AN INTEGRATED DENSITY BASED TRAFFIC LOAD BALANCING SYSTEM IN A CLOUD ENVIRONMENT

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ABSTRACT
Density of road traffic is a severe problem in the present world. The objective of this work is to manage the traffic lights and to provide importance in emergency cases using cloud. Traffic control system is a density based system that can determine the density of the vehicles at each side of the junction road when vehicles are nearer to that junction and transfer the information to the cloud. The presented system works based on a PIC16F8 series microcontroller. Density of vehicles is detected using Infrared sensors, which are placed within a fixed distance. Priority is provided to the overcrowded side of the road in traffic.

Keywords: PIC, IR sensors, Wi-Fi router, Vehicles counting, Traffic control system

1. INTRODUCTION
Controlling the traffic becomes the challenging task due to increased usage of the vehicles by the people. Sometimes green light is given for junctions with less density also. To correct the above-mentioned issue in the system handling the traffic for vehicles is implemented. Presently in different directions the traffic lights with fixed time delay are set according to a specific cycle while switching from one signal to other. This creates unnecessary traffic during rush hours. This project can applied using IR sensors, PIC microcontroller and with the service of cloud.

The cloud technology provides the reckoning services such as storage spaces, back end databases and the servers over the Internet. Cloud providers are the ones which offer the above services based on some usage amount for the utilization of the provided services. The proposed work gives out the solution to control the traffic over the road by using PIC controller. PIC is very efficient microcontroller. We collect the signal information and store it in cloud which merges all the signal points and work accordingly in emergency cases.

II. PROBLEM STATEMENT
Traffic congestion is a main problem with foremost cities. In India the traffic lights are founded on timing system i.e. whether the vehicles are present or not the timing will remain constant which makes people to wait unnecessarily for longer time. The key characteristic of the traffic in cities particularly for developing the geographies is that even if the geographies are explicitly mentioned/marked on the roads it doesn’t move through the lanes (Vivek Tyagi, et al., 2012).

In Emergency cases (VIP’s) the signals are precise manually, which is a hard-hitting task and can’t be executed successfully. Due to this man power is required in large amount and is a waste of time.

I. EXISTING SOLUTION
Nowadays people are very much interested in automating their needs. Most of them focus on the estimation of the traffic flow. The rate is calculated for the vehicles based on the throughput at a particular fixed point. Loop detectors and pneumatic sensors are used to measure the traffic flow using which rate is calculated. And image processing technique also has used. However; this technique is very costly and in developing countries maintenance is mandatory.

The traffic in metropolitan city includes various vehicles such as personal vehicle, public and emergency vehicle may be a VIP vehicle. At some junction points these transport waits for long period of time. Due to this lot of time is merely wasted in waiting for the signal to turn green particularly for emergency cases (Ashwini Sawant et al., 2015). The vision based technique using video processing for traffic light control also yields the interest in many researchers. This system will minimize the traffic in many situations and optimize the traffic rate. It also can be interconnected with all other signals through a Wifi router, continuous density control will be achieved all over the city. The concept of cloud computing provides dynamically scalable resources as a service over the Internet (Shrividhya, et al., 2017).

III. METHODOLOGY

Work Flow

START

CHECK FOR SIGNALS ‘ON’

CHECK FOR DENSITY OF ROADS

CHECK FOR PRIORITY OF THE ROAD
It is evolved from virtualization, distributed and utility computing and parallel computing and from grid computing (Subhakala et al., 2017). The proposed methodology illustrates a model which comprises of IR sensors, microcontrollers, LCD Display panel and interconnection among the existing microcontrollers. The workflow will be from checking all the signals to storing & sending information to the server as shown in Fig.1.

IV. PROPOSED WORK EXECUTION: cloud Hosting services are provided for hosting the virtual servers in order to utilize the resources from the physical web servers. Clients can use their service as much as they need to, based on their requirements.

Cloud hosting is opted in this paper work for hosting signals on single servers. It can be dedicated servers or shared servers. It can be considered as an extension of clustered hosting where multiple servers host the signals. The physical servers are managed within data centres. These facilities are implemented to prevent people from accessing or disrupting them.

A) Working of “IR” Sensors: The first module regarding the IR sensors where, there are four IR sensors placed after a minimum distance from the traffic signal in a four-way traffic signal system. We can place any number of IR sensors according to the length of the road. Traffic on the road with loads of vehicles can be controlled by using the Wireless Sensors Networks which are plotted along the road and also at the traffic junctions (Ashwini Sawant et al., 2015) It senses the amount of density of a particular road. IR sensor consists of IR transmitter and receiver sensing the density of the road and produces an output signal. The output IR signal is provided as an input to the microcontroller. Throughput of the traffic is measured using loop detectors and pneumatic sensors (Ashwani Sangwan and Kumar, 2016). B) Processing of “PIC” Microcontroller: The second module is about the working of the microcontroller. Some of the embedded machines such as automobile engines, remote controls, electronic appliances use microcontrollers as they automatically restricted (Kirti Karande and Hardik Vaghela, 2015). The input for the microcontroller is the output signals from the IR sensors. The microcontroller processes all the IR signals and based on the density of the roads it increases the timings of the green signal for that particular road. The output from the microcontroller is stored in cloud and is displayed on the LED and LCD display.

C) Execution of the Output through “LCD” Display: The third module is the working of the LEDs which displays the outcome of the system. The resultant pins of the microcontroller are given to the LEDs and LCD display which increases the timing of the green signal in the particular road where there is heavy density. The timing for the green signal is displayed in the LCD display. The indication of the traffic lights is through the LED lights.

D) Interconnection among Microcontrollers: The processing of a single microcontroller controls the traffic at a single junction. In a city at all junctions, signals are processed with an individual microcontroller therefore connecting the microcontroller information on all junctions we can provide a controlled traffic flow throughout the city. This information is passed on to the cloud server for the automation of all the signals in a city.

E) Establishing Connection to the Cloud Using “WIFI ROUTER”: The traffic information on a city from the microcontroller is sent to the cloud server. We process that information and the signals are automated where we can control the traffic in city. This can be achieved by using Wi-Fi router to connect the traffic information on the cloud. Wi-Fi router helps us in establishing connection to the cloud as shown in Fig.2.
An integrated density ...

Fig.2 Block Diagram Description

And the final working model of the system is shown in Fig.3.

Fig.3 Working Model of the System

F) Source Code for the Module:

```c
int main(void)
{
  DDRB = 0xff; DDRD = 0xff; DDRC= 0x00;
  PORTB = 0x00; PORTD = 0x00; while (1)
  {
    if((PINC&0x01) == 0x01)
    {
      PORTB |= (1<<G1);
      PORTB |= (1<<Y2);
      PORTD |= (1<<R3);
      PORTD |= (1<<R4);
    }
    else if((PINC&0x02) == 0x02)
    {
      PORTB |= (1<<R1);
      PORTB |= (1<<G2);
      PORTD |= (1<<Y3);
      PORTD |= (1<<R4);
    }
  }
  else if((PINC&0x08) == 0x08)
  {
    PORTB|= (1<<Y1);
    PORTB |= (1<<Y2);
    PORTD |= (1<<R3);
    PORTD |= (1<<G4);
  }
  else
  {
    PORTB = 0x00; PORTD = 0x00;
    PORTB |= (1<<G1);
    PORTB |= (1<<Y2);
    PORTD |= (1<<R3);
    PORTD |= (1<<R4);
    _delay_ms (7000);
    PORTB = 0x00;
    PORTD = 0x00;
  }
}
```

V. RESULT

The module thus implements Density based traffic controlling system using IR technology. PIC is very efficient architecture used for low end security systems and IR technology is widely adapted technology for communication. Current work focuses on the effective usage of IR and PIC controller for digital security systems. The proposed system provides of the count of the vehicles at either side of the junction while those vehicles are near the particular junction. Once the circuit is connected and coded, the circuit is sensed through IR sensor for testing. This IR sensor is mainly used to describe the opto-electronic means for sensing the things, commonly known for photo detection. While testing keep the transmitter & receiver aligned in a straight position facing each other. It deals with the proposed work and its Hardware & software requirements of Traffic control system.

And what would be the output for the given input. It also explains the process of managing the traffic in a city by making a connection to the cloud server.

![Traffic rate](Fig.4 Estimation graph of traffic rate)
Diagrammatic representations are given to make the system more clear. It tells about each module that are used in this application. It discusses the experimentation and result that meant for when a project is completed that needs to perform some experimentation there occurs a result, based on these the project status will easily have notified. The results are showed as a snapshot. Fig. 4 explains the statistics regarding the traffic rate from 2000 to 2020. From 2000, the traffic rate is increasing continuously to some extent. By implementing this kind of density managing module in high traffic areas can negligibly reduce the traffic rate over the crowded areas.

VII. CONCLUSION AND FUTURE ENHANCEMENT: Density based traffic signal system cut down the waiting time of the vehicles in the traffic signals. By connecting the microcontroller information on all the signals in the city/town areas we can predict and reduce the traffic caused due to overloaded vehicles in the traffic signals thus providing smooth movement of vehicles along the road in a city through establishing connection along the cloud server. Thus, there is a free flow of vehicles for junctions without stopping. To over-come the present world’s issue, our idea can be implemented.

VIII. REFERENCES
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