

IOT BASED SMART HIGHWAY MANAGEMENT SYSTEM

^[1]Mr. Ravikumar H M , ^[2]S B Veerasha, ^[3]G M Arpita, ^[3]Uppara Sudhakara, ^[4]Banakara Kotreshwari

^[1] Assistant Professor , ^[2]^[3]^[4]^[5]Students

Department of Electrical & Electronics Engineering

^[1]^[2]^[3]^[4]^[5]Rao Bahadur Y Mahabaleswarappa Engineering College

Abstract—A smart Highway is an innovative concept for smart roads of future smart cities. It is a program of innovation that links a different way of looking at things with innovative ideas that apply the opportunities offered by new technologies in smart ways. Nowadays safety on road has become an important factor in our life because there is an increasing amount of accidents on the road and there are some places where accident occur frequently such as crossings roads. In this project, we present a low-cost innovative technology for smart highway roads, wherein we detect the over speed and heavy load of the vehicle with number plate capture by using IR sensors and IOT devices. The Project also focuses on accident avoiding roller barriers to avoid rule violations. This consists of both flexible property and semi rigid property barrier stiffness. They are different in mechanism than other types of barriers also reduces the hazards or accidents. Urethane has become the material of choice in so many of today's performance driven applications because it exhibits extraordinary physical and mechanical properties that other materials. Along with this for a proper management of roads street light management system also plays an important role. Smart highway and smart roads are terms for number of different ways technologies are incorporated into roads, for improving the operation of vehicle for traffic lights and street lightning for monitoring the condition of the road, speed and load level of the vehicles.

I. INTRODUCTION

Since the creation of the first human on Earth, business and transportation of goods through land and on the road has been a usual way. With developing the highway, transportation and business trade, vehicle weigh-in-motion technology has become a key technology and trend of measuring weight of the loads. Moreover, because of the strong competition between transport modes and companies, transportation management was improved, which has led to an increase in the numbers of fully loaded trucks and their gross weights. Recently, there have been a significant number of OPEN ACCESS 2 vehicles illegally overloaded and the damage vehicles cause on the road is in direct proportion to the axle weight by 4th power. The overloaded transportation would greatly increase the cost for the pavement maintenance and repair, shorten the service life of pavement, even affect the traffic safety and capability. So, it is imperative to build a weigh station to solve these problems. Traditionally the weights of vehicles were measured and collected by placing it on the scale while the vehicle is at rest. Weight information of vehicles acquired by static weighing (i.e., does not move) was a conventional method which was used widely these days. Though the precision of this way to measure the gross weight of vehicle is very high, there are many disadvantages of the method: it is not only expensive but also not possible to measure the weight of each axle separately. The most important is that it is inconvenient to weigh with stopping vehicles in some practical application. Automated speed detection systems have been implemented worldwide. The system involves a speed gun which is used to check for over-speeding of vehicles by placing it in the direction of moving vehicle. This involves manpower with a person holding the gun. If over-speeding is detected, the person informs the Toll where the vehicle can be charged for fine. To eliminate the manpower involved and make the system fully automated, different strategies have been deployed. A revise

system is proposed in which detects objects and speed of vehicles by using RF signals.

A traffic violation detection system must be realized in real-time as the authorities track the roads all the time. Hence, traffic enforcers will not only be at ease in implementing safe roads accurately, but also efficiently, as the traffic detection system detects violations faster than humans. A user-friendly graphical interface is associated with the system to make it simple for the user to operate the system, monitor traffic and take action against the violations of traffic rules. IOT is the network of physical devices that allows the devices to communicate with each other. IOT allows remote sensing and control over the devices. It is an advanced automation and analytics system which uses artificial intelligence technology to deliver advanced and automated products and services. These systems allow greater transparency, control, and good performance.

Nowadays flexibility of streetlight system is being highly challenged. Majority of the control runs in a manual setup whereas some are automated based on their surrounding parameters. Handling remote area location is the greatest dilemma. Manual mistakes can lead to energy wastage and lower the performance of the system. If a vehicle crosses a predefined line on the road while their red signal, it is detected as a signal violation. The main issue of existing electric system is the connectivity problem as most of the connections handled by different contractors are done manually. Timer settings are performed manually. Timer often requires twelve hours continuous power supply and the further timer settings may be disrupted in the absence of continuous power supply.

Barriers or guard rails or longitudinal barriers or traffic barriers keep vehicles within their road way and prevent vehicles from colliding with dangerous obstacles such as boulders, sign supports, trees, bridge abutments, building walls and large storm drains.

II. OBJECTIVE

The main objective of this project is

- Detection the heavy vehicle in the road and updating in IOT.
- Accident avoiding cylinders in S cross roads.
- Speeding detection and booking a Violation and updating the data.
- Using camera capturing the number plate the vehicle and booking a violation.
- Automatic Street light management.

III. PROBLEM STATEMENT

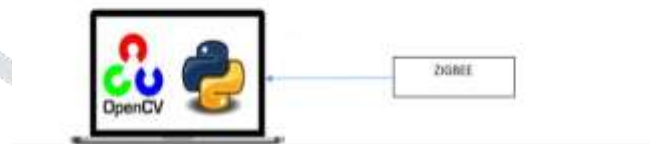
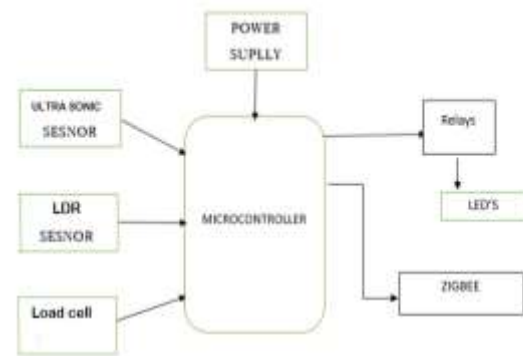
Common Highway roads have to face many problems such as traffic jams which cause loss of valuable time. Due to Heavy vehicles road will be full of pothole and create the traffic. Nowadays safety on road has become an important factor in our life because there is an increasing amount of accidents on the road and there are some places where accident occurs.

IV. METHODOLOGY

This project provides a better solution for streetlight control and automation. The system consists of LDR, relays, microcontroller, Ultrasonic Sensor, and some electronic components. A low visibility roadway environment due to haze is one of the major traffic security concerns. It is known that in low visibility conditions, such as haze and smoke, crashes tend to be more severe than under normal clear condition. Thus there is a drastic need to test and develop countermeasures to improve traffic security and driver performance under reduced visibility conditions to determine the speed of the coming vehicle.

The entire system can be monitored and controlled by a central system through a web interface. A central database is created to fetch data from all individual systems. Light Dependent Resistors are light sensitive devices. They are made up of semiconducting materials with high resistance. LDR works under the principle of photoconductivity in which conductivity of the material gets reduced by the absorption of light. First the CCTV camera footage from the road side is sent to the system. Vehicles are detected from the footage. Tracking the activity of vehicles system determines if there is any violation or not. Vehicle accident statistics disclose that the main threats a driver is facing are from other vehicles. Consequently, developing on-board automotive driver assistance systems aiming to alert a driver about driving environments, and possible collision with other vehicles has attracted a lot of attention.

V. BLOCK DIAGRAM



Ultrasonic sensors used for speed detection, LDR sensors used for street light management, load cells is used for over load detection are all connected to microcontroller and power supply for complete operation is given to microcontroller. The relay operates with the input of microcontroller and relay gets activated and then LED glows. A input signal is also given to the ZIGBEE which is a wireless technology designed to use low power digital radio signals for personal area network, which further connects to the openCV.

VI. SOFTWARE

- Embedded C
- Arduino IDE
- Python IDE
- OpenCV

VII. ADVANTAGES

- Able to determine the heavy vehicle in highway
- Traffic violation control
- Speeding detection
- Vehicle Number plate capturing

VIII. APPLICATION

- Street light controller
- Traffic control
- Speed control with High-speed detector
- Used in smart city concepts

- Heavy weight detection
- Accident avoiding cylinders in S cross roads

RESULT

CONCLUSION

An enormous amount of energy can be saved by replacing sodium vapor lamps by LED and adding an additional feature for security purposes. It prevents unnecessary wastage of electricity, due to manual switching of streetlights. The convergence of detection for the three kinds of traffic violations mentioned is dissimilar, since there each has a different threshold condition. The system provides detection for all three violations but detects signal violation and parking violation better than direction violation

In this project, the automatic number plate recognition system using vehicle license plate is presented. The system use image processing techniques for identifying the vehicle from the database stored in the computer. The system works satisfactorily for wide variation of conditions and different types of number plates. It is implemented and executed in OpenCV and performance is tested on genuine images. The system works quite well however, there is still room for improvement. The camera used in the system for this project is sensitive to vibration and fast changing targets due to the long shutter time. The system speed can be increase with high resolution camera. The character recognition method is sensitive to misalignment and to different sizes, so the affine transformation can be used to improve the character recognition from different size and angles. The statistical analysis can also be used to define the probability of detection and recognition of the vehicle number plate. At present there are certain limits on parameters like speed of the vehicle, script on the vehicle number plate, skew in the image which can be removed by enhancing the algorithms further.

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