

Traffic Light Pre-Emption Control System for Emergency Vehicles

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Abstract: The blow sensor will ascertain the arresting and sends it to PIC microcontroller. Microcontroller sends the active bulletin through the GSM MODEM including the area to badge ascendancy allowance or an accomplishment aggregation (AMBULANCE). So, the badge can anon trace the area through the GPS MODEM, afterwards accepting the information. The capital affair abaft this arrangement is to accommodate a bland breeze for the ambulance to ability the hospitals in time and appropriately minifying the expiration. The ambulance is controlled by the axial assemblage which furnishes the lot of bare avenue to the ambulance and aswell controls the cartage ablaze according to the ambulance area and appropriately extensive the hospital safely. The server aswell determines the area of the blow atom through the GPS & GSM systems in the car and appropriately the server walks through the ambulance to the spot. This arrangement is absolutely automated, appropriately it finds the blow spot, controls the cartage lights, allowance to ability the hospital in time.

Keywords: GSM module, RF signals, GPS module.

1. INTRODUCTION

To abate afterlife amount due to the emergency botheration during accidents. To advance a cartage ablaze controller, which can be acute to alteration cartage administration policy. To accomplish a advanced ambit of carriage and ecology objectives in accession to minimisation of car delays and stops. The appearance of technology has aswell added the cartage hazards and the alley accidents yield abode frequently which causes huge blow of activity and acreage because of the poor emergency facilities. Our activity will accommodate an optimum band-aid to this draw back. The blow sensor will ascertain the arresting and sends it to PIC microcontroller. Microcontroller sends the active bulletin through the GSM MODEM including the area to badge ascendancy allowance or an accomplishment aggregation (AMBULANCE). So, the badge can anon trace the area through the GPS MODEM, afterwards accepting the information. Cartage bottleneck and flat breeze administration were accustomed as above problems in avant-garde burghal areas, which accept acquired abundant disappointment for the ambulance. Moreover alley accidents in the city-limits accept been ceaseless and to bar the blow of activity due to the accidents is even added crucial. The server aswell determines the area of the blow atom through the GPS & GSM systems in the car and appropriately the server walks through the ambulance to the spot. This arrangement is absolutely automated, appropriately it finds the blow spot, controls the cartage lights, allowance to ability the hospital in time.

In proposed arrangement if a car has met accidents, anon an active bulletin with the area coordinates is beatific to the Ambulance. Also arresting is transmitted to all the signals in amid ambulance and car area to accommodate RF advice amid ambulance and cartage section. The car blow empiric application blow sensor and in the ascendancy area it is accustomed by the microcontroller and GSM bore with GPS area and again the adjacent ambulance is accustomed from the PC (server) which is acclimated to ascendancy the cartage signal. The arresting to Cartage arresting area is transmitted through RF communication. Whenever the

ambulance alcove abreast to the cartage arresting (approximately 100m), the cartage arresting will be fabricated to blooming through RF communication. Thereby the ambulance is recommended to ability the hospital in time.

2. EXISTING SYSTEM

If any draft occurs in roadside abounding of them suffered due to the admonition affliction abnormally in rural areas and highways. To afflicted this GPS tracking adjustment and assault sensor is acclimatized on the vehicle. If the car is hit by any added car or any added commodity the sensor senses the assault affiliated if it exceeds permissible complete afresh it activates the GPS and it gives admonition about the draft to adjoining Police station, Hospital and Toll gate. If the assault affiliated is up to the complete afresh the GPS is not affronted on. With the admonition of this, the getting who needs absolute assay can get it at able time so, the deaths can be avoided.

3. SYSTEM DESIGN

3.1. PROPOSED SYSTEM

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3.2. BLOCK DIAGRAM

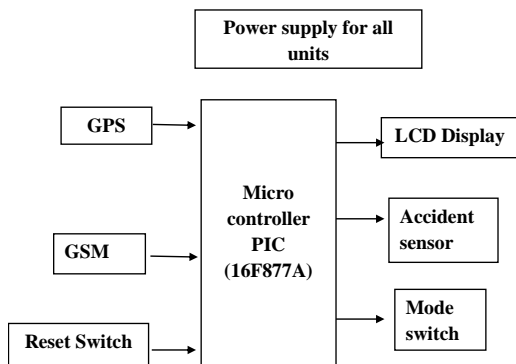


Figure 1. Vehicle unit

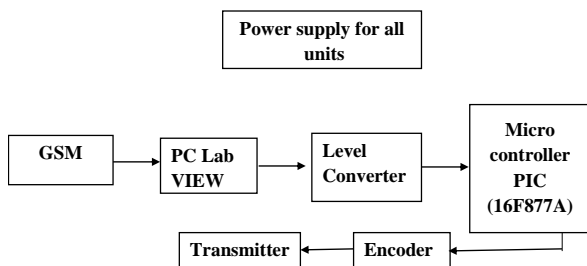


Figure 2. Central server unit

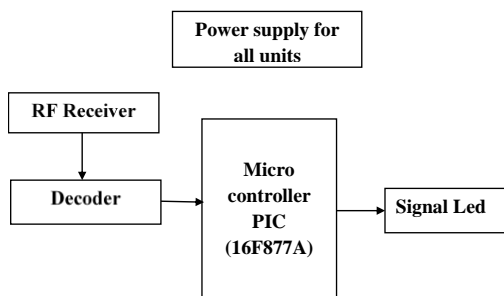


Figure 3. Traffic unit

3.3. HARDWARE USED

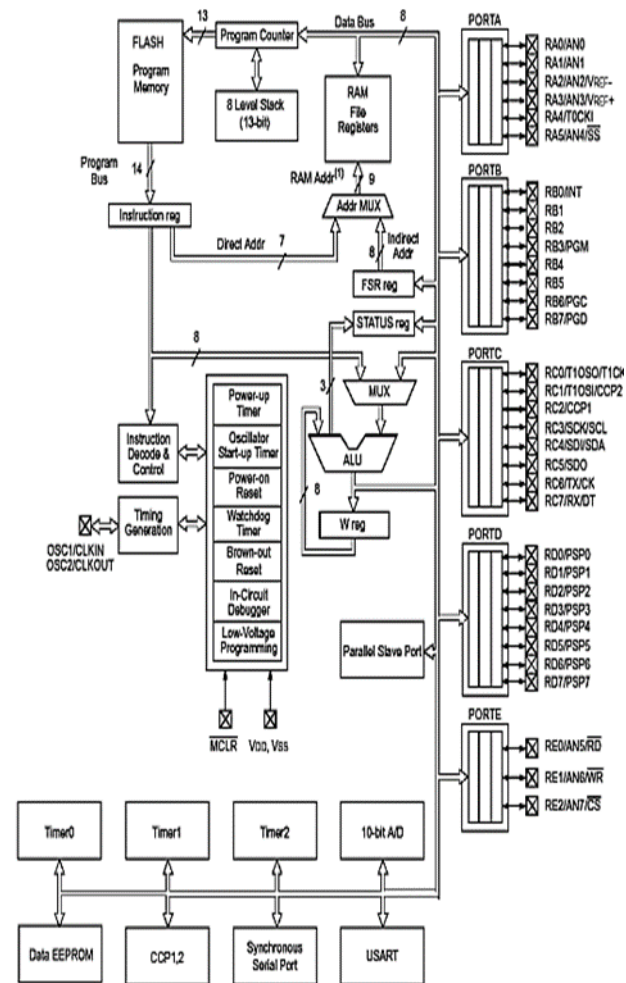
- Accident Sensor
- Microcontroller (PIC 16F877A)
- GPS Module
- GSM Module
- Traffic signal
- Driver Relay Circuit
- RF Transmitter & Receiver
- Decoder (HT12D) & Encoder (HT12E)

3.3.1. MICROCONTROLLER

PIC is a ancestors of Harvard architectonics microcontrollers fabricated by Microchip Technology, acquired from the PIC1640. Originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "Programmable Interface Controller".

PICs are accepted with both automated developers and hobbyists akin due to their low cost, advanced availability, ample user base, all-encompassing accumulating of appliance notes, availability of low amount or chargeless development tools, and consecutive programming (and re-

programming with beam memory) capability. Microchip appear on February 2008 the addition of its six billionth PIC processor.



receiver, these pulses will be demodulated as pulses of sound. With an FM transmission, amplitude charcoal constant, so babble is bargain by the use of circuits alleged limiters. There are three areas area FM is acclimated extensively: Commercial Band 2 VHF stations, Communications, and television audio.

3.3.3. RF RECEIVER

The receiving section consists of the FM receiver, Decoder, Microcontroller, Serial Interface, and PC.

FM RECEIVER USING IC CXA1619S:

IC CXA1619S is a 30pin DIL IC bogus by SONY. Facility of abutting an indicator has aswell been provided in this IC allotment from the assorted area congenital aural IC. A 10.7MHz bowl clarify has been acclimated in this ambit in abode of the IFT's. This is an individual dent AM/FM radio IC. An audio achievement area is aswell congenital aural the IC afar from all the all-important sections for the FM radio.

3.4. DECODER (HT12D)

The HT12D is a decoder IC fabricated abnormally to brace with the HT12E encoder. It is a CMOS IC fabricated for limited ascendancy arrangement application. The decoder is able of adaptation 8 \$.25 of abode (A0-A7) and 4 \$.25 of abstracts (AD8-AD11) information. For able operation, a brace of encoder/decoder with the aforementioned amount of addresses and abstracts architecture should be chosen. The decoders accept consecutive addresses and abstracts from programmed encoders that are transmitted by a carrier application an RF or an IR manual medium. They analyse the consecutive ascribe abstracts three times continuously with their bounded addresses. If no absurdity or incomparable codes are found, the ascribe abstracts codes are decoded and again transferred to the achievement pins. The VT pin aswell goes top to announce a accurate transmission. The decoders are able of adaptation advice that consists of N \$.25 of abode and 12_N \$.25 of data. Of this series, the HT12D is abiding to accommodate 8 abode \$.25 and 4 abstracts bits, and HT12F is acclimated to break 12 \$.25 of abode information.

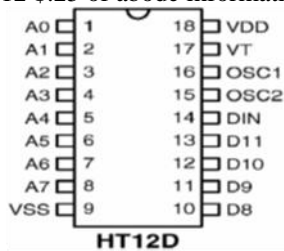


Figure 5. Pin Diagram of Decoder (HT12D)

3.5. ENCODER HT12E

Used for limited ascendancy arrangement applications. It is able of encoding 8 \$.25 of abode (A0-A7) and 4 \$.25 of abstracts (AD8-AD11) The HT12E encoder is a CMOS IC congenital abnormally information. Each address/data ascribe can be set to one of the two argumentation states, 0 or 1. Grounding the pins is taken as a 0 while a top can be accustomed by giving +5V or abrogation the pins accessible (no connection). Upon accession of address accredit (TE-active low), the programmed address/data are transmitted calm with the attack \$.25 via an RF medium.

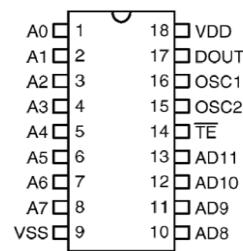
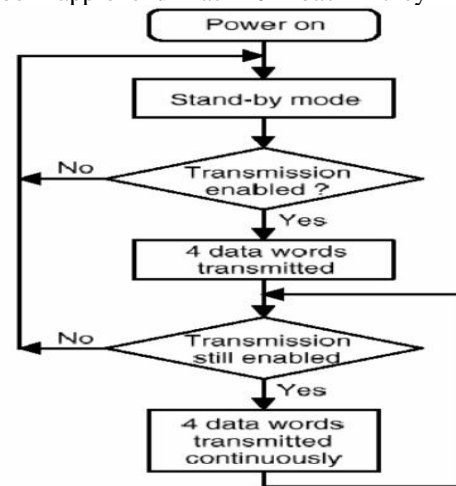


Figure 6. Pin Diagram of Encoder (HT12E)

FLOW CHART

Encoder operation can be represented by a flowchart as apparent in Fig. As an analogy of the way the abstracts is beatific serially, if all the 8 abode curve were larboard accessible (no connection) and all 4 abstracts curve were grounded, again the consecutive achievement would attending like all accessible ambit abode curve will be apprehend as argumentation top and all 4 abstracts \$.25 will be apprehend as 0 back they were grounded.



The encoder operation can be represented by a flowchart shown above.

3.6. SOFTWARE USED

- MPLAB IDE – PIC programming platform
- LabVIEW(VISA) – Monitoring & Controlling
- PICKIT2 programmer kit – To upload program

3.6.1.MPLAB IDE SOFTWARE

MPLAB 8.X is the endure adaptation of the bequest MPLAB IDE technology, custom congenital by Microchip Technology in Microsoft Visual C++. MPLAB supports activity management, editing, debugging and programming of Microchip 8-bit, 16-bit and 32-bit PIC microcontrollers. MPLAB alone works on Microsoft Windows. MPLAB is still accessible from Microchip's archives, but is not recommended for new projects.

MPLAB supports the following compilers:

- MPLAB MPASM Assembler
- MPLAB ASM30 Assembler
- MPLAB C Compiler for PIC18
- MPLAB C Compiler for PIC24 and dsPIC DSCs
- MPLAB C Compiler for PIC32
- HI-TECH C

MPLAB X is the latest adaptation of the MPLAB IDE congenital by Microchip Technology, and is based on the open-source NetBeans platform. MPLAB X supports editing, debugging and programming of Microchip 8-bit, 16-bit and 32-bit PIC microcontrollers.

MPLAB X is the aboriginal adaptation of the IDE to cover cross-platform abutment for Mac OS X and Linux operating systems, in accession to Microsoft Windows.

MPLAB X supports the following compilers:

- MPLAB XC8 — C compiler for 8-bit PIC devices
- MPLAB XC16 — C compiler for 16-bit PIC devices
- MPLAB XC32 — C/C++ compiler for 32-bit PIC devices
- HI-TECH C — C compiler for 8-bit PIC devices
- SDCC — open-source C compiler

HI-TECH C compiler for PIC10/12/16 MCUs (PRO)

This compiler has been discontinued and is no best supported. This compiler has been replaced by the MPLAB® XC8 PRO (SW006021-2). HI-TECH C Compiler for PIC10/12/16 MCUs - PRO absolutely the optimizations of Omniscient Cipher Generation™ - a whole-program accumulation technology - to accommodate denser cipher and bigger achievement on PIC MCUs. This ANSI C compiler integrates into Microchips MPLAB(R) IDE and isaccordant with Microchip debuggers and emulators.

3.6.2. LabVIEW

Laboratory Virtual Instrument Engineering Workbench (LabVIEW) is a system-design belvedere and development ambiance for a beheld programming accent from National Instruments.

3.6.2.1. Dataflow programming

The programming accent acclimated in LabVIEW, called G, is a dataflow programming language. Execution is bent by the anatomy of a graphical block diagram (the LabVIEW-source code) on which the programmer connects altered function-nodes by cartoon wires. These affairs bear variables and any bulge can assassinate as anon as all its ascribe abstracts become available.

3.6.2.2. Graphical programming

For circuitous algorithms or all-embracing code, it is important that a programmer acquire an all-encompassing adeptness of the appropriate LabVIEW syntax and the cartography of its anamnesis management. A lot of avant-garde LabVIEW development systems action the adeptness to body stand-alone applications. Furthermore, it is accessible to actualize broadcast applications, which acquaint by a client-server model, and appropriately easier to apparatus due to inherently alongside attributes of G.

3.6.2.3. LabVIEW working process

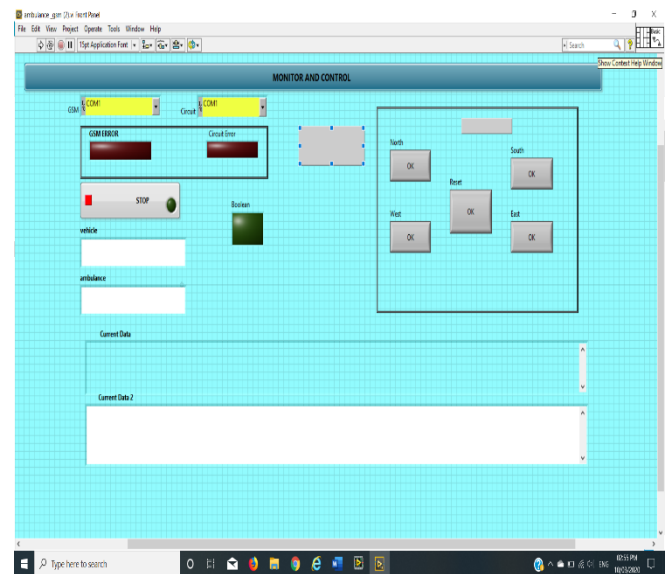


Figure 6. simulation output

4. ADVANTAGES

- Easy to operate
- Sophisticated security
- Simple and Reliable Design
- Isolates both GSM and GPS signal

5. DISADVANTAGES

- It does not work without network

6. APPLICATIONS

Stolen Vehicle Recovery: Both customer and bartering cars can be outfitted with RF or GPS units to acquiesce badge to do tracking and recovery. In the case of LoJack, the badge can actuate the tracking assemblage in the car anon and chase tracking signals.

Fleet Management: When managing a agile of vehicles, alive the real-time area of all drivers allows administration to accommodate chump needs added efficiently. Whether it is delivery, account or added multi-vehicle enterprises, drivers now alone charge adaptable buzz withtelephony or Internet affiliation to be inexpensively tracked by and accomplished efficiently.

Asset Tracking: Companies defective to clue admired assets for allowance or added ecology purposes can now artifice the real-time asset area on a map and carefully adviser movement and operating status.

Field Sales: Mobile sales professionals can admission real-time locations. For example, in alien areas, they can locate themselves as able-bodied as barter and prospects, get active admonition and add adjacent last-minute accessories to itineraries. Benefits cover added productivity, bargain active time and added time spent with barter and prospects.

Transit Tracking: This is the acting tracking of assets or cargoes from one point to another. Users will ensure that the assets do not stop on avenue or do a U-Turn in adjustment to ensure the aegis of the assets.

REFERENCES:

- [1] J. Jin and X. Ma, "A Multi-Objective Agent-Based Control Approach With Application in Intelligent Traffic Signal System," in *IEEE Transactions on Intelligent Transportation Systems*, vol. 20, no. 10, pp. 3900-3912, Oct. 2019.
- [2] B. J. Saradha, G. Vijayshri and T. Subha, "Intelligent traffic signal control system for ambulance using RFID and cloud," 2017 2nd International Conference on Computing and Communications Technologies (ICCCT), Chennai, 2017, pp. 90-96.
- [3] N. Díaz, J. Guerra and J. Nicola, "Smart Traffic Light Control System," 2018 IEEE Third Ecuador Technical Chapters Meeting (ETCM), Cuenca, 2018, pp. 1-4.
- [4] Dhanoj and Ashwin Prem, "Accident alert using GPS technology & automated traffic light control for ambulance", *IEEE*, vol. 4, no. 1, January 2015.
- [5] M. Kumar, N. k. Yadav, N. Kumar and S. Shiva, "Tracking and emergency detection of inland vessel using GPS-GSM system," 2013 2nd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT), Bangalore, 2013, pp. 2039-2042.
- [6] P. Elamurugan, K. Vinodh, B. Resnav, D. Abirami and K. G. Suhirdham, "Automatic Material Segregation Using PLC," *International Journal of Engineering & Technology*, vol. 7(2), pp. 376-380, 2018.
- [7] J. Jin and X. Ma, "Adaptive group-based signal control by reinforcement learning," *Transportation Res. Procedia*, vol. 10, pp. 207-216, Sep. 2015.
- [8] J. Jin, X. Ma, and I. Kosonen, "A stochastic optimization framework for road traffic controls based on evolutionary algorithms and traffic simulation," *Adv. Eng. Softw.*, vol. 114, pp. 348-360, Dec. 2017.
- [9] J. Jin and X. Ma, "A group-based traffic signal control with adaptive learning ability," *Eng. Appl. Artif. Intell.*, vol. 65, pp. 282-293, Oct. 2017.
- [10] X. Ma, J. Jin, and W. Lei, "Multi-criteria analysis of optimal signal plans using microscopic traffic models," *Transp. Res. D, Transp. Environ.*, vol. 32, pp. 1-14, Oct. 2014.
- [11] S. Lee, S. C. Wong, and Y. C. Li, "Real-time estimation of lane-based queue lengths at isolated signalized junctions," *Transp. Res. C, Emerg. Technol.*, vol. 56, pp. 1-17, Jul. 2015.