

# Priority Based City Traffic Regulation for Emergency Vehicle Using IOT

Niketa P. Chaudhari<sup>1</sup>, V.D.Chaudhari<sup>2</sup>

<sup>1,2</sup>PG student of GF's Godavari College of Engineering

**Abstract-** Due to rapid development of metropolitans cities no of vehicles on road increases hence in result traffic congestion is also increase rapidly. Traffic congestion is major problem in big cities especially in rush hours. Emergency vehicle often stuck in traffic jam and it can be dangerous for any one's life. Hence aim of this paper is reduce waiting time of emergency vehicles and gives conditions information about traffic density on different road to emergency vehicle. For traffic density measurement IR sensor use as input data of traffic density send on internet using IOT. RF module gives information about presence of emergency vehicle. Problem of two EVs with same priority also solve in this project. Driver of emergency vehicle check traffic density at particular traffic signal from internet

**Keywords-** Emergency vehicle, traffic density, IOT.

## I. INTRODUCTION

Increase in number of vehicles cause increase in traffic congestion hence most affected due to traffic congestion problem is emergency vehicle like fire brigade, ambulance. If any patient in ambulance suffering from dangerous situation want to give urgent treatment but this emergency vehicle will get stuck in traffic then this very dangerous for one's life. Traffic light play very important role in for traffic management but it is static in nature time duration of traffic light is constant cannot change with respect to traffic density hence dynamic traffic light control play very important role for traffic management. there is no doubt emergency vehicle will not wait for green signal but in such case if any accident happened it also cause headache. Hence our aim is to make automatic lane clearance for emergency vehicle.

*Existing system:*

- 1) Simple traffic management system-Here one traffic police officer allocated at every intersection and it controlled traffic by hands. He gives instruction of stop or wait to driver but it is very inefficient method many times driver violate rules.
- 2) Automatic traffic management system -there three different color light use for traffic management green light is 120 second on and yellow light is 20 second to indicate ready to go and all other time red light on to asking for stop. but here duration of light is fix and it cannot distich between emergency vehicle and ordinary vehicle
- 3) Traffic management using wireless sensor- network here wireless sensor used for collect data regarding traffic density size of vehicle length of vehicle speed of vehicle

in WNS consist of small tiny components which sense surrounding it can collect process and transmit data it operate in real time it interchange information to other nodes or base station.

- 4) Intelligent traffic management using image processing- Here camera is mounted on high pole to measure traffic density. Camera mounted on high pole can cover larger distance hence picture capture by camera process by computer to analyze no of object different object like truck ambulance etc. it is also useful to detect violation of traffic rules by driver. But camera should be robust it need to place at each phase.

## II. LITERATURE REVIEW

Wireless sensor network- is new approach to control traffic flow sequence it compose of small tiny device to collect manipulated and transmit data between two nodes and base station it place at road side . It dynamically adaptive technique for single or multiple intersection. nodes are communicated wireless and also self organize it use for reducing waiting time of emergency vehicle[1],[2],[3]. Image processing- in images processing system image sequence capture by camera analyze and use different edge detection techniques and object counting techniques. to get no of vehicle and to get information about different vehicles (cars Truck Ambulance) in case of emergency ambulance gives priority over others[4],[5],[6]. Reference paper [7],[8] provide approach to provide priority for emergency vehicle and traffic management for emergency vehicle here RFID use for calculate traffic density and detect the emergency vehicle. Communication between traffic signal and emergency vehicle is done by transceiver and GPS, at starting driver of ambulance enter destination and hence whole system inform all traffic signal in way of emergency vehicle .when emergency vehicle is away from sufficient distance from traffic signal then all red signal turn into green and actual distance of EV is monitor through GPS, but here starting point and destination point of EV is necessary. If EV change rout due to some reason it will collapse. Paper[9] green light period of traffic signal plays important role in traffic management. Paper present technique to control green light period of traffic signal as per requirement according to traffic density and on base of time require for EV to cross traffic junction. paper approach technique to estimate travel time require for cross junction. [10] provide solution using zigbee wireless communication protocol and GPS receiver. Here IR speed sensor use to find speed of vehicle and according to speed of vehicle it set color of traffic signal EV

*Need of Dynamic Traffic Management System:*

My aim is to implement dynamic traffic management project implements dynamic Traffic Signal other than Static. The reason for this decision is to adapt the signal control to dynamic traffic flow. The number of vehicles arrived at the traffic signal intersection varies from time to time hence static traffic control may prove to be unreliable. Moreover it has also been observed that Periodic Signal Control is unable to perform up to its potential in case of very busy intersections.

**III. PROPOSE SYSTEM**

Propose system consist of two main part

- 1) Emergency vehicle unit
- 2) Junction unit

*Emergency vehicle unit-* this unit is to be installed in emergency vehicle it consist of RF transmitter and key to assign priority as per situation and QR code to check traffic density at different traffic signal in case of fire brigade and as per condition of patient in case of ambulance.

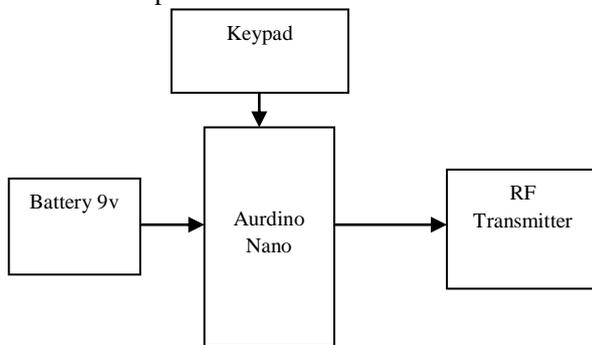


Fig. 1: Block diagram for emergency vehicle

Traffic density collected by IR sensor can be monitor by EV driver on internet in android mobile by using QR code. Three keys are used here to press button for indication of level of priority and four keys to indicate on which direction or signal EV want to go. Assume ambulance consist of three person driver Nurse and patient and relatives of patient is optional first of all authorize person of hospital check the health status of patient and press key as per health condition.

E.g. Heart attack, pick up patient from disaster sites----- Higher priority.  
 Small accident ----- medium priority  
 Shifting of patient ----- lower priority etc.

*In case of Fire brigade:*

Any mall or industries, hotel full with humans suffered from fire ----- higher priority  
 Cemetery suffered from fire containing ----- medium priority  
 Any small commercial shop without human suffer from fire gives ----- medium priority  
 Saw mills, any old means (lower priority)  
 According to reported information driver of fire brigade, Ambulance press that particular key.

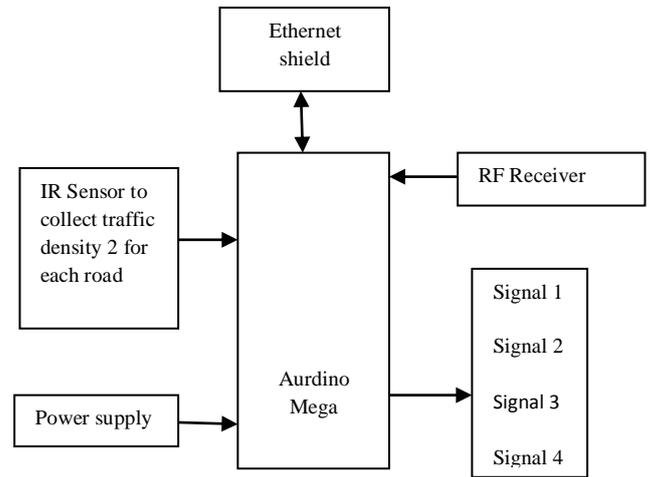


Fig2: Block diagram for Traffic Signal

*Junction unit -* IR sensor used for check traffic density on road near a junction and send it on internet using IOT to available for EVs driver to check traffic density this traffic density can driver seen it on internet. RF receiver received signal send by RF transmitter and make signal for particular time. In addition to regular three colors red green and yellow one additional blue signal use for traffic signal to indicated that when EV is coming then blue and green signal will turn on .

*How It Will Work*

- 1) For providing dynamic traffic control first calculate capacity of that particular road in propose system we assume that capacity of particular road is 100 it consider on two wheeler.
- 2) IR sensor continuously monitors traffic density and according to traffic density traffic signal time will change. It will indicate traffic density in percentage. According to traffic signal it will determine the time of green signal.
- 3) EV detection- Here for demonstration purpose we have use RF transmitter and receiver when ambulance come in range then it broadcast signal to station and it will automatically set green signal on path of emergency up to EV cross junction and also turn on blue signal to notice other driver to stop or slow down gives priority for emergency vehicle.
- 4) When two EVs reach near junction check priority of vehicle giving higher priority gives first.

**IV. STEPS OF PROPOSED TRAFFIC SIGNAL ALGORITHM**

The proposed algorithm contains seven steps:

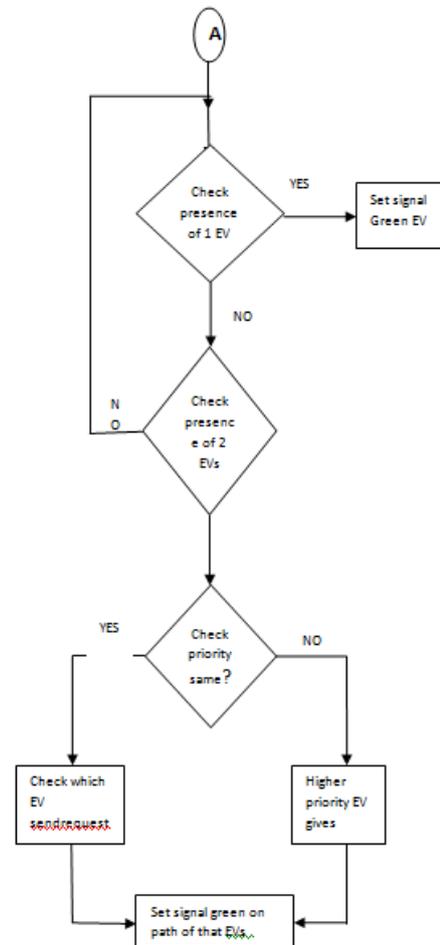
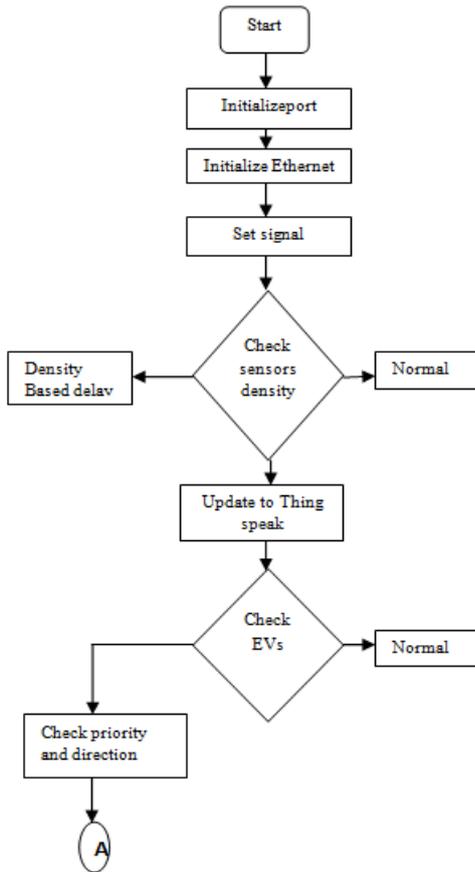
- 1) Determining the queue length (volume) of traffic.
- 2) All the vehicles run at a constant speed and all the vehicles are in the same type.
- 3) All traffic density data send to internet using internet of things(IOT) on thingspeak.
- 4) According to traffic it will change traffic signal green signal time
- 5) Traffic density cross predetermine level of traffic then signal turn green.

- 6) Every vehicle driver can detect the traffic density at particular road on internet using QR code which is given to every emergency vehicle .Every ambulance must have a chart depicting the condition code along with its description. For example
- 7) After making the necessary checkup the nurse enters the relevant condition code

*Check of Emergency Vehicle Presence:*

- 1) If any emergency vehicle is detected system turn signal to green up to emergency vehicle crosses the particular range.
- 2) If tow emergency vehicle present at same lane then up to second emergency vehicle cross that particular signal is remains in on condition.
- 3) When two emergency vehicles occurred from different lane then system will check priority first according higher to priority that particular vehicle gives first priority and then make signal green on second emergency vehicle.
- 4) If two emergency vehicle presented same time with same priority(higher) then system will gives priority to EV which send request first and then shift with second one

V. SYSTEM FLOW CHART



VI. EXPERIMENTAL RESULTS

Aim of this project is fulfilled traffic light signal is time is change according to traffic density. Traffic density data collected by IR sensor is send to internet via thingspeak IOT platform. Driver of Emergency vehicle can check traffic density onthingspeak in case of emergency to select with low traffic path. When any emergency vehicle is inform traffic signal for crossing particular junction then make that signal green for predetermine time. but if at same time two EVs come with different priority suppose one with high and another EV from another path with low priority then it gives priority to high priority vehicle then switch to low priority and then turn to regular cycle. In Case 2 when two emergency vehicles with same priority arrived at same at same time but if there is small time lag between two request. This time delay can be analyze by controller on the basis this first come and first out which vehicle send request first then gives priority to that particular vehicle.



Fig.4: traffic density at signal 1 on thingspeak



Fig.5: traffic density at signal 2 on thingspeak

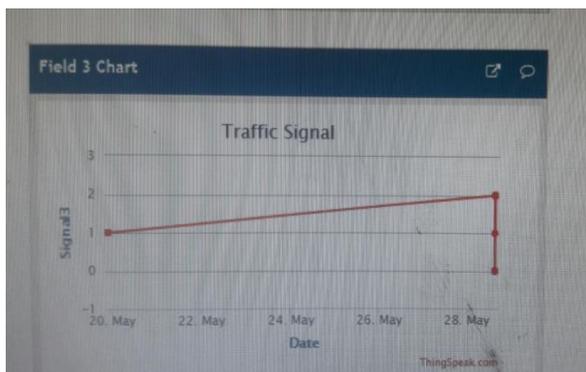


Fig.6: traffic density at signal 3 on thingspeak

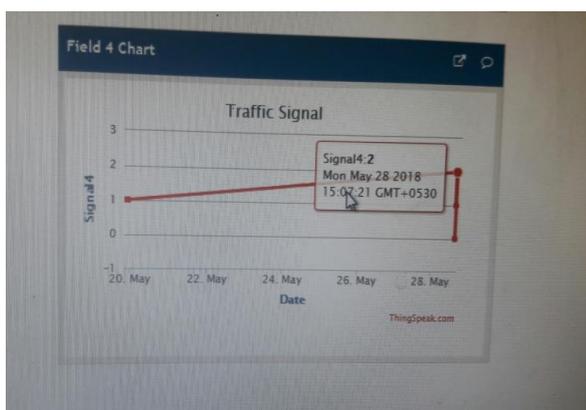


Fig.7: traffic density at signal 4 with time and day information of data updated on thing speak

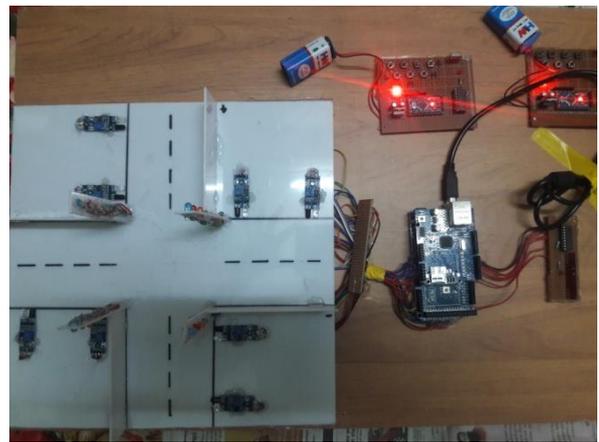


Fig.8: Experimental setup

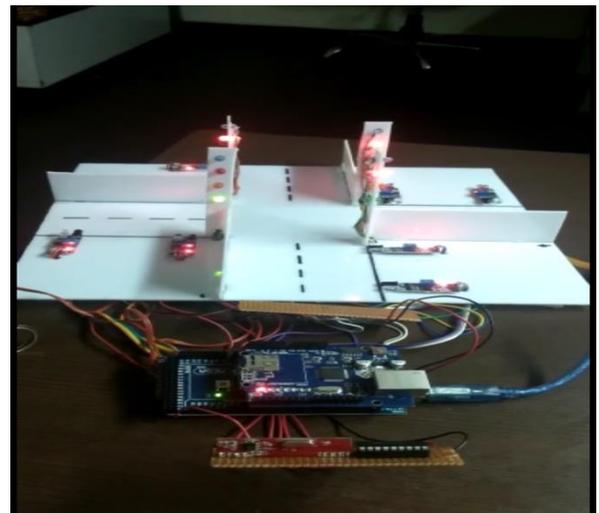


Fig.9: shows experimental setup when traffic density is higher set green signal

Image 1,2,3,4 show output of data send on thingspeak using IOT it shows traffic density at different traffic signal with updated time and day information.

### VII. CONCLUSION AND FUTURE SCOPE

In this project successfully completed target to reach emergency vehicle at destination in short time by providing information of traffic density at different junction on internet by using IOT. And also solve problem when two emergency vehicle come at same time with same priority then on the basis of first come first out EV send request first will gives priority. In future for security purpose we can add some password system and here only persons having.

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