VEHICLE TRAFFIC CONGESTION CONTROL SYSTEM IN SMART CITIES

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Abstract : Advanced traffic congestion system is implemented on Intelligent transportation systems (ITS) is the Accurate and real time measurement of traffic parameters such as type and number of vehicles, their individual speeds, overall flow pattern, automatic detection of the information of local traffic, road conditions. Investment in traffic monitoring can provide better urban planning and reduce congestion and average velocity at that point instead of the speed along the entire road of vehicle movements. To design a simple sensing system for vehicle speed sensing.The traffic information can be collected by using Inductive loop sensor. By collecting information, the decision making have been done by the data-centric routing scheme to meet different user requirements.Analyzing to find the optimal travel path of a vehicle

***IndexTerms* - Intelligent Transportation System (ITS), Inductive loop, Arduino, GSM**

I. INTRODUCTION

Advanced traffic management system using IOT in march 2016 Mahesh Lakshminarashiman was introduced, the proposed architecture and working with BIG Data analytics involve HADOOP map is presented. It is only used for big cities Accurate and real time measurement of traffic parameters such as type and number of vehicles, their individual speeds and overall flow pattern are essential to successfully implement an Intelligent Transportation System (ITS) and thus enable optimal utility of existing roadways. The inductive loop output should be such that the type, speed, and occupancy time of each vehicle can be determined.

The traffic flow sensors can be broadly classified into intrusive and nonintrusive types based on whether they need to be placed below the road surface or not. The nonintrusive methods are based on video image processing, microwave radar, ultrasonic, optical, and laser radar, which can be installed above the roadways . Based on the sensing principle used, the existing intrusive traffic flow sensors can be classified as inductive loop, magnetometer, and pressure switch types.

The inductive loop have been specified for the reason: (1)They are widely used as they provide good sensitivity coupled with a cost effective solution.(2)Non Radiative electro magnetic detection Inductive loop is an electromagnetic communication or detection system which uses a moving magnet or an alternating current to induce an electric current in a nearby wire.Inductive loop consists of wire "coiled" to form a loop that usually is a square, circle or rectangle shape that is installed into or under the surface of the roadway. Inductive loops work like a metal detector as they measure the change in the field when objects pass over them.

Fig 1: Implemented the average velocity of the vehicle speed

Along the entire road of vehicle movements and find the optimal route of vehicle path

II. TRAFFIC CONGESTION CONTROL

Traffic congestion on road networks is characterized by slower speed ,longer trip times and increased vehicular queuing. Vehicle volume is increased exponentially to increase traffic congestion. Different technologies are there to detect traffic congestion and making congestion management more efficient. We introduce Inductive loop coli as a easier efficient and inexpensive congestion detection technology.

III. METHODOLOGY

INDUCTIVE LOOP COIL-It can be placed in a roadbed to detect vehicles by measuring the vehicle's magnetic field. The detectors simply detect the movement of the vehicle, individual speed, type of vehicle, average density of the flow of vehicles on the road. The loop can be placed in a single lane or across multiple lanes.

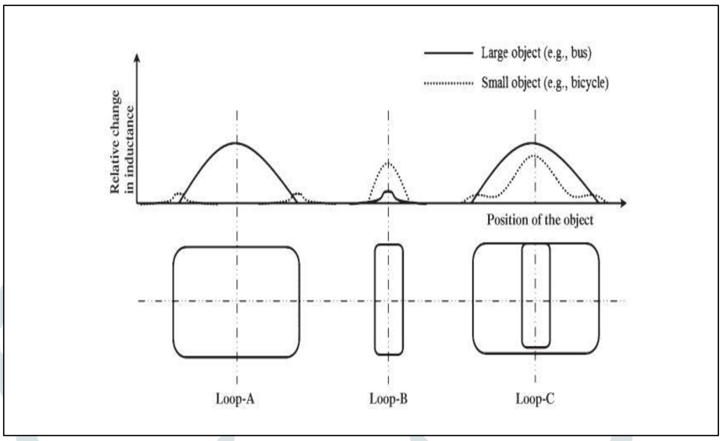

Fig.3.1 Three possible inductive loops for vehicle detection

The coil structure with a large area indicated as "Loop-A" in Fig. 2 i s t he one in use f or lane-based homogeneous traffic and is well suited t o detect large vehicles such as car or bus or truck. When such a large vehicle goes over t he loop, the change in the inductance LP of the loop will be as indicated by the curve (continuous line) drawn on t op of the Loop-A section i n Fig. 2. However, if a s mall vehicle such as a bicycle goes over t his loop, the change in the inductance of the loop will be small, and it is detectable only when the object is directly above the coil position, as indicated by the curve drawn with a dotted line in Fig. 2, above Loop-A. In all other positions, t he resultant change in the inductance of Loop-A will be negligible. On the other hand, for a coil structure as indicated in "Loop-B," with a smaller cross-sectional area compared with Loop-A, the r elative change in the coil inductance (shown by the curve drawn i n dotted line) will be appreciable when a s mall vehicle approaches, close to the plane (vertically) of t he loop. However, the relative change in inductance (indicated by the continuous line, on top of Loop-B) will be small f or a large vehicle (bus or truck) moving over Loop-B. Thus, Loop-A i s mainly sensitive to large vehicles, and Loop-B i s sensitive to small vehicles that go very close (i.e., vertical distance from the loop plane) to the loop. The proposed loop, "Loop-C" in Fig. 2, is formed using a continuous conductor wound as illustrated to form an outer loop and an inner loop. The loops are formed such that a current flow through the coil produces a magnetic flux in the outer loop to be in line and aiding the flux produced by the inner loop, at the center of the loop. When a large vehicle such as a bus moves over Loop-C, the loop will give a r elative change in inductance similar t o Loop-A, and when a s mall object such as a bicycle goes over t he loop, it gives a r elative change in inductance similar t o Loop-B. Thus, a large vehicle (e.g., bus) and a smaller vehicle close to the loop (e.g., bicycle) can be reliably detected with the proposed Loop-C shown i n Fig. 2.

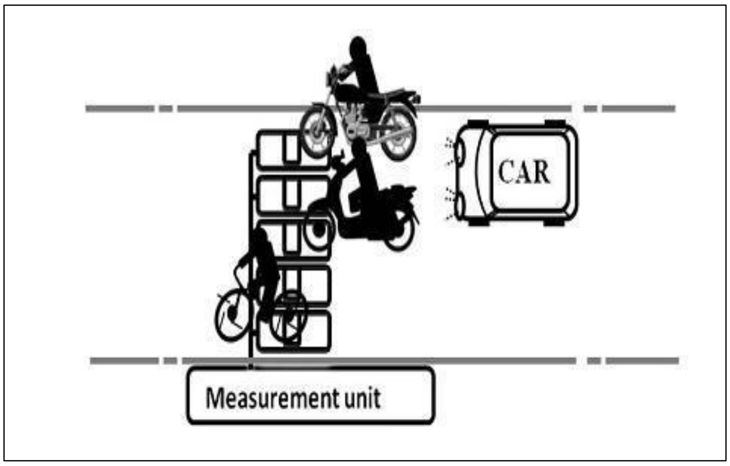

Fig.3.2 3-D view of the proposed loop

A detailed 3-D view of the proposed loop is show n i n Fig. 3. The loop coil can be placed below or on the surface of the road. The loop is connected to the measurement system as indicated in Fig. 3. Capacitances C1 , C2 , and CM along with inductance LP of the loop coil form a resonant circuit. This circuit passes t he signal at the resonant frequency to the measurement system and attenuatesall t he unwanted frequency components t hat may be picked up by t he loop. The measurement system and the loop with inductance LP are connected together using a twisted-pair cable. The voltage across capacitor CMis given t o a Data Acquisition System (DAS). The data acquired by t he DAS i s sent to a computer and a suitable algorithm, implemented in the computer using a virtual instrumentation environment, detects t he type and speed of the vehicles, and counts t he number of vehicles being sensed.

IV. EXSISTING METHOD

They have developed [1] Mahesh Lakshminarasimhan (march 2016) have proposed in Advanced traffic management system using IOT This paper focus only in big data analytics involving Hadoop is presented. It is only used for big cities .[2]Santhosh Hebbar have proposed in A mobile ZigBee module in a traffic control system (december 2015) when an ambulance needs to pass through a junction, its speed often must be reduced due to traffic. It's only applicable for ambulance.[3] Carlos Sun and Stephen G. Ritchie have proposed in Individual Vehicle Speed Estimation Using Single Loop Inductive Waveforms in California PATH Working Paper UCB-ITS-PWP-99-14. This paper describes, Travel time is the reciprocal of speed and is a useful measure of road congestion and traffic system performance. Travel time is also a basic traffic variable that is used in many Intelligent Transportation System (ITS) strategies such as route guidance, incident detection, and traveler information systems. Previously, speeds were mainly acquired from double inductive loops configured as speed traps, since single loop speed estimates based on assumptions of a constant vehicle length were inaccurate.

However, more accurate measurements of speed can now be accomplished with single loops by utilizing inductive waveforms of vehicles that are outputed from newer detector cards. An algorithm using signal processing and statistical methods was developed to extract speeds from inductive waveforms. The results show that the proposed algorithm performs better than conventional single loop estimation methods. The results also show that the algorithm is robust under different traffic conditions and is transferrable across surveillance sites without the need for recalibration. The use of the extensive single loop surveillance infrastructure is a cost-effective way of obtaining more accurate network-wide travel time information.

This paper presents a new methodology for computing vehicle speeds using single loops. The inductive waveform slew rates are extracted, and a linear regression model is used for deriving speeds from slew rates. Data collected from Irvine, California, shows that this method can perform better than other methods of computing speed. One main advantage this method has over other methods is the fact that the accuracy of predicting speeds is not a function of the distribution of vehicle lengths. Another advantage, is the robustness of the method which is shown to be temporally and spatially transferable.

This method requires very little computing power and cost to implement. The simplicity of the methodology leads to uncomplicated real-time implementations for traffic management and control purposes.The utilization of the current single loop infrastructure avoids costly road closures and equipment associated with the cutting of double loops. In many cities and states,this infrastructure is extensive and can produce speed information for different Intelligent Transportation System needs. However, double loops or other detection systems are still necessary if high accuracy in speed computation is required. Local accelerations can be computed by using this method if double loops are available. The local accelerations are simply the difference between the speed computed from the first and second loops in a speed trap.

The local accelerations can be a valuable input for congestion monitoring and incident detection algorithms. No acceleration results were presented because there was no ground truth available for validating results. The development of efficient traffic light control, parking space identification and anti-theft security mechanism using RFID.The development of Supervised technologies Average speed of distinct vehicle types on a road .This system do not have enough details to indicate traffic flow and applicable with lane based traffic. Our proposed system will overcome this issues

V. WORKING MODEL

The proposed Architecture to implemented the average velocity of the vehicle speed along the entire road of vehicle movements and find the optimal route of vehicle path. To find the Shortest and time economic path of route by using GSM interfacing with Arduino. The Architecture of Traffic congestion is given,

Every circuit needs a source to give energy to that circuit. The Source wills a particular voltage and load current ratings. The following is a circuit diagram of a power supply. We need a constant low voltage regulated power supply of +5V, providing input voltages to the microcontroller RS232, LM311 and LCD display which requires 5 volts supply.

To accomplish the sensing of large as well as small vehicles, a multiple loop system with a new inductive loop sensor structure is proposed. Senses and segregates the vehicle type as bicycle, motor cycle, scooter, car, and bus. Enables accurate counting of the number of vehicles even in a mixed traffic flow condition.A large vehicle goes over the loop, the change in the inductance LP of the loop will be as indicated by the curve (continuous line) drawn on top of the Loop-A.

Arduino is an open-source computer hardware and software company, project and user community that designs and manufactures microcontroller-based kits for building digital devices and interactive objects that can sense and control objects in the physical world.The project is based on microcontroller board designs, manufactured by several vendors, using various microcontrollers. These systems provide sets of digital and analog I/O pins that can be interfaced to various expansion boards ("shields") and other circuits. The boards feature serial communications interfaces, including USB on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated

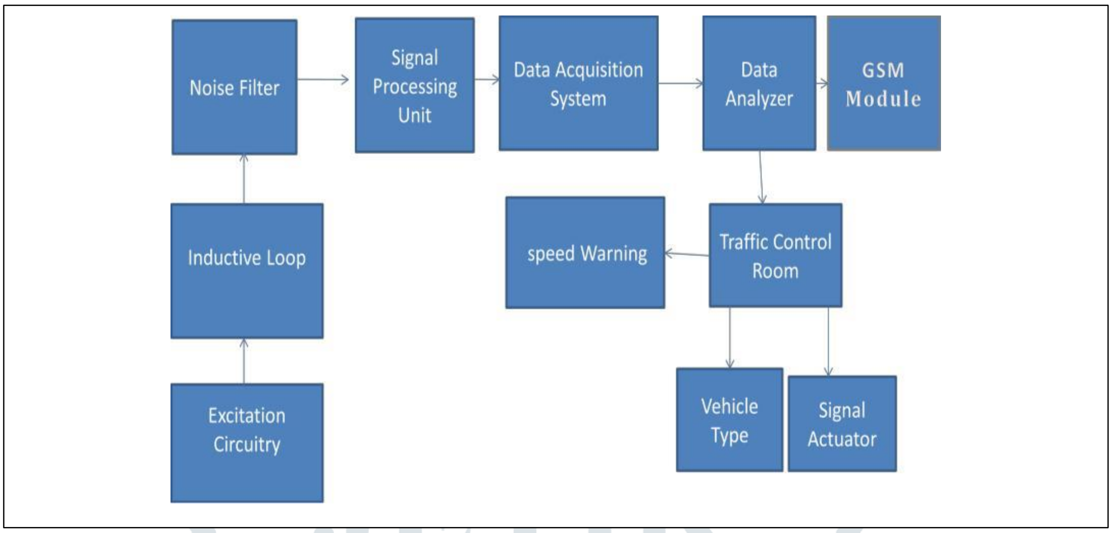

Fig.5.1 Architecture of Traffic congestion

development environment (IDE) based on the Processing project, which includes support for the C and C++ programming languages.The first Arduino was introduced in 2005, aiming to provide an inexpensive and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors.

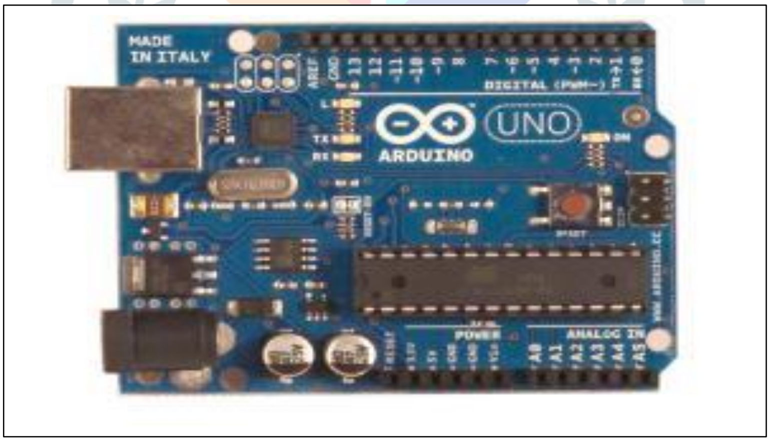

Fig.5.2 Arduino board with an RS-232serial interface

HARDWARE- An early Arduino board with an RS-232serial interface (upper left) and an Atmel ATmega8 microcontroller chip (black, lower right); the 14 digital I/O pins are located at the top and the six analog input pins at the lower right.An Arduino board historically consists of an Atmel 8-, 16- or 32-bit AVR microcontroller (although since 2015 other makers' microcontrollers have been used) with complementary components that facilitate programming and incorporation into other circuits.

An important aspect of the Arduino is its standard connectors, which lets users connect the CPU board to a variety of interchangeable add-on modules known as shields. Some shields communicate with the Arduino board directly over various pins, but many shields are individually addressable via an I²Cserial bus—so many shields can be stacked and used in parallel. Prior to 2015 Official Arduinos had used the Atmel megaAVR series of chips, specifically the ATmega8, ATmega168, ATmega328, ATmega1280, and ATmega2560 and in 2015 units by other manufacturers were added.

A handful of other processors have also been used by Arduino compatible devices. Most boards include a 5 V linear regulator and a 16 MHz crystal oscillator (or ceramic resonator in some variants), although some designs such as the LilyPad run at 8 MHz and dispense with the onboard voltage regulator due to specific form-factor restrictions. An Arduino's microcontroller is also pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory, compared with other devices that typically need an external programmer. This makes using an Arduino more straightforward by allowing the use of an ordinary computer as the programmer. Currently, optibootbootloader is the default bootloader installed on Arduino UNO.

SOFTWARE- Arduino programs may be written in any programming language with a compiler that produces binary machine code. Atmel provides a development environment for their microcontrollers, AVR Studio and the newer Atmel Studio.

The Arduino project provides the Arduino integrated development environment (IDE), which is a cross-platform application written in Java. It originated from the IDE for the Processing programming language project and the Wiring project. It is designed to introduce programming to artists and other newcomers unfamiliar with software development. It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and provides simple one-click mechanism for compiling and loading programs to an Arduino board. A program written with the IDE for Arduino is called a "sketch".

The Arduino IDE supports the C and C++ programming languages using special rules of code organization. The Arduino IDE supplies a software library called "Wiring" from the Wiring project, which provides many common input and output procedures. A typical Arduino C/C++ sketch consist of two functions that are compiled and linked with a program stub main() into an executable cyclic executive program:

- setup(): a function that runs once at the start of a program and that can initialize settings.
- loop(): a function called repeatedly until the board powers off.

After compilation and linking with the GNU toolchain, also included with the IDE distribution, the Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal coding that is loaded into the Arduino board by a loader program in the board's firmware.

GSM- A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone.When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages.

A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities.For the purpose of this document, the term GSM modem is used as a generic term to refer to any modem that supports one or more of the protocols in the GSM evolutionary family, including the 2.5G technologies GPRS and EDGE, as well as the 3G technologies WCDMA, UMTS, HSDPA and HSUPA..A GSM modem exposes an interface that allows applications such as NowSMS to send and receive messages over the modem interface. The mobile operator charges for this message sending and receiving as if it was performed directly on a mobile phone. To perform these tasks, a GSM modem must support an “extended AT command set” for sending/receiving SMS messages, as defined in the ETSI GSM 07.05 and and 3GPP TS 27.005 specifications.GSM modems can be a quick and efficient way to get started with SMS, because a special subscription to an SMS service provider is not required. In most parts of the world.

GSM modems are a cost effective solution for receiving SMS messages, because the sender is paying for the message delivery. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, such as the Falcom Samba 75. (Other manufacturers of dedicated GSM modem devices include Wavecom, Multitech and iTegno.

A GSM modem could also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. Any phone that supports the “extended AT command set” for sending/receiving SMS messages, as defined in ETSI GSM 07.05 and/or 3GPP TS 27.005, can be supported by the Now SMS & MMS Gateway. Note that not all mobile phones support this modem interface.

Due to some compatibility issues that can exist with mobile phones, using a dedicated GSM modem is usually preferable to a GSM mobile phone. This is more of an issue with MMS messaging, where if you wish to be able to receive inbound MMS messages with the gateway, the modem interface on most GSM phones will only allow you to send MMS messages. This is because the mobile phone automatically processes received MMS message notifications without forwarding them via the modem interface.

It should also be noted that not all phones support the modem interface for sending and receiving SMS messages. In particular, most smart phones, including Blackberries, iPhone, and Windows Mobile devices, do not support this GSM modem interface for sending and receiving SMS messages at all at all. Additionally, Nokia phones that use the S60 (Series 60) interface, which is Symbian based, only support sending SMS messages via the modem interface, and do not support receiving SMS via the modem interface.

IV. RESULTS AND DISCUSSION

The project "multiple inductive loop vehicle detection" has been completed successfully and the output results are verified. The results are in line with the expected output. The project has been checked with both software and hardware testing tools. In this work "I/O devices" are chosen are proved to be more appropriate for the intended application. The project is having enough avenues for future enhancement. The project is a prototype model that fulfills all the logical requirements. The project with minimal improvements can be directly applicable for real time applications. Thus the project contributes a significant step forward in the field of "Project Domain", and further paves a road path towards faster development s in the same field. The project is further adaptive towards continuous performance and peripheral up gradations. This work can be applied to variety of industrial and commercial applications.

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