Smart Traffic Management in Emergency

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Abstract **- Currently, handling the traffic has become a huge problem because of rapid-fire increase in motorcars and also because of high waiting time stoppage between traffic lights. In order to amend this problem, we will go for viscosity- grounded traffic lights system. This composition explains the method to control the traffic grounded on viscosity. In this system, we will use IR detectors to measure the traffic viscosity. We've to arrange one IR detector for each road; these detectors always smell the traffic on that particular road. All these detectors are connived to the microcontroller. Grounded on these detectors, regulator detects the traffic and controls the traffic system. This particular design is intended for densely populated cities. For example, in Bangalore, the roadways are always congested. The majority of the time, traffic will last at least 100 meters. The traffic cops can't hear the ambulance's temptress from this distance. As a result, he disregards this, and the ambulance must remain until the traffic has cleared. It can take at least 30 twinkles to get out of traffic. So, by this point, anything might be true. As a result, this design overcomes these drawbacks. According to this concept, if an ambulance approaches a traffic post in an emergency, the traffic lights will automatically halt and provide a green signal to this ambulance.**

INTRODUCTION

Traffic bottlenecks have become a severe concern all around the world in recent years. According to current figures, on an average, a person loses approximately half a year of his or her life in traffic. Furthermore, detention grows, commuters arrive at their destinations delayed, giving rise to serious outcomes on a daily basis. In most cases, traffic may be regulated at multiple major intersections by using either an automatic traffic light control system or DIY traffic police intervention. Still, because it ignores the fluctuating traffic viscosity, the traditional traffic light system, which entails a constant time interval distributed to either side of the intersection, is ineffective.

In some circumstances, the traffic system's priority must be modified based on a smaller quantity vehicle's travelling by the road, the appearance of personal vehicles and ambulances, and other factors. We've developed an automatic traffic signal system based on the data below, with a built-in assumption to prioritize the frequently congested lane. Our proposed system contains a timekeeper that runs for a set amount of time, as well as an infrared detector that counts the quantity of cars During that time, I happened to be passing by on lanes with less traffic, it also has LED lighting that is switched green. The Arduino Mega platform has a built-in programming sense that is used to control these devices.

The Indian megacity management system is made up of a number of interconnected systems, one of which is traffic management. It is also one of the most important features of smart megacity. The world is evolving at dizzying pace speed, this must continue in order for progress to continue unabated. On the contrary, ultramodern transportation fails to provide individuals with a smooth transit system. Excessive traffic congestion causes delays in getting to work or home, energy waste, vehicle wear and tear, and even road rage among stressed-out and unhappy drivers. Furthermore, as the population grows, traffic concerns such as speeding, accidents, hit-and-run, and other offences become more prevalent.

As a result, traffic control has become a mandate for a prosperous civilization. Smart and flexible traffic control systems are currently favored in most growing

countries. This sort of traffic management is usually handled by centrally managed systems/waiters.

In light of this, the Internet of Effects, which has proven useful in practically every aspect of our daily lives, is viewed in a mechanism of controlling traffic via intermediate garçon. In our proposed work, the number of vehicles passing via a transit that is a great distance from the existing traffic congestion locations is relayed to a command post for traffic influx control. To control the flow of vehicles, timely public information about the megacity's traffic congestion knot can be disseminated via the web and media.

RESEARCH CHALLENGES

A group of issues has been linked succeeding extensive researching and accounting in the manner traffic lights work in several thoroughfares in congested metropolises.

- There is traffic congestion on some of the most significant primary vital thoroughfares, particularly during rush hours and special seasons, resulting in long wait times and high energy consumption costs.
- The prevailing traffic control system does not consider the precedence providing a traffic light that is farther distant from another a longer length of green light, so that we can clear the currently backed-up traffic.
- A direction that does not require one is given a long green light.
- There is no available data on which we may base our decisions for prioritisation or traffic analysis.

One of the most serious issues that transportation systems face is traffic congestion in large cities. The utilisation of control stations, each of which manages traffic within its region of influence, is the foundation of our strategy to achieving a result. To resolve disagreements at their boundaries, these stations must be coordinated. This section covers the operations that the original station must do, as well as the conditions for the many segments of road that fall under its jurisdiction. The focus of this research is on a single original control area – communication between distinct original control areas is far beyond.

OBJECTIVES

Translucency and the rule of law. Strengthening functional processes, correctional measures and individual capabilities will only have borderline impact in the absence of broader structural reforms aimed at setting the traffic light system within this governance frame. The main end of the design is to guide the ambulance in the hard- core megacity traffic, as ambulance is carrying the diseased to sanitarium for treatment it's an exigency situation, we need an effective traffic control system to help the ambulance to reach sanitarium in right time. Another ideal of this design is to maintain traffic free traffic with automatic control.

- removing traffic snarls and lowering wait times at traffic lights, as well as achieving traffic ignorance.
- Providing a clear way for emergency situations, comparable to ambulance buses.
- Eliminating the mortal element intervention in traffic light automated control and depending only on the smart control outlined in this paper
- giving critical information to the traffic administration department to help in decision-making and traffic flow regulation

LITERATURE SURVEY

In recent years, more individuals have begun to migrate from pastoral to urban regions in order to improve their survival skills. Increased population across the world has resulted in the operation of more vehicles (both 2 and 4 wheelers), necessitating the deployment of traffic heads to supervise traffic scripts in both directions (rambler or vehicles). Several research have been suggested or implemented in this respect in order to prevent traffic on lanes with fewer vehicles. To alleviate traffic at road corners, Y.N. Udoakahet.al created a traffic light control system utilizing a PIC18F4550 microprocessor and an IR detector [1].

Using an ARM7 microprocessor, Vaishali Bet.al created a traffic management system with a collision alarm at a road intersection. Then, based on the viscosity of vehicles adhering to the lane, traffic lights were vigorously modified. A collision alarm was also detected using an ultrasonic detector, and the alert was communicated to the intended philanthropist through Wi-Fi [2]. Y M Jagadeesh created a detector-based traffic signal management system with dynamic

control, reducing the ATWT (Average Trip Waiting Time) [3]. Siddharth Srivastava designed a microcontroller-based time-keeper control system that adjusted traffic lights depending on high-resolution traffic photographs taken by cameras. For recycling the traffic lights, a MATLAB image processing application was employed [4]. R. Tina created an intelligent traffic light management system for minimizing traffic and operating expenditures [5]. All of the approaches indicated below are set up to be superior to our proposed system in terms of costs and efficacy.

[6] demonstrated an Internet of Things-based traffic light control system using an infrared detector and cameras. This research resulted in an IRsense-based technology that caused traffic signals to shift the lights (red/unheroic/green) in a consistent manner. The Wi-Fi transmitter sent the tasting data from the IR detector, which was then input by the jeer- pi regulator. The technique offered the benefit of eliminating "unwanted delays" for cars during traffic signal operations in more congested areas.

[7] described an IoT-based grounded traffic control system. This system employed MATLAB software for image processing and a WI-FI transceiver module to give car count data. The new signal was created using the inputs from the preceding signal's traffic viscosity. The jeer-pi and Arduino tackles were utilised. Direct data communication through pall, rather than using a Wi-Fi transceiver, could improve the system's effectiveness. [8] presented a traffic-control system that employed a wireless transmitter to send photos directly to the main garcon. The garcon system also handled picture processing and traffic viscosity control. The length of a stop sign for a specific path at a junction was brought to light by the road's traffic viscosity. Even so, if the information to be conveyed isn't in the form of graphics, the system can be improved. Instead, the repurposed affair information is provided directly, saving a significant amount of time and communication baggage.

[9] presented a traffic-control system based on detector devices that continuously broadcast infrared light. The luminosity of bounced back light back to the detectors was used to determine whether the vehicle was there or not. The suggested system would serve as the scaffolding for a intelligent traffic routing system. The detectors employed then had a flaw in their operation is reliant on pyrexia and moisture conditions altering. A gradual Internet of effects (IoT) grounded traffic control system was created in [10]. In this case, a bedded circuit with RFID and an assembled system was employed. Hadoop was included to assist with large data analytics. In addition, supervised learning approaches were employed in this investigation.

An comparable strategy was proposed in [11], which used detectors and RFIDs to identify cars and determine their location. Using a wireless link, the data collected by detectors was sent to a amalgamate control center for further processing. For nations with varying traffic conditions, such as India, in [12], an IoT-based approach to efficient parking management was suggested. Optical Character Recognition, a type of image processing, was used to confirm the hand, and an uprooted number plate was urged to garçon the system. Only registered activists will be given access to the available parking lot, according to the algorithm. A micro regulator made real-time vehicle analysis and optimization easier.

With the use of Ultrasonic detectors, a lane-ground traffic monitoring system was introduced in [13]. Regulator was used to utilize the data from the detectors. It was then sent to garcon via a Wi-Fi module. Traffic was managed by a traffic signal control medium that relied on lanes recognizing traffic circumstances. An adaptive method for controlling the traffic system in respect to the autonomous termination of emergency vehicles was proposed in [14] using IoT technology. They used Raspberry PI, Node MCU, RFID Tag, and Reader to construct a system to adapt signal changes by connecting with the detectors in the automobile.

In [15], a scalable armature for municipal IoT environments was developed, built on Lambda Architecture and data input via web services that give a common interface to our system, as well as data storage in a distributed, scalable, NoSQL data store the researchers presented a study on how big data and cloud computing operations may support traffic planning in smart cities. Based on data readily available in Edmonton's megacity, the research in this paper also revealed concrete proof of conception.

METHODOLOGY

The software process is the set of conditioning and associated results, which produced a software product. Example Waterfall process model, helical model and

Evolutionary model. The “Waterfall” process model has been followed for the development of this design. This model is the one of the stylish process models. There are several variations of this model. This process is stylish only when all the conditions are known in advance. This process is easy to understand by system inventors as well as druggies. And this process model is more visible, as it produces deliverables at the end of end phase. Visibility is one of the process characteristics that are looked for by design directors while opting a process model for any design.

The block illustration of the model proposed is given below in Figure 1.

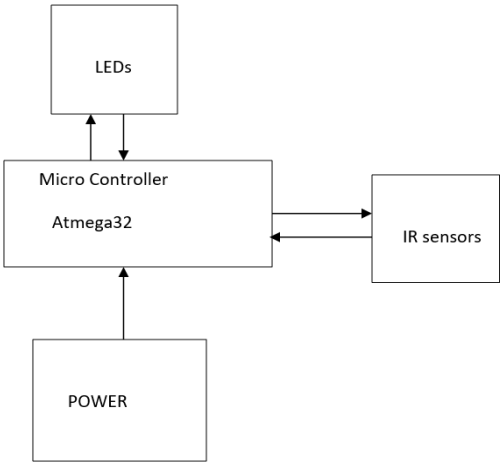

Figure 1. Block Diagram of model proposed

What we've to do is we've to attach an IR receiver on pole0.5 km before the traffic signal. Ambulance will be continuously transmitting signals; these transmitted signals are entered by the receiver on the pole after entering these signals if the red light is (ON) on the way of Ambulance that light will be automatically turned to green and on all other ways the red light will be turned (ON) making way for Ambulance. If there's green light no action will be performed.

The Arduino Mega platform, which is connived with an IR detector and LEDs, is included in our suggested system (Red & Green only an infrared detector that counts the number of vehicles in the lane is connected to the Arduino. According to the programming sense hidden within the Arduino platform, the information from the IR detector is passed to the ARDUINO board for subsequent activation of either the red or green light on the lane. Our regulator believes that if a specific lane's green light repeats for two consecutive times, the other lane is given priority for the third time, permitting the lane with the fewest cars to pass through. The efficacy of our sophisticated technology is demonstrated in this operation script. The configuration of the module in the ambulance is described in Figure 2.

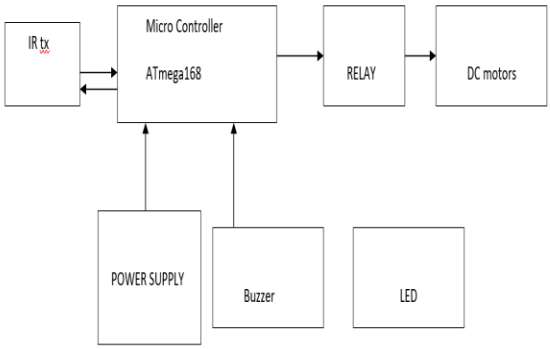

Figure 2. Module setup in Ambulance

Photoelectric detectors on one side of the road are required for the planned intelligent cross-road traffic operation system, and they should not be placed on the side with sub exits. The system also makes use of detectors DSj, where j denotes potential route expansions after traffic, and their main function is to offer details on the potential for opening traffic in these areas. They provide their readings to the central traffic control system at the traffic control button. In accordance with the significance of each road, the traffic operation authority is also instructed to give directives proportional weights for road precedence.

DESIGN CONSIDERATIONS

The design considerations are created to draw attention to the issues that arise when applying the requirements and principles of universal availability design to buildings and installations. In existing constructions, they can also be used to locate walls. For convenience of reference, the design concerns are divided into smaller groupings and given as bullet points. For important concerns in each subgroup, a distinct fashionable practices section has been provided. The developer must refer to applicable laws and design primers for compliance with statutory and other requirements. These considerations are meant to serve as a design guideline and planning tool in relation to universal availability. The developer must

also ask the client for any pertinent design guidance and take into account any unique design requirements and standards.

This particular design is intended for densely populated cities. For example, in Bangalore, the roadways are always congested. The majority of the time, the traffic will last at least 100 metres. The traffic cops can't hear the ambulance's temptress from this distance. As a result, if this is overlooked, the ambulance will have to wait until the traffic has cleared. It can take at least 30 twinkles to get out of traffic. So, by this point, anything might be true. As a result, this design overcomes these drawbacks. According to this concept, whenever any ambulance approaches a traffic post in an emergency, the traffic lights will automatically halt and provide a green signal to this ambulance.

RESULTS

As we can see the result, we have both transmitter circuit and the receiver circuit.

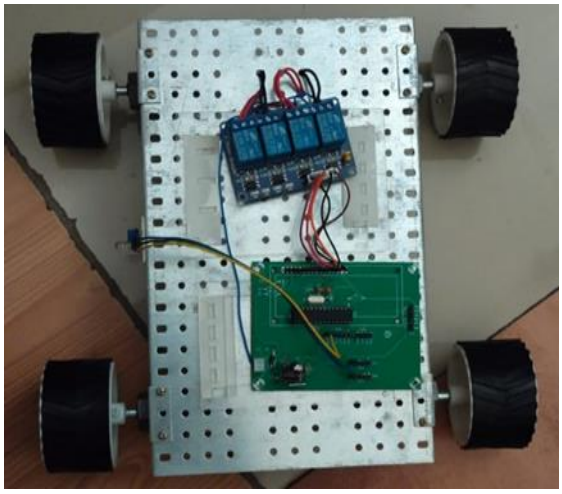

Figure 3. Circuit of Transmitter(Ambulance)

In figure 3, we can see Atmega 48 microcontroller is connected to the relays to amplify the voltage from 5v - 12v to the motors as the motors need that much voltage to work. The two sides vertical motors are shorted and given to each one relay as they have the same functionality so that can move only in the straight direction. The transmitter IR sensor is also connected to the ambulance to transmit the signal where the receiver can know if the ambulance is in that particular lane.

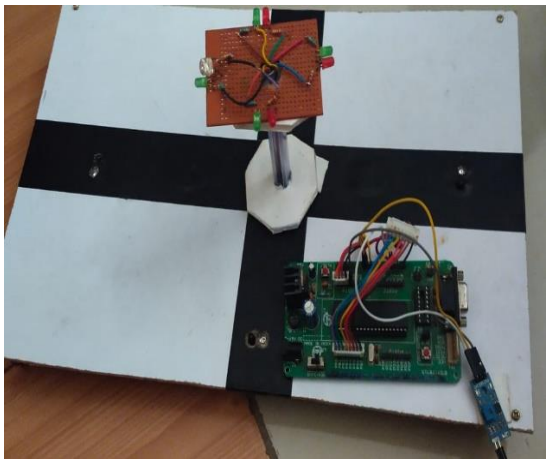

Figure 4. Circuit of Receiver System

In fig 4, we can see Atmega 32 microcontroller is connected as input to the IR sensors that detects the Ambulance and send that to the traffic signals, where all 4 sensors are connected to the leds which indicate the signal and gives permission when ambulance is detected in that range. If no Ambulance is detected then the system senses the density of all the lanes and sends the one which has more density, but the most priority is given to ambulance that means if any ambulance is occurred then ambulance is sent first from that lane making its path free to go.

CONCLUSION

"Necessity is the mother of all inventions," as the adage goes, and a requirement for software that could manage process and bias was met. The design method employed at the time yielded good results, and the microcontroller is adequate for measuring the required parameters. The device's power consumption has been maintained as low as possible, and the measures it takes are quite reliable. To solve the problem, a largely interactive stoner-friendly module based on FPGA technologies and microcontrollers was created. The module that has been created will make the procedure easier. The stoner module has outperformed in terms of decreasing human labour and increasing comfort.

As a result, the module is proving to be an excellent tool. Incorporating the previously mentioned anticipated enhancement would make the app a wonderful tool for assisting stoners. which is caused at road bends. Counting the number of cars in each lane and giving priority to the lane with the fewest vehicles reduces the amount of unnecessary traffic jams that occur during peak hours (i.e. morning and late

evening). In the future, a sound detector might be used in conjunction with an Arduino platform to detect the frequency of an ambulance approaching a traffic light. It can be given the highest priority regardless of the amount of traffic viscosity in the lanes. This has the potential to save the lives of those who are in desperate need of medication.

The suggested method intends to alleviate traffic congestion and generate traffic flow in megacity thoroughfares by employing an intelligent algorithm based on computing precedence's, which indicate the overall recommended relative weight of a certain direction in cross-road traffic. The technology can recognise vehicles that are used in emergency situations, such as ambulance buses.

REFERENCE

[1] Y. N. Udoakah1, * and I. G. Okure2, "Design and Implementation of a Density-Based Traffic Light Control with Surveillance System", Nigerian Journal of Technology (NIJOTECH), Vol. 36, No. 4, October 2017, pp. 1239 – 1248.

[2] Vaishali B and Jeyapriya A, "Density based Traffic System and Collision Alert at Intersection of Roads", Journal of Electrical & Electronic Systems, J Electr Electron System 2017, 6:2 DOI: 10.4172/2332-0796.1000229.

[3] Y M Jagadeesh, G. Merlin Suba, S Karthik, and K Yokesh, "Smart Autonomous Traffic Light Switching by Traffic Density Measurement through Sensors", IEEE Xplore, DOI: 10.1109/CCOMS.2015.7562885.

[4] Siddharth Srivastava, Subhadeep Chakraborty, Raj Kamal, Rahil, Minocha, "Adaptive Traffic Light Timer Control", IIT Khanpur's NERD Magazine, March 2016.

[5] Greenshields, B. D., "A study of traffic capacity", In Highway Research Board Proceedings Vol.14, 1935, pp. 448–477.

[6] L. P. J. Rani, M. K. Kumar, K. S. Naresh and S. Vignesh, "Dynamic traffic management system using infrared (IR) and Internet of Things (IoT)," Third International Conference on Science Technology Engineering Management (ICONSTEM), Chennai, pp. 353–357, 2017.

[7] Robertson, D.I. Bretherton, R.D. - Transp. & Road Res. Lab., Crowthorne, "Optimizing networks of traffic signals in real time the SCOOT method", IEEE Transactions on Vehicular Technology, Vol. 40, Issue:1, Part 2, Feb 1991, pp. 11-15.

[8] Ben-Akiva, M., DePalma, A., and Kaysi, I., "Dynamic network models and driver information systems", Transportation Research Part A: General, Vol. 25, Issue 5, September 1991, pp. 251-266.

[9] Cascetta, E., Inaudi, D., and Marquis, G., "Dynamic estimators of origin-destination matrices using traffic counts", Transportation Science, Vol. 27, Issue 4, 1993, pp. 363–373.

[10] Crittin, F., "New algorithmic methods for real–time transportation problems", PhD thesis, Ecole Polytechnique Federale de Lausanne, 2003.

[11] Sundaram, S., "Development of a dynamic traffic assignment system for short–term planning applications", Master's thesis, Massachusetts Institute of Technology, 2002.

[12] S. Rane, A. Dubey and T. Parida, "Design of IoT Based Intelligent Parking System Using Image Processing Algorithms," IEEE International Conference on Computing Methodologies and Communication, pp. 1049–1053, 2017.

[13] V. S. Nagmode and S. M. Rajbhog, "An Intelligent Framework for Vehicle Traffic Monitoring System using IoT," IEEE International Conference on Intelligent Computing and Control, 23-24 June 2017.

[14] S. V. Bhate, P. V. Kulkarni, S. D. Lagad, M. D. Shinde and S. Patil, "IoT based Intelligent Traffic Signal System for Emergency vehicles," International Conference on Inventive Communication and Computational Technologies, pp. 788–793, 2018.

[15] D. Serrano, T. Baldassarre and E. Stroulia, "Real-time traffic-based routing, based on open data and open-source software," IEEE 3rd World Forum on Internet of Things (WFIoT), Reston, VA, pp. 661–665, 2016.