SMART CONTROL OF TRAFFIC LIGHTS USING ARTIFICAL INTLIGENCE

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ABSTRACT

Efficient traffic management is crucial for ensuring road safety and minimizing congestion. Automated traffic light detection and classification systems play a significant role in this regard by enabling real-time monitoring and control of traffic signals. This study proposes a novel approach for detecting and classifying traffic lights using the ResNet50 convolutional neural network (CNN) architecture. By leveraging deep learning techniques, the system can accurately identify traffic lights in images or video streams captured by surveillance cameras or vehicle-mounted sensors. The ResNet50 model is trained on a large dataset of annotated traffic light images to learn discriminative features for detection and classification tasks. Additionally, the proposed system incorporates pre-processing techniques such as image segmentation and region proposal algorithms to improve the efficiency and accuracy of traffic light detection. Experimental results demonstrate the effectiveness of the proposed approach in accurately detecting and classifying traffic lights under various environmental conditions and lighting conditions. By automating the process of traffic light detection and classification, the proposed system offers a cost-effective and scalable solution for enhancing traffic management and improving road safety.

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.

2.LITERATURE SURVEY

TITILE:

Smart Control of Traffic Light System using Image ProcessingAUTHORS:
Khushi

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.

3 IMPLEMENTATION STUDY

EXISTING SYSTEM:

In the existing landscape of traffic management systems, traditional approaches to traffic light detection and classification often rely on rule-based algorithms or handcrafted features. These methods typically involve techniques such as color thresholding, edge detection, or template matching to identify traffic lights in images or video streams. However, these traditional methodsmay encounter challenges in accurately detecting and classifying traffic lights under varying environmental conditions, such as changes in lighting, weather, or occlusions. Additionally, these approaches may lack robustness and scalability, as they often require manual tuning of parameters or may not generalize well to different traffic scenarios.

Disadvantages:

Manual

Tuning

Limited Scalability

Difficulty in Adapting to Changes

Proposed System & alogirtham

The proposed system for traffic light detection and classification using ResNet50 aims to overcome the limitations of existing methods by leveraging deep learning techniques. The system utilizes the ResNet50 convolutional neural network (CNN) architecture, which has demonstrated state-of-the-art performance in image classification tasks. By training the ResNet50 model on a large dataset of annotated traffic light images, the system can learn discriminative features for accurately detecting and classifying traffic lights in various environmental conditions.

4.1 Advantages:

- Robustness
- High Accuracy

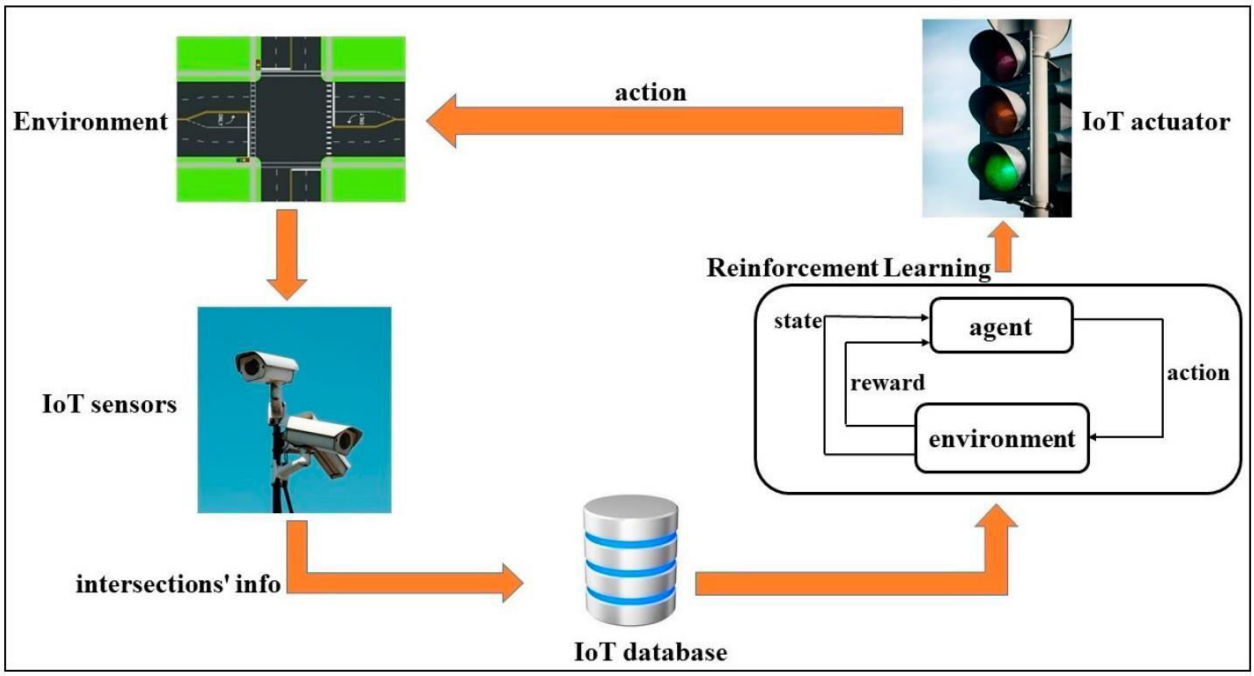


Fig:3.1 System Architecture

IMPLEMENTATION

MODULES

A traffic lights project typically involves several key modules, each responsible for different aspects of the system. Here's an overview of common modules in a traffic light project:

1. Power Supply Module

Function: Provides electrical power to the entire traffic light system.

Components: Includes transformers, rectifiers, batteries, and backup power systems.

2. Controller Module

Function: Acts as the brain of the traffic light system, managing the timing and sequence of the lights. Microcontrollers or Programmable Logic Controllers (PLCs) programmed with specific algorithms to control the light cycles.

Features: Can include real-time clock (RTC) for accurate timing, communication interfaces, andinput/output ports.

5 RESULTS AND DISCUSSION

SCREEN SHORTS:

To run project double click on 'run.bat' file to get below output

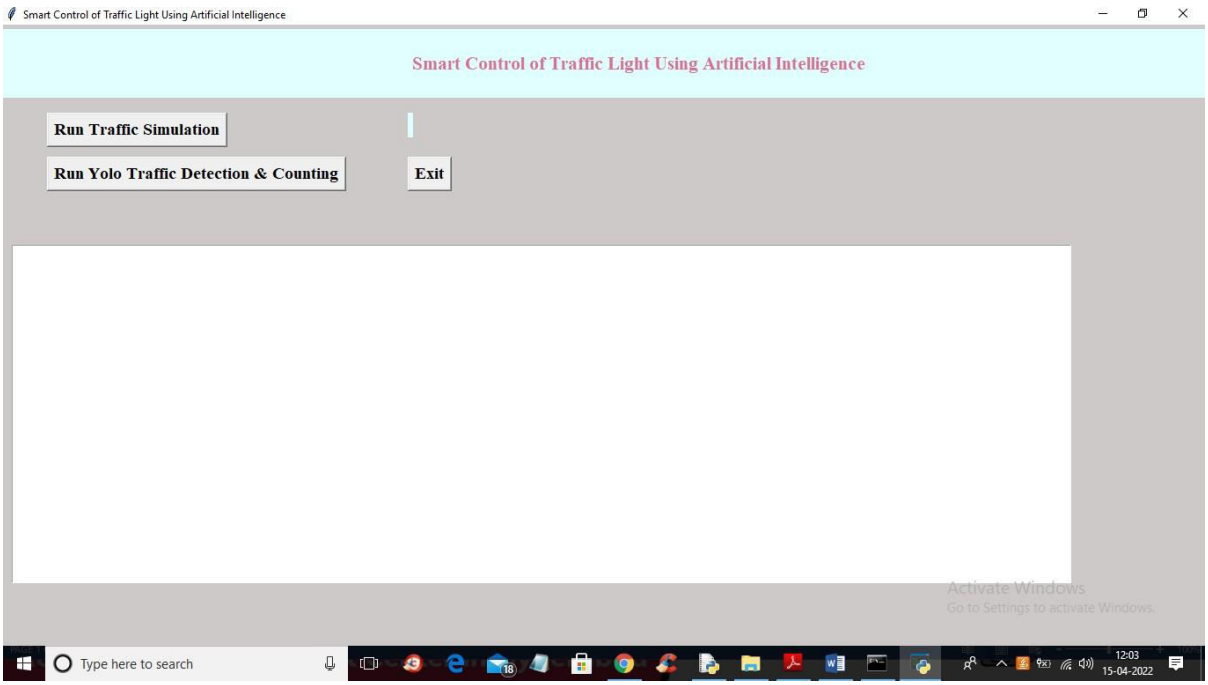
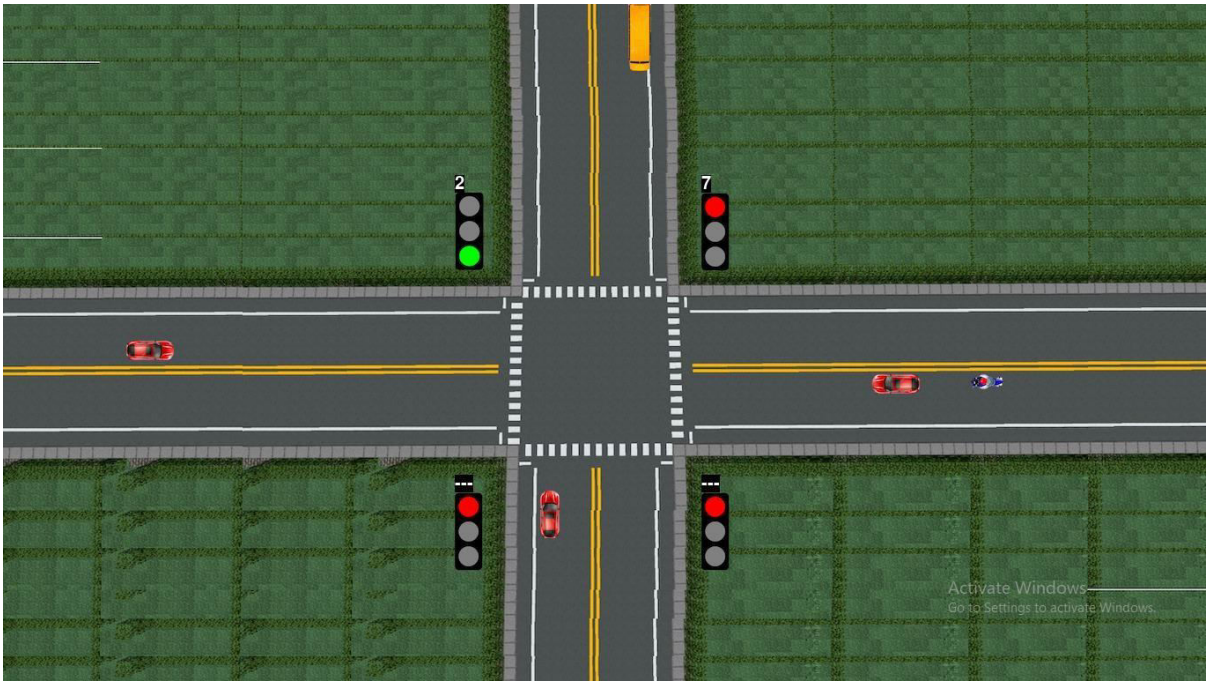


FIGURE: 5.1 DISPLAY RUN OUTPUT

In above screen click on 'Run Traffic Simulation' button to start PYGAME simulation and get below outpu


2
7

Activate Windows
Go to Settings to activate Windows.

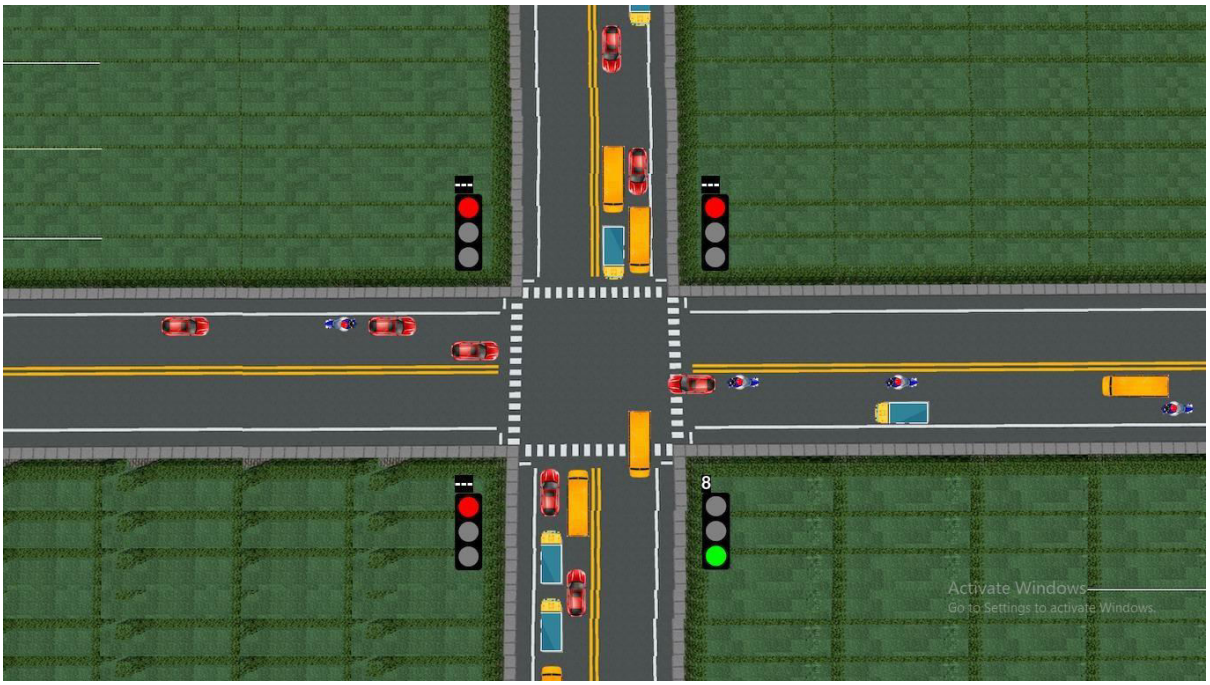


FIGURE:5.2 RUN SIMULATION

In above screen you can see PYGAME simulation output and at each lane traffic density is calculated and then adjust green and red line. This simulation run in INFINITE loop so you press 'windows' key from keyboard and then close application and then restart and run second YOLO module

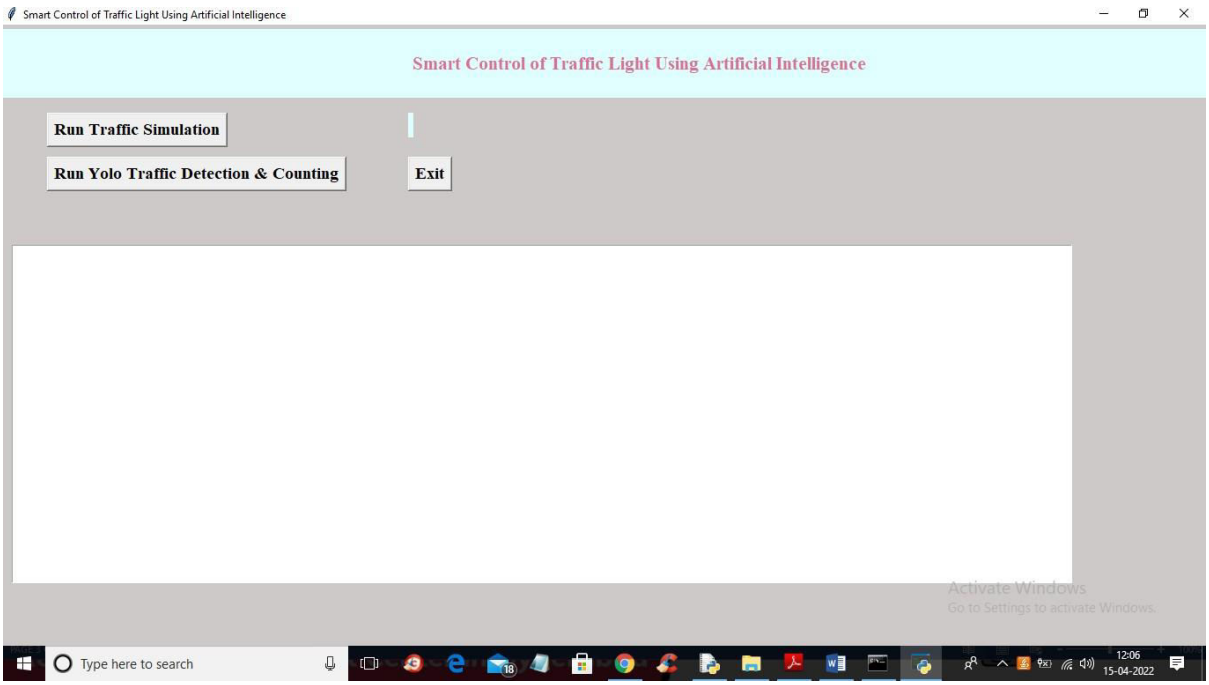


FIGURE:5.3 RUN YOLO TRAFFIC DETECTION

Now in above screen click on 'Run Yolo Traffic Detection & Counting' button to upload trafficvideo and then estimate traffic density

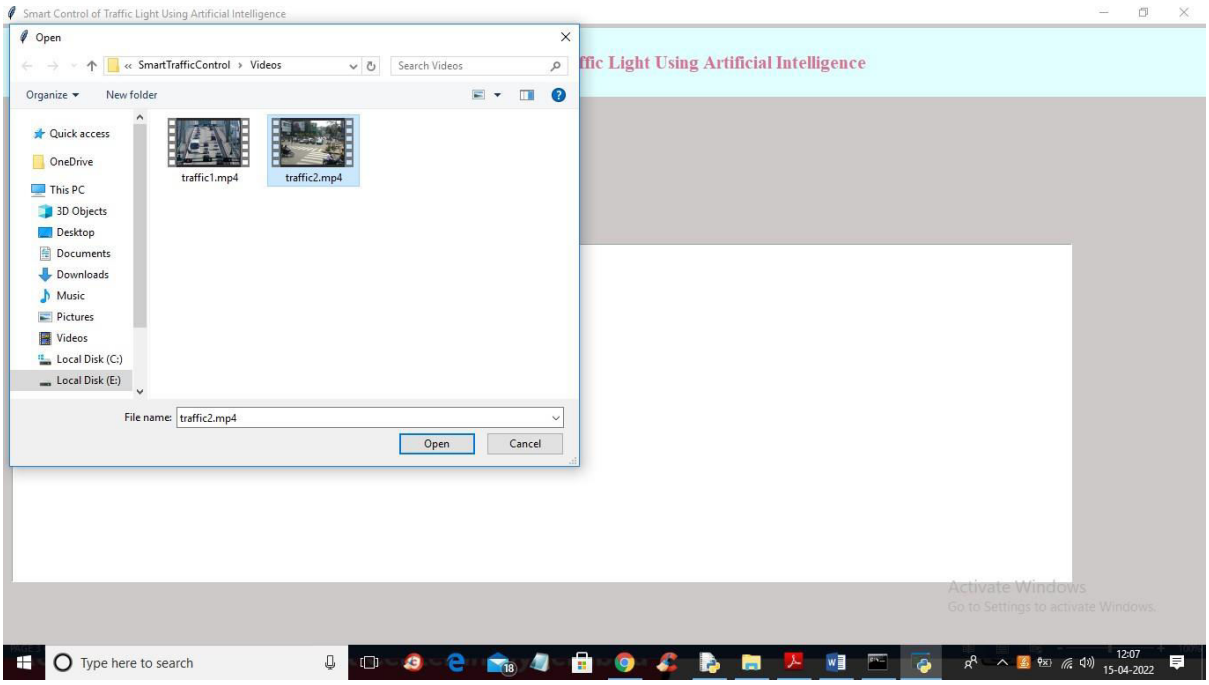


FIGURE:5.4 UPLODE TRAFFIC VIDEO

In above screen selecting and uploading 'traffic2.mp4' video and then click on 'Open' button to get below output

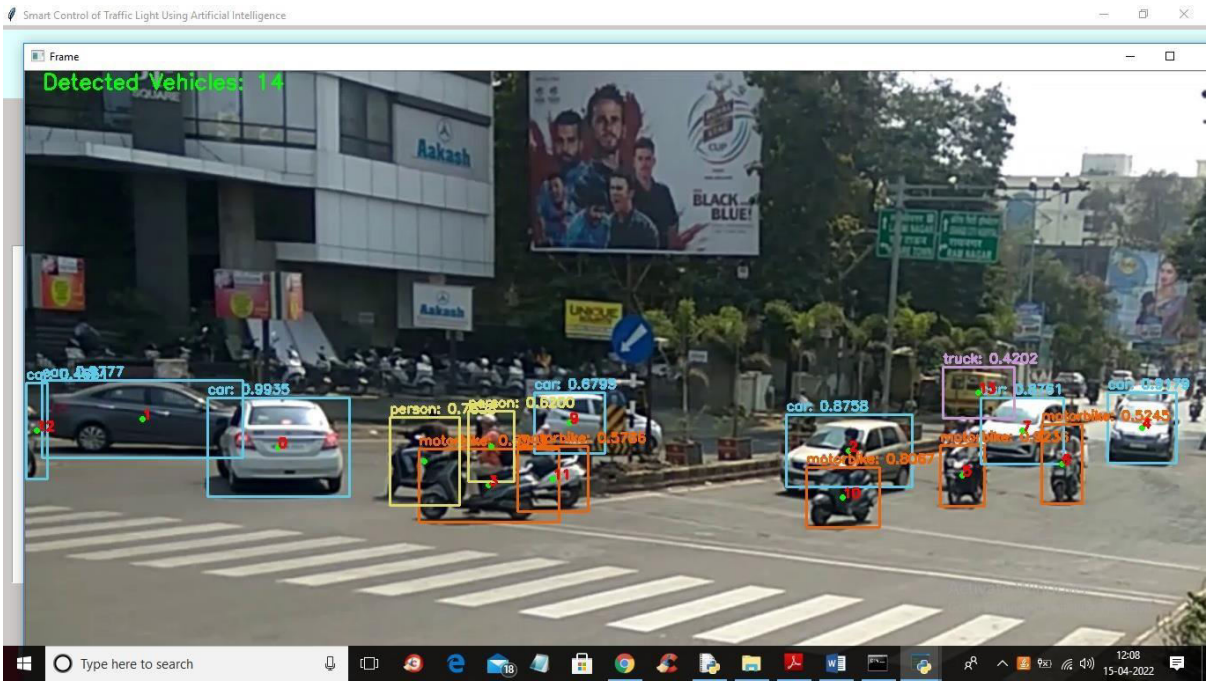


FIGURE:5.5 DETECTED VEHICLES TRAFFIC VIDEO

In above screen detecting traffic and then estimating its count and based on that traffic time will be adjusted. YOLO runs very slowly in normal laptop so let it finish all frame processing then u will get output.mp4 file which you can play as normal video with traffic density.

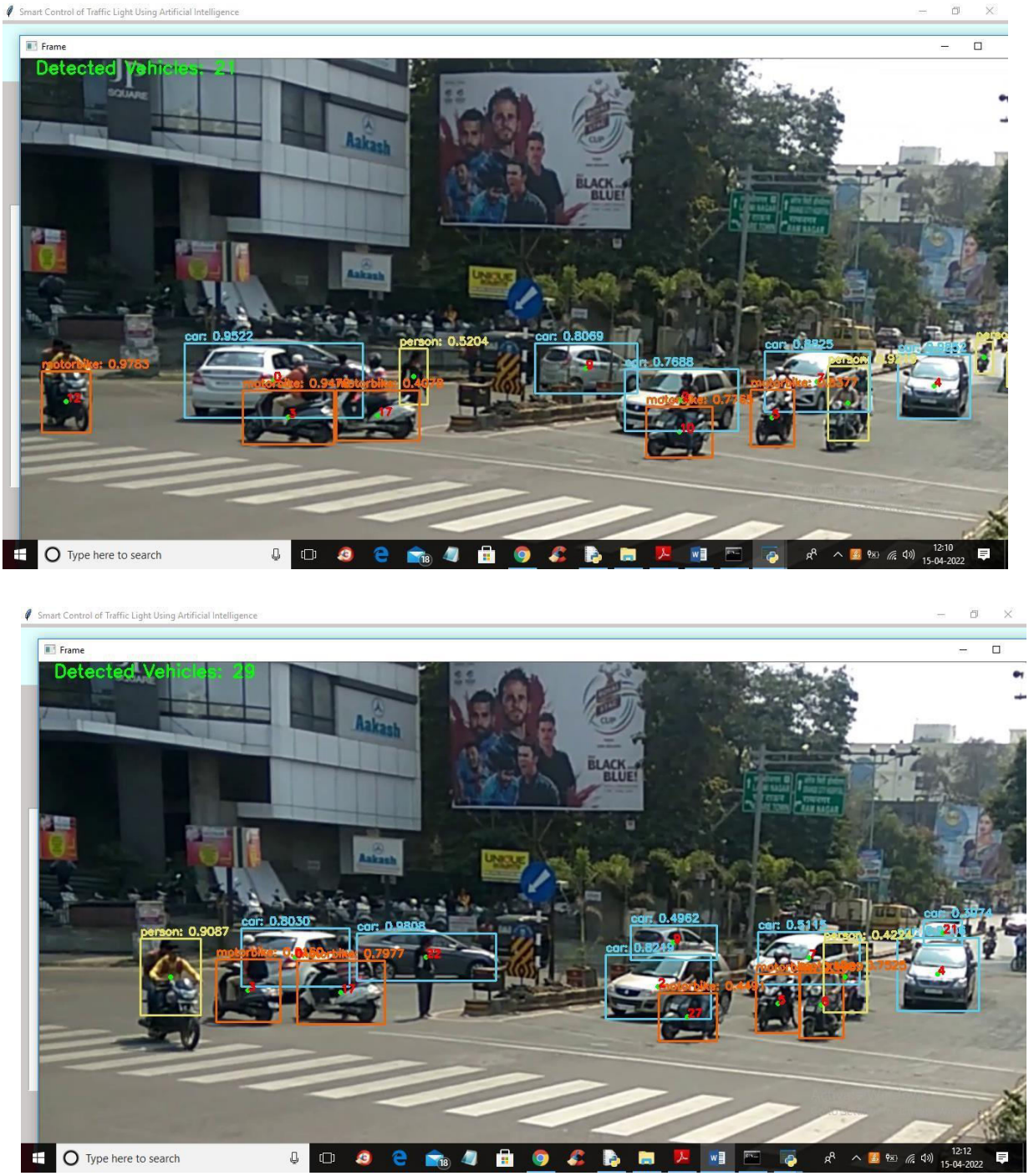


FIGURE: 5.6 TRFFIC DENSITY VIDEO

6. CONCLUSION AND FUTURE WORK

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 fora 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

7. REFRENCES

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