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Internet of Things Based Traffic Management

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Abstract:- With the development in automobiles, traffic light regulation has become a serious concern, and it is also necessary to eliminate time delays while travelling in traffic due to long delays at traffic signals. So, after thinking about this issue, we've decided on a Smart Traffic Light Signaling System with IR Sensors. This article shows ways to cut down on traffic delays in high-traffic locations. We are using infrared sensors in this system to determine the traffic density at traffic signals. We will install IR sensors on each road in the traffic junction for this purpose. These infrared sensors will determine the density of traffic on that road. Sensors are connected to a microcontroller. The microprocessor will operate the lights based on the density of traffic detected by IR sensors. The traffic density will be detected by IR sensors, and the microcontroller will operate the traffic signals accordingly based on the density of traffic. Traffic messages will be printed on the LCD under this system.

Keywords:- *IOT, Sensors, Microcontroller, Traffic Detected, Message Print on Print LCD.*

I. INTRODUCTION

Traffic congestion has become a severe concern in our day-to-day operations in today's high-speed world. It reduces individual productivity and, as a result, society's productivity, as many work hours are lost on signal processing. Large numbers of vehicles, inadequate infrastructure, and an irrational usage of the signalling system all contribute to the tumultuous traffic jams. Since most engines are kept running, a significant quantity of natural resources, such as gasoline and diesel, are consumed with no apparent benefit, thereby contributing to the rise in pollution levels. Therefore, novel approaches utilising sensor-based automation techniques are required in order to remove or at least greatly reduce these problems.

Currently, traffic lights are controlled by a manual traffic control system that is based on fixed time intervals. Because of the inconsistent traffic density pattern throughout the day, India's present traffic control system is inefficient. As a result, even if the traffic density is low or there are no vehicles at all, vehicles must wait for a lengthy time. The average wait time is larger under a manual traffic control system due to the predefined duration for switching lights.

Dynamic Traffic Management System Using Image Processing and IoT Subhash B. Tatale, Dr. S. R. Sakhare, Hemant Dusaane, Mamta Puri, Pratika Girme, Rutuja Sankpal, Padmavati Ghule, Nitin N. Sakhare, and others from the Department of Computer Engineering at the Vishwakarma Institute of Information Technology in Pune, Maharashtra, India Traffic management has become a big issue as the number of vehicles has increased. The current traffic system is inefficient. The Internet of Things (IoT) and image processing are used in this paper to provide an adaptive traffic management system. Image processing is used to examine real-time data in the suggested system. Different lanes are regularly monitored by cameras. The data collected from various lanes is reviewed. Image processing is used to detect and count the number of vehicles in each lane. the total number of This project will take only a tiny amount of coding and a very simple circuit appropriate for beginners. The video at the bottom of the page will lead you through each step of this entertaining traffic light project. An Arduino and LEDs are used in this straightforward project to replicate a traffic signal. Until the Arduino's power supply is turned off, it functions as an internal timer and runs on code.

II. LITERATURE REVIEW

Over the previous few years, the road infrastructure has steadily improved. Road transportation has become a focal point for fast growth as connectivity has increased. People have easier access to services, transit, and mobility because to roads. However, traffic congestion in metropolitan centres is fast expanding, resulting in a chronic problem in densely populated downtown regions.

In the urban transportation system, traffic lights play a crucial role. They determine the optimum signal timing settings to govern traffic movement on city roadways. As a key component of intelligent transportation systems, adaptive traffic signal controllers play a critical role in reducing traffic congestion by making real-time adjustments in response to changing traffic network dynamics.

The three key criteria for road traffic analysis are density, speed, and flow. For wide geographical and temporal coverage of the highway network Real-time assessment of space mean speed and density is required as input for high-performance road traffic management and control. Data from cars, such as position and speed, is gathered and utilised to optimise traffic signals in an adaptive traffic control system. The system establishes a common wireless communication

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protocol for automotive applications as well as the use of in-vehicle sensors. They use a number of different traffic signal control algorithms. The establishment of Intelligent Traffic Lights are part of a smart city framework for VANET. that broadcast warning messages and traffic statistics, is suggested by the intelligent traffic system for VANET. Various variables are present in that system.

In 2011, Active RFID and GSM technologies were used to monitor and measure traffic congestion on the roads. In this study, the author develops an intelligent traffic congestion monitoring and measurement system that uses a probe car to monitor and measure road traffic congestion and provides a simple platform for analysing traffic flow and congestion patterns. For computing the average journey to traverse two roadways, One active RFID tag, one wireless router, and one wireless coordinator are all used. deployed at roadside, roughly 200 metres apart. These systems will gather signals from active RFID tags affixed to the probe vehicle using wireless devices. When a probe vehicle passes by roadside devices, its travel time is recorded.

III. IMPLEMENTATION

Traffic control is now done by the employment of a system of hand signals, traffic lights, and markings by traffic police officers. Through driver-licensing authorities, a similar and corresponding education programme is necessary to ensure that drivers of motor vehicles are aware of the rules of the road and the activities they are expected or encouraged to do when a certain control device is present. Design and usage criteria apply to each traffic control device; Stop signs, for example, always have a red background and are octagonal in size.

Motorists can detect the sign in the visual field along the road quickly and uniformly thanks to design criteria. Colors and patterns shapes are commonly used to help with identification and decision-making. Currently, traffic lights are put on in separate directions with a preset While switching from one signal to the next, there is a temporal delay that follows a specific cycle. producing unnecessarily and wastefully congested traffic in one lane while the others remain empty

The system we propose monitors traffic density on certain lanes and changes signal timing accordingly. IR sensors identify impediments and offer an estimate of traffic density on a given lane, which is then sent to a controller unit, which makes the appropriate judgments as needed.

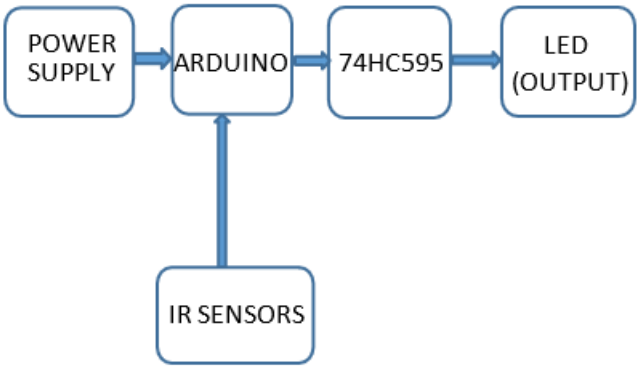

Fig 3.1 :- Block diagram of Proposed system

- To begin, ac power is converted to dc and then sent to Arduino through a rectifier.
- IR sensors are also directly linked to Arduino.
- The IC 74HC595 is linked to the Leds and Arduino to properly control the entire circuit.
- The leds are linked between the resistance and the IC 74HC595, and one of the leds' terminals is connected to ground through the resistance.

➢ *Power Supply*

An electrical device known as a power supply delivers electricity to a load. Converting electric current from a source to the appropriate voltage, current, and frequency for powering a load is the main duty of a power supply. As a result, power supplies are usually referred to as electric power converters. While some power supplies are independent units, others are built within the appliances that make up the loads they support. On all power supplies, one or more power output connections provide current to the load while a power input connection absorbs energy in the form of electric current from a source.

In this project, we use a rectifier to supply the circuit with a 9V DC supply through a 12-0-12V transformer.

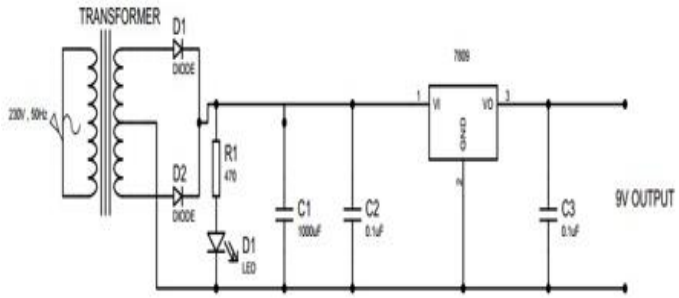

Fig 3.2: Arduino MEGA

➢ *9 V DC Power Supply*

We are utilising a 7809 voltage regulator, two 0.1 microfarad capacitors, one 1000 microfarad capacitor, two diodes, a 470 ohm resistor, a red led, and other components to power our project. Red led is just used as an indicator in this circuit. With the aid of a voltage regulator, the rectifier converts a step down transformer's 12V AC source into 9V DC. Below is a list of the rectifier's specific functions.

IV. SOFTWARE SYSTEM DESIGN

➢ *Role of Arduino in the Project*

We used one Arduino MEGA board, eight servo motors (one pair for each road), all four LEDs (as signals), and one Arduino UNO board, together with all four RFID readers, to control traffic at a road intersection. Jumper wires are also used to connect the MEGA and UNO boards to form a circuit.

Consider a traffic light where four different roads converge (R1, R2, R3, and R4). On road R1, there will be two barriers (left and right) for every lane, a signal, and an RFID reader. All remaining routes, including R2, R3, and R4, are affected by this.

The barriers in both lanes will be up (open) when the signal for road R1 becomes green; when the signal for roads R2, R3, and R4 turns red, the barricades in those respective lanes will be closed (down), stopping vehicles from running the signal and minimising traffic jams and collisions.

After a certain length of time, the road R1 signal now turns yellow.

The RFID reader on road R3 detects the tag that is attached to the emergency vehicle (which has been saved in the programme), turning the signal for road R1 to red (barricades will be closed) and R3 to green (barricades will be opened), allowing the emergency vehicle to pass without incident. As another example, if an emergency vehicle approaches road R3, which has a red signal while road R1 has a green signal. On all routes where the emergency vehicle originates, this procedure shall be followed.

Fig 4.1(a): Arduino MEGA

Fig 4.1(b): Arduino UNO

➢ *Problem Description*

- *Existing Problem*

Nowadays, owning a car that is both economical and has greater spending power is pretty straightforward for the typical person. In spite of the fact that it has led to a better quality of life, it generates traffic congestion and increases traffic in large cities. The approach to reducing traffic congestion is a sophisticated traffic management system, which will enhance current operations. Traffic congestion is a severe problem in almost every modern metropolis on the world. Numerous issues have been brought on by congestion.

The most populated cities in the world are plagued by a number of grave problems and worries. Accessing various areas of the city is becoming more difficult.

Time-consuming and difficult. Traffic congestion causes people to lose time, miss out on opportunities, and get frustrated. Traffic jams cause workers to become less productive, trade opportunities are lost, deliveries are delayed, and costs go up as a result. Additionally, because of the heavy traffic, emergency vehicles occasionally get stuck in it and can't get to their destination in time.

Fig 4.2(a): breaking of signals

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Fig 4.2(b): traffic congestion


Fig 4.2(c): disobeying of traffic rules

- *Purpose*

The goal of this initiative is to raise public knowledge about traffic regulations, minimise traffic congestion, reduce the time it takes for emergency vehicles to arrive at their location, and reduce the number of accidents caused by violations of traffic rules, which can sometimes be deadly.


Fig 4.3: Obeying of traffic rules due to our system

- *Scope*

The project may be used on both three-lane and four-lane roadways. In this project, we may also employ IOT (Internet of Things). By displaying the message on the LCD, the traffic density estimation can be analysed, and we can offer the expected time and save time for reaching the destination.

V. RESULT

The project is the result of a year of study and development. When the circuits are implemented separately, they yield the desired output; when they are implemented together, however, the output changes and provides a different response each time. This may be the result of a problem with the bread board's internal wiring or loose wire connections.. This study investigates if the concepts / solution methods provided in the research are satisfied by the practical implementation. The major mode of communication for this project is infrared technology.

The following findings were attained from the series of trials we conducted:

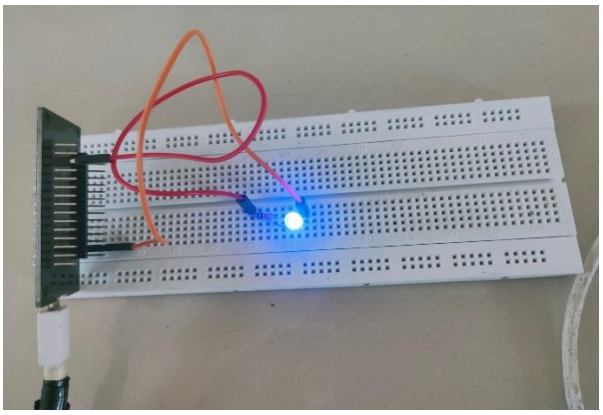
Fig No 5.1 : LED Blink

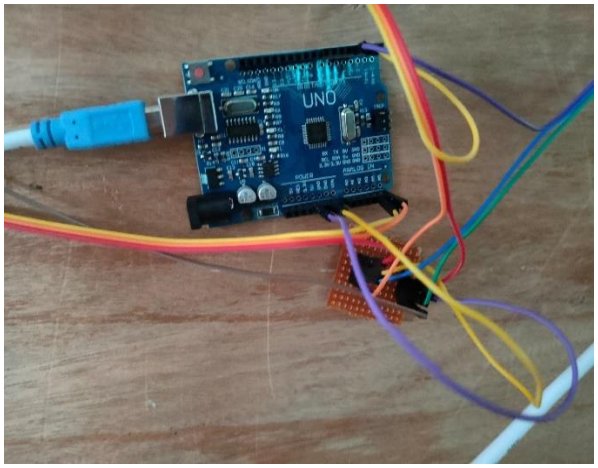

Fig No 5.2 : Arduino Connections

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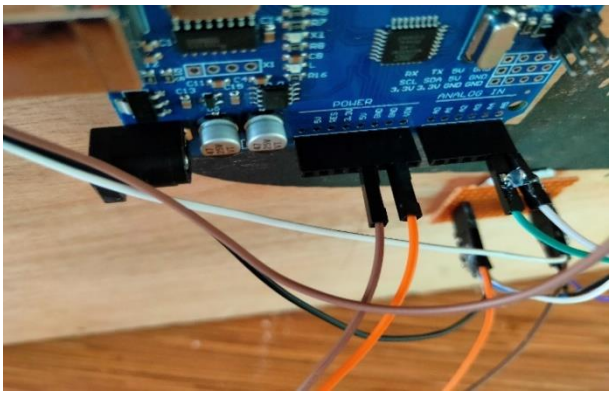
Fig No 5.3 : Arduino Connections Model 2

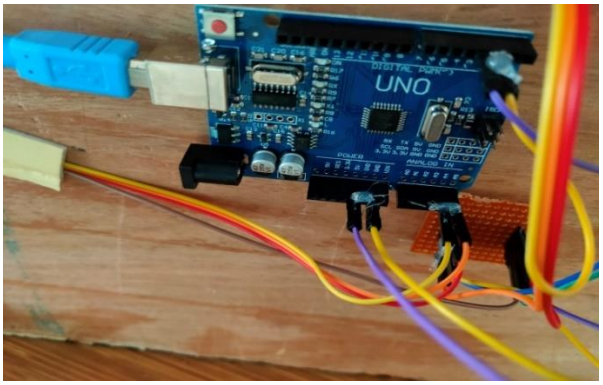

Fig No 5.4 : Aurduino Connections Model 2

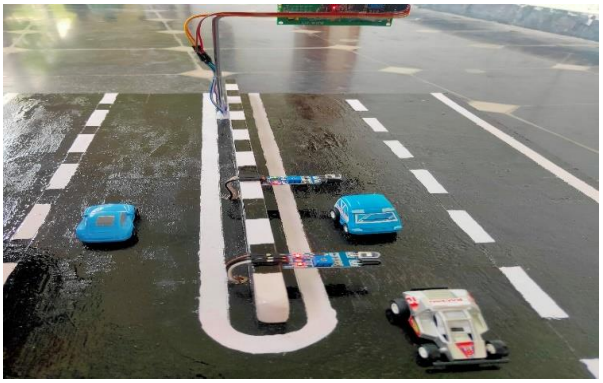
Fig No 5.5 : IR Sensor Connections Model 1

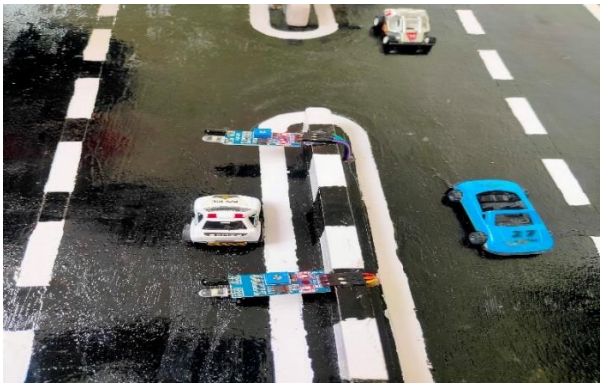
Fig No 5.6 : IR Sensor Connections Model 2


Fig No 5.7 : IR Sensor Connections With LCD Disply Model

- The clearing of traffic may be done smoothly.
- Time can be distributed equally among all junctions.
- Time management that works.

VI. FUTURE SCOPE

Safety first: It must be ensured that no compromises are made on safety problems, e.g., a backup stand-by set-up that can convert from automated to manual mode should be given in the event of sensor or circuit faults, so that the vehicular mob does not spiral out of control. The traffic check point may be connected via wireless transmitters in the future, allowing the crossings ahead to anticipate oncoming traffic One approach to achieve this is to connect the monitoring system to GPS and brief radio communications signals. This will act as a feed forward mechanism, allowing the signalling system to smooth out and reduce congestion.

We will also upgrade this system with contemporary technology so that if a vehicle attempts to move during a red light, an alarm will sound to warn the driver and an alert will be sent to the traffic warden with a photo.

VII. CONCLUSION

Due to India's daily average of 384 road accidents, our nation desperately needs an efficient traffic management system. In this project, a novel technique is developed to lessen traffic congestion and unfavourable time delays. By designating time periods based on the merit of the vehicle load in various lanes of multi-junction crossings, the bothersome chaos of traffic may be correctly channelled with the help of this technique.

With outstanding findings, we were able to deploy the prototype successfully in a lab setting. The next step is to evaluate this schema's performance in a real-world environment before implementing it on a bigger scale. We predict that this will cause the traffic management system to undergo a significant shift.

REFERENCES

[1]. Mr.Sujoy Mondal ,7 years as an Assistant Professor in RCCIIT.
[2]. Embedded System for Intelligent Traffic Signal Control Innovative Systems Design And Engineering, ISSN 2222-1727 (paper) ISSN 2222-2871 (online), Vol. 3, No. 5, 2012, by Dinesh Rotake and Prof. Swapnili Kar.
[3]. Shruthi K Rand Vinodha K, Priority Based Traffic Lights Controller Using Wireless Sensor Networks, International Journal Of Electronics Signals And Systems (IJESS), Vol-1 Iss-4, 2012.
[4]. Koushik Mandal, Arindam Sen, Abhijnan Chakraborty, and Siuli Roy, IEEE Annual Convention on Intelligent Transport Systems, 2011. Road Traffic Congestion Regular monitoring Using Active RFID and GSM Technology by Koushik Mandal, Arindam Sen, Abhijnan Chakraborty, and Siuli Roy, IEEE Annual Meeting on Intelligent Transport Systems, 2011.
[5]. Vikrama ditya Dangi, Amo lParab, KshitijPawar, and S.S Rathod's Image Processing Based Intelligent Traffic Controller. Vol-1, Iss-1, ISSN: 2278 – 1129, Postgraduate Science Research Journal (UARJ), 2012.
[6]. Micro controller based traffic light controller, Department of Electrical Engineering, B. Prashanth Kumar, B. Karthik.
[7]. Volume 3, Issue 3 (March 2014) of the International Journal of Innovative Research in Science, Engineering, and Technology K.Vidhya, A.BazilaBanu, K.Vidhya, A.BazilaBanu, K.Vidhya, A.BazilaBanu, K.
[8]. Second International Conference on Emerging Trends in Engineering and Technology, Shilpa S. Chavan, Dr. R. S. Deshpande, and J. G. Rana (2009) "Design of Intelligent Traffic Light Controller Using Embedded System."
[9]. Ahmed S Salama, Bahaa K Saleh, and Mohamad M Eassa presented their Intelligent Cross Road Traffic Management System (ICRTMS) at the 2nd International Conference on Computer Technology and Development (ICCTD 2010) in 2010.
[10]. A First MsPromilaSinhmar submitted Intelligent Traffic Light and Density Control Using IR Sensors and Microcontroller in the International Journal of Advanced Technology and Engineering Research (IJATER).
[11]. Wikipedia (online), www.wikipedia.org
[12]. Arun A. Balakrishnan, Uttara E. Prakash, Athira Thankappan, Vishnupriya K. T., Uttara E. Prakash (2018). Proceedings of the 2018 International Conference on Emerging Trends and Innovation in Engineering and Technological Research, Density Based Traffic System Using Image Processing.
[13]. SenhalataDoddigarla, Navitha Naidu, and Shruti Malgatti are Ashwin Basavaraju, SenhalataDoddigarla, and Shruti Malgatti. (2014). International Journal Of Advanced In Engineering & Science, Volume:03, Vehical Density Following Various to Control Traffic
[14]. Rebort A sowah, Sarpong Kwadwa Asare (2012). Using Image Processing Techniques, design and create a micro - controller traffic light system LegonOkponglo Junction real case prototype, University of Ghanna, IEEE 2012.
[15]. Uddin Mohammad Shahab Mohammad Shahab Uddin Mohammad Shahab Ud Md. Ayon Kumar Das, Ayon Kumar Das, Ayon Kumar Das, Ayon Kumar Das, Ayon Kumar (2015). Bangladesh Perspective, IEEE 21-23 May 2015, Real-time Area Based Current Traffic Prediction by Image Analysis for Traffic Signal Control System.
[16]. M. Naveen, S. Raghavendra, D. Imran Basha, P. Kiran Kumar, M. Naveen, S. Raghavendra, D. Imran Basha, P. Kiran Kumar, M. Naveen, S. Raghavendra (2019). International Journal of Electronics Engineering, ISSN: 0973-7383 Volume 11 • Issue 1 pp. 348-351 Jan - June 2019. Density-based Traffic Signals Controlling Using ARDUINO and IR Sensors, International Journal of Electronics Engineering, ISSN: 0973-7383 Volume 11 • Issue 1 pp. 348-351 Jan - June 2019.
[17]. Afeefa M U, Aruna T S, Clincy Jose, Radhika V M, Saiba P A, Afeefa M U, Aruna T S, Clincy Jose, Radhika V M, Saiba P A, Afeef (2017). PIC Microcontroller-Based Density-Based Traffic Signal System, International Journal of Computer Trends and Technology (IJCTT) – Volume 47 Number 1 May 2017.
[18]. S.Arockiaraj, S.Sundara Mahalingam (2018). Using Arduino to Control Traffic Lights Based on Density
[19]. Akindele Ayoola E, Awodeyi Afolabi I, Matthews Victor O, Alashiri Olaitan A, Idowu Oriyomi K, Olaloye Folarin J, Akindele Ayoola E, Awodeyi Afolabi I, Matthews Victor O, Alashiri Olaitan A, Idowu Oriyomi K, Olaloye (2018). Development of a Digital Measurement Electronic Weighing Indicator Volume: 05 Issue: 09, September 2018. International Research Journal of Engineering and Technology (IRJET).
[20]. Andrew Gilman and Donald G. Bailey, Massey University's Institute of Information Sciences and Technology, Palmerston North, New Zealand (2005). IEEE 2005 High-speed Weighing Using Impact on Load Cells