# MATLAB TO EMBEDDED SYSTEM TRAFFIC CONTROL MANAGEMENT-A RESEARCH

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**Abstract:**
Today's traffic management system has no significance on live traffic scenario, which leads to amateurish traffic management systems. These traffic timers just show the pre-set time, this is like using open loop system. The project is to design and develop an adaptive traffic control system using a digital image processing. Traffic is the one of the major problem which world faces day by day because of the increase in human population and number of vehicles on the road. Conventional traffic control system is allotted fixed timing to traffic light at road intersection which cannot be varied as per traffic situation or density. But we need an improvement in traffic control system. This proposed system measures the number of vehicles present in each lane using image processing in MATLAB software. This paper is presented through by using MATLAB and Embedded system. A Simulation of Fuzzy Traffic Controller design for controlling Green Light time for effective traffic flow is implemented. Intelligent Traffic controllers are required these days to adjust to a situation of ever increasing traffic. Artificial Intelligence technique such as neuro-fuzzy systems, fixed time embedded controllers, etc. are available to handle the traffic related problems. But Adaptive traffic signal controller based on Fuzzy Inference System used in this project provides smart solutions for efficient traffic control. By using Embedded system it discuss about the ITSC system. The ITSC system will able to deal two basic problem of traditional traffic light system: i) Detection of traffic volume by using genetic algorithm. ii) Emergence vehicle detection such as ambulance, police etc by using wireless sensor network (IR) embedded at the signal intersection.
**Keywords:** traffic lights, traffic simulation, Intelligent Traffic Signal Controller, embedded system, fuzzy logic.

## 1.0 Introduction:

The incommensurate infrastructure and the unreasonable distribution of the development are major cause for increasing the rapidly traffic jam that we have face serious problem day after day. The main cause leading to traffic congestion is the increasing number of cars and vehicles which happen due to population and development of the economy of the urban person. The number of road users constantly increases and resources provided are limited. So that Intelligent control of traffic will become a very important issue in the upcoming year. However, some limitations to the usage of smart traffic control exist. Avoiding traffic conjunction there are several models for traffic performance. The traffic control system based on vehicle density calculation tries to decrease possibilities of traffic jams. This Paper will be implemented by Mat lab software and embedded systems. So it is said that if the lane with higher traffic density should switch on the green signal light for a longer period than the lane with the lesser density. This technique is based on the measurement of the traffic density by correlating the live traffic image with a reference image. The higher the difference is, higher traffic density is detected.

## 2.0 Literature Review:

**Parthipan et al (2015)** there's a huge increase in car user's day by day, Traffic blockings and traffic jams have become very common these days. In this paper, an arrangement for the traffic in highways is estimated by image processing method has been proposed. This Paper will be implemented by Mat lab software and it aims to anticipate abundant traffic in highways.

**Jadhav A.D. et al (2014)** to make traffic light controlling more efficient, we exploit the emergence of new technique called as "Intelligent traffic light system ". This makes the use of Sensor Networks along with

Embedded Technology. This project also includes analyzing traffic of each road along the signals and assigning time period to glow the respective light. This time slot may vary according to the traffic. The older system uses integrated highway management system based on the radio frequency identification (RFID) technology in which it will be tracking vehicles and Electronic toll collection system will be implemented

**Malathi, T et al (2011)** an idea is proposed to help the elderly people by giving provision for on- road pedestrian crossing in high density traffic areas like near school, hospitals, markets, etc and to reduce the accidents rate. To implement this, here an additional time delay is introduced in the traffic signal for pedestrian crossing in addition to vehicle crossing in all possible direction. Additionally, two parameters are provided, one to track the vehicle which violates the traffic rules and other to clear the traffic for emergency vehicles. All the above said three parameters can be simulated by using PROTEUS software and the system function is implemented using UTLP Kit.

**Ahmed S. Salamaet al (2009)** provide integrated intelligent traffic light system using photoelectric sensors distributed on long range before and after traffic light on roads. In the case of Emergency such as, the passing president car and ambulance that require immediate opening of traffic signal. The system has the ability to open a complete path for such emergency cases until reaching the target but this system does not operate wells when more than one emergence Vehicles come on the signal from two sides

**3.0 Methodology and process:**

Today's traffic management system does not help much in detailing of when deciding when to change the lights for the various road users waiting in different lanes. How long the signal stays green in one lane and red in others is determined by simple preset timing that is calculated when the crossing is designed. Today's methods are robust and work well but the systems are very inefficient because they are unable to handle various situations that arise throughout the day. Unnecessary waiting time in the signal can be avoided by determining in which side the green signal should be ON for a long time during the traffic and to achieve this we need to find the density of the traffic present on the roads. We found that Image processing is one of the best methods which we can use for adaptive signal controlling. Image processing provides measurement of Pattern i.e. measures various object in an image and Image Recognition i.e. Distinguish the objects in an image. Therefore this purpose of image processing can be used to identify the density of traffic present on the roads which gives the information of number of vehicles present in each lane.

**4.0 Techniques Used In Proposed System**

MATLAB is widely used in digital image and video processing as a computational tool. Digital image processing algorithms can be used to extract the size, scale or number of objects in a scene. Environment for data analysis, visualization and algorithm development is provided by the tools and algorithm used in functional techniques for processing digital images.

**Emergency Vehicle Detection**: In this proposed system image captured by a camera will be a color image initially. Thus we will use color based thresholding in which thresholding is to be done based on color values in natural images to detect an ambulance in an image. Where image will be compared with the predefined criteria of ambulance detection in which blue color intensity of siren with number of pixels used to define a region of siren set by the MATLAB programmer.

**Vehicle Counts in Respective Lane:** Once the process of emergency vehicle detection is completed, initially captured color image is then converted into grey scale image for lane detection, vehicle detection and its count. First, we build a background model to segment foreground objects. Then we apply blob detection, which returns the count of blobs present in that image. we have mentioned the different regions for different lanes in background model, so accordingly it returns the total count and depending on the regions we can decide the vehicle count in that particular lane. We put region of interest in each lane and gets the count for respective lane.

The problems are occurred due to traffic congestion are:

1) Heavy traffic jam: Because of heavy traffic jam it waste time as well as fuel also and it happened at the main junctions when people have emergency such as before office hour, morning and after office hours, evening.

2) There is no traffic but still need to wait: Sometimes there is no traffic at certain junctions, and people have to wait. Because of the traffic light remains red for the present time period, the road users should wait until the light turn to green. If they run the red light, they have to pay fine.

3) Emergency vehicle stuck in traffic congestion: Due to traffic jam, the emergency vehicle such as ambulance, fire brigade and police will be stuck at the traffic junction and that's why emergency vehicle can't move due to

congestion. This is because the road users waiting for the traffic light turn to green. This is very critical problem because it can cause the emergency case become complicated.

4) Users have lack of traffic information: Present traffic systems unable to provide traffic information on congested roads and also fail to provide information about alternate roads when traffic congested on roads.

Other scenarios in which this technology is employed include:

**Stolen vehicle recovery:** Both consumer and commercial vehicles can be outfitted with RF or GPS units to allow police to do tracking and recovery. In the case of LoJack, the police can activate the tracking unit in the vehicle directly and follow tracking signals

**Trailer tracking:** Haulage and Logistics companies often operate lorries with detachable load carrying units. The part of the vehicle that drives the load is known as the cab and the load carrying unit is known as the trailer. There are different types of trailer used for different applications, e.g., flat bed, refrigerated, curtain sider, box container.

**Fleet management:** When managing a fleet of vehicles, knowing the real-time location of all drivers allows management to meet customer needs more efficiently. Whether it is delivery, service or other multi-vehicle enterprises, drivers now only need a mobile phone with telephony or Internet connection to be inexpensively tracked by and dispatched efficiently.

**Transit tracking:** This is the temporary tracking of assets or cargoes from one point to another. Users will ensure that the assets do not stop on route or do a U-Turn in order to ensure the security of the assets.

**5.0 Simulation**

The simulation period was four hours and was randomly chosen. Although the volume of results did not provide sufficient evidence for analyzes, the goal was to evaluate the stability of the model during simulation. Analysis of this graph shows that the mechanism for retaining vehicles of the control traffic light remained stable throughout the simulation.

**Figure 1 Basic Structure of FIS**

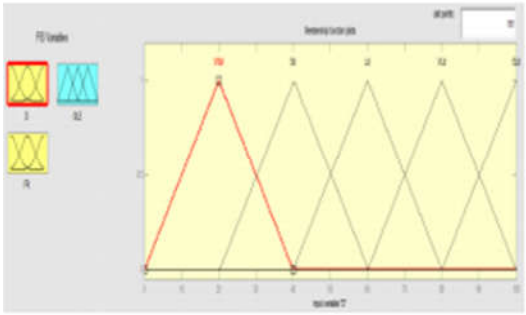

**Figure 2 Input Membership Functions for Traffic Density**

Finally, the stability of the system could be evidenced with the last test performed with the traffic lights flow collected in the simulation

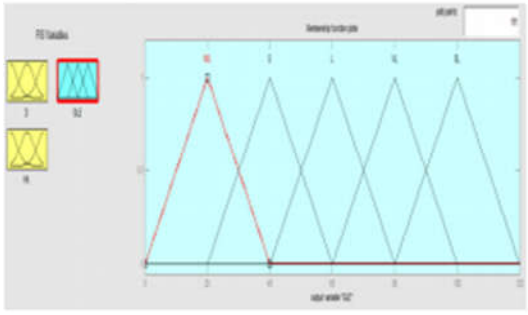

**Figure 3Input Membership Functions for traffic lights collected in the simulation.**

Simulation of this fuzzy traffic controller is made in SIMULINK environment of MATLAB. Results for green light extension time in seconds are obtained with SIMULINK model of fuzzy traffic controller which shows linear increment in the green light extension time for increasing values of traffic density and traffic flow rate. When traffic density (0-100 Veh/Km) and traffic flow rate (0-1000 Veh/Hr) is varied within their full range, green light time also varies within its full scale (0-100 seconds).

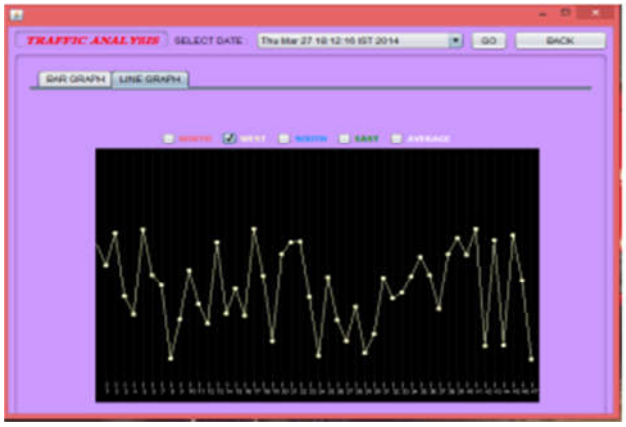


**Figure 4 line graph of traffic in a particular area**

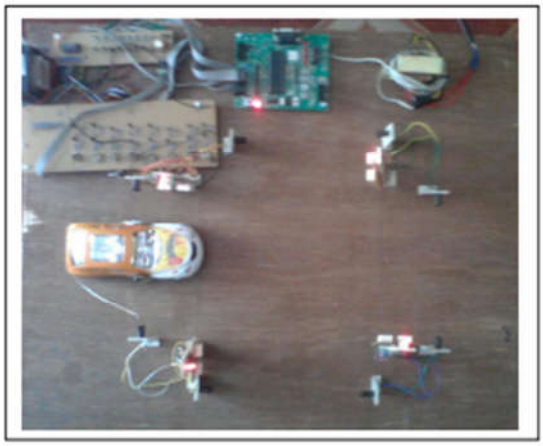

**Figure 6 ITSC system (Upper view) using embedded enhancement**

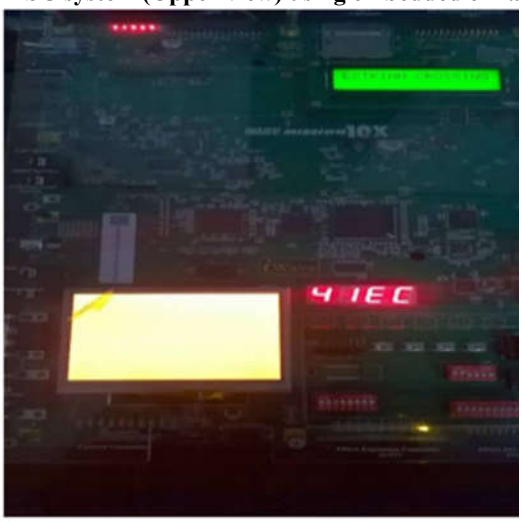

**Figure 7 Output for Pedestrian enhancement**

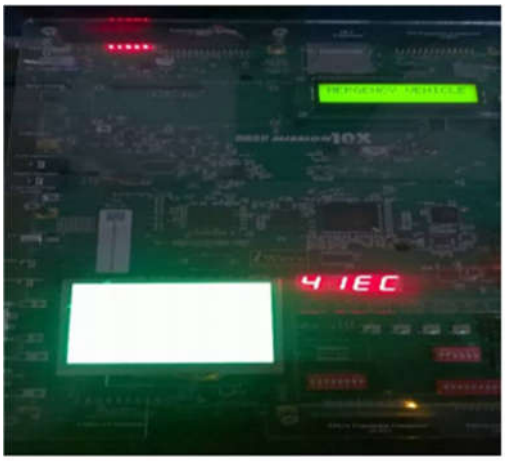


**Figure 8 Outputs for Emergency Vehicle**

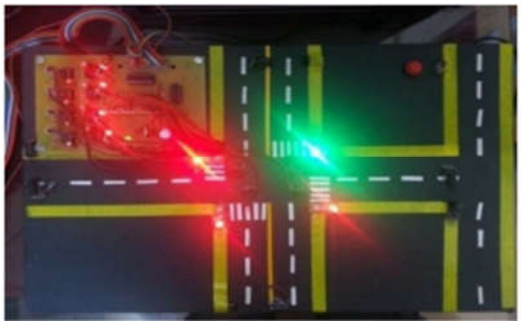

**Figure 9 Track of Intelligent Traffic Controller System**

**6.0 Conclusion:**

A method for controlling the traffic signal using Image Processing is presented. This is done by using the camera images captured from the lanes, each image is processed separately and the number of vehicles had been counted and according to that priority is given and green signal is operated based on timer. Seeing that this method has been implemented using Image Processing and MATLAB software, therefore production cost is low while achieving high speed and accuracy.

The improvement of traffic is mostly depend on the modern ways of traffic management and control. In future work, we will use real dynamic road section to estimate the unknown traffic volumes and apply to real traffic. When more than one emergency car came then most of the system fails. They give green signal to both which lead to traffic conjunction problem and also leads to accidents. the method can provide a safe, secure and efficient way of public transportation system. This method gives the solution to avoid accidents during pedestrian crossing in highly congested area and to give importance for emergency vehicle to save human life. Here provision is also given to help the authority to find the people who violate the rules

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