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SMART CONTROL OF TRAFFIC LIGHT USING ARTIFICIAL INTELLIGENCE

P Lakshman[1], N Charan Kumar[2], P.Dhavala Badri Nadheeswar Reddy[3]

[1,2,3,4] UG Scholars, Department **of** AI and ML, DS
[1,2,3,4] RK College of Engineering Vijayawada, India.
[1]pamulalaxman45@gmail.com, [2]Nagamcharan892@gmail.com, [3]Pdbnr142@gmail.com

ABSTRACT: Traffic congestion is becoming one of the critical issues with increasing population and automobiles in cities. Traffic jams not only cause extra delay and stress for the drivers, but also increase fuel consumption and air pollution. Although it seems to pervade everywhere, megacities are the ones most affected by it. And its ever-increasing nature makes it necessary to calculate the road traffic density in real-time for better signal control and effective traffic management. The traffic controller is one of the critical factors affecting traffic flow. Therefore, the need for optimizing traffic control to better accommodate this increasing demand arises. Our proposed system aims to utilize live images from the cameras at traffic junctions for traffic density calculation using image processing and AI. It also focuses on the algorithm for switching the traffic lights based on the vehicle density to reduce congestion, thereby providing faster transit to people and reducing pollution

1.1 INTRODUCTION

With the increasing number of vehicles in urban areas, many road networks are facing problems with the capacity drop of roads and the corresponding Level of Service. Many traffic-related issues occur because of traffic control systems on intersections that use fixed signal timers. They repeat the same phase sequence and its duration with no changes. Increased demand for road capacity also increases the need for new solutions for traffic control that can be found in the field of Intelligent Transport Systems. Let us take the case study of Mumbai and Bangalore. Traffic flow in Bangalore is the worst in the world while Mumbai is close behind in fourth position, according to a report detailing the traffic situation in 416 cities across 57 countries. In Bangalore, a journey during rush-hour takes 71% longer. In Mumbai, it is 65% longer.

II.LITERATURE SURVEY

2.1Smart Control of Traffic Light System using Image Processing

AUTHORS: Khushi

ABSTRCT: The congestion of the urban traffic is becoming one of critical issues with increasing population and automobiles in cities. Traffic jams not only cause extra delay and stress for the drivers, but also increase fuel consumption, add transportation cost, and increase carbon dioxide air pollution. The traffic controller is one of critical factors affecting the traffic flow. The conventional traffic patterns are nonlinear and complex and time dependent rather than traffic dependent. This paper proposes a traffic control system based on image

processing using MATLAB code which changes the time of green, amber and red light with respect to the traffic density and traffic count. Two Arduino UNO is used, one for controlling green and amber lights and other for controlling red light. This is a continuous process.

2.2"Improving Traffic Light Control by Means of Fuzzy Logic,"

AUTHORS:
A. Vogel, I. Oremović, R. Šimić and E. Ivanjko

ABSTRACT: In urban areas, the traffic demand grows every year due to the constantly increasing number of vehicles. The consequence is a capacity drop of the roads followed by traffic problems like congestion, reduced travel time, increased fuel consumption, etc. This paper presents an adaptive traffic light controller based on fuzzy logic for improving the traffic flow on an isolated intersection. A set of fuzzy rules has been made that, using the collected information from road detectors (queue length, arrival flow, and exit flow), computes the amount of time for which the next phase should be shortened or extended. The proposed fuzzy control system is constituted of two parts: one for the primary driveway (with a higher volume of vehicles) and for the secondary driveway (with a lower volume of vehicles). The proposed controller is compared with a fixed signal program in three scenarios with different traffic demand proofing the effectiveness of the developed decision rules.

2.3"Smart controlling for traffic light time,"

AUTHORS:

A.A. Zaid, Y. Suhweil and M. A. Yaman

Abstract: Traffic jam and traffic accidents become serious problems especially in crowded cities, which wasting time and money. Traffic light is basic element in control traffic flow through specify waiting and going time, fixed traffic light time systems is bad control way, since number of cars is not consistency with each traffic light, thus lead to imbalance system. Intelligent transportation system including smart way to control traffic light time based on number of cars in each traffic light, this paper develops an automatic algorithm to control traffic light time based on artificial intelligent techniques and image for cars on traffic lights, this algorithm is validated by compare its results with manual results. Applying following proposed algorithm in transportation system will regulate traffic flow and reduce traveling and waiting time wasted in roads.

III.EXISTING SYSTEM

In the first method, VANETS are used to get information and location of every vehicle, which in turn is passed on to the nearest Intelligent Traffic light with the help of installed GPS Further, these ITLs will update the statistics and sent it to nearby vehicles. In case of accidents, the information would be sent to drivers to choose an alternate route to avoid congestion. However, this technique is not feasible as its deployment is quite expensive. • In the second method, infrared sensor-based microcontrollers are used, which

capture the unique ID of every car using transmitter and receiver. In case of an emergency situation, vehicle's radio frequency tags can be used to identify them and let other vehicles move. This method detects red light violations. However, this technique is not flexible due to the fact that infrared sensors need to be in sight

3.1Limitations of Existing Methods

In the third method, fuzzy logic technique is used in which two fuzzy logic controllers are used – one is to optimize the signal and the other controller is used to extend the green phase of a road in an intersection. The sensors used to collect input data are video cameras that are placed at incoming and outgoing lines. The controller then utilizes the information collected through these sensors to make optimal decisions and minimize the goal function. • In the fourth method, fuzzy logic is used, and the system takes in the number of vehicles and the average speed of traffic flow in each direction as the input parameters. The number of vehicles and the average speed of traffic flow can be determined using sensors placed on the road.

IV.PROPOSED SYSTEM

Now-a-days due to increasing number of vehicles it's becoming difficult to manage traffic efficiently which leads to longer duration journey and maximum petrol consumption and to avoid this problem standard techniques was introduce such as manual traffic control which require more number of traffic person, static time traffic control which is not effective as it will use same timer for all lanes with heavy and light traffic and sensor based traffic management but this require heavy budget of sensor deployment to sense and manage traffic based on density.To overcome from above issues author of this paper is utilizing traffic cameras and YOLO object detection algorithms to estimate traffic density at all lanes and then adjust red and green signal time. Cameras will take snapshot of all lanes every five seconds and then estimate traffic at lanes and based on density green and red signal time will be adjusted.

4.1 PROPOSED METHODOLOGY

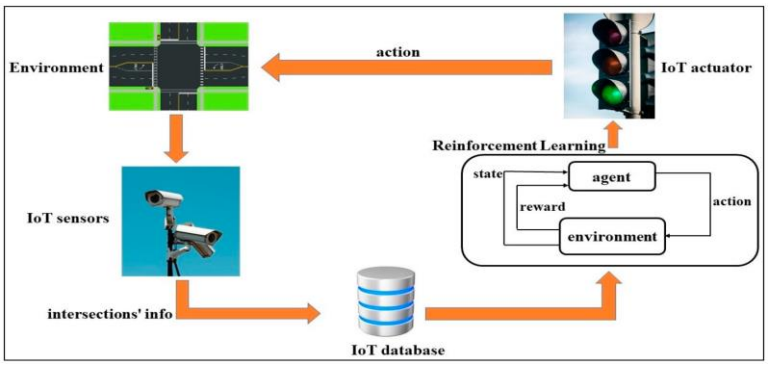
The number of vehicles of each class, such as car, bike, bus, and truck, is detected, which is to calculate the density of traffic. The signal switching algorithm uses this density, among some other factors, to set the green signal timer for each lane. The red signal times are updated accordingly. The green signal time is restricted to a maximum and minimum value in order to avoid starvation of a particular lane. A simulation is also developed to demonstrate the system's effectiveness and compare it with the existing static system.

4.2 RELATED WORK

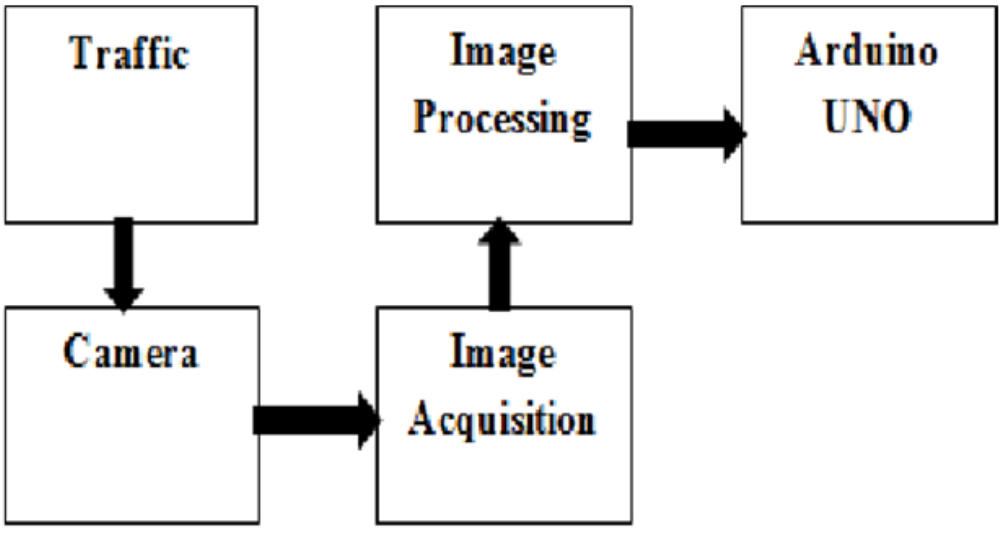
The efficient management of traffic flow is crucial for maintaining smooth transportation systems in urban areas. Traditional traffic light control systems often rely on fixed timing patterns, leading to inefficient traffic management, congestion, and longer travel times. To address these challenges, the integration of Artificial Intelligence (AI) and Internet

of Things (IoT) technologies can revolutionize traffic control, enabling dynamic and adaptive control of traffic lights. This paper presents a project that explores the implementation of an AI-powered and IoT-based smart control system for traffic lights, aiming to optimize traffic flow and reduce congestion.

SYSTEM ARCHITECTURE :

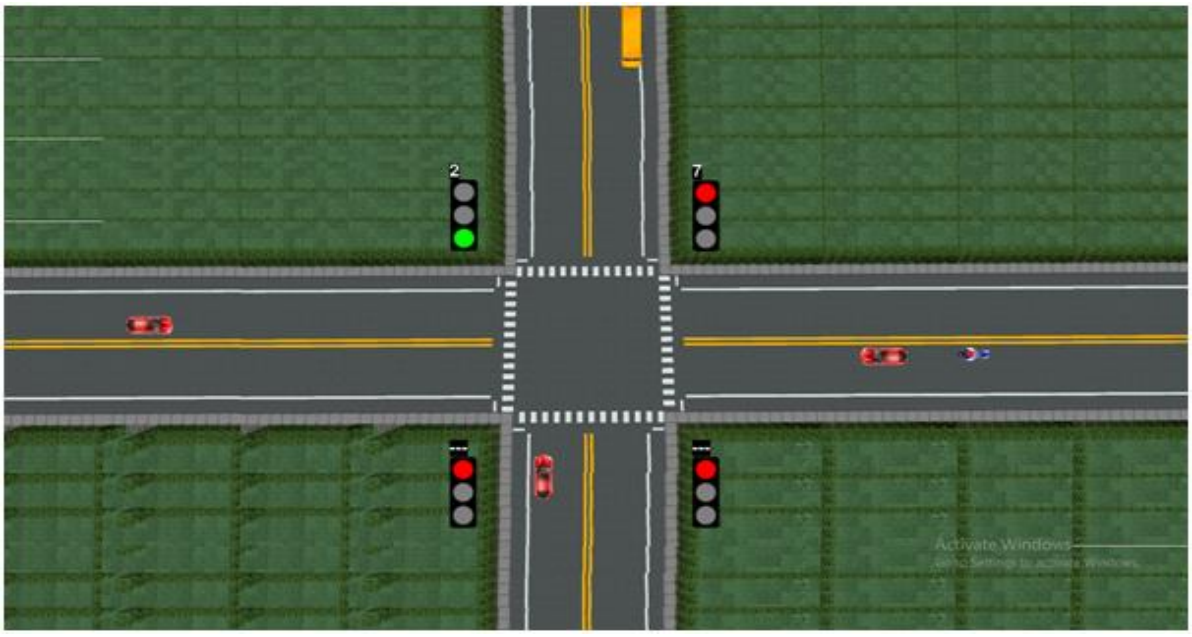


DATA FLOW DIAGRAM



V.RESULTS


Smart Control of Traffic Light Using Artificial Intelligence
Smart Control of Traffic Light Using Artificial Intelligence
Run Traffic Simulation
Run Yolo Traffic Detection & Counting
Exit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VI.CONCLUSION

In conclusion, the proposed system sets the green signal time adaptively according to the traffic density at the signal and ensures that the direction with more traffic is allotted a green signal for a longer duration of time as compared to the direction with lesser traffic. This will lower the unwanted delays and reduce congestion and waiting time, which in turn will reduce fuel consumption and pollution. According to simulation results, the system shows about 23% improvement over the current system in terms of the number of vehicles crossing the intersection, which is a significant improvement. With further calibration using real- life CCTV data for training the model, this system can be improved to perform even better

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