

Intelligent Traffic Management Control Systems

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Abstract— Due to the proliferation in the number of vehicles on the road, traffic problems are bound to exist. Therefore, the use of Intelligent Transportation Systems (ITS) has become mandatory for obtaining traffic Information from roads. Congestion on a busy road is a common view these days which leads to waste of time and is quite important issue of concern for millions. This issue can be dealt if the information about the traffic is imparted to the drivers. This in turn can help them to decide which route is to be taken so that they can avoid time killing. The driver sends a message to the server through GSM enquiring real time traffic condition. The server then transmits the information collected by it through IR sensors about the latest and real time traffic information to drivers and their in-car units. The purpose of this system is to design and implement a new system which is integrated with GPS- GSM to provide following feature: a) Location information, b) Real time tracking using SMS, c) Instantaneous communication therefore, we can receive running report quickly. The system software is devised in the keil micro vision compiler environment using programming language “Embedded C”. It is completely integrated so that once it is implemented in all vehicles, then it is easy to collect traffic vehicles information any time

Keywords— Intelligent Transportation Systems (ITS), GPS, GSM

I. INTRODUCTION

Traffic research data has the aim to minimize the real time traffic congestion and continuously traffic flow of number of people and goods. With the increasing population there has been obvious increase in number of vehicles on the road which ultimately leads to traffic congestion. Traffic congestion is increasing exponentially and has become one of the major problems being faced by urban and suburban areas in the recent years. The main issues that shoot because of traffic congestion are waste of time and fuel which are obviously the most important parameters of the lives of common people [1].

This project has been segregated into two sections: Vehicle section and server section. The vehicle section comprises of reporting the real time parameters, such as location of the vehicle, its motion through SMS to the central server. The system is characterised by wireless technology and makes the use of GSM and GPS that track the real time location of the vehicle. The system works when the vehicles are waiting on the signal traffic light to turn to green from red. The server reads and collects the information about the traffic of the roads meeting of the particular square and sends the information to the vehicle driver on his demand through SMS from his GSM.

On the request of vehicle user the information about traffic jams, time to pass traffic jams or possible alternate routes can also be provided through GSM mobile phone, IR sensor transmitter and receiver. This system has an “On-board Module” which is placed in the vehicle for tracking purpose. This module consists of GSM, ARM, IR sensor and GPS receiver. This project is simple to design and implementation is also easy [2].

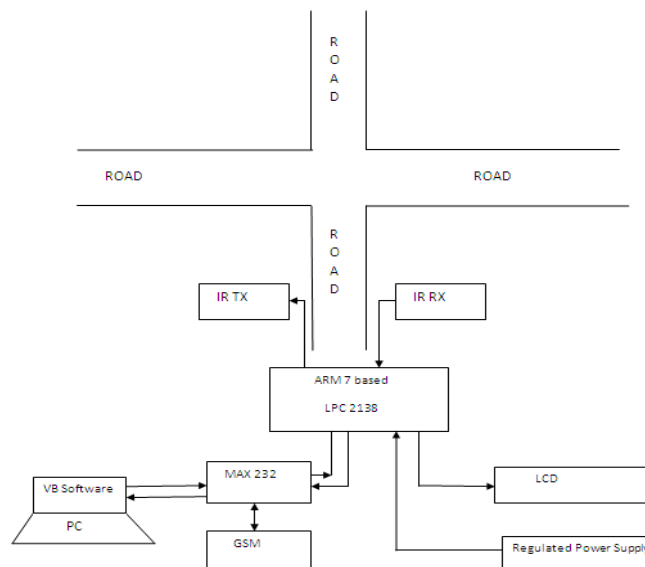


Fig.1 Overall System Block Diagram

Hardware framework for traffic data collection system contains high Performance ARM controller, GPS, IR sensor and GSM modem and overall system embedded into a vehicle. This system will provide the information about the exact location of your vehicle through GPS. Microcontroller unit form the heart of tracking unit, which acquires and process the position data from the GPS module. The vehicle unit sends the position latitude, longitude either at fixed interval or on demand. The receiver of GPS receives or resolves the navigation message which are broadcasted by GPS position satellites, computes the longitude and latitude of vehicle coordinates transforms it into the GSM message form by GSM communication controller, and sends the message to monitoring center via the GSM network. AT commands must be used for establishing communication between the GSM modem and the computer [3].

Control server (s) for accepting vehicle data, doing necessary computations based on pre-defined traffic-rules, issuing traffic management messages and emergency service information to the relevant vehicles and computing necessary billing for individual vehicles. The intelligent traffic data collection and monitoring system stores the recorded sample into its memory through its feature of In-Application programming. Data is stored with the real time and data stamp with it. This real time and date is provided by the user. Microcontroller transfers the recorded data to the computer by serial communication through MAX232. This data is used for traffic monitoring by the user sitting on the computer. To interface the UART and PC RS32 all the nine outputs are connected through MAX232 IC for the signal conversion. Whole data transfer protocol is implemented through software.

Working of Proposed System

Now a day's vehicle users are increased day by day. Every person is busy with his work and in a hurry because today's world is very fast and everybody is in a selfish manner to do his/her work as early as possible. Most of the industrials, company workers, etc are in a hurry while travelling and due to conventional traffic systems everybody will reach late on his work because lengthy and heavy traffic jams. So to overcome all these problems a new service this is based on latest technology and provides us traffic information so that most of the traffic problems can solve.

Firstly coordinates of the vehicles can be detected through GPS. Due to the GPS, vehicle detection or tracking is possible. Depending upon the latitude and longitude and the request switch through which one can message or request to the server about real time traffic data density collection system. This message can be send by using GSM.

On the server side the real time traffic data can be collected by using IR sensor. Depending upon the presence of vehicle traffic data density such as low, medium or high density can be calculated and send to the request number through GSM.

The output of these overall systems is stored in the system upto new request comes from the user. In these formats latitude and longitude can be set so that vehicle position is detected. After that the traffic data density can be detected to the respected square road shown by GPS. And the output of traffic density is highlight on the form. Through this map information can be send on the request number about the traffic flow.

II. TRAFFIC CONTROL SYSTEM

ULN2003 belongs to the family of ULN200X series of ICs. Different versions of this family interface to different logic families. ULN2003 is for 5V TTL, CMOS logic devices. These ICs are used when driving a wide range of loads and are used as relay drivers, display drivers, line drivers etc.

Each channel or Darlington pair in ULN2003 is rated at 500mA and can withstand peak current of 600mA. The inputs and outputs are provided opposite to each other in the pin layout. Each driver also contains a suppression diode to dissipate voltage spikes while driving inductive loads.

A) Description of Server side :

LPC 2138 is used as a processor in our system. In which we are connecting GSM & GPS modules to the UART0 & UART1 of LPC2138. MAX232 protocol is used for connecting GSM & GPS modems to interface with LPC2138. 16x2 LCD display is used to display certain outputs such as temperature, distance etc. LCD is interfaced with P0.16 to P0.20 and P0.22 of port0 of LPC2138. To provide power to the system we are using 12v battery as a power source, from which we are designing two power output which are 3.3v & 5v.

TSOP 1738 IR Sensor is used to detect the obstacle, which are interfaced with P0.28 to P0.30, P0.21 and P0.25 of port0 and P1.31 of port 1 of LPC 2138. Signal LED's are used to control and manage the traffic. LED's include Yellow, Red and Green lights. Yellow LED signal 1 and 2 are interfaced with P1.17 and P1.20 respectively, Red LED signal 1 and 2 are interfaced with P1.23 and P1.22 respectively, Green LED signal 1 and 2 are interfaced with P1.16 and P1.21 respectively of port1 of LPC 2138. Voltage regulator 1117 is interfaced with P 1.29 and MAX 232 is interfaced with P 0.0 and P 0.1 of port0 of LPC 2138. Pin no.9 and 7 of Max 232 can be connected to GSM through pin no.1 and 2 respectively.



Fig. 2 Traffic Management Systems

B) Flow Chart of VB

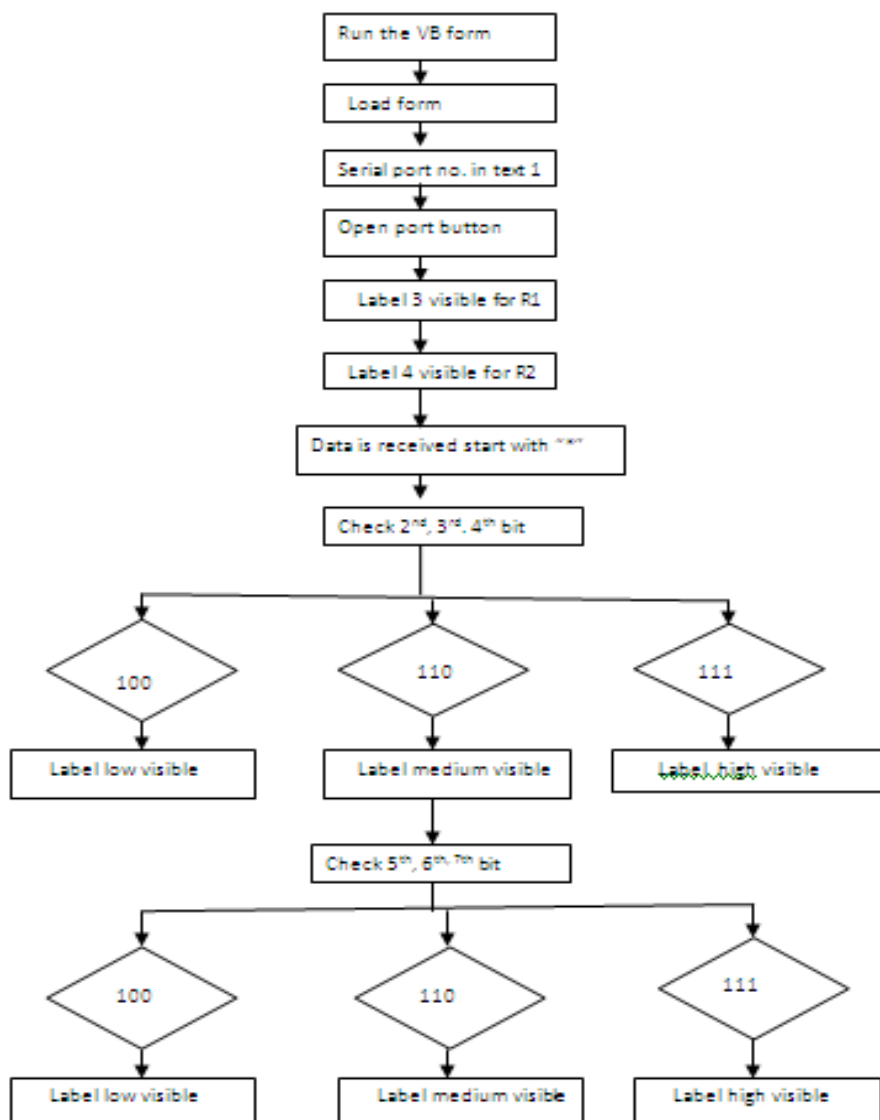


Fig. 3 Flow chart of VB

III.RESULTS AND DISCUSSION

A) Coordinates Displayed

In vehicle side we used GPS to detect the vehicle current position through its longitude and latitude. Fig.4 Shows the GPS coordinates which is displayed on the LCD.

When the driver is requested to server about his current traffic density status then server reads the IR sensor status of that requested area through microcontroller and then gives back reply to the requested vehicle either traffic data density is low or medium or high. Fig.5 shows road R1 having low density and road R2 having high density on the LCD.

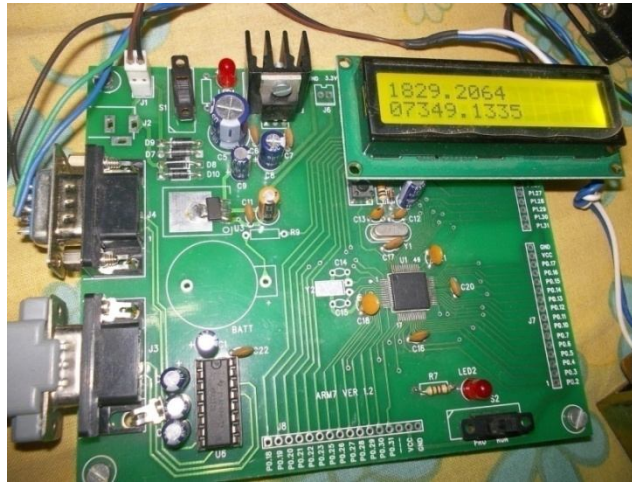


Fig.4. Coordinates Are Displayed On LCD through GPS

B) Traffic Data Density

When any request arrived from vehicle side through GSM to the server then in the server room firstly that request vehicle location can be detected through GPS and focus only on that requested area and then after study of traffic data on that road, Server gives back reply to the requested vehicle through GSM and these traffic information provider systems are totally based on priority. Fig.5 shows information provided by sensor to the requested vehicle about road R1 and R2. Road R1 having low density and R2 having high density.



Fig.5. Traffic Data Density Shown On LCD

C) Display Of GUI Of Server Unit

When driver sends request about traffic information then in server side controller read that request and real time traffic density is shown on the traffic data density collection form as shown in fig 5 by using VB software. Fig 6 GUI of Server Unit shows longitude and latitude of the requested vehicle area which are present on that area. So that we can detect requested vehicle area. Path A and Path B are our two demonstrated path and it shows the results about traffic density.

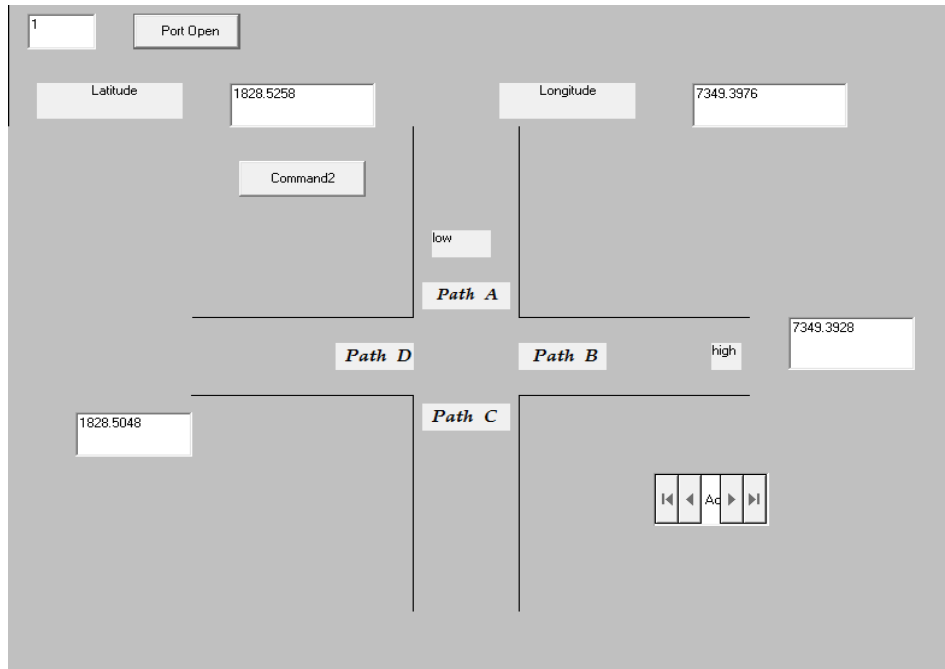


Fig.6. Display of GUI of Server Unit

IV. CONCLUSIONS AND FUTURE SCOPE

In this project study the optimization of traffic data collection in a City using IR sensors and microcontroller. By using this system configuration we try to minimize the possibilities of traffic jams problems, which are generally caused by traffic lights and a large quantity of vehicles. It is observed due to this proposed system of Intelligent Traffic data collection is more efficient and convenient than the conventional controller in respect of less waiting time, more distance covered by average vehicles and efficient operation during emergency mode and GSM interface.

Also proposed system has more advantages and user friendly while handling or utilizing. Moreover, the designed system has simple and easy architecture, response time is fast within a time, user friendliness and a lot of scope for further expansion. It is noted that this system is timer based and give instant reply due to this one can determine or try the alternate route so that he or she will reach their destination within time and avoid real time traffic jams.

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