Strategical Management of Image Processing Based Real Time traffic control system with GSM Interface

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ABSTRACT

In many big cities, traffic congestion is increased because of rapidly increasing population. Due to transportation authorities have been challenged to manage the increasing traffic congestion in major roadways. Current traffic light system uses fixed delays with particular sequence while switching from one direction to another. This is because of unwanted congestion during day and night time, loss of man-hours, fuel consumption. This system aimed at the signaling time changes automatically depend on traffic density. The proposed system uses a web camera mounted on DC motor to sense the traffic on the road.

Keywords: Traffic congestion, ARM-7, Web camera, Image processing, GSM.

1. INTRODUCTION

Traffic congestion is the biggest or common problem in major cities. Many traffic systems based on the real time operating system. But an intelligent traffic system senses presence or absence of vehicles and react accordingly. The purpose behind that drivers will not spend unnecessary time waiting for the traffic lights to change. The signal timing varies based on traffic density of roadway. It is therefore be way to improve traffic flow and safety of the current transportation system is to apply intelligent control methods.

As the number of road users constantly increases and resources provided by current infrastructure are limited, intelligent control of the traffic will become a very important issue in the future. Objective of proposed system is to improve efficiency of existing automatic traffic signaling system. The system will be image processing based adaptive traffic controlling. The timing will be calculated each time change automatically depending upon the traffic road.

The proposed system will be functioning based on traditional system along with automatic signaling. System will have artificial vision with the help of digital camera mounted on motor for its rotation to face lanes and sense the traffic on the road. The camera is controlled by PC to change its direction and capture image. Estimate traffic load on particular road will be used to calculate the required time duration for controlling of signal lights.

The system is integrated with GSM module to handle the emergency situation. GSM transmitter is installed in ambulance to send an emergency message while GSM receiver is installed at each intersection of traffic signal and to assign highest priority to handle an emergency situation.

2. LITERATURE REVIEW

The author namely Chandrasekhar M, Saikrishna. C, Chakradhar. B, Phaneendra kumar, P& sasanka. C describe [1] According to this, system can be done using two ways viz image capturing and electronic sensors to find the density of each road.

The author namely Jagtap Varsha Suresh (International Journal of scientific & engineering Research, volume 6, Issue 1, January-2015 1461 ISSN 2229-5518) [2] describes design and development of an Image Processing Based Traffic Control System with GSM and GPS Interface

The author namely Ms. Pallavi Choudekar, Ms. Sayanti Banerjee, Prof. M. K. Muju [3] describes Real Time Traffic Light Control using Image Processing.
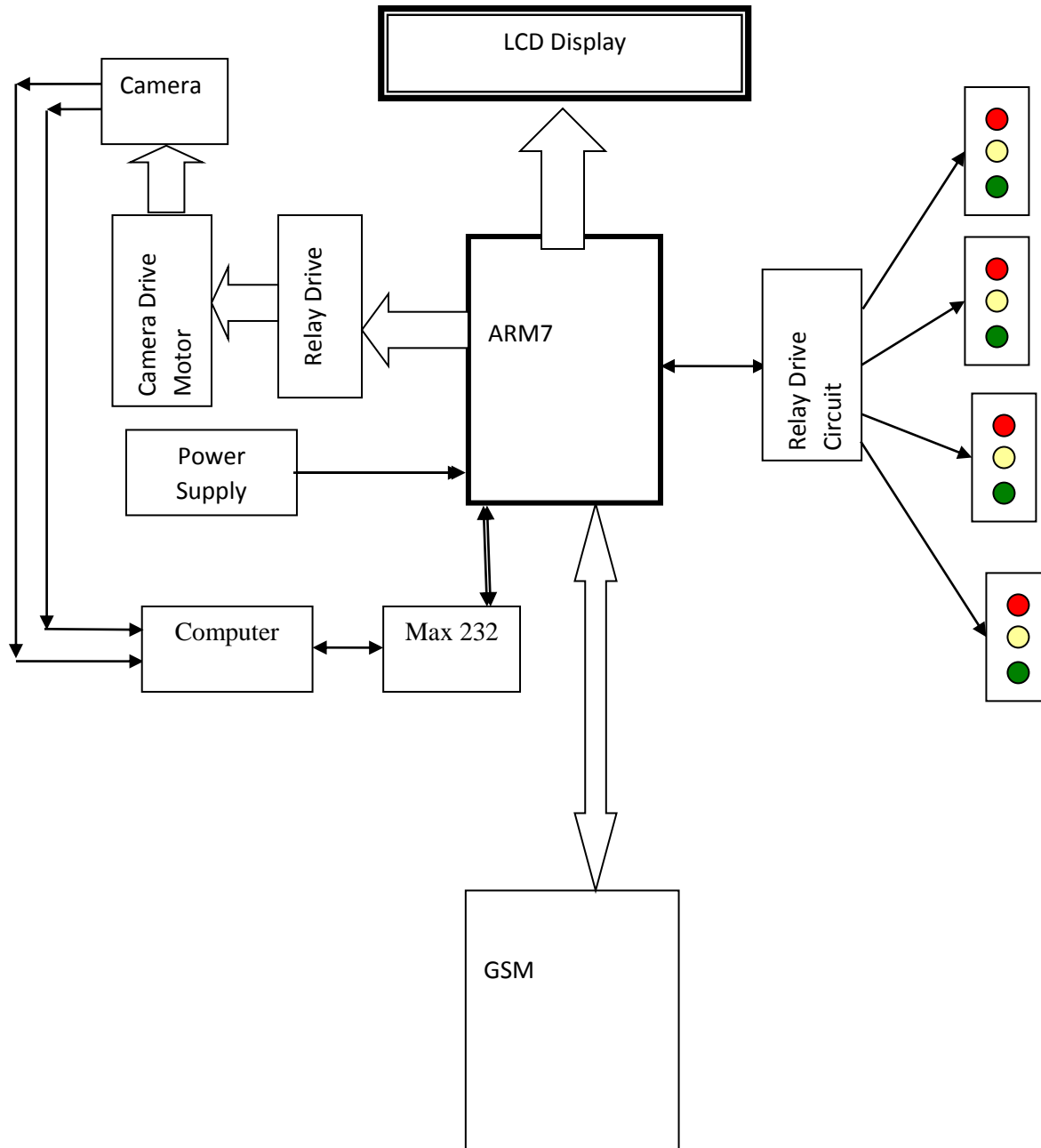
3. BLOCK DIAGRAM

**Fig: Block diagram of adaptive traffic control system**

In our system, ARM7 controller is used which has two serial communication ports (UART'S). First one is connected to computer and another one is connected to GSM module. Relay drive circuit is used to control the DC motor. The DC motor can

be rotated in two directions either clockwise or anticlockwise. The camera which is mounted on DC motor will capture the image of the road and this image will be store in MATLAB. MATLAB will process that captured image and will find the density of the road. According to density, time will allot to each road side. And that allotted time will send to ARM7 controller, ARM7 will decide the priority of the traffic signals.

The system is integrated with GSM module and thus the signals can also be controlled with the help of mobile in case of an emergency situation.

4. EXPERIMANTAL SETUP

Adaptive Traffic Control System mainly consists of camera mounted on DC motor which is installed at each intersection, a PC with MATLAB for image processing tasks, a GSM module and ARM7 controller for controlling DC motor and traffic light signals. After the image is have been captured and process by PC, time is assigned to each signal according to its traffic density. GSM transmitter is installed in an ambulance to send emergency message and GSM receiver is installed at each intersection and assign the highest priority in order to handle the emergency situation. Each intersection is assigned a unique code which can turn the signal green.
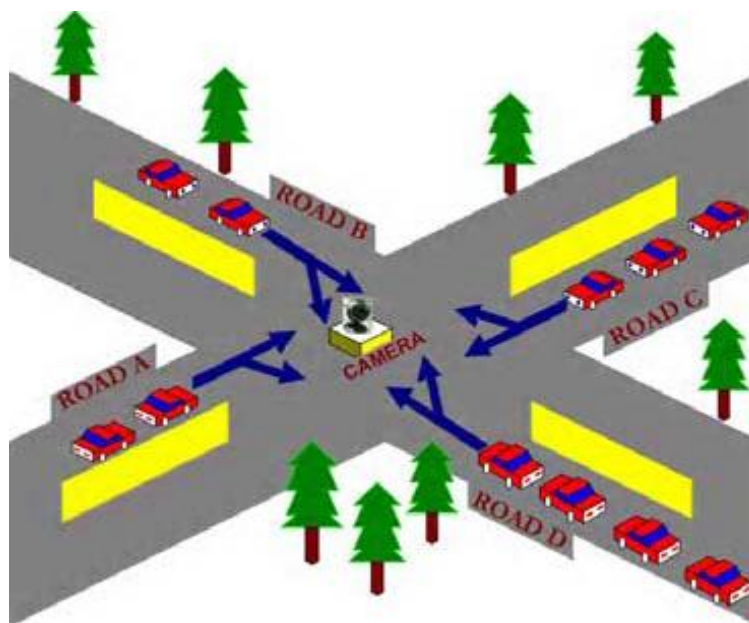
MATLAB Programming is used for analyzing road data and time duration for signal.

5. Image Analysis

The image capture from the camera is processed to calculate the total cover area of vehicles on the traffic road. The greater number of vehicles on the road, the greater will be covered area and more time assign to that road. The main steps of image processing are described below:
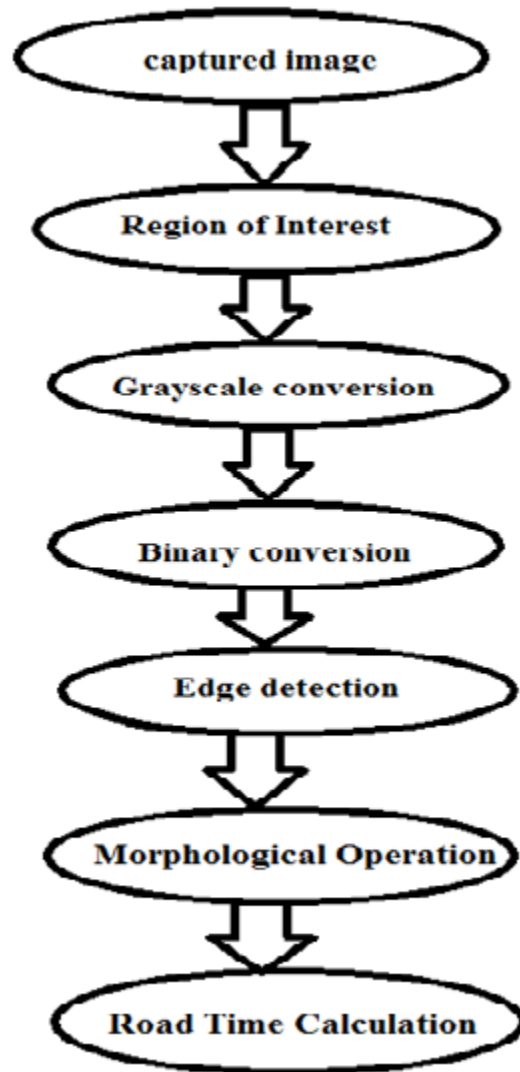
1. Region of Interest (ROI): The main aim for selecting region of interest is to remove unrequired information presents on the road. First of all taking the picture of all empty road and image is capture and save, since the image is in the form of matrix so, some rows and columns are deleted from this capture image and these image will be saved as region of interest images.

2. Conversion to Grayscale: The image of actual road condition is converted into grayscale image with Histogram


Equalization process for improving image contrast.

3. Conversion to binary: The gray scale image is converted into binary format with the threshold value.

4. Applying ROI: The converted binary image is ANDed with ROI image on pixel by pixel basis to remove the undesired area.

5. Edge Detection: The edges are then found in the resulting image using edge detection method.
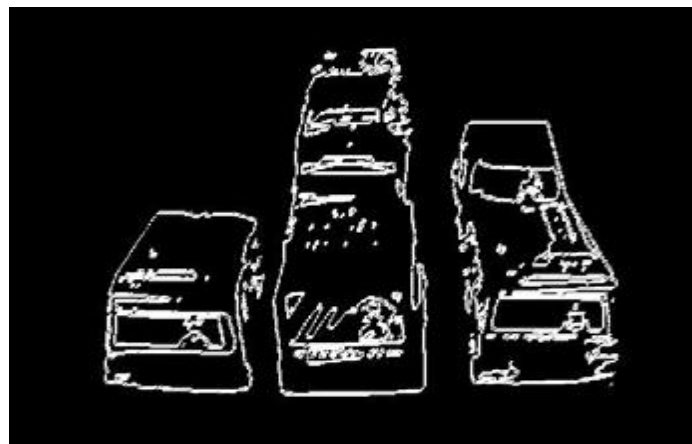
6. Morphological Operation: In this operation, the image dilation is done

7. Road Time Calculation: White pixels in acquired image are then counted for allocating time to signals of the road at the intersection. More white pixels correspond to denser road and hence more time allocation is there.

5. EMERGENCY MODE:
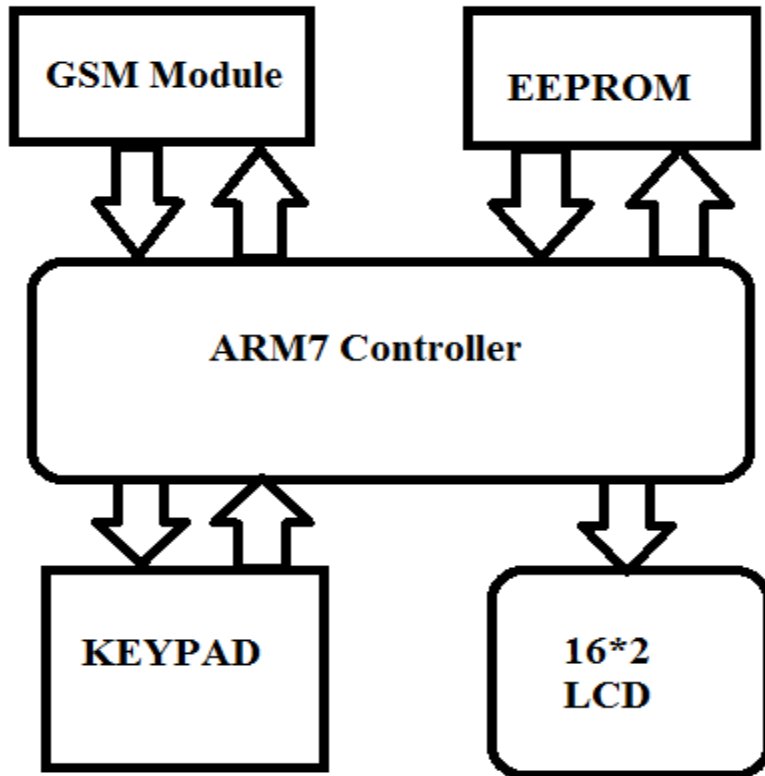
According to Ref [6], Adaptive traffic control system is made wireless with the help of GSM module to handle the emergency situations. As the GSM network provides wide spread coverage feature that makes the whole system available for almost all the time. Other feature of GSM network has high security infrastructure which provides the information send or receive can not be monitored. In this mode each ambulance carries a wireless card and this wireless card contains GSM transmitter and receiver, EEPROM, keypad, 16*2 LCD, all interfaced to ARM7 controller. The GSM receivers installed at each intersection are stored in EEPROM. The operator can enter a code assigned to particular intersection with the help of keypad. The ARM7 controller uses this code as an index to EEPROM location, retrieves the number of GSM receiver and sends the information in the form of short message service (SMS) by using appropriate AT command through GSM module to receiving end that is intersection of roads. The receiving operation of GSM which contains GSM receiver is controlled by PC. PC has the data base of authorized mobile numbers. Whenever message is received, an interrupt is generated. The PC scans the data base for this received number, processes the message after confirmation and turns the required green signal ON.

6. FUTURE SCOPE:

In this project, a method for estimating the traffic using Image Processing is presented. Each image is processed separately, because this method has been implemented using Image Processing and Mat lab software, production costs are low while achieving high speed and accuracy. The study showed that image processing is a better technique to control the state change of the traffic light.

7. REFERENCE:

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    C describe Traffic Control Using Digital Image Processing

2) The author namely Jagtap Varsha Suresh (International Journal of Scientific & Engineering Research)

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     And GPS Interface.

3) REAL TIME TRAFFIC LIGHT CONTROL USING IMAGE PROCESSING. The author namely Ms. Pallavi

    Choudekar, Ms. Sayanti Banerjee, Prof. M. K. Muju.

4) Image Processing based Adaptive Traffic Control System the author namely Arif A. Bookseller, Rupali

    R Jagtap.

5) Smart Traffic Control System Using Image Processing the author Prashant Jadhav, Pratiksha Kelkar,

    Kunal Patil, Snehal Thorat.

6) Umar Farooq, Hafiz Muhammad Atiq, Muhammad Usman Asad, Asim Iqbal describes design development of an image processing based adaptive traffic control system with GSM interface.