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Smart Traffic Signal Violation Detection System Based on IOT

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ABSTRACT- Roads are primary route to transportation in each country, and they are frequently characterized by traffic congestion due to a lack of traffic management. It could be due to the big population, lack of technology, and violations committed by humans, the most serious of which is traffic rule infringement. It is extremely difficult for authorities to determine whether or not there is a traffic rule infringement, resulting in horrible scenarios that endanger not just drivers but pedestrians as well. To apprehend car owners who disregard traffic signal limits, the traffic police need a straightforward strategy. The administrators are currently checking the film that is being recorded near the traffic signal 24 hours a day, 7 days per week to see if anyone has disregarded the traffic light laws. After taking a picture of the license plate, they must report. Technology can play a big part in addressing these violations, which is why our work focuses on IoT and image processing-based methods. The suggested system's camera records a picture of the car, analyzes the video using the right image processing algorithm, and then records the license plate of the vehicle that violated the traffic laws and transmits it to the administrators. As a result, less manual work is required from police managers, and the video analysis takes place directly on the edge device.

KEYWORDS- IOT, Traffic Signal Violation Detection, Image Processing, Video Surveillance, Automatic Number Plate Recognition.

I. INTRODUCTION

We have a growing problem with traffic violations. Reducing the amount of violations improves order and reduces the frequency of accidents. Currently, the majority of monitoring is done manually. This issue primarily affects the traffic police department. To check if someone has broken the law, thousands of administrators watch every camera in their region. Additionally, they must personally note the vehicle's license plate and submit a report. This places a heavy burden on the traffic police because it requires round-the-clock supervision and a sizable amount of staff.. As a result, we may apply computer vision technologies to assist humans in preventing these infractions. Instead of a normal traffic cop watching the vehicles, cameras can be used to improve efficiency and reduce reliance on humans.This opens up more opportunities for automation. One of the most sought-after challenges in computer vision is detecting automobiles in surveillance data. We attempted to count vehicles and detect speed violations here [6].

The suggested technology will catch the majority of traffic signal violators, enforcing rigorous traffic laws. It also requires a lot of resources to transmit the film 24 hours a day, 7 days per week. Only when the light turns red will the proposed system take the video/series of images. This will add the first filtering layer.

II. LITERATURE SURVEY

Zhang et al.[1] review the applications, algorithms, and solutions that have been proposed recently to facilitate edge video analytics for public safety. The latter is characterized as having higher requirements on hardware resources as the sophisticated image processing algorithms under the hood. However, analyzing large-scale live video streams on the Cloud is impractical as the edge solution that conducts the video analytics on (or close to) the camera provides a silvering light. Analyzing live video streams on the edge is not trivial due to the constrained hardware resources on edge.

Chaithra B et al. [2] describes an Automatic Number Plate Recognition (ANPR) system designed to detect the vehicles that violate traffic signal by extracting their number plate from digital images. Further, it sends a violation SMS to the owner of the vehicle immediately. The proposed system inputs the captured image of the vehicle. The image segmentation techniques are used to extract the number plate region. Correlation technique is used for comparing the segmented image with the template images.

Kumar, Ashok et al. [3] work mainly focuses on accident detection and proposes an Optical Flow based Transfer Learning (OFTL) approach for detecting anomalies both in source and target scene without performing manual labeling.

Al-Sakran et al. [4] they proposed an architecture that integrates internet of things with agent technology into a single platform where the agent technology handles effective communication and interfaces among a large number of heterogeneous highly distributed, and

decentralized devices within the IoT. The architecture introduces the use of an active radio-frequency identification (RFID), wireless sensor technologies, object ad-hoc networking, and Internet-based information systems in which tagged traffic objects can be automatically represented, tracked, and queried over a network. This research presents an overview of a framework distributed traffic simulation model within NetLogo, an agentbased environment, for IoT traffic monitoring system using mobile agent technology.

Jubair Mohammed Bilal et. al [5] proposed a new digital-logic based system which is more efficient than currently used traffic control systems. The intelligent traffic control system (ITSC) is based on a simple principle; the principle being that "a car can only move ahead if there is space for it" and "the signal remains green until the present cars have passed".

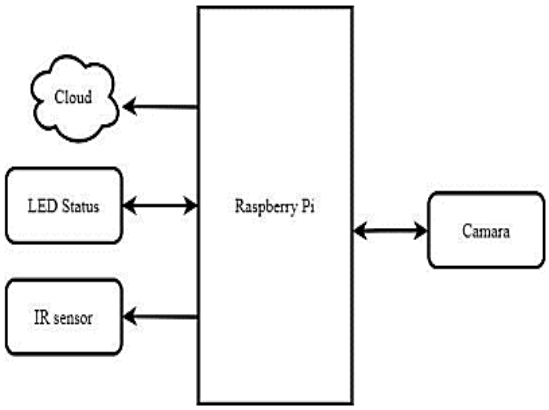

Figure 1: System Block Diagram, proposed

III. PROPOSED SYSTEM

From Figure 1 to finalize solution will be a kind of system that merges current Python source code for Open CV with a web page that displayed the result of record plate number as the ability to query a database to a specific plate numbered default run identification as shown in Fig 2 and 3. All of the automobiles' license plates will be kept in a database, which will be checked to discover the defaulter. The created system will use a logical and effective strategy to detect fast-moving vehicles, applying cost-efficient methods to get good outcomes. It can be quite difficult to captured original photos of moving autos in such a way that the vehicle plate number can be identified. In the existing systems outlined above, several ways for capturing the plated number of systems have been used. The majority of them were successful in collecting fast-moving vehicle license plates. The closest study, which used Open CV and Python, was it able to recognize the license plated number of, but no database system was in the place of identify the culprit.

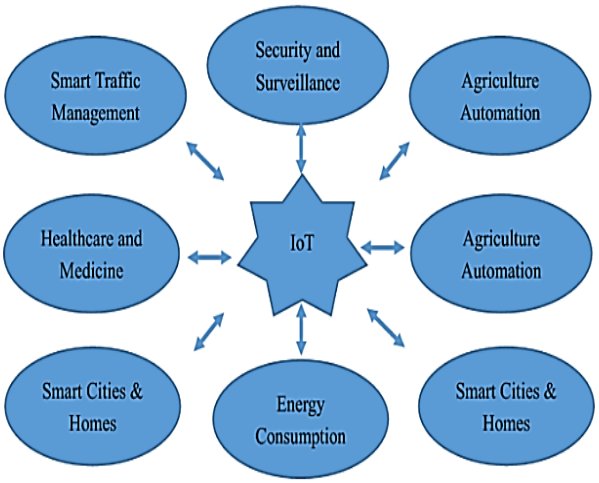

Figure 2: Applications of IOT

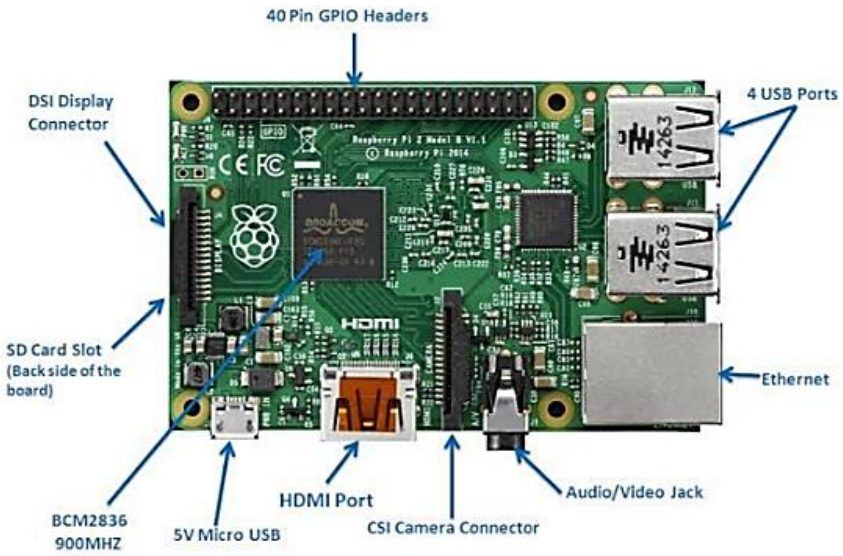

Figure 3: Raspberry Pi

The camera system's software stack will be lib camera. Driving complicated camera systems directly through kernel (usually, V412) drivers has proven to be extremely challenging, frequently resulting in significant quantities of unwanted and highly platform-specific application code. As a result, lib camera, a much higher level user space camera stack, has arisen, giving ways for integrating third-party image sensors and Image Signal Processors (ISPs).

Figure 4: Open CV Logo

Perhaps you graphical desktop sharing VNC is a technology that has allowed us to control one computer is desktop interfaced from another computer. VNC Viewer share key broad and mouse or touch s to the VNC server and received screen changes in return. The Raspberry Pi's desktop will appear insider as a window on our computer. We'll be able to control its if you were work on directly on the Raspberry Pi.VNC Connecting from Real VNC comes standard with the Raspberry Pi .It includes both the VNC Server, which allows us to remotely operate your Raspberry Pi, VNC Viewers which allowed us to controlled desktop computers originally from the your Raspberry Pi if desired in Figure 4.

IV. RESULTS

The suggested technology simply monitored the zebra crossing when light goes red and records videos for that time as shown in Figure 5, 6, 7 and 8. If a vehicle breaches the signal, the system sends a report to the administrator along with the observed car's license plate. The output of the suggested system is depicted in the figures below.

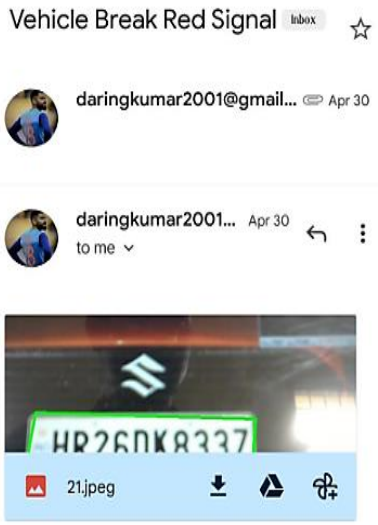

Figure 5: Report Send to the Administrator

Figure 6: Output Image 1

Figure 7: Output Image 2

Figure 8: Output Image 3

V. CONCLUSION

The smart traffic signal violation detection system built on the Internet of Things (IoT) only observes the zebra crossing while the light is red and records video at that period. This will serve as the initial filtering stage. Later, it uses the right image processing technology to analyze the video and determine whether any vehicles are breaking any traffic laws.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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