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## International Journal of Intellectual Advancements and Research in Engineering Computations

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### IOT BASED TRAFFIC LIGHT CONTROL FOR EMERGENCY VEHICLES

**1 st Author: Mr.C Arun prasath (Assistant Professor),Department of ECE,**

**Mahendra Engineering college(Autonomous),Mallasamudram**

**Mail Id: arunprasath2602@gmail.com**

**UG Students : Karthikeyan. K, Narindar.K,Krishnaprakash.P**

**Department of Electronics and Communication Engineering**

**Mahendra Engineering College(Autonomous),Mallasamudram,Namakkal,Tamilnadu,India.**

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#### ABSTRACT

Unwanted activities on roads, such as incidents and increased site visitors jams, can reason human lives and economic loss. For environment friendly incident management, it is imperative to send Emergency Vehicles (EVs) to the incident vicinity as rapidly as possible. To decrease incidence clearance time, a number of approaches exist to furnish a clear pathway to EVs mostly outfitted with RFID sensors in the city areas. However, they neither assign priority to the EVs based totally on the kind and severity of an incident nor consider the impact on different on-road traffic. To tackle this issue, in this paper, we introduce an Emergency Vehicle Priority System (EVPS) with the aid of finding out the precedence degree of an EV primarily based on the type and the severity of an incident, and estimating the number of vital sign interventions whilst thinking about the influence of those interventions on the site visitors in the roads surrounding the EV's tour path. We current how EVPS determines the priority code and a new algorithm to estimate the variety of green signal interventions to acquire the quickest incident response while concomitantly lowering effect on others. A simulation mannequin is developed in Simulation of Urban Mobility (SUMO) the usage of the real site visitor's information of Melbourne, Australia, captured by way of various sensors. Results exhibit that our gadget recommends appropriate number of intervention that can minimize emergency response time significantly.

**Keywords:** Arduino, Intelligent traffic system, emergency vehicle priority, smart traffic lights, Traffic.

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#### I. INTRODUCTION

Traffic mild controllers play a good sized position in maintaining smooth site visitors flows in town environments. The sequences and intervals of site visitors mild indicators are two key elements that must be viewed when designing a site visitors mild controller. In many countries, most site visitors mild controllers function fixed sequences and intervals of mild signals, which do not consider dynamically altering visitors environments. Such fixed visitors mild manage techniques are solely appropriate for stable and everyday

traffic, and no longer for dynamic site visitors situations. Therefore, standard visitors mild controllers are one of the main elements contributing to extreme street congestion in urban areas. In addition, facilitating and prioritising the transit of emergency cars in city areas involves an important safety issue. However, in normal visitors mild controllers, light sequences are decided except thinking about the presence of emergency vehicles. Therefore, emergency vehicles such as ambulances, police cars, and fireplace engines must wait at intersections, which will increase their delays and leads to the loss of lives and property. Improving

emergency response instances is extraordinarily critical, particularly for health and health-related incidents. However, when the wide variety of motors will increase at an intersection, this now not solely will increase the response instances of emergency vehicles however additionally will increase the probability of accidents occurring when emergency automobiles enter intersections at high speed. For example, in Ireland, an common of 700 fatalities are recorded each yr due to the fact of late ambulance responses. The National Highway Traffic Safety Administration in the US launched a file regarding accidents that worried emergency cars such as fire trucks, ambulances, and police cars. The organization studied the number of ambulance accidents over the 20-year duration of 1992–2011 and estimated that an common of 1,500 accidents involving ambulances took place every year, whereby 33 people were killed and 2,600 humans have been estimated to be injured. According to the report, fire engine accidents are the second leading reason of demise for firefighters. There have been roughly 31,600 accidents involving fire engine automobiles over a 10-year period in which 630 firefighters had been killed. In addition, it is reported that there are about 300 fatalities in the US each yr for the duration of police pursuits, the place 30% of the fatalities include human beings now not worried in pursuits.

Therefore, lowering emergency response instances by means of minutes or even seconds is quintessential in emergency situations. An intelligent visitor's administration device is obligatory for effectively keeping off emergency automobile accidents at intersections by way of imparting inexperienced and pink indicators to emergency cars and non-emergency vehicles, respectively, primarily based on an wise precedence algorithm.

We endorse an emergency automobile precedence and self-organized visitors management system, which prioritizes the arrival of emergency cars at intersections to decrease their response instances in emergency situations. In addition, it prioritizes all 4 strategies at intersections and determines the sequences and the intervals of visitors light signals based totally on the estimated arrival instances of emergency vehicles and the density of cars on every approach.

## II. LITERATURE REVIEW

Accidents involving emergency motors characterize a Significant trouble that is developing worldwide. Most emergency automobile accidents show up at intersections because emergency automobiles journey at greater speeds in urgent situations, which can lead to extreme damage or death. To priorities the transit of emergency cars and organize traffic flows at intersections, a variety of traffic management schemes have been proposed through researchers [1]. In [2]-[5], clever site visitors manipulate structures were proposed to supply

precedence to emergency vehicles. In [6], cameras had been set up at intersections to measure traffic conditions, which had been then utilised to estimate the sequences of site visitors lights. Shaikh and Chandak [7] utilised current technologies, such as infrared cameras and GPS, to discover the presence of emergency automobiles and calculate the real-time traffic density. In [8], RFID tags have been utilized to pick out the presence of emergency motors and the inductive loop method used to be adopted to matter vehicles. Emergency car pre-emption methods have been proposed in [9] and [10], the place sensors have been established at each intersection to become aware of the presence of emergency vehicles.

Then, the site visitors mild controller introduced a inexperienced mild in the path of an emergency car till it exited the intersection. An RFID- and GPS-based automated lane clearance protocol for ambulances used to be proposed in [11]. The objective of this protocol used to be to minimize the tour instances of ambulances through clearing lanes prior to an ambulance reaching an intersection.

## III. EXISTING SYSTEM

Automatic visitors mild controller for emergency car consists of each software program and hardware implementation. An embedded software used to be created the usage of MicroCode Studio the place this software program used to be particularly designed for PIC compiler. The flowchart of this task is proven in Figure 2 Once the push button is pressed, an RF sign will be transmitted to the RF receiver. This will prompt the PIC to manage and set off the site visitors mild to flip from pink to green. Some delays will be brought if the emergency automobile nonetheless does no longer control to bypass the visitors mild junction the place the time period of the inexperienced mild sign look will be longer. The site visitors mild machine will be again to ordinary when the emergency car efficaciously crosses the site visitors mild junction

## IV. PROPOSED SYSTEM

Traffic is a essential issue for most of the metropolitan cities of the world. Efficient visitors administration can have a major impact on the country's economy. Emergency motors such as ambulances are caught in visitors junctions due to the fact of improper visitors management. Through this work, we will get an possibility to analyze the improvement of an embedded system, improvement of android application, and examine about IoT.

Major challenges recognized are:

- Installation of sensors in a suited area in a traffic junction.
- Some changes or adjustments are wanted in Traffic junctions to use the proposed system.

Our device proposed to maximise site visitors throughput and minimise common automobile ready instances at intersections. This scheme quickens emergency response operations, by facilitating the transit of emergency automobiles through intersections in urban areas. The machine minimises total delays, lane opening instances and ready time for both emergency and non-emergency cars lowering the fuel consumption and air air pollution In our system, an emergency vehicle can attain the scene of an accident with minimal delay in each mild and heavy site visitors stipulations compared to conventional and digital visitors mild systems. The proposed system additionally assigns the very best priorities to high-density approaches, in order to keep away from lengthy queues of motors at intersections.

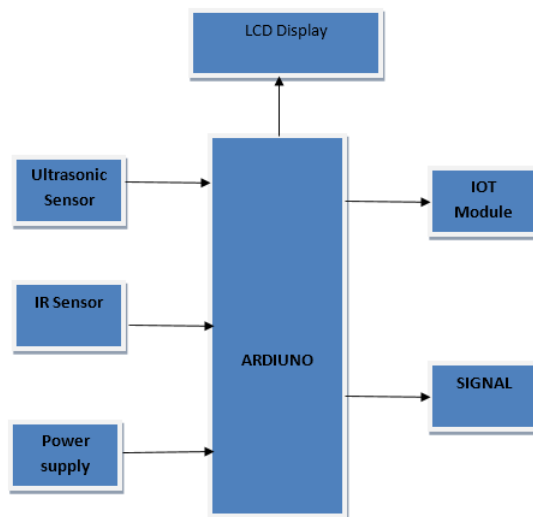
The proposed gadget offers with the systematic strategy for traffic controlling. But this can be prolonged by way of accident detection and imparting medicine to the victims at the accident spot. By growing the technology, we can additionally avoid accidents by providing extra true accident detection structures that can

stop the car to overcome the accidents. Traffic controlling systems can additionally be improvised the use of greater quick and authorised systems.

Proposed system, which ambitions to decrease the common waiting times of each emergency and non-emergency motors at intersections with the aid of utilising the following key features:

- Intersection Controller: The intersection controller manages the arrival of emergency and non-emergency vehicles. It priorities emergency motors at intersections and assigns the best possible priorities to high-density roads or approaches.
- Ultrasonic Sensors: Sensors are mounted at a distance of 25 m from an intersection controller by means of Bluetooth.
- Emergency Vehicle: An emergency car drawing near an intersection communicates with the intersection controller via Bluetooth for precedence assignment.

### ***BLOCK DIAGRAM***

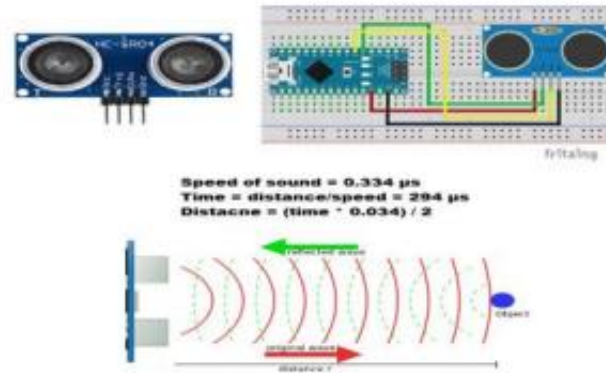


### ***1. ULTRASONIC SENSOR***

Water Level Monitoring

The Ultrasonic sensor is used to monitor the level of the water. It is achieved by measuring the distances. The distance can be calculated using the given formula

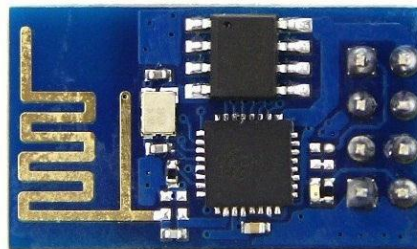
$$\text{Distance} = (\text{speed of sound} * \text{time taken}) / 2 \text{ objects}$$



## 2. ESP8266 WIFI MODULE

The receiving internet records via ESP8266 modem when interfaced with microcontroller or PC is tons much less tough as differentiated and Ethernet module when you consider that ESP is a SoC and Integrated TCP/IP way of life stack. AT firmware is supplied convenient to use bearing set with which it will in accepted be orchestrated or labored at a variety of Baud Rate (Supported 9600, 115200 or 57600). Plain Text may additionally be despatched via the modem via interfacing

solely three warning signs of the successive interface of modem with microcontroller (TxD, RxD and GND). In this arrangement RTS and CTS symptoms of successive port interface of ESP Modem are associated with one another. The transmit banner of successive port of microcontroller is associated with of the consecutive interface get sign (RxD) of ESP Modem whilst get banner of microcontroller successive port is associated with transmit hail (TxD) of successive interface of ESP Modem.



## 3. MICROCONTROLLER ARDUINO

Arduino Uno is primarily based on AVR microcontroller referred to as Atmega328. This controller comes with 2KB SRAM, 32KB of flash

memory, 1KB of EEPROM. Arduino Board comes with 14 digital pins and 6 analog pins. ON-chip ADC is used to pattern these pins. A sixteen MHz frequency crystal oscillator is geared up on the board. Following parent indicates the pinout of the Arduino Uno Board.



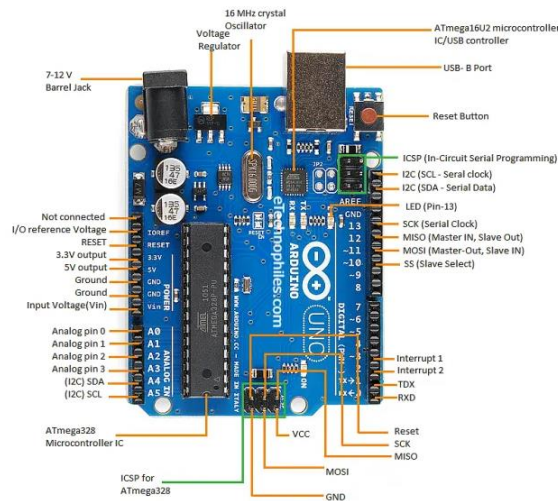
### Pin description

There are various I/O digital and analog pins positioned on the board which operates at 5V. These pins come with fashionable running scores ranging between

20mA to 40mA. Internal pull-up resistors are used in the board that limits the modern-day exceeding from the given running conditions. However, too lots enlarge in present day makes these resistors vain and damages the device.LED. Arduino Uno comes with built-in LED

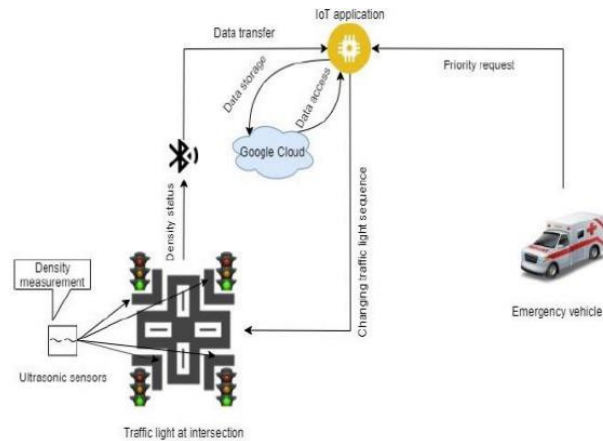
which is related thru pin thirteen Providing HIGH price to the pin will flip it ON and LOW will flip it OFF. Vin. It is the enter voltage supplied to the Arduino Board. It is unique than 5 V provided via a USB port. This pin is used to grant voltage. If a voltage is supplied via electricity jack, it can be accessed thru this pin.5V. This board comes with the capability to grant voltage regulation. 5V pin is used to furnish output regulated voltage. The board is powered up the usage of three approaches i.e. USB, Vin pin of the board or DC energy jack.USB helps voltage round 5V whilst Vin and Power Jack guide a voltage stages between 7V to 20V. It is endorsed to operate the board on 5V. It is vital to notice that, if a voltage is furnished thru 5V or 3.3V pins, they end result in bypassing the voltage law that can injury the board if voltage surpasses from its limit.GND. These are floor pins. More than one floor pins are supplied on the board which can be used as per requirement.Reset. This pin is integrated on the board which resets the application walking on the board. Instead of bodily reset on the board, IDE comes with a characteristic of

resetting the board via programming.IOREF. This pin is very beneficial for supplying voltage reference to the board. A protect is used to examine the voltage throughout this pin which then pick the applicable strength source.PWM. PWM is furnished via 3,5,6,9,10, 11pins. These pins are configured to provided 8-bit output PWM.SPI. It is acknowledged as Serial Peripheral Interface. Four pins 10(SS), 11(MOSI), 12(MISO), 13(SCK) grant SPI verbal exchange with the assist of SPI library. AREF. It is referred to as Analog Reference. This pin is used for imparting a reference voltage to the analog inputs.TWI. It is known as Two-wire Interface. TWI verbal exchange is accessed via Wire Library. A4 and A5 pins are used for this purpose. Serial Communication. Serial conversation is carried out via two pins known as Pin zero (Rx) and Pin 1 (Tx).Rx pin is used to acquire information whilst Tx pin is used to transmit data, External Interrupts. Pin two and three are used for imparting exterior interrupts. An interrupt is known as by means of offering LOW or altering value.



## V. RESULT

The hardware implementation of the Priority based Intelligent Traffic Control for Emergency Vehicles at Intersections using IOT Using Arduino is shown below



## VI. CONCLUSION

Our proposed device objectives to maximize site visitors throughput and minimize common car ready instances at intersections. This scheme quickens emergency response operations, by facilitating the transit of emergency motors through intersections in city areas. The machine minimizes total delays, lane opening instances and ready time for both emergency and non-

emergency cars lowering the fuel consumption and air air pollution In our system, an emergency vehicle can attain the scene of an accident with minimal delay in each mild and heavy site visitors stipulations in contrast to conventional and digital site visitors mild systems. The proposed system additionally assigns the best priorities to high-density approaches, in order to keep away from lengthy queues of motors at intersections.

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