International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 10 Issue 6 ǁ 2022 ǁ PP. 1780-1783

Traffic Density Control Using Deep Learning

Aiesha Roshan*[1], Manukrishnan[1], Sneha Mohandas[1], Sreejith PR[1]
[1]*Mar Athanasius College of Engineering , Kothamangalam ,Kerala, India*
*CorrespondingAuthor:*snehamace123@gmail.com*

Abstract
The growing population and increased vehicles lead to the main challenges in urban life. The role of traffic management will save time and fuel consumption and reduce environmental pollution. As the number of road user's increase constantly and current resources infrastructures being limited; a smart traffic control will become a very important issue in the future. These needs have led to an ever increasing demand for an " intelligent " traffic control system. Therefore, optimization of traffic control to better accommodate this increasing demand is needed. In this paper, a new method for traffic light control is presented by using deep learning. In the proposed models, traffic light scheduling is determined based on the density and the number of passing vehicles. Emergency vehicles, such as ambulances and fire engines and protective scenarios, such as the passage of political authorities will be prioritized in this system. The drivers of the emergency vehicles can control this system by sending a message. If it is found that which direction should have longer signal time of the green light in the traffic, it can be expected to prevent unnecessary waiting time of the traffic light. In this system, vehicles are detected using deep learning techniques.
Keywords:*YOLO, RFID, Open CV.*

Date of Submission: 14-06-2022 Date of acceptance: 29-06-2022

I. INTRODUCTION

With Traffic congestion is one of the major critical issue due to the increasing of population and of automobiles in cities.Traffic light control is presented using deep learning which is an advanced version of machine learning,which is a field of inquiry devoted to understanding and building methods that 'learn', that is, methods that leverage data to improve performance on some set of tasks.It is seen as a part of artificial intelligence. Machine learning algorithms build a model based on sample data, known as training data, in order to make predictions or decisions without being explicitly programmed to do so. Machine learning algorithms are used in a wide variety of applications, such as in medicine, email filtering, speech recognition, and computer vision, where it is difficult or unfeasible to develop conventional algorithms to perform the needed tasks .Traffic light scheduling is determined based on density and number of passing vehicles. Emergency vehicles such as ambulance, fire engine and passage of political authorities will be prioritised in this system.

The existing traffic light control systems are inefficient due to the usage of predefined algorithms on offline data. This causes in numerous problems such as long delays and a wastage of energy. Estimation of traffic density indirectly affects in decreasing the high traffic congestion which will occur due to the less planning of transportation infrastructure and the policies. The goal of this research is to introduce an applicable method to improve the existing static traffic signal system into a dynamic system. As an approach we analyze the use of machine learning algorithms to measure the traffic density to tackle this research problem of high traffic congestion. The main target is to implement this system for the four-way junctions since it is a place where the possibility of having a traffic congestion seems to be high. With use of these traffic density estimation algorithm, crowd density estimation and signal handling we conduct experiments on minimizing the congestion at four-way junctions.

The average time each class of vehicle takes to cross an intersection can be set according to the location, i.e., region- wise, city-wise, locality-wise, or even intersection-wise based on the characteristics of the intersection, to make traffic management more effective. Data from the respective transport authorities can be analyzed for this. The signals switch in a cyclic fashion and not according to the densest direction first. This is in accordance with the current system where the signals turn green one after the other in a fixed pattern and does not need the people to alter their ways or cause any confusion. The order of signals is also the same as the current system, and the yellow signals have been accounted for as well. Order of signals: Red → Green → Yellow → Red

II. METHEDOLOGY

TheTo improve the safety for both pedestrians and the vehicles traffic signal is must. Emergency vehicles, like Ambulance have responsibility to reach patients or those who are met with accidents have to quickly transfer them to hospital. Due to traffic signals they may be delayed for rescue operations. This paper define how traffic signal lights will detect emergency vehicles, how to manipulate the traffic light and how to provide free way to emergency vehicle.

The modularity criteria are:
• Train the model for vehicle detection using object detection
• Count the number of vehicles on each road.
• Arduino controls the traffic light based on vehicle count.
• RFID is used to detect emergency vehicles

The Signal Switching Algorithm sets the green signal timer according to traffic density returned by the vehicle detection module, and updates the red signal timers of other signals accordingly. It also switches between the signals cyclically according to the timers. The algorithm takes the information about the vehicles that were detected from the detection module, as explained in the previous section, as input. This is in object detection method, with the label of the object detected as the key and the confidence and coordinates as the values. This input is then parsed to calculate the total number of vehicles of each class. After this, the green signal time for the signal is calculated and assigned to it, and the red signal times of other signals are adjusted accordingly

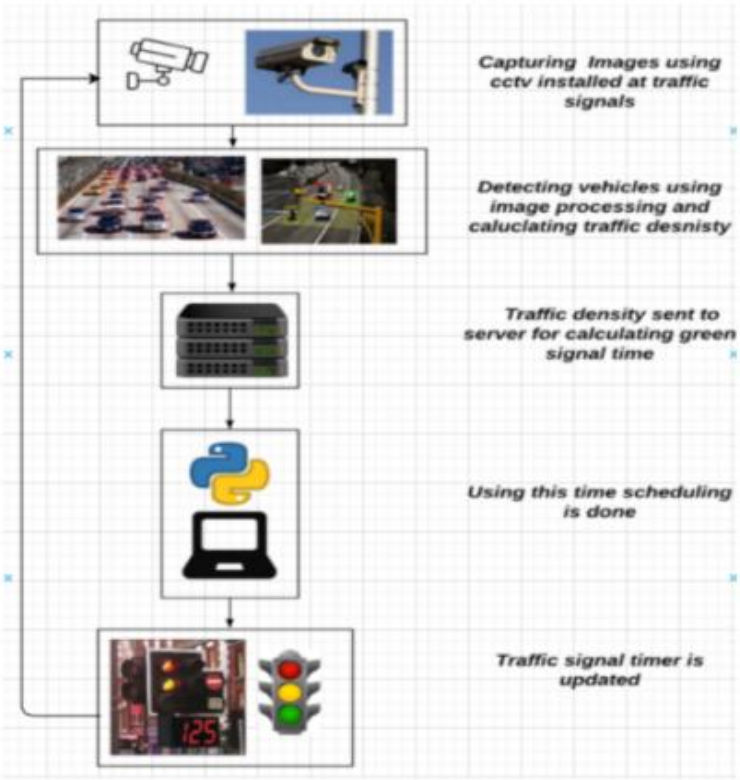

Figure 1: Proposed System Overview

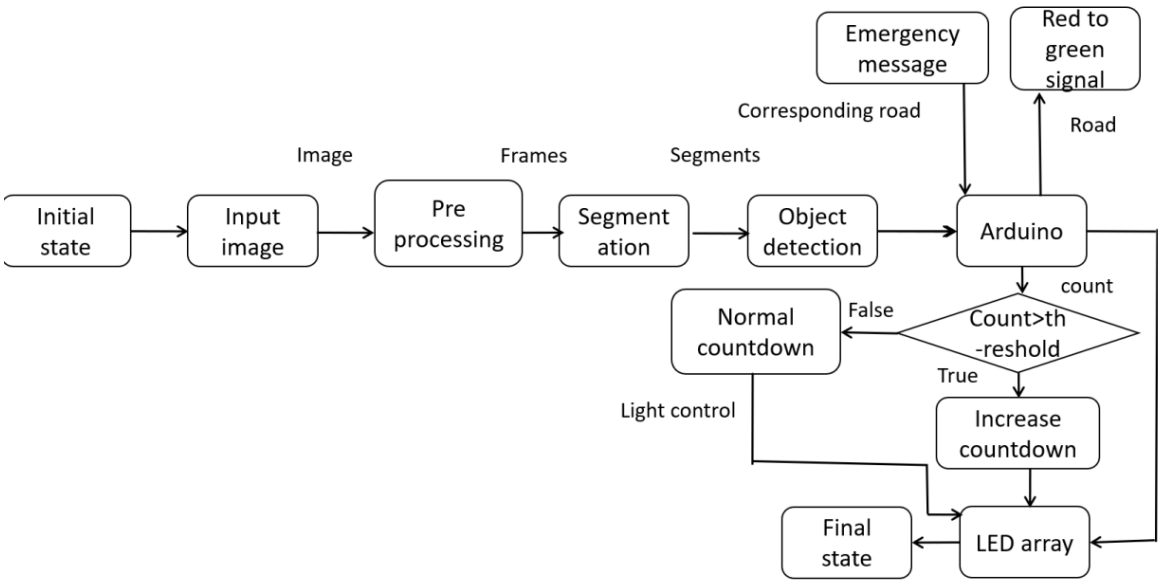

Figure 2: State chart diagram

III. THE SIMULATION

AC Simualtion for this project is done in proteus software. LCD display, arduino, serial monitor,and LEDs are used for the simulation.The LEDs indicate the traffic light switching in four directions, north, east, west and south. The LCD display indicates the time delay.

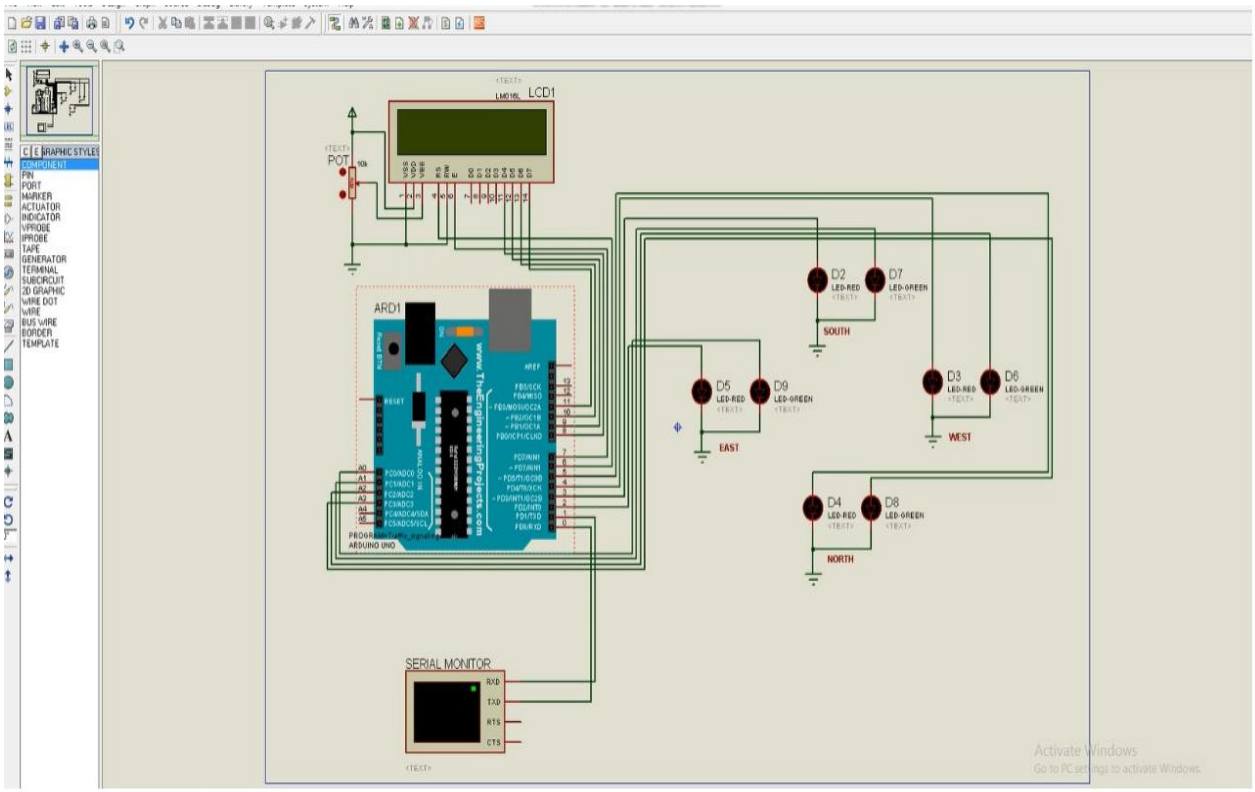

Figure 3 :Simulation Diagram

IV.HARDWARE IMPLIMENTATION

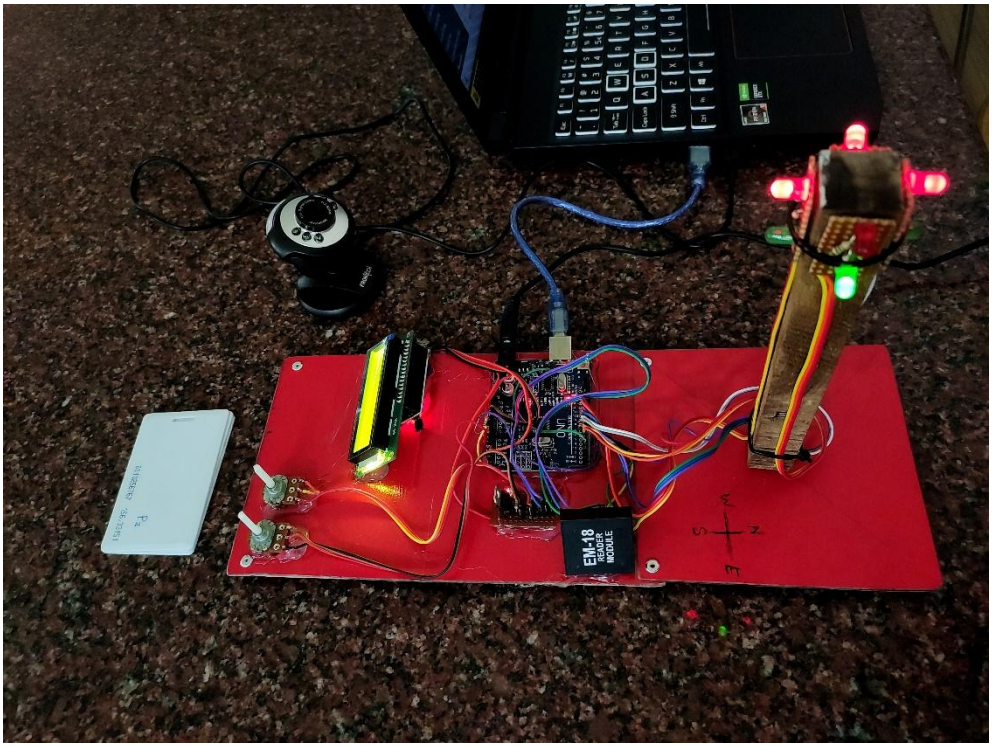

Figure 4: Hardware

This is the hardware model of our project.As shown in fig 4 we have used Arduino,potentiometer,voltageregulator,LEDs for traffic light switching,RFIDsensor.RFID tags are used to detect emergency vehicles which will be sensed by RFID sensor in the system.The webcam placed on the traffic signal detects the vehicles on the road and it is converted to give the delay time in the traffic light.If the vehicle density on a particular lane is high , the green signal time is increased from 4 seconds to 8 seconds.

V.CONCLUSION

Our project is an intelligent solution to control and manage the crossroad traffic using deep learning model and hardware. This paper provides a solution to reduce traffic congestion on roads overriding the older system of hard coded lights which cause unwanted delays. Reducing congestion and waiting time will lessen the number of accidents and also reduces fuel consumption which in turn will help in controlling the air pollution. Scheduling of green and red traffic lights is determined based on the density and number of vehicles passing through the main streets leading to the crossroads in the proposed models. Usually, during traffic jam, the emergency vehicle, such as ambulance, fire brigade and police will be stuck especially at the traffic light junction. This is because the road users waiting for the traffic light turn to green. This is very critical problem because it can cause the emergency case become complicated and involving life. This system solves this problem. Use of sensors to check whether emergency vehicle passed or not will be prioritized in the future.

REFERENCES

[1]. Mihir M. Gandhi, Devansh S. Solanki, "Smart Control of Traffic Light Using Artificial Intelligence",5th **IEEE International Conference on Recent Advances and Innovations in Engineering- ICRAIE 2020.**

[2]. Khushi, "Smart Control of Traffic Light System using Image Processing," 2017 **International Conference on Current Trends inComputer**, Electrical, Electronics and Communication (CTCEEC), Mysore, 2017, pp. 99-103,

[3]. A. Vogel, I. Oremovi´c, R. Simi´c and E. Ivanjko, "Improving Traffic Light Control by Means ˇ of Fuzzy Logic," 2018 **International Symposium ELMAR, Zada**r, 2018, pp. 51-56

[4]. Badura.S, Lieskovsky.A,[4] published "Intelligent Traffic System: Cooperation of MANET and Image Processing" **ICIIC, First international conference**,vol.no,pp.119,23,5-7, August 2019