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Smart Congestion Avoidance Approach for Itinerants

P. Anil[1], P. Raveendra [2]

M.Tech Student, Department of Electronics and Communication Engineering, VR Siddhartha Engineering College, Vijayawada, Andhra Pradesh, India[1]

Assistant Professor, Department of Electronics and Communication Engineering, VR Siddhartha Engineering College, Vijayawada, Andhra Pradesh, India[2]

ABSTRACT: Traffic congestion becoming a major problem in the growing countries with higher usage of individual vehicles, inadequate infrastructure and improper design of the roads. The main causes for increasing traffic are the increase in the population and insufficient public transportation system. Mainly, the congestion problems faced by the travelers in metropolitan regions causes spending more time on the roads, more fuel consumption and leading to frustration has increased across all population groups. In the previous times, some techniques had proposed to avoid road congestion like intelligent traffic light system and dynamic traffic control systems but still they suffer, when the number of vehicles arrived on the lanes at a short period of time. The proposed method intimates to the travelers and drivers to propose an alternative way at traffic signals when congestion is occurred. In this method, an installed camera is used, which is fixed away from the junction at a pre-defined distance. If the traffic congestion is occurred up to the camera zone (distance proposed from the junction point) then the system warns the coming drivers on the lane, to choose for an alternate way to escape from the congestion. The information broadcasted by using display/audio mode, which is fixed at the road side. The intimation should give from the camera zone to the particular distance which will be helpful to take an alternate way to the drivers. This system provides a sophisticated approach to avoid congestion.

KEYWORDS: Traffic congestion; camera zone; still camera; predefined distance
TOOL: LabVIEW 10.0

I. INTRODUCTION

Population growth has increased the number of vehicles and passengers on the country's freeways and highways. Since the current transportation infrastructure has not kept pace with the growth in traffic demand. With inadequate space and funds for the construction of new roads, and the growing imbalance between traffic demand and transportation resources, the traffic jams are occurred. Traffic jams form a serious problem in modern cities. They bring about considerable economic loss, increase travel times and aggravate pollution. Governments spend a great amount of money trying to monitor and understand traffic jams, but this seems difficult due to the complex nature of traffic jams. One of the complexities is unpredictability whether sometimes traffic jams occur or not. Another complexity is that traffic jams are dynamic and interrelated. Due to these, a fully automatic analysis of traffic jams is hard, requiring considerable experience and knowledge. Traffic congestion levels have been increasing significantly in the last few decades and this trend seems to continue. The general perception is that crash frequency increases with increasing congestion levels. Nevertheless, it is expected that severe crashes will not increase under these traffic conditions. Once traffic is congested, vehicles decelerate and accelerate within short distances. Speed in the queue is low and as a result fewer crashes are expected to occur within the queue. On the other hand, traffic that approaches the queue might be surprised by the queue and therefore, more severe rear-end crashes are to be expected at the tail of the queue. Once traffic is congested, vehicles decelerate and accelerate within short distances. Speed in the queue is low and as a result fewer crashes are expected to occur within the queue. On the other hand, traffic that approaches the queue might be surprised by the queue and therefore, more severe rear-end crashes are to be expected at the tail of the queue. There are two types of congestion: structural or incidental (also referred to as recurrent and non-recurrent congestion). Structural congestion occurs when traffic demand is higher than capacity, while incidental congestion is the result of occasional

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conditions such as a crash, bad weather or road works which alter the traffic flow. Drivers are able to anticipate the occurrence of structural congestion more easily because it takes place at about the same locations at about the same time of the day. Incidental congestion, on the other hand, might surprise drivers and lead to more unexpected behavior. The extent to which congestion surprises drivers also depends on other factors, such as the distance from which the queue is visible (e.g. a queue located just after a curve will result in greater surprise) and the use of technology to warn drivers (e.g. variable message signs or in-car technology). It is expected that the effects of congestion on safety will vary according to the type of congestion and the extent to which the congestion surprises the driver. There is a relationship between congestion levels and route choice. Drivers opt for alternative routes in an attempt to reach their destination faster than by simply joining or entering a queue. This route choice may be based on the driver's familiarity with the network or on information provided by either variable message signs or in-vehicle systems. When traffic diverts from congested motorways to secondary roads, a safety problem might arise as different types of roads show different levels of safety.

II. LITERATURE SURVEY

Automated Traffic Surveillance and Control (ATSAC) System [1] contains a number of features that provide a powerful and flexible capability to manage traffic. Many traffic detectors are used to collect data used for critical intersection control, traffic responsive control in networks, real-time surveillance of traffic conditions using color-graphic monitors, real-time evaluation of system performance, and automated generation of new traffic signal timing plans. Closed-circuit television is also used to provide additional information regarding the cause of congestion. The Los Angeles Department of Transportation installed the first phase of ATSAC System in June 1984, since that time, ATSAC has been in continuous operation, new features have been added to the system, and implementation throughout the city is underway. An evaluation study was conducted to quantify the improvements achieved with the ATSAC System in the Coliseum area. The results of this study were: stops reduced by 35%, intersection delay reduced by 20%, overall travel time reduced by 13 % , fuel consumption reduced by 12.5%, and air emissions reduced by 10%. The economic benefits of the reductions in stops, travel time, and fuel consumption were also calculated.

Intelligent Vehicle Highway Systems (IVHS's) [2] traffic has generated considerable thrusts in the last two decades. The most recent advances in vehicle controllers and highway management technology seem to indicate that it is possible to start implementing such systems in everyday traffic. IVHS consists of both intelligent vehicles and intelligent or automated highways. Intelligent vehicles would allow an increase in highway capacity of up to 300%. This would be the result of elimination of traffic congestion by increasing the speed and decreasing the inter-vehicle distance. A very important component of an intelligent highways' management system is a traffic simulation system [2]. Such as system, consists of a traffic-flow simulation code, which is able to simulate traffic on a freeway and arterials network and a computer system. This computer system consists of hardware and software. The system uses a mathematical traffic flow model to perform traffic-flow simulation and predict the traffic conditions in real time. Tests with real traffic data collected from the freeway network in the small metropolitan area were used to validate the accuracy and computational rate of the parallel simulation system. The execution time for a 2-h traffic-flow simulation of about 200619 vehicles in an 18-mi freeway, which takes 2.35 min of computer time (on a single-processor computer simulator), took only 5.25 s on the parallel traffic simulation system. This parallel system has a lot of potential for real-time traffic engineering applications.

The design of systems for intelligent control of urban traffic is important in providing a safe environment for pedestrians and motorists. Artificial neural networks (ANNs) (learning systems) [3] and expert systems (knowledge-based systems) have been extensively explored as approaches for decision making. While the ANNs compute decisions by learning from successfully solved examples, the expert systems rely on a knowledge base developed by human reasoning for decision making. It is possible to integrate the learning abilities of an ANN and the knowledge based decision-making ability of the expert system. The performance of the proposed intelligent decision-making system is evaluated by mapping the adaptable traffic light control problem. The application is implemented using the ANN approach, the FES approach, and the proposed integrated system approach.

Vehicle Information and Communication System (VICS) [4] is starting to become practicable. The infrared system of VICS detects vehicles on the road by using optical beacons to control traffic and to supply real-time traffic information.

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But it needs an enormous budget because the optical beacons must be located on every lane of the road throughout the country. In this method propose a traffic information system using existing Light Emitting Diode (LED) traffic lights, and focus on its visible rays and power used for traffic control, the number and location of the traffic lights, and the movement toward LED traffic lights. We design the best service area not to interfere with other service areas and analyze its basic performance such as the suitable modulation, required SNR and the amount of receivable information.

III. PROPOSING METHOD

The approaches which were discussed above give study of traffic jam reducing techniques. With these proposing models the traffic jams were reduced at some instant, but still traffic jam is a major problem in urban or developing areas. It is difficult to study about traffic jams because it is an aperiodic based. It is difficult to the passengers and drivers to find where the traffic jam will be occurred at junctions. If you struck in the traffic jam it is difficult to escape. The proposing method is an efficient way to escape from the traffic jam while traffic jam occurred at a junction. Proposing method has still camera which is fixed at some distance (proposing distance) from junction on the road which is called zonal area. It will be take continuous images regularly with some time difference (1sec or 2 sec). Assumed that there is no vehicle at zonal area the image captured by the camera has no vehicle. After some predefined time vehicle image is captured and compare with the previous image, then some difference will be occurred with depends on the reference line provided on the road. The process is continuous whenever the difference between the images is more. If there is zero difference in the image assumes that there is no vehicle in the reference line else there is a vehicle occupied in the respective space. The proposing block diagram explaining the concept is shown in figure1.

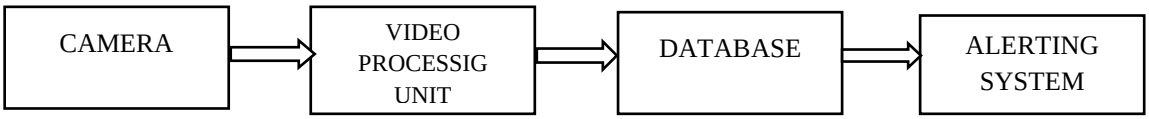

Fig1. Block Diagram of Smart Congestion Avoidance Approach

Camera:
Camera was graphs video data about the vehicles from the top of the road. That video data is processes by the LABVIEW based system to identify the traffic congestion occurred or not. It was fixed at some distance from the junction. If congestion was occurred up to that camera zone then we system alerts the coming travelers to choose alternative root.

Video Processing unit (VPU):
One processing unit which is pre-programmed was process these images to identify the traffic congestion. It was pre programmed Laboratory Virtual Instrument Engineering Workbench (LABVIEW) based system. Then that video data is converts into 1D array data by using the image to array converter.

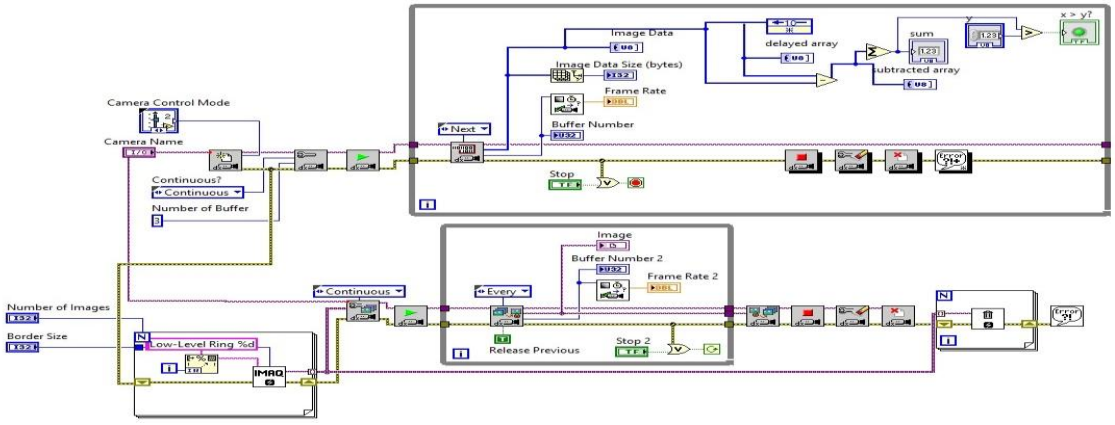

Fig.2: Video Processing unit

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In that array data is delayed then that delayed array data and the present video array data is compared with the help of comparison function which will take two inputs as input and gives their subtracted value. Then that subtracted array element values are summed to get one constant value by using the summation vi. Then that value is compared with the threshold value which is fixed by studying different live array values. If the gathered value is higher than the threshold value then the output will be a high signal, otherwise the output of the VPU will be a low signal that means no traffic congestion occurred at the junction.

Alerting system:

If the traffic congestion is occurred at the junction that information is passes to the coming travelers by this system. It is also a LABVIEW based system which can have recorded audio data in .wav format. It will intimate the travelers by playing recorded audio to alert them for escape them from congestion. The audio VI used for alerting travelers was shown in fig. 3. In this alerting system had used audio system for alerting the travelers. In the Fig.3 Shows the audio input path that gives the direction of audio file which is stored in the database. One timer is also presented here for set to stable mode after countdown of timer becomes to zero. For loop is used for the input high condition from the Video Processing Unit occurred only it will be activates again.

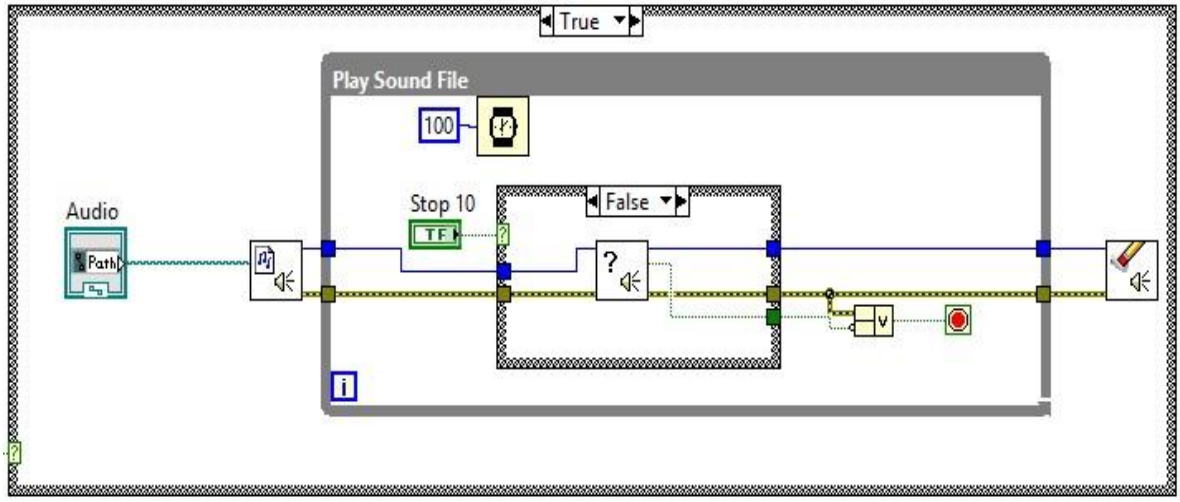

Fig.3: Audio system

This alerting system is places at the nearest left (left or right based on the traffic rules of that nation) turn to alert them to choose alternative root.

IV. **RESULT**

The received data from the camera will be a video data; it will be given to the video processing unit. The sample diagram of that camera output will be shown in fig .4. That data will be given to the video processing unit for further processing. Here the screen short of the one sample was shown as camera output. It is a 1600X1200 sized image having 32 bit and RBG (Red, Black, and Green) format image. Because of it is a video data at a time it as 11, 62, 622 number of samples at a time.

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Fig 4: Camera Output

That video data will be converts into the images and then these images are into the array data. These arrays were delayed by using feedback node for easy to comparison. Then the comparison was done between present array value and previous array value. If the difference is low that means of congestion was occurred. If high difference occurred then the congestion was not occurred.The delayed array and present array and differenced array were shown in Fig. 5. All the elements in the subtracted array were summarized by using summation VI. After to that value was compared with the threshold value to fins the congestion occurred or not.

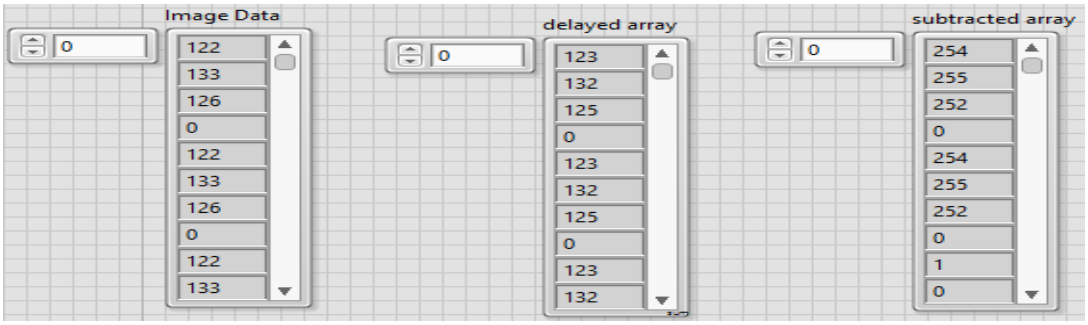

Fig.5: Structure of arrays

If congestion was occurred one activation trigger was sent to the alerting system to activate the message. The audio was already in the data base of the alerting system. It plays the audio to alert the travelers to take alternative root which is located at the nearest left turn to the junction.

IV. CONCLUSION

The traffic problem is reduced by using simple image comparison operation. There is a way to reduce traffic for coming vehicles to the junction at the time of congestion occurred, So that the travelers may have an alternative route to reach their destination. The time of travelling is also reduced at the time of congestion. The economical loss is also reduced, if the vehicle is blocked in the congestion very long time the fuel consumption is also increases by this the travelers may get economical loss. The environmental pollution is also reduced at some instant as the vehicles releases harmful gases into the Air. Due to these gases global warming will be occurred. By using this method the rate of overcrowding at the junction will be reduced so that the amount of gases released in to the air will also be reduced

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which in turn reduces the pollution. According to this method the health condition of the people will be better than before, if the vehicle blocked in the traffic congestion the travelers and drivers may hear so many sounds like lorry horn, bus horn etc. by this the sound pollution will be generates at the junction. By the sound pollution we get many deceases like mental tension. More ever high sound pollution is harmful to the pregnant ladies and small kids.

V. FUTURE WORK

1. It is better to identify the difference between the empty road and road.
2. At the junction this system will be work individuality at each side need to synchronize all the systems to get better service.
3. For the accuracy of the results, better to use high resolution camera.

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BIOGRAPHY

P. Anil is a student pursuing M-Tech in the Electronics and Communication Engineering department, college of VR Siddhartha Engineering College, Vijayawada, A.P, India. He received B-Tech in 2013 from RISE, Gandhi group of Institute of engineering & Technology, Ongole, A.P, India. His interested areas are Intelligent Transportation Systems, Location Based Systems, Electronic toll collection & Telecommunication.

P. Raveendra is an Assistant professor in the Electronics and Communication Engineering department, College of VR Siddhartha Engineering College, Vijayawada, A.P, India. He received M-Tech in 2012 from VR Siddhartha Engineering College, Vijayawada, A.P, India. His interested areas are Intelligent Transportation Systems, Embedded systems and Electronic toll collection.