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Smart Features Use on Highway

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Abstract**—***An intelligent 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, turns. Also, there is a big problem of traffic jams on the road. Due to heavy rain fall, there is a possibility of water overflow on the bridges and accident may occur. In hilly area there is a possibility of landslide. so, there came a need to design a system which can detect these unexpected events. So, we are designing a system that is An Intelligent Highway system with Weather Accidents Landslides and traffic which is an innovative concept to maintain safety on roads.*

Keywords— Smart highway, Electronic tolling collection, botanical planting, RFID, PUC, HPC, LED

I. INTRODUCTION

India has the second largest Highway network in the world with over 3 million kilometers of roads of which 60% are paved. These roads make a big contribution in India's economy. With the advancement of Technology, the most developed projects undertaken along with the real estate are the massive Road building projects. But why new roads are being built faster and faster automobiles are invited in high numbers making road safety a crucial question. Highway safety is emerging as a major social concern in the country. The statistics are mind boggling with an average mortality rate of 100000 persons died in the road accidents. According to survey from WHO, each year road traffic injuries 1 Awareness of 1.2 million men comma women comma and children around the globe and injured many more. The death toll is on the higher side for the countries where pedestrians, motorcycles and passengers are vulnerable and vehicles like the safety norms, like India. Smart highway and smart roads are term for a number of different ways technologies are incorporated into roads, for improving the operation of connected an autonomous vehicle and for monitoring the condition of roads, traffic level and speed of vehicles. Smart highway and smart road are terms for a number of different ways technologies are incorporated into roads, for improving the operation of connected and autonomous vehicles for traffic lights and street lighting, and for monitoring the condition of the road, traffic levels and the speed of vehicles. The principal idea of solar road panels is utilizing the space occupied by roads to generate electricity via photo-voltaic panels installed in place of a conventional concrete or asphalt road surface. Critics have pointed out that solar roadways would be both more expensive, and less productive than more conventional ways of combining solar power with infrastructure, such as building shelters over roads and parking areas and putting traditional solar panels on the roofs. Roadway-powered electric vehicle system is the patent held by Howard R. Ross. It has several components. The first of which is an all-electric vehicle that would be fit with electromechanical batteries that accept a charge from the road. The road is the second component and would have strategically placed charging coils as to only charge the car when needed. These cars and roads would not require gas or solar power. The maintenance of such road is also important. The main objective of smart highway is to target the improvement of road safety, increase energy efficiency and reduce congestion

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for road transport. These goals will be achieved by the concrete and sustainable deployment of Cooperative Intelligent Transport Systems in 7 Pilot Sites located in 7 European cities.

II. METHODS

2.1 Rumble Strips

Rumble strips, also known as sleeper lines, alert strips, audible lines, wake up call's growlers, drift lines, and drunkbumps, are a road safety feature to alert inattentive drivers of potential danger, by causing a tactile vibration and audible rumbling transmitted through the wheels into the vehicle interior. They are used for safety purpose on highways. A rumble strip is applied along the direction of travel following an edge line or centreline, to alert drivers when they drift from their lane. Rumble strips may also be installed in a series across the direction of travel, to warn drivers of a stop or slow down ahead, or of an approaching danger spot.

2.2 Smart Guide Rails

Also known as Safety Roller Barriers. Barriers or guard rails or longitudinal barriers or traffic barriers keep vehicles within their road way and avoid vehicles from hitting with dangerous hurdles such a boulder, sigh support, trees, bridge struts, building walls and large storm drains.

2.3 Smart Street Lights

For the past years, environmental issues have gained a lot of attention. Various government organizations are working to create technologies which can be environment friendly or Finding newer different ways for reducing the damage done to the environment. Energy- efficiency is the motto for every new brand that is launched in the market. Amongst various problems, arises the problem of electricity consumption. We might have noticed that sometimes in vacant college campuses or on rural highways, a large number of street light are kept on even though there is no one to utilize those resources. It may also happen that the Administrator might forget to turn off the street lights during the day & result in a tremendous loss of energy. Usually, these street lights are attached with High Pressure Sodium (HPS) bulbs which consume a lot of power. HPS bulbs have a choke coil which consumes a bit of energy other than the original consumption of the power assigned to the bulb. A solution to this is to replace the HPS bulbs with Light Emitting Diodes (LEDs). LEDs consume far less power & have a long life compared to HPS bulbs. Just a mere replacement of the bulbs will contribute to a lot of energy efficiency. As a matter of fact, our proposed system doesn't stop by just replacing HPS bulbs by LEDs. Here we plan to control the street lights depending on the need of the hour. If a few IR sensors are installed to detect the vehicle & turn on the street lights sequentially according to the position & direction of the car with the help of microcontrollers. This system can be installed in places where the traffic density is low compared to the dense traffic which we find on city streets. The system can be completely automatic so the need to turn on the power supply manually is also eliminated. Implementing this system will save hours of energy daily which can be used for other purposes or can be supplied to villages where there are frequent power cuts or no power at all. Sensor based technology is the future & can be beneficial for a developing country like India to make a landmark in the world where nowadays technology is the 4th basic need of human life.

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2.4 Smart Tolling System

As the name suggests, "Smart Highway Toll Collection System" is an automatic system which leverages the "Internet of Things" technology to identify a vehicle via a unique identification tag. When a vehicle passes through a toll booth, this RFID cards used to track & bill the vehicle owner through a payment gateway. Electronic toll collection (ETC) aims to eliminate the delay on roads by collecting tolls electronically. ETC determines whether the cars passing are enrolled in the program, alerts enforcers for those that are not, and electronically debits the accounts of registered car owners without requiring them to stop. Electronic toll collection has facilitated the concession to the private sector of the construction and operation of urban freeways. Also, it has made feasible the improvement and the practical implementation of road congestion pricing schemes in a limited number of urban areas to restrict auto travel in the most congested areas.

2.5 Compressible Life Saver

A compressible Life Saver is placed on the abutment wall so that if the driver is in attentive and by mistakenly crashes into the wall then there is not any kind of damage caused to the vehicle as well as driver. An energy absorbing guy trailer crash attenuator system come prizes or all of two or more impressive elections comp rising left and right curved, metal side panels. The row of compressible sections extends in an axial direction from a front end and Terminates in a back end that is engage able with the rigid back up. When the row is impacted by a vehicle in the axial direction, the comfortable sections bend outwardly and absorb energy.

III. ANALYSIS

3.1 Traffic Volume Study

Traffic volume is the number of vehicles crossing a section of road per unit time at any selected period. Traffic volume is used as a quantity measure of flow; the commonly used units are vehicles per day and vehicles per hour. A complete traffic volume study may include the classified volume study by recording the volume of various types and classes of traffic, the distribution by the direction and turning movements and the distribution on different lanes per unit time. The object and uses of traffic volume studies are given below:

i. Traffic volume is generally accepted as a true measure of the relative importance of roads and in deciding the priority for improvement and expansion,
ii. Traffic volume study is used in planning, traffic operation and control of existing facilities and also for planning and designing the new facilities.
iii. This study is used in the analysis of traffic patterns and trends.
iv. Volume distribution study is used in planning one-way streets and other regulatory measure.
v. Turning movement study is used in the design of intersection, in planning signal timings, channelization and other control devices.
vi. Pedestrian traffic volume study is used for planning sidewalks, cross walks, subways and pedestrian signals.

There are variations in traffic flow from time to time. Hourly traffic volume varies considerably during a day; the peak hourly volume may be much higher than average hourly volume. Daily traffic volumes vary considerably in a week and there are variations with seasons. Hence if a true picture is to be obtained, the hourly traffic volume

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be known along with the patterns of hourly, daily and seasonal variations. Classified traffic volume study, the traffic is classified and the volume of each class of traffic i.e. bus, car, auto-rickshaw, two wheelers, etc. is found separately. The direction of each class of traffic flow is also noted. At intersections the traffic flow in each direction of flow including turning movements are recorded.

3.2 Passenger Car Unit (PCU)

Different classes of vehicles such as cars, vans, buses, trucks, auto rickshaw, motor cycles, bullock carts, etc. are found to use the common roadway facilities without segregation on most of the roads in developing countries like India. The flow of traffic with unrestricted mixing of different vehicles classes on the roadways forms the heterogeneous traffic flow or the mixed traffic flow. As this mixed Traffic consist of the vehicles of different length, width, speed and acceleration. Apart from these, the driver behavior of the different vehicle classes varies considerably. Therefore, it is necessary to make all different classes vehicles in one unit of passenger cars only. It is common practice to consider the passenger car as the standard vehicle unit to convert the other vehicle classes and this unit is called Passenger Car Unit or PCU. Thus, in mixed traffic flow, the traffic volume and capacity are generally expressed.

Towards Ghodbandar

TIME	TWO WHEELER	THREE WHEELER	FOUR WHEELER	HEAVY VEHICAL	TOTAL
9-10	775 X 0.5	600 X 1.5	700 X 1	250 X 1	2237
10-11	600 X 0.5	585 X 1.5	710 X 1	220 X 1	2107
11-12	200 X 0.5	363 X 1.5	680 X 1	150 X 1	1474
12-1	454 X 0.5	225 X 1.5	650 X 1	140 X 1	1354
1-2	375 X 0.5	250 X 1.5	500 X 1	125 X 1	1188
2-3	300 X 0.5	220 X 1.5	450 X 1	100 X 1	1030
3-4	454 X 0.5	200X 1.5	550X 1	110 X 1	1187
4-5	660 X 0.5	250 X 1.5	580 X 1	150 X 1	1435
5-6	555 X 0.5	270 X 1.5	600 X 1	145 X 1	1428
6-7	665 X 0.5	400 X 1.5	650 X 1	140 X 1	1723
7-8	475 X 0.5	550 X 1.5	720 X 1	150 X 1	1933

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IV. CONCLUSION

Road traffic & accidents have become a major concern nowadays. The main concern of our project is to minimize accidents and ensure safe traffic movements. And to make a safe highway by adding some of the safety features so that the accidents can be avoided and to save electric energy.

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