by the traffic controlling authority manually. If the traffic is higher in some cases at that time it can be operated manually so that there is a precise way to manage the traffic so that the preference is given to the lane which requires the movement, also in some emergency cases like the ambulance movement is very important so it should be the first preference .But here in case of some emergency vehicles movement the controller cant sense the vehicle in peak traffic hours .so the advanced system should be implemented to improve the traffic controlling.

Kanade Pooja Rajendra et al [2] This paper proposes a traffic controlling by using sensor nodes and other wireless devices. the main sensor which is an IR sensor senses the traffic details all the time and the information is transmitted wirelessly through some transceivers. Here the transmission takes place in two ways one is base node and other is the wireless way of transmission. The information about the traffic is transmitted to the base band through wi-fi system. Also RFID(Radio frequency identifications) are available as tags which can be used in cars based on their purpose and the RFID readers are placed near the IR sensor so that the sensing is done appropriately and tags are given to the personals based on their vehicle and the vehicles like ambulance are given with high priority tags so that they have 1st preference during emergency cases.

Amneshgoel et al [3] The main problem in the cities are about traffic , most of the cities are facing the problem of long traffic jams , in order to regulate the traffic the wireless sensor network (WSN) is used in this process to manage the traffic jams . Mainly sensors are used to sense the traffic , here they are of two types they are (i) Intrusive type here in intrusive type the sensors are placed under the road to measure the strength of the traffic and (ii) Non-intrusive type here the sensors are placed on the road to sense the traffic . The advantage of non-intrusive type is that the cutting of road is not required and image processing technique is used and in some cases when whether is not suitable this might miss behave and the accurate readings may not be obtained this is the only disadvantage.

Mittal et al [4] The emergency vehicles must be given at most preference like ambulance This module deals with the advent of providing the signal for vehicles which has the top priority , here the vehicles like ambulance are provided with the RFID(radio frequency identification) which are attached to the vehicles which requires the special priority and there is a MCU microcontroller which is used in detecting the vehicles which are having RFID tags so that the vehicles in that lane are able to move fast . Here they are provided with a name called Green wave system which is specially used in traffic clearance system .This method can be very much useful in traffic controlling but what if there are many vehicles in that lane and traffic in other lane also if its high there is a chance that the vehicle which need to pass may not be able to clear through the traffic. This is a consideration which might affect the model.

Mohammad et al [5] When traffic controlling is going completely wireless then data need to stored and accessed any time. The cloud way of data storage is a granted way to access the data anytime by an authorised person. The storage in the cloud can be done in three ways (i) software as a service (SAAS) (ii) platform as a service(PAAS) (iii) Infrastructure as a service (IAAS) ,in this method the SAAS provides access to the software and its web based function PAAS provides the frame work and operating systems, IAAS offers many services like hardware , servers, networking components and a massive storage space. Thus by combining these methods complete system of traffic controlling was achieved.

Dhaval Prakash Gupta et al [6] A better and improved traffic controlling system must be implemented in this proposed work here the Arduino is used as the main component to generate the signal based on the traffic density. The data is been stored using IOT and signals are generated using the Arduino. The key significance is to provide the service for the emergency vehicles to save the lives. The vehicles are provided with the gsm module and the accelerometer is used to detect the sudden change in the axis of the vehicle and send the information to the Arduino and the risk of accident is avoided by

some precautions. Thus the combination of these two IOT and the GSM can really help in managing the amount of accidents and reduce them.

Adi Anil Kumar et al [7] In this method, green wave system is also been used which helps in providing the signal to the emergency vehicles .Based on this the ZIGBEE is used in this traffic controlling system , here the ZIGBEE transmitter is fixed in the vehicles and the ZIGBEE receiver is placed near the signal so that whenever the vehicles are more there is a switch which provides the information to the server and provide the signal in that lane. Apart from this there is a important factor which detect the stolen vehicle , it is done by using RFID tags these tags are placed in the vehicles and whenever the vehicle passes through the signal the data from stolen vehicles in tallied and the vehicle is identified whether it is stolen are not.

Balaji ParasumannaGokulam et al [8] The fuzzy logic is used in this system in order to give the precise way of traffic controlling, here it is completely different from other system because wireless sensors (or) IOT based system is been developed in all the other system. The fuzzy logic agent provides the precise way of signalling so based on the traffic conjunction the signal is provided for the lane which requires the signal , therefore the traffic is managed and this is much more reliable than any other device because it is operated directly without any other external interference.it is operated manually by an authorised person. This method provides a precise way of traffic controlling by this fuzzy based logic control system.

A.Richardet al [9] Here the traffic controlling is done with the help of Microcontroller . The camera, sound detection device and the IR sensors are connected to the microcontroller. Based on the traffic and sensing the strength of the traffic the signal is provided. the sound detection device is used to detect the sound of any emergency vehicle with the siren sound it can detect the sound of the vehicle and it provides the signal to that particular lane in which the ambulance in present, this is a traditional system in which if there is lot of traffic in a lane and it is difficult to sense the vehicle in that and then providing signal to that lane can be very difficult and it can make lot of unnecessary traffic jam also. This method rectifies this problem.

R. Surshkumar et al [10] Emergency vehicles like ambulance must reach the medication centre in right time , but the key factor that disables this process is the traffic because if there is a lot of traffic it is highly impossible to make the ambulance reach in time in order to make it happen there are lots of systems which have been implemented and it is done through the microcontroller based RF transmitter and receiver. Here the RF transmitter is placed in the ambulance and when it approaches the signal the transmitter is turned on the signal is sent to the receiver via microcontroller in wireless medium so that the ambulance can get the path and proceed. This can be

operated in urban areas because in cities the amount of traffic is more when compared to the urban areas. This can be implemented even in cities but when traffic is more the detection may not be accurate.

Dipti Srinivasan et al [11] The main parameters used here are the distributed control, neural control, hybrid model and traffic signal control. The neural and hybrid based system of traffic controlling is used in this system for traffic controlling and this works on UTCS (urban traffic control system) and is highly recommended in urban areas where controlling of traffic is also very crucial. The neural network is very much helpful as the traffic is high in some particular time and the signal allocation should be precise. This provides a faster way of traffic controlling by generating signal based on the traffic strength.

Ms. Pooja Mahajan et al [12] The traffic conjunction in the urban areas are much increasing problem. In this method, the wireless sensor based network is used in order to sense the strength of the traffic and the main aim is to maximise the traffic flow. It is done using the vehicle detection using intersection control agent (ICA) which sense the traffic and its density and the signal is provided for a particular lane and its same for other lanes also. Therefore the maximum possible vehicles are able to cross the signal.

Dang-Nhac LU et al [13] Traffic routing method based on ant colony system is used for finding the shortest path in the given direction towards the way of travel. This is a hybrid technology which provides the

shortcuts and if there is any conjunction in the way, it senses the traffic in that particular direction and provide the best possible route which is faster. This can be very helpful for daily travelling persons and sales man.

MounibKhanferet al [14] wireless network can play an important role in traffic controlling as the transmission of data is no more in wired medium hence as there are many advantages in wireless network here it is used in transportation monitoring in various places based on their required purpose the specific design has been implemented. In WSN data collected by the nodes are accurate and high security. The architecture is flexible so that it can be changed based on the requirement hence the implementation of wireless networks in transportation can be very much helpful.

Malik Tubaishat et al [15] This paper mainly deals with the wireless sensors and the information collected by this sensors is observed. PEDAMACS (Power efficient delay awareness medium access control protocol) used in this method is effective. It is a effective routing system with low power consumption. The intersection control system provides the signal for the required paths. The data obtained from the sensors are used in various system and it can be used in traffic controlling also, here in traffic controlling the strength of the traffic is been calculated and the information regarding the traffic is been gathered.

S.no	Title and Author name	Methodology	Components	Advantages
1.	Smart Traffic light Control System	Traffic light system, IR sensor.	PIC microcontroller, LCD, XBEE transceivers, coloured LED lights (Red, Orange, green).	1. Cost-effective. 2. Specially designed for + type of junctions
2.	Traffic load minimization using IoT	XBEE protocol, RFID.	Sensor node, Central node, Raspberry pi, Arduino UNO, IR sensor, RFID, Network devices.	1. The traffic conjunction is reduced. 2. It involves both hardware and software components. 3. Realtime contrast can be obtained.
3.	Intelligent Traffic Light System to Prioritized Emergency Purpose Vehicles based on Wireless Sensor Network	WSN network, Intrusive system, Non-intrusive system.	IR sensors, coloured LED lights, transceivers.	1. Importance is given to the emergency vehicles. 2. SI and II base communication is implemented in this method. 3. Vehicles movement is given much priority.
4.	A Novel Approach to Implement Green Wave system and Detection of Stolen Vehicles	RFID tags, Green wave system	MCU microcontroller, RFID transmitters and RFID	1. Emergency vehicle detection 2. The lost vehicles can be identified.

			receivers, Sensors, GSM module.	3.In case of signal violation the message is sent using GSM module.
5.	A Smart System Connecting e-Health Sensors and the Cloud	IOT, SAAS-software as a service, PAAS-program as a service, IAAS-infrastructure as a service.	Sensors-temperature sensor, pulse sensor, Raspberry pi, storage device.	1.Used in monitoring Vehicles transporting the patient . 2.The time taken by this method to calculate traffic and other parameters is faster than other systems. 3.The data is stored in the cloud and it can be accessed any time.
6.	Accident Detection Module and IOT Based Traffic Light Control for Smooth Passage of Emergency Vehicle	Accident detection, GSM module.	WIFI module, LCD display, traffic lights, data storage device.	1.The traffic can be manually operated. 2.The data storage is also easy. 3.It can be used in accident controlling also.
7.	A Novel System for Traffic Control Based on Emergency Vehicle Clearance, Congestion Control and Anti-Theft Assistance	XBEE protocol, RFID transceivers.	Microcontroller LPC2148, GSM module, RFID reader, Proximity sensor, IR sensors.	1.It is an automatic traffic controlling system. 2. Stolen Vehicles can be identified easily. 3.Emergency vehicles are given the most priority and signals doesn't turn red till the vehicle passes.
8.	Distributed Geometric Fuzzy Multiagent Urban Traffic Signal Control	Fuzzy logic, IOT.	Data communication system, Intersection system, GFMA signal control, Geometric fuzzy interface system.	1.Geometric fuzzy logic system can be much useful in major traffic delays 2.It can be operated manually also so that in case of any issues traffic is directly managed. 3. Synchronization of these fuzzy agents are simple.
9.	Implementing Smart Control of Emergency Vehicle Using Image Processing	Sound detection, Image processing.	Cameras, sound sensors, RFID readers, Micro controller.	1.GPS is used for vehicle location identification 2.Time delay is reduced for emergency vehicles movement. 3.Data is stored in cloud so that it can be accessed in any time.
10.	Advanced Traffic Clearance System for Ambulance Clearance using RF-434 Module.	Radio frequency, sound detection.	Atmega 328 p microcontroller ,RF transmitter and receiver.	1.During emergency purpose it can be helpful in life saving. 2.It is a simple process for traffic controlling. 3.It consumes less power.

11.	NeuralNetworksforReal-TimeTrafficSignalControl	Neural network, Distributed control network.	Machine interface network, control devices, camera.	1.The machine interface provides faster signals. 2.System works for longer duration. 3.Used in effective traffic controlling.
12.	Traffic Control System	Intersection control	Arduino, signal dash board, ESP8266 wi-fi module.	1.Based on WSN. 2.Used in single and multiple intersection points. 3.System is self configuring can be operated in real time also.
13.	A Novel Traffic Routing Method Using Hybrid Ant Colony System Based on Genetic Algorithm	GACSS frame work, Hybrid ant colony system.	VANET simulator.	1.Used in solving problems in path and time. 2.The GACSS frame work has faster processing time. 3. The traffic light ability can also be monitored.
14.	WSN Architectures for Intelligent Transportation Systems	WSN, Transportation system.	WSN architecture	1.Multilevel architecture is used. 2.They are good in power and processing. 3.Itprovides required security.
15.	Adaptive Traffic Light Control with Wireless Sensor Networks	PEDAMACS, ICA	Sensor nodes, actuators and ICS.	1.Centralized method to control traffic. 2.Improves the flow of traffic. 3.Improves the coordination among the traffic signals.

3. Conclusion

The abstract from various papers have been analysed for the methods implementation procedures, advantages and limitations. All the proposed methods focus on reducing traffic, manage traffic, provide safety for vehicles. Much importance is given to the emergency vehicles especially ambulances using RFID tags and in some, they have used microcontrollers to detect the ambulance.

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