

Project Synopsis
on
RESCUE ROUTE

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DECLARATION

We hereby declare that this submission is our work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgement has been made in the text.

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CERTIFICATE

This is to certify that Project Report entitled “**RESCUE ROUTE**” which is submitted by **Kashish Gupta , Khushi Vaish and Nikita Sharma** in partial fulfilment of the requirement for the award of degree B. Tech. in Department of Computer Science of Dr A.P.J. Abdul Kalam Technical University, Lucknow is a record of the candidates own work carried out by them under my supervision. The matter embodied in this report is original and has not been submitted for the award of any other degree.

Date:

Supervisor Signature
Supervisor Name
(Designation)

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ABSTRACT

In today's world we have been facing problem due to increasing traffic on roads. This causes a lot of waste of time and increases stress level. As many emergency vehicles are also stuck in traffic for hours leads to losing life of people. So, this requires development of a system to handle traffic in a smart way by automatically adjusting its timing based on traffic density provide passage for ambulances using RCNN(Region-based Convolutional Neural Network), webcam, NodeMCU controller, LEDs. The core idea revolves around traffic management through the assessment of traffic volume on each side of the road, with the aim of implementing smart traffic signal control based on this density information. The webcam captures images of the vehicles on the road and send images to the NodeMCU microcontroller and then we apply RCNN algorithm and OpenCV to detect and count number of vehicles on the lane and set traffic timing accordingly. If ambulance is detected traffic light turns green on that side and other side are turn red to provide passage for emergency vehicles.

INTRODUCTION

One of the pressing issues exacerbated by the world's growing population and the rapid increase in the number of vehicles is traffic congestion. In countries like India, the rate of expanding road infrastructure lags far behind the rate of vehicle growth . Traffic jams give rise to numerous critical problems that have a direct impact on people's daily lives and, in some cases, even lead to loss of life . For instance, when an emergency vehicle such as an ambulance is transporting a critically ill patient, being trapped in a heavy traffic jam significantly reduces the chances of the patient reaching the hospital in a timely manner. Therefore, it is imperative to develop an intelligent traffic management system that can effectively regulate traffic to prevent accidents, collisions, and traffic gridlocks, with a special focus on ensuring the swift passage of emergency vehicles like ambulances. These challenges can be mitigated through the application of emerging technologies, specifically Machine Learning (ML). By establishing connections between a range of software packages and hardware devices, whether through wireless or wired means, a system can be created to efficiently regulate traffic.. A solution to this issue involves the development of a program that assesses traffic flow on each road and adjusts the timing of signals accordingly. This can lead to inefficient traffic flow, with one lane being overly congested while others remain vacant. In cases where traffic density varies at different sides of an intersection, a mechanism is proposed to adapt red and green light durations based on the density of traffic. In instances of long traffic jams where vehicles come to a complete stop, drivers and passengers can experience considerable mental stress. This can escalate into road rage, underscoring the severity of the traffic congestion problem. Therefore, there is a pressing need for intelligent solutions to address this issue.

PROBLEM STATEMENT

Urban traffic congestion and emergency response delays pose critical issues. Traffic signals lack adaptive features to optimize traffic flow during peak times, leading to longer travel times and increased pollution. Additionally, ambulances encounter red lights, jeopardizing swift medical attention. The proposed solution, a Traffic Density Analyzer, seeks to resolve these issues. It utilizes real-time data to assess traffic conditions and extend 'go' signals by 2 seconds during heavy traffic. Simultaneously, it creates red-light-free pathways for ambulances, ensuring prompt emergency responses. The Traffic Density Analyzer offers the potential to ease congestion, reduce travel times, and enhance public safety by prioritizing emergency services.

- Optimize Traffic Flow:** Develop a system that adapts traffic signal timings based on real-time traffic density data to alleviate congestion, reduce travel times, and enhance overall transportation efficiency.
- **Increase Ambulance Response Efficiency:** Establish a priority mechanism to grant ambulances a red-light-free pathway, ensuring swift response to emergencies and enhancing public safety.
- **Reduce Environmental Impact:** By minimizing traffic congestion and idling, contribute to lower emissions and reduced environmental pollution, thereby promoting a healthier urban environment.
- **Enhance Public Safety:** Improve the safety of the public by expediting ambulance responses and minimizing the risk of delays during critical medical emergencies.
- **Improve Urban Transportation Infrastructure:** Implement an innovative solution that enhances the functionality of urban traffic management systems, ultimately benefiting the quality of life and transportation experience for residents.

LITERATURE REVIEW

1)Real-time traffic density count using image processing.

Authors: Abbas, Naeem, Muhammad Tayyab, and M. Tahir Qadri.

Journal: International Journal of Computer Applications Year: 2013

Abbas, et al. present a method for assessing lane-specific traffic density through the application of image processing. This approach offers distinct advantages, primarily obviating the need for costly aerial imagery and intricate sensor-based systems, thus rendering it a cost-effective solution. Notably, our system does not necessitate the installation of additional devices like RFIDs. Future improvements can include the incorporation of an emergency vehicle identification system, affording priority to such vehicles, and the integration of Vehicular Ad-hoc Networks (VANETs) to enhance road safety and contribute to the development of intelligent transportation systems.

2)Smart traffic control system using image processing.

Authors: Jadhav, Prashant Journal: International Research Journal of Engineering and Technology (IRJET) Year: 2016

Jadhav, Prashant, et al. introduces a novel approach to estimate traffic, employing image processing on captured highway camera footage to count vehicles, issue warnings for heavy traffic if thresholds are exceeded, and offers cost-effectiveness, ease of implementation, and notable accuracy and speed compared to traditional sensor-based systems. It is executed using MATLAB and image processing, aims to alleviate heavy traffic congestion. It involves the utilization of web cameras positioned in traffic lanes to capture road images, which are then meticulously processed to gauge traffic density. Based on the data analysis conducted through MATLAB, the system commands traffic signal LEDs to display specific time intervals, facilitating traffic management.

3) Density Based Traffic Control System with Smart Sensing Of Emergency Vehicles

Authors: D. M. . Varadharaj Journal: International Journal of Computer Applications Year: 2019

D. M. . Varadharaj employs switches, rather than magnetic sensors, to assess traffic density and modulate green signal durations based on this information, leading to the desired outcomes. Future project developments involve extending the system to manage all four lanes at a traffic signal by employing efficient PIC interfacing techniques. Furthermore, the system will incorporate the capability to detect emergency and government vehicles through the use of RF transmitter and receiver components, known collectively as an RF transceiver. The primary goal of the project is to optimize traffic flow by effectively utilizing green signal durations. In this system, the traffic density in a specific lane is determined by the count of magnetic sensors placed at the roadside, which generate output signals corresponding to the traffic density.

4) Vehicles Density Based Traffic Control and Ambulance Detection using RFID

reader & IR Sensors”

Authors:1Vivekanand Thakare, 2Damini R. Singh, 3Abhishek Kumar, 4Sonam J. P. Sharma, 5Rushikesh P. Sonekar, 6Prajwal R. Badwe “Vivekanand Thakare et. al., International Journal of Advanced innovative Technology in Engineering, 2022, 7(2), PP 28-33

This study aims to present a deep learning-based, decentralized smart traffic management system that optimizes traffic on the roadways and use intelligent algorithms to better correctly control all traffic scenarios. Through the use of an IR sensor, an object identification algorithm, and sensor data, the system receives the density of cars in traffic as input and outputs multiple vehicles for signal management. To lessen traffic congestion, an algorithm in an IR sensor is utilized to forecast the number of vehicles in traffic in the future. In addition, by installing RFID Reader in emergency vehicles such as ambulances and police cars, among others, RFID Reader is also used to prioritize emergency vehicles.

The traffic system receives data from IR sensors and digital cameras that are abstracted from digital image processing techniques to determine the density of cars. It then uses this information to produce outputs such as signal management. The time will either decrease or rise depending on the density of vehicles. Time will be added to the lane when there is a lower vehicle density than in the other. To reduce traffic congestion, an algorithm is employed to forecast the future traffic density.

The traffic density of the cars is sent into the system by cameras, which are decoupled from RFID readers. and the data from IR sensors, which are then provided as an output for signal management. The purpose of the IR sensor is to control signal timing based on congestion in traffic.

For signal control in the traffic management system, use the AT Mega 328 P. The traffic system's goal is to control traffic flow and decrease stoppage time by introducing sensors to control traffic lights.

Vehicle Detection: When there are more cars on one road than on another during traffic, a light will open on that road. An infrared sensor is used to identify vehicles. in order for it to clear the route more quickly than the prior available traffic signal. Detection of Vehicles with IR Sensor Identifying Ambulance: Because a certain lane has a time limit, there are a lot of cars in traffic. Emergency vehicles have been experiencing delays and issues. Here, if there is an ambulance in the traffic, the RFID reader will identify it. Traffic system design uses Arduino, Express PCB, Proteus software, RFID reader for ambulance detection, and coding and circuit design. It helps to maintain traffic density while enhancing the system's overall security, safety, and dependability. The amount of traffic in a given lane at any given time is determined by the number of vehicles on the road. Additionally, it grants emergency vehicles in traffic or lane where they are present priority over other vehicles. If that is the case, the lane with the emergency vehicle will begin before all other lanes. Therefore, it lessens the likelihood of any negative incident.

5) "Real Time Traffic Density Measurement using Computer Vision and Dynamic Traffic Control,"

Authors: M. F. Chowdhury, M. Ryad Ahmed Biplob and J. Uddin, 2018 Joint 7th International Conference on Informatics, Electronics & Vision (ICIEV) and 2018 2nd International Conference on Imaging, Vision & Pattern Recognition (icIVPR), Kitakyushu, Japan, 2018, pp. 353-356, doi: 10.1109/ICIEV.2018.8641039.

In this paper, we propose a dynamic traffic control system that uses image processing and real-time video feeds to measure the traffic density at intersections. After gathering a video sample, a combination of Gaussian algorithms was applied to foreground detection and background subtraction in order to maintain track of the number of cars in each lane. By using their line of centroid, the vehicles are identified. A vehicle is confirmed by centroid movement. The traffic conditions detected from the video feeds will be used to dynamically adjust the traffic lights at the intersections.

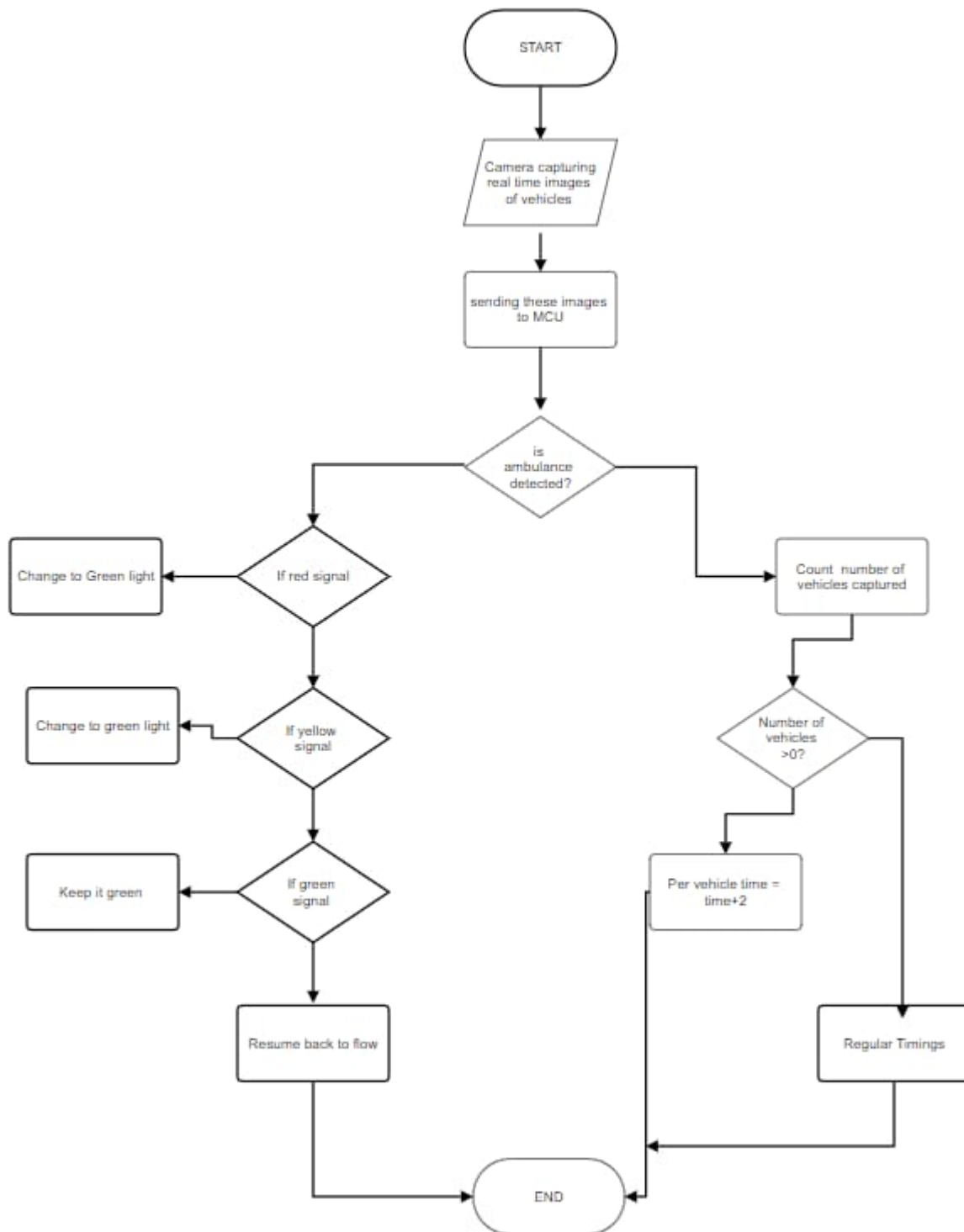
6) Smart Ambulance Traffic Control System

Authors: SUREN KRISHNAN, RAJAN THANGAVELOO*, SHAPI-EE BIN ABD RAHMAN & SIVA RAJA SINDIRAMUTTY

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The Smart Ambulance Traffic Control System (SATCS), an integrated system for managing traffic signals in emergency ambulance scenarios, is presented in this paper. By using Radio-Frequency Identification (RFID) technology, SATCS makes it possible for ambulances and traffic lights to communicate with one another. The RFID system makes sure that the traffic lights turn green when an emergency ambulance approaches a junction, giving it priority passage. Because of RFID technology, SATCS provides server-less deployment, offline support, and cost-effectiveness in contrast to other systems like the Intelligent Traffic Control System for Smart Ambulance, Smart Ambulance Guiding System, Smart Ambulance System, and Smart Ambulance with Traffic Control Ability. The prototype uses Intel Upsquared and RFID technology, and it has been successfully tested without internet access. The authors advise real-world testing despite the proof of concept, taking into account variables like varying ambulance speeds.

FLOWCHART



ALGORITHM PROPOSED

STEP 1- Start

STEP 2- Camera capturing real time images of vehicles as shown in Fig 2. Sending these images to NodeMCU Controller.

STEP 3- If an ambulance is detected then green that lane and the other three lanes keep red until it passes otherwise go to step 4.

STEP 4-Count incremented.

STEP 5- Check if the previous lane is green then go to the next step otherwise go to step 4.

STEP 6- Stop count calculates time delay depends on vehicle count and value is store in the memory.

STEP 7- Assign delay value to green light and clear the count value and go to step 2.

TECHNOLOGY USED

MACHINE LEARNING

- RCNN Algorithm
- Tensorflow

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