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AUTOMATIC TRAFFIC CLEARANCE SYSTEM FOR AMBULANCE BY USING IR AND ARDUINO UNO CONTROLLER

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ABSTRACT: The project aims to build a dynamic traffic signal system based on traffic density, where the timing of the signal will alter automatically upon sensing the volume of traffic at any intersection. It is time to move away from more manual mode or fixed timer mode and towards an automated system with decision-making skills because traffic congestion is a serious issue in the majority of cities throughout the world. As the current traffic signalling system is time-based, it may become ineffective if only one lane is in use. We have developed a framework for an intelligent traffic control system in order to optimise this problem. When traffic is heavier on one side of the junction, the typical permitted green period may need to be extended. As a result, we suggest a system in which the duration of a green light and a red light is determined by the volume of traffic that is present at the time. IR is utilised to do this (Infrared sensors). With the aid of the Arduino Controller, the green light's shining time is determined once the density has been calculated (Arduino). The roadside sensors that detect the presence of vehicles transmit that information to the Arduino Controller (Arduino), which determines when to switch the signal lights on or off and how long a flank will be open. We have outlined the steps involved in using this framework in the sections that follow. Here, we're using a wifi module to identify ambulances or other emergency vehicles; if the module (ESP8266) receives information based on the driver's instructions, the green light at the intersection should turn on.

Keywords: IR, Wifi, Esp8266, traffic lights.

I INTRODUCTION

We must cope with several challenges in today's world, one of which is the traffic bottleneck, which is getting worse every day. Conventional website traffic

systems typically require manual handling at traffic junctions and lack an accurate monitoring mechanism. Not only does this cause passengers to feel anxious, but it also wastes a lot of petrol because of the delay at the traffic junction. This necessitates the development of a system to manage traffic in an intelligent manner by automatically altering its time dependent on the volume of website visitors. In this, traffic is sensed using digital IR sensors, and the sensors also detect cars based on the signal they emit. Sensor units placed next to the road can regulate the volume of traffic on the website by properly adjusting the traffic signals. All IR sensors are connected to Arduino Uno, which also examines data from IR sensors. The system's traffic signals are comprised of LEDs, with two LEDs for each lane in each signal. By using this system expansion at a traffic junction, we don't have to worry about managing the traffic manually and it takes less time than when using the conventional traffic system. In order to build a functioning model of a smart traffic signal that automatically modifies its timing based on online traffic direction, we harvest solar energy from photovoltaic panels. Because there are more cars on the road today, traffic congestion is viewed as a serious problem in today's society. However, if we dig deeper into this problem, we find that there are other factors that contribute to traffic congestion as well, such as poor infrastructure, outdated traffic signals, and so forth. Because it is expensive and inefficient on narrow roads, significant infrastructure improvements are not viable everywhere. As a result, given that the fixed plan has a set time allocation at each junction and is unable to adjust for the traffic density offered at a junction, the focus of this study will likely be on traffic light configuration. So, thickness-based traffic control may be taken into account as a solution to lessen traffic congestion on the road in a practical manner. Sensing units and microcontrollers are essential for picking up website traffic in thickness-based traffic light control systems and moving the data to the next level for output generation. The major goal of focusing on this issue is to reduce traffic congestion, fuel waste, and crashes caused by a large diversity of vehicles at the time of travel. IOT, or the Internet of Things, is a key invention for this project. IOT enables various tools to communicate online with drivers or other related tools to share information. [2] In the current network architecture, challenges can be picked up and

managed from a different location thanks to the network of points [1].

II LITERATURE SURVEY

[1] Pampa Sadhukhan and Firoj Gazi's "An IoT based Intelligent Traffic jam Management System for Roadway Crossings," IEEE 2019: The authors of this paper attempted to use an ultrasonic proximity sensor to measure the website traffic density at a certain intersection and set the signal procedure time based on the estimated value of traffic jam thickness. Ultrasonic sensing units Node (USN), Microcontroller, Wi-Fi module, and Signal LEDs are the components used. Here, the Web Traffic Management Component and the Traffic Density Checking Module (TDMM) are used (TMM). The TDMM measures the width of the web traffic line to determine the density of the jam, and the TMM modifies the traffic signal's operating time based on the density of the congestion. The microprocessor in the TDMM collects data from the sensor node and the Wi-Fi module and also transmits data to the TMM. TDMM are placed at specific distances from signal crossings, such as 50, 100, and 150 metres. By measuring distance, the USN is used to determine whether there are any adjacent standing vehicles or not. The outcome demonstrates that the authors were successful in estimating the online traffic thickness using ultrasonic proximity sensors.

[2] Abdul Kadar's article "An Internet of Things (IoT) based Smart Traffic Management System: A Context of Bangladesh" Mohammad Nazim Uddin, Iaamanur Rahman, Muhammad Masum, Md. Kalim Amzad Chy, Khairul Islam Azam, IEEE 2019: The authors of this work attempted to create a smart website traffic administration system (TMS) utilising IOT, with a focus on Bangladesh. In this instance, the vehicles are controlled with the help of traditional traffic signals as well as a mix of sensors and expert system. The equipment components used are the ESP 8266 WiFi module, RFID module, HC-SR04 Ultrasonic sensor units, Arduino Massive 2560 controller, and LED signal. The ESP8266 Wi-Fi module provides the output that helps in moving the data to cloud web servers & LED's at signal light. The Arduino Mega receives the input from RFID sensor & ultrasonic detecting devices. The HC-SR04 ultrasonic detects cars at distances between 2 cm and 400 cm. The emergency response vehicles, such as the fire department and rescue teams, use this system. This system's disadvantage is that it consumes a lot of

electricity and WiFi is not always easily available in public places.

[3] By M.E. Harikumar, M. Reguram, and Prathyush Nayar, "Affordable Traffic Control System for Emergency Situation Autos Using ZigBee," IEEE 2019: This study presents a system designed primarily for emergency vehicles operating in busy traffic lanes. The authors can provide information about the existence of an ambulance or any other type of emergency vehicle because they are using Zigbee for car-to-lorry communication. The issue of rescuing removing the lane due to traffic congestion will undoubtedly be resolved by the system. The signal control unit at the intersection receives information about the car. The information on the emergency vehicle's lane usage is transmitted using a Zigbee process. In accordance with the distance between the lane crossway & the emergency vehicle, the emergency vehicles that are close to the intersection will unquestionably have the highest priority. Given that the stretcher has stress sensors, the signal transmission begins as soon as the individual is onboard and strapped to the stretcher. This system's shortcomings include a lack of cost effectiveness and a failure to monitor web traffic density.

[4] Omid Avatefipour and Froogh Sadry's "Website Traffic Management System Using IoT Technologies - A Competitive Analysis," published in IEEE 2018: The authors of this essay have compared the various Traffic Management Solutions on the market. It discusses many website traffic management systems, including the IR Systems, Green Wave System, RFID Equipment, and WSN Equipment. Uses, benefits, and drawbacks of each system are described. The Green Wave device is effective in locating stolen vehicles, although it does not perform as expected in harsh weather conditions. RFID solutions are environmentally friendly, but they consume more power and can be duplicated. Wireless Sensing Unit Network (WSN) systems process large amounts of data quickly, but they are susceptible to interference and are relatively easy to hack. Although it's fairly simple to create GSM solutions, this technology is being phased out by several suppliers to make way for 5G. It is simple to set up IR sensing unit-based systems, however they become inoperable when exposed to sunlight. The findings show that each of the aforementioned systems has at least one drawback.

[5] Mpho K. Madisa and Meera K. Joseph, "Android and also Cloud based Traffic Control System," IEEE 2018: The author of this work has made an effort to create a traffic control system that, specifically in large cities, helps to prevent traffic congestion and provides means for the emergency car. Both an Android-based system and a cloud server-based system are used in this task. Android mobile devices, Arduino IDE, GSM components, and various IoT stages are all included in this system. In this work, the Arduino Uno microcontroller is used to manage all of the traffic signals, and the GSM module is used to link smartphones to the microcontroller. The microcontroller counts the number of vehicles as they arrive at the signal based on the Android devices already there. The microcontroller is connected through cloud web server with the aid of the MQQT cloud server and also the GSM module. The obstruction of web traffic is measured and signal modifications are made in response to concerns based on the current android mobile devices. This paper's advantages include low cost, simplicity of implementation, and MQQT's superior information dissemination. The limitations of this study include that GSM is being phased out by several manufacturers to make room for 5G and that it is not energy efficient.

III PROPOSED SYSTEM

In this paper, we introduce the idea of density-based traffic light arrangements, which alter traffic light colour in accordance with the volume of traffic present at a certain side of a traffic intersection. We must employ sensors and IOT technology to determine the traffic density. The proposed model in this paper is created with Arduino and IR Sensors. To measure traffic density, IR sensors are employed as sensors, while an Arduino serves as the microcontroller. At traffic intersections, IR sensors are installed on each side of the intersection to count the passing vehicles and link with an Arduino. After collecting data from sensors, we can determine the amount of traffic on each side of the intersection and adjust the traffic signal as necessary. In order to provide some light on potential future work, we will examine the limitations of the density-based traffic signal layout in this study.

IV WORKING METHODOLOGY

The system's goal is to modify the timing of the traffic lights in accordance with the volume of traffic on a certain road. When a traffic infraction

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occurs at a red light, the camera is activated to record the licence plate, which is then displayed on the IOT server. The data will be dynamically controlled in accordance with the traffic movement detected by the sensors to prevent a traffic jam. The Arduino UNO changes the duration of the green traffic light for the specific lane from three seconds to six seconds when there is traffic congestion by receiving information about the density from the IR sensors, which identify the presence of the vehicle. If there isn't any traffic, the density management operates according to the prescribed flow, which is three seconds per case if traffic density returns to normal and stays at six seconds if heavy traffic continues.

The outcome comprises the traffic density controller with defaulter identification being successfully implemented. The system consists of two intersections, each with two IR sensors to measure traffic density and a third IR sensor to identify defaulters who run red lights.

Case 1: The traffic intensity is medium when only one IR sensor detects the vehicles. The duration of the green light is not prolonged, and each traffic light blinks once every three seconds.

Case 2: The traffic density is high when both IR sensors identify the vehicles. The green light remains on for an additional 6 seconds before returning to regular traffic.

Case 3: When the wifi module receives information from the driver, the green light is relocated to the appropriate moment on the road.

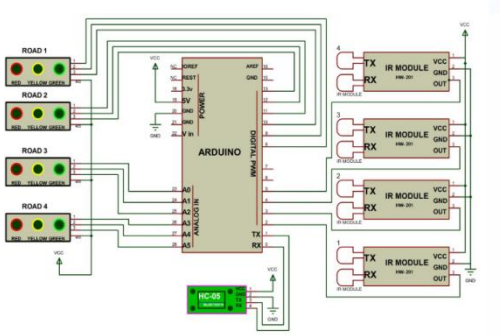

Fig.1. Circuit diagram.

The approach operates on the tenet that traffic signal delays are adjusted based on the volume of vehicles using a designated stretch of road. A four-way road has four sensors installed on each side that count the number of vehicles that pass by the area they cover. In this case, we are designing a density-based traffic light system in place of a traffic control system. A photodiode and an IR transmitter are both built into an IR sensor. This IR transmitter and receiver will be placed at a specific distance apart on the same sides of the road. The IR

sensor will identify the vehicle as it passes through these IR sensors and communicates the information to the Arduino Controller. The Arduino Controller will keep track of how many vehicles are present and adjust the LED lighting time to reflect the density of vehicles. The LED will glow longer than average in the lane or road with the higher density, and vice versa. Initially, the traffic lights operate with a set delay of 1000 milliseconds, resulting in a total process delay of 1000+1 milliseconds. At that intersection is where the complete embedded system is located. LEDs and infrared sensors are connected to the Arduino controller. Four infrared sensors and eight LEDs are needed in total. They are therefore connected to any two Arduino ports. IR transmitter and IR receiver make up an IR sensor module.

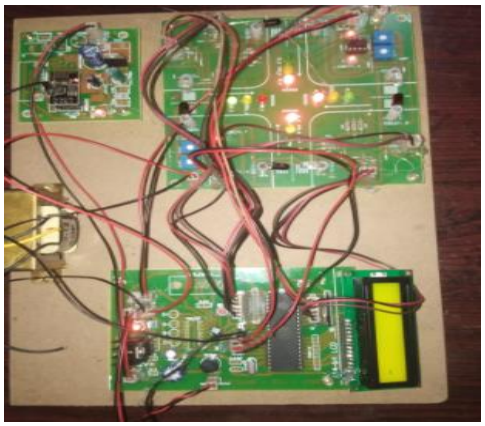

Fig.2. Receiver section side module.

An automated method of controlling signals in accordance with the volume of traffic on the roads is our project, density-based traffic light control. Infrared sensors are positioned throughout the intersection at predetermined distances from the signal at the junction. The amount of traffic on the highways determines how long the traffic light will be delayed. The number of vehicles on the road is detected by the IR sensors. The Arduino Controller decides which route should be given the highest priority and the longest time delay for the matching traffic signal based on the IR count.

V CONCLUSION

The suggested Traffic Control for Smart Ambulance is built around the use of IR sensors to monitor traffic conditions. The application provided here allows the parties, the ambulance, and the control room to observe the traffic conditions. The ambulance will be able to get to the hospital using this application with the least amount of delay and without running into any traffic. In this project, we looked at how an Arduino board and IR sensors could be used to optimise a city's traffic light controller. The development and design of a traffic signal system involved careful hardware and software

integration. This interface runs in sync with the entire traffic system operation. This project's ability to automatically design the traffic light model in any way will be helpful for properly developing a road system.

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