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Dharmisetty Rajesh, Chitturu Lazaru, Chinni Dhileep,
Kotha M K Sampreeth, Chanumolu Sagar Vijay Chowdary and
Saragadam Sridhar

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1st Dharmisetty Rajesh, 2ndChitturu Lazaru,3rd Chinni Dhileep, 4thKotha M K Sampreeth
,5thSagar Vijay Chowdary Chanumolu,6th Mr Sridhar Saragadam, Associate Professor
[1-6]*department of computer science and engineering*
[1-6] *Miracle educational society group of institutions*
Bhogapuram, India
Email:lajaruschitturu225@gmail.com, dharmisettyrajesh009@gmail.com

***Abstract*—Now a days traffic especially in cities is increasing rapidly which causes high traffic jams at traffic junctions. Many times emergency vehicles like ambulances and fire engines got stuck in this traffic jams which leads to cause loss of lives or damage to public property. These vehicles should wait even though the remaining roads are free due to static sequence of traffic light. To avoid these problems, this proposed system provides a better solution by preempting emergency vehicles to reach their destination in time. The traffic light signals are monitored in way that it should give priority to that path in which the emergency vehicles lie.This can be done by collecting the GPS co-ordinate values of that vehicle by a node mcu from database and automatically a IOT device turn on the green light in that road.This can reduce the waiting time of emergency vehicles in traffic .And it is economically good to implement.**

***Index Terms*—IOT device, GPS, traffic lights, node mcu, database.**

I. Introduction

In the current days the traffic has been increasing tremendously in an uncontrollable way.This traffic congestion may even leads to increase in waiting time of emergency vehicles which in turn causes deaths of patients and loss of valuable property.Day by day people likes to get comfort so everybody may have their own vehicles rather than public ones. A report states ,every hour 17 deaths takes place as ambulance fails to reach hospital in time.these deaths are due to fixed sequence of traffic lights execution.it is very difficult to provide a dedicated lane for these emergency vehicles.so,this paper gives a best solution ,"TRAFFIC LIGHTS AUTOMATION FOR EMERGENCY VEHICLES" will automate traffic lights execution for dynamic situations to preempt these vehicles that helps to reach their destinations in time.A survey stated that 90 percent of heart patients are died due late arrival.

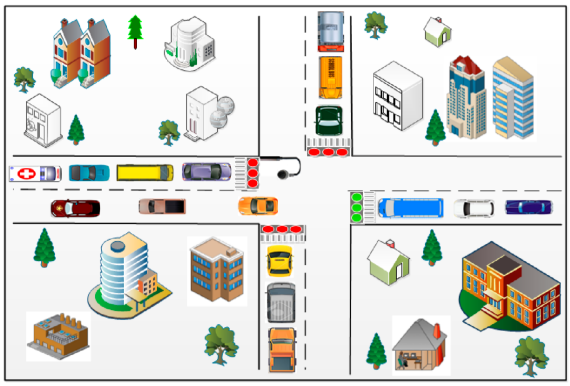


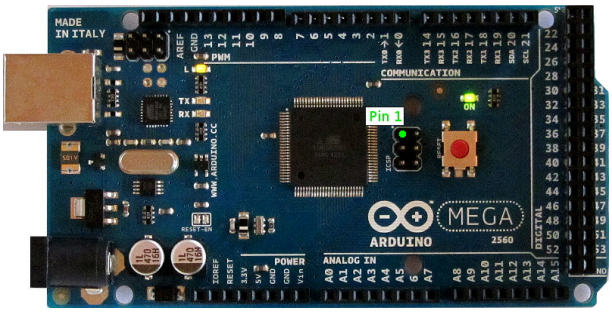
Figure 1. Emergency vehicle waiting at an intersection.

as shown above an increase in number of vehicles not only increase in accidents but also increases the time to arrive hospital.The emergency vehicles entering into intersections at high speed on red light poses danger to traffic on rest of road and can cause severe accidents .The proposed system when emergency vehicles hits a particular location on the road ,location of vehicle is calculated and a siren is activated to acknowledge people about emergency and traffic lights are monitored automatically .

II. METHODS AND MATERIALS

A. Arduino Mega 2560

An Arduino Mega is a microcontroller which is used for controlling controlling hardware devices.The hard devices include(lights,sensors,motor ,etc ..). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. In that 54 digital input/output pins we are using 12 for lights.



Digital input 1 for Lane -1 Red light. Digital input 2 for Lane -1 Yellow light. Digital input 3 for Lane -1 Green light. Digital input 4 for Lane -2 Red light. Digital input 5 for Lane -2 yellow light. Digital input 6 for Lane -2 Green light Digital input 7 for Lane -3 Red light. Digital input 8 for Lane -3 Yellow light. Digital input 9 for Lane -3 Green light. Digital input 10 for Lane -4 Red light. Digital input 11 for Lane -4 Red light. Digital input 12 for Lane -4 Red light.

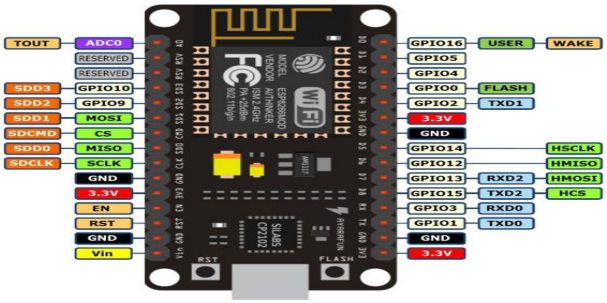
Digital pins 13 and 14 are used serial communication between nodeMCU and arduino and Gnd pin of node mcu is is connected to the Gnd pin of arduino for supplying power.

And another Gnd pin of arduino is connected to bread board t for giving power to lights which are placed on the breadboard.

B. Siren

A siren is device which makes a loud noise on the traffic signals whenever any emergency vehicles is near to the traffic lights it will alerts the people in the traffic by making very loud sounds.The siren is automatically operated by arduno mega.by attaching two input.output pins of arduno to siren .These pins automatically gives some signals to the siren and it will be activated and making the sounds.the siren will be automatically tuned of by the arduno.by using the siren the people the traffic are alerted.

C. nodemcu



NodeMCU Development board is featured with wifi capability, analog pin, digital pins and serial communication protocols.The figure contain 17 gpio pins and node mcu contains two parts 1.esp 12-E chip. Tensilica Xtensa® 32-bit LX106, 80 to 160 MHz Clock Freq, 128kB internal RAM, 4MB external flash, 802.11b/g/n Wi-Fi transceiver and 2.2.4 ghz inbilt antena

It has the power requirement

.Operating Voltage: 2.5V to 3.6V .On-board 3.3V 600mA regulator .80mA Operating Current .20 µA during Sleep Mode Node Mcu contains many input/output pins out of the we are using four pins

1.gnd which is connected to the arduino

2.power pin-which is responsible for supplying the required power

3.D2 -which is act as input

4.D3 -which is act as a output

the nodde mcu recives the data from firebase. By using serial communication between node Mcu and arduino it sends the received data from NodeMcu to arduno.

D. FireBase/ A Dedicated Database

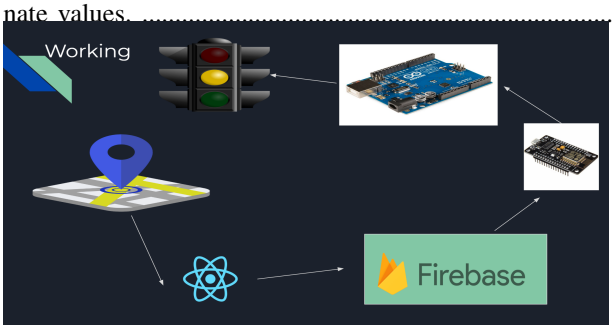
A firebase is a free database which is provided by the Google. A firebase is a online database for storing the data(here data regarding to the lattitude and longitude values).the firebase gets the lattitude and longitude values from the android app which designed using react native. The firebase is a no sql database. NOte: you can use a dedicated database instead of firebase.

E. react

A React is java Script library for Developing mobile apps .by using this React library react native adnroid app is built .By using this app we can get coordinate values from GPS(Global positioning System) .By using this app we can send coordinate vlaues to the Firebase. This mobile app is directly installed on the drivers mobil and driver will turn on GPS location the values are send to the firebase.

III. WORKING PROCEDURE

The traffic signals working procedure starts with by turning on the mobile location and the location value will taken by android app .The android app which made by using by using react native which is a popular java script frame work developed by facebook.After receiving values from firebase it will send and stored in the online database(Firebase) .the firebase will store the values just for a some amount of time.When the vehicle is moving that means [16] GPS(Global positioning System)values are changed.After the vehicle is moving new coordinate values will be replaced by old coordinate values. The coordinate values will be send to Arduino .The coordinate values will be send to arduino By using nodemcu which act as a mediator between arduino and and firebase .The communication between arduino and node MCU is serial communication. On receiving the coordinate values can be used by arduino to make decisions. Here we are initially placing some coordinate values at each lane.For the lane1 we are placing some coordinate values depends upon some geographical conditions when ever the emergency vehicle is nearer to the vehicle to those coordinate values .The arduino will automatically turn on the green light in that particular lane and it will also turns on siren and will alerts the public some emergency vehicle is coming on the road .So that public will alert give clearance to the emergency vehicle.so that in any lane if vehicle is coming it will turn on the light automatically.After crossing the vehicle it will waits for a few seconds and it will executes the traffic lights normally and it will tun off the siren. And again if the vehicle is moving it will receive the coordinate values and it will checks the every second .if the vehicle is nearer to the traffic signals it will execute the same procedure. The below figure shows the complete working procedure of the how the location sends to firebase and arduino receives the coordinate values.



A. Working Procedure by using Flow Chart

The subsection will discuss a detailed working procedure for traffic lights automation of traffic lights by using flow graph.

Step -1: In the first step open the android app and turn on the GPS(Global Positioning system).The GPS will turn on and it will take the coordinate values based the location of GPS.The android app will send only latitude and longitude values to the the firebase only if the app is connected to the internet.

Step-2: In the second step check if the Firebase receive the values are not .If not wait as long as it receives the coordinate values from the android app.If the Firebase connection is properly working it will receives the values and store the values Firebase online database .In that we will create the two instances on the database for storing latitude and longitude values. If the Firebse connection is properly not worked it will be terminate. Again it will received values form the android app which stores it.

Step-3: On receiving values from Firebase it will be send to arduino by usoing a microcontroller called nodeMCU.It will send to arduino the receives lattitude and longitude values .And in the a code will be executed continuously.

Step-4: The received values in the it will be stored in two variables and the coordinate values is nearer to the traffic signals or not.The coordinated values to be matched are some predefined coordinate values are assigned depends upon that the received coordinate values are checked.

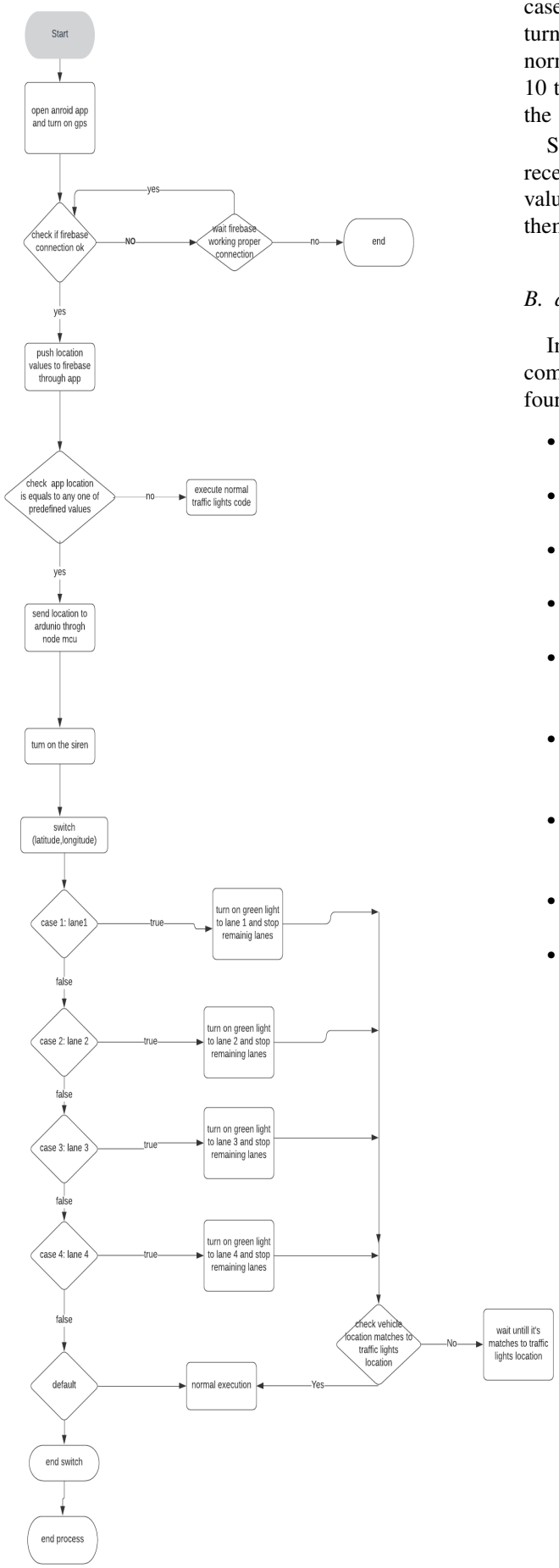
It will turn on the siren and By turning on the siren the people who are in the traffic can recognise some emergency vehicle is coming in the traffic.

In that a switch expression to give signal to which lane.

case 1:If the coordinate values is nearer to the Lane-1 it will turn on the Green light in the Lane-1.And it will continues to normal execution if the vehicle crosses the Lane-1 and after 10 to 20 seconds it will turn of the siren and it will continues the traffic lights execution continues normally.

case 2: If the coordinate values is nearer to the Lane-2 it will turn on the Green light in the Lane-2.And it will continues to normal execution if the vehicle crosses the Lane -2 and after 10 to 20 seconds it will turn of the siren and it will continues the traffic lights

case 3: If the coordinate values is nearer to the Lane-3 it will turn on the Green light in the Lane-3.or else executing the traffic lights noramlly.



case 4: If the coordinate values is nearer to the Lane-4 it will turn on the Green light in the Lane-4.And it will continues to normal execution if the vehicle crosses the Lane -4 and after 10 to 20 seconds it will turn of the siren and it will continues the traffic lights.

Step -5: After executing the above conditions.It will again receive values from the Firebase and it will check received values and if the the coordinate values matches it will execute them.This processing is going on continuously.

B. detection of lane

In this section we are discuss how to find out the vehicle is coming from which direction .In that basically we are taking four coordinate values.

- by default, all the co ordinate values of 4 lanes are fixed in firebase database.
- when a vehicle starts moving vehicle's location is sent to database every time.
- if this vehicle arrives to the fixed location of particular lane then this vehicle's location is matches to database.
- Node mcu is wifi module .It passes this location to ardiuno board.
- Then a siren is activated and it is continued to make sound until emergency vehicle left from traffic. siren is placed to aware the people about emergency vehicle is in traffic.
- Within a few seconds then ardiuno board monitors the traffic lights in the respected location and allow vehicles in that lane first.
- vehicle in that lane will start moving and whenever it reaches to traffic lights , vehicle's location is matches to traffic lights location.
- then siren is turned off and ardiuno board goes back to normal execution where it left before.
- if(lane1 coordinates $\leq$ predefined values)
  $\{$
  $turn\,on\,green\,light\,for\,Lane1$
  $\}$
  else if(lane2 coordinates $\leq$ predefined values)
  $\{$
  $turn\,on\,green\,light\,for\,Lane2$
  $\}$
  else if(lane3 coordinates $\leq$ predefined values)
  $\{$
  $turn\,on\,green\,light\,for\,Lane3$
  $\}$
  else if(lane4 coordinates $\leq$ predefined values)
  $\{$
  $turn\,on\,green\,light\,for\,Lane4$
  $\}$
  else
  $\{$
  $normal\,execution\,of\,traffic lights$
  $\}$

IV. CONCLUSION

According to a report published by Times of India about 146,133 people were killed in road accidents in India in the year 2016. Unfortunately about 30By the above approach we were able to achieve the following results

1.we can clear traffic for emergency vehicles.

2.By this method we can saves the life people who are emergency state

3.the signals are given to emergency vehicle based on GPS(global positioning system)location.If it is near to the traffic we can give the green signal to the emergency vehicle. 4.The cost to implement this technology is also cheaper than other.

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