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Vehicle Speed Control Using Arduino in Traffic-Signal Area

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ABSTRACT:
In our day to day life we witness an increase in population thereby a sudden increase of vehicles on roads causing major traffic jams and delays. There always exists an emergency situation where we require the movement of ambulances and fire engines to reach its destination on time. Due to bad traffic situations this event fails to happen. This paper proposes an automatic green channel facility during heavy traffic for an emergency vehicle in a particular lane. Vehicular Ad-Hoc Networks (VANET) is an effective method of communication between the emergency vehicle, the traffic lights (infrastructure) and the other vehicles. A traffic scenario is created to evaluate the performance of communication between the moving nodes, road side units and the traffic lights, till the vehicle successfully reaches its destination. VANET is an advanced application of Mobile Ad Hoc Network (MANET), which can easily optimize road traffic as well as improve safety so as to provide an intelligent transport system. The proposed research paper is analyzed through a real-time vehicle traffic scenario simulation and then evaluated through a series of simulation using network simulator.

I.INTRODUCTION

A wireless sensor network is a collection of nodes organized into a cooperative network. Each node has capability to sense data, process the data. These sensors work with each other to sense some physical phenomenon. The nodes in the network are connected via Wireless communication channels. In the daily life we always see that there is always a problem to an emergency vehicle such as ambulance, patrol car and fire-fighter to pass through traffic light because it was red and it's disturbing the drive. This situation is often happen because lack of cooperation from civilian and sometimes the driver don't have the experience of this situation and so he waits till the signal turns to green. The emergency vehicle recognition system is used to co-ordinate with driver and guides him in a cleared path avoiding delay in the traffic. It helps driver reach the destination with in less time. A wireless alert will be given to the traffic wardens in case of any difficulty for the E-vehicles to clear the way. The users of the system are Traffic police, Wardens, Public and Emergency vehicle drivers. The radio system is now in its existence. As it has got some drawbacks it's been modified using different models namely: Centralized accident and trauma services (CATS), Emergency management and research institute (EMRI), Ambulance access for all (AAA), Emergency and accident relief centre (EARC). The main focus of EVRS is not to design a cost friendly system. Instead, it is on as useful it could get to save the life of people. System is easily operable and understanding the system helps people. A warning system for alerting the driver of a private vehicle that an emergency vehicle is approaching.

II.EXISTING SYSTEM

2.1 SYSTEM ANALYSIS

- Present existing system is the Radio systeminthevehicleconnectedwiththecallCentre.
- Emergency vehicles, such as ambulances, police cars, or fire trucks, typically carry a loudsiren and flashing lights to warn motorists and other people on the road that the emergencyvehicleneeds therightofway.
- Here is no efficient method to recognize and transport emergency vehicles in the leastpossible time.

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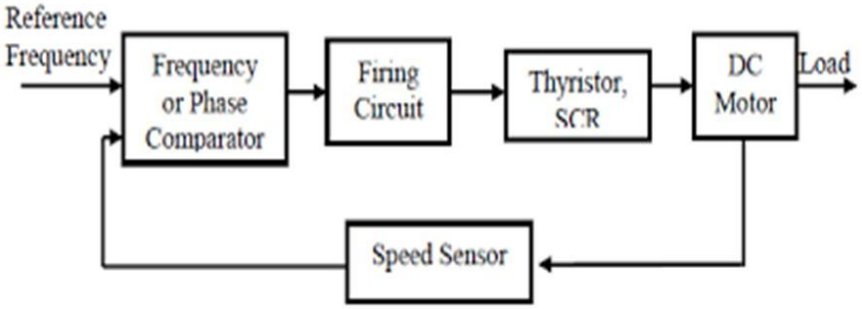
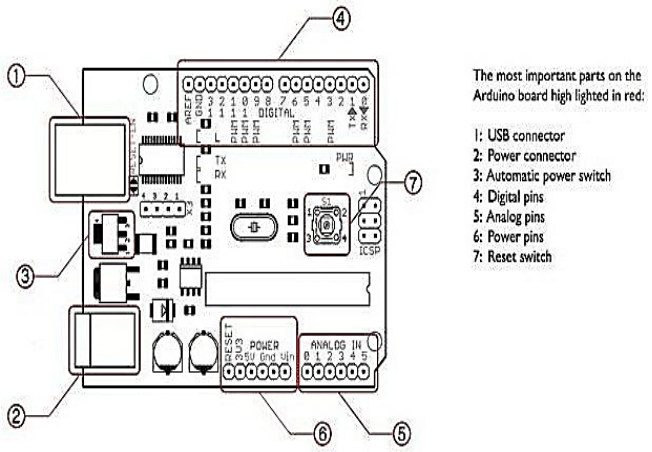


III.PROPOSED SYSTEM

HARDWAREREQUIREMENTS

ARDUINOUNOR3MICROCONTROLLER

The ArduinoUno R3 is a microcontroller board based on the ATmega328. It has 14 digitalinput/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystaloscillator, a USB connection.



SPECIFICATION

- Microcontroller:ATmega328
- OperatingVoltage:5V
- InputVoltage(recommended):7-12V
- InputVoltage(limits):6-20V
- DigitalI/OPins:14(ofwhich6providePWMoutput)
- AnalogInputPins:6
- DCCurrentperI/OPin:40mA
- DCCurrentfor3.3VPin:50mA
- FlashMemory:32KB(ATmega328)ofwhich0.5 KBused by boot loader

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- SRAM:2KB(ATmega328)

POWER

The Arduino Uno can be powered via the USB connection or with an external power supply.Thepower source is selected automatically.

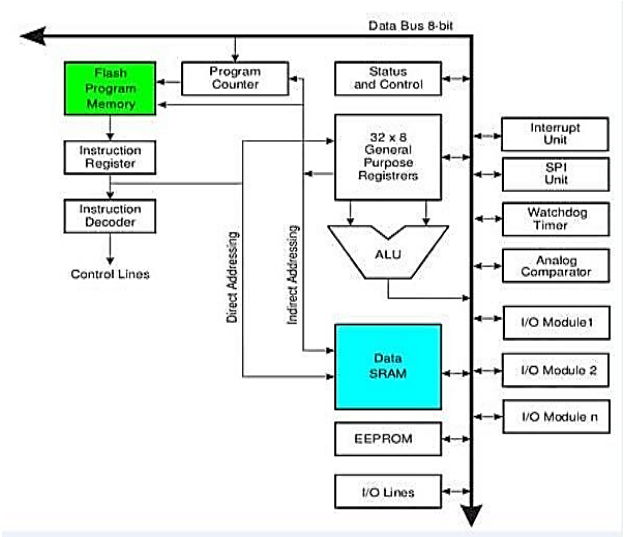
External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm centre-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vinpin headers of the POWER connector. The boardcan operate on an external supply of 6to20volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and theboard may be unstable. If using more than 12V, the voltage regulator may overheat and damage theboard.The recommendedrangeis7to12volts.The powerpinsare asfollows:

VIN.- The input voltage to the Arduino board when it's using an external power source (asopposed to 5 volts from the USB connection or other regulated power source). You can supplyvoltagethroughthispin,or,ifsupplyingvoltageviathepowerjack,accessit throughthispin.

5V.- The regulated power supply used to power the microcontroller and other components on theboard. This can come either from VIN via an on-board regulator, or be supplied by USB or anotherregulated5Vsupply.

3V3 -A3.3voltsupplygeneratedbytheon-boardregulator.Maximumcurrentdrawis50mA.

GND.Groundpins.



Communication

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega8U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '8U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required.

The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer.(but not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Uno's digital pins.

The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library.

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PROGRAMMING

The Arduino Uno can be programmed with the Arduino software. Select "Arduino Uno from the Tools > Board menu (according to the microcontroller on your board). For details, see the reference and tutorials. The ATmega328 on the Arduino Uno comes preburned with a boot loader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C headerfiles).

You can also bypass the boot loader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions for details. The ATmega8U2 firmware source code is available . The ATmega8U2 is loaded with a DFU boot loader, which can be activated by connecting the solder jumper on the back of the board.
Or you can use the ISP header with an external programmer (overwriting the DFU boot loader). See this user-contributed tutorial for more information

Automatic (Software) Reset
Rather than requiring a physical press of the reset button before an upload, the Arduino Uno is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2 is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted(taken low), the reset line drops long enough to reset the chip. The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the boot loader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload. This setup has other implications. When the Uno is connected to either a computer running Mac OS X or Linux, it resets each time a connection.

USB Overcurrent Protection
The Arduino Uno has a resettable polyfuse that protects your computer's USB ports from shorts and over current. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or over load is removed.

Physical Characteristics
The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160mil(0.16"),notanevenmultipleofthe100mil spacing of the other pins.

LIGHTEMITTINGDIODE
A light-emitting diode (LED) is a two-lead semiconductor light source. It is a pn-junction diode,which emits lightwhen activated.When a suitable voltageis applied to the leads, electronsareable to recombine with electron holeswithin the device, releasing energy in the form of photons.This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon)is determined by the energy band gap of the semiconductor**.**

An LED is often small in area (less than 1 mm^2) and integrated optical components may be used toshape its radiation pattern. Appearing as practical electronic components in 1962, the earliestLEDs emitted low-intensity infrared light. Infrared LEDs are still frequently used as transmittingelementsinremote-controlcircuits, suchasthoseinremotecontrols.

WORKINGPRINCIPLE

TRANSFORMER
The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Thenthe secondary of the potential transformer will be connected to the precision rectifier. which isconstructed with the help of op–amp.

BRIDGE RECTIFIER
When four diodes are connected as shown in figure, the circuit is called as bridge rectifier. Theinput to the circuit is applied to the diagonally opposite corners of the network, and the output istaken from the remaining two corners. Let us assume that the transformer is working properly andthere is a positive potential, at point A and a negative potential at point B. the positive potential atpointAwillforwardbias D3andreversebiasD4.

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The negative potential at point B will forward bias D1 and reverse D2. At this time D3 and D1are forward biased and will allow current flow to pass through them; D4 and D2 are reverse biasedand will block current flow. The path for current flow is from point B through D1, up through RL,through D3, through the secondary of the transformer back to point B. this path is indicated by thesolidarrows.Waveforms (1)and(2)canbe observedacrossD1 andD3.One-half cycle later the polarity across the secondary of the transformer reverse, forward biasingD2 and D4 and reverse biasing D1 and D3. Current flow will now be from point A through D4, upthrough RL, through D2, through the secondary of T1, and back to point A.

One advantage of a bridge rectifier over a conventional full-wave rectifier is that with a giventransformerthebridgerectifierproducesavoltageoutputthatisnearlytwicethatoftheconventional full-wave circuit. This may be shown by assigning values to some of the componentsshown in views A and B. assume that the same transformer is used in both circuits. The peakvoltage developed between points X and y is 1000 volts in both circuits. In the conventional full-wave circuit shown—in view A, the peak voltage from the center tap to either X or Y is 500 volts.Since only one diode can conduct at any instant, the maximum voltage that can be rectified at anyinstantis 500volts.

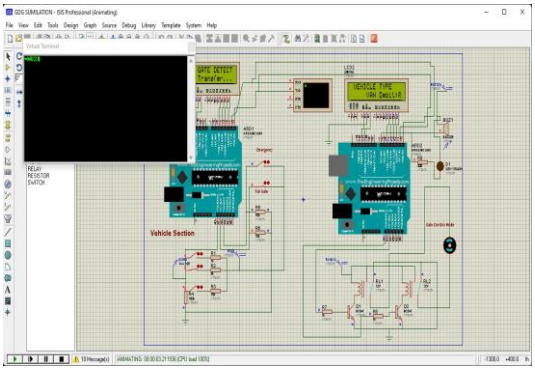
SOFTWARE DESCRIPTION

EMBEDDED C

An embedded system is an application that contains at least one programmable computer (typicallyin the form of a microcontroller, a microprocessor or digital signal processor chip) and which isused byindividualswhoare,inthemain,unawarethatthe systemiscomputer-based.

- ,Access,etc.

RESULT



IV.CONCLUSION

In this research project, we have considered only one major factor that is delay. The main criterion is signaling to the nearest traffic light so that a green signal switching is achieved. Information like GPS position and so on can also be sent to other vehicles to establish a V2V communication. It is possible to extend this research for many more emergency traffic scenarios taking into account other factors.

V.FUTURE ENHANCEMENT

- Nine basic data types, including 32-bit IEEE floating-point,
- Flexible variable allocation with bit, data, bdata, idata, xdata, and pdata memory types,
- Interrupt functions may be written in C,
- Full use of the 8051 register banks,
- Complete symbol and type information for source-level debugging,

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- Bit-addressable data objects,
- Built-in interface for the RTX51 Real-Time Kernel, Microcontrollers.
- Support for the Philips 8xC750, 8xC751, and 8xC752 limited instruction sets,
- Support for the Infineon 80C517 arithmeticunit.

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