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Traffic Signal Uses and Road Signs – A Review Paper

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Abstract:

Technological advancement has reasonably increased traffics on roads, which has challenged the safety of road users and has resulted in losses of human lives. Road signs play a vital role in the regulation of traffic which is placed along, besides or above the roadway. Present paper is an attempt to discuss different road signals and road. Traffic signals give advance information about road conditions ahead. Each road user should know the marking and signs on the road. The road signs and markings help the road user to follow the rules and should be mastered before venturing the road. As control devices for traffic, signs need full attention, respect and the driver's appropriate response.

Keywords: Traffic signals, Regulation, Marking, Control Devices color, shape,.

Introduction:

The issue of urban traffic is a significant aspect that influences the growth and limits the economic development of cities. To deal with the numerous traffic issues in cities, it was important to optimize traffic control signals since the system is complicated in a random fashion. Incorrect timing of the signal. Plans have the potential to inconvenience drivers (add additional delay), raise pollutants, and increase fuel consumption. Investigating the use of signal optimization approach is crucial to ensuring that freshly created timing plans will enhance system performance. Cross intersections play a significant role in the metropolitan traffic network. The main strategy for raising intersection quality is signal timing optimization. The urban road system is crucial because of intersections. The low is relatively simple to produce efficiency of a vehicle's operation when it frequently merges, diverges, or intersects ata grade crossing. This situation will result in a reduction in traffic capacity, an increase in vehicle delays, and an increase in noise pollution and exhaust emissions. On the other hand, ifthe intersection is closed, it will affect not only the nearby roads but also the routes that are distant from it. Therefore, for traffic moving through the intersection, organizational optimization is required. Techniques for traffic simulation are being more often utilized to improve junction conditions. In order to investigate and address the traffic issue, it becomes acrucial instrument. Through the use of cuttingedge computer technology, traffic simulation studies the characteristics of a practical traffic system that could resurface in order to find the best solution to a real-world traffic issue The traffic signals have three lights orderly red, yellow, green, by which the can guide the traffic whether to move or stop. The first traffic signal was fixed in London in 1868, which was a semaphore- arm type signal. Traffic Signal must be required which will reduce the chance of an accident, time of travel for the passengers, congestion, conflict, and bottleneck. These problems can be solved by providing an efficient traffic control at intersections and that can be achieved by a provision of automated volume based traffic signal system at intersections for continuous and efficient movement of vehicles.

Types of traffic Signs in India

The traffic signs in India are categorized into three major groups, which are Regulatory signs, Warning signs and Informative signs.

Regulatory signs

Most signs under this category come with a round shape. Some of them feature a red border with a black symbol and white background inside while some others can be depicted with a blue circle and white symbol within. These regulatory or mandatory signs indicate rules that should be followed strictly. Otherwise, the driver will be punished and receive a challan for their violation. Not following these signs might affect the traffic flow and caused a serious accident.

Cautionary sign

The signs of this category usually are depicted with the red triangle border with a smaller black graphic inside. These signs give warnings to the road users about the potential danger ahead, for example, turn and curves, lane transition, and pedestrian crossing. Even though there is hardly any regulation or penalty attached to these signs, these signs are very important to your safety. When seeing these warning signs, a driver should pay closer attention and prepare for the situation.

Informatory sign

While the other two types of signs have a particularly important meaning for the safety of the road-users, the third category includes signs that will give you information regarding the destinations, distance, fuel stations and other locations. Observing these signs will help you navigate through the complex traffic system.

Functions of traffic signals

Traffic signs exist to perform certain functions for drivers on the road. Mainly, their core function is road safety. Additionally, traffic signs are helpful in the following ways:

1. For those without a map or knowledge of the area, they show the distance remaining to reach a particular destination.

2. If people take a wrong turn or want to reach somewhere faster, traffic signs also show alternate routes to a certain destination, in case there are any.

3. Informative traffic signs help people find facilities, people may be seeking out like hospitals, public toilets, or parking spaces. Traffic signs can also denote colleges, schools, clubs, public places, workspaces, and restaurants

Traffic Rules in India

Traffic rules are officially listed in the 1989 'Rules of Road Regulations.' They are as follows: · Keep to your left if driving on a two-way street or road so that vehicles coming in the opposite direction can pass using the right lane smoothly.

- If you want to turn right ahead, you must be at the centre of the road and then gradually take a broad right turn.
- When you are coming towards a road intersection, road junction, or pedestrian crossing, you must slow down your vehicle.

- If being overtaken by a vehicle, you must not increase the speed of your vehicle or, in any way, prevent the vehicle that is attempting to overtake from passing.
- Overtaking is prohibited in the following cases:
- If passing would, in any way, be dangerous for other travellers on the road.
- If passing is near a bend, hill, corner, or point, as it may lead to a critical accident without clear sight of the road in front.
- If the driver upfront has not signalled the driver behind that the former may be overtaken.
- When trying to overtake a vehicle that's already being passed by the third vehicle, due to lack of space.
- For those driving two-wheelers, you and your passenger seating must wear a helmet.

Literature Review :-

In order to address the many traffic issues, several articles and studies have been produced in the topic of traffic control. Following are explanations of a few of these papers

2.1 Litana U. & Jem Sugal 2009 For an intelligent traffic signal simulator, a suitable algorithm and its simulation were created and built. The created system can detect the presence or absence of cars within a specific range by adjusting the duration for the traffic lights to respond appropriately.

2.2 Mahmoud Taghizadeh et al.2010 Proposed a generic framework for the integration of a simulator and a vehicle traffic simulator for quick design and assessment of vehicular communication protocols-based dedicated short-range communication applications. The performance of the collision avoidance apps is investigated using the resultant integrated simulator.

2.3 Khalid A. S. Al-Khateeb et al. 2011 Discussed the creation of a genetic algorithm-based intelligent traffic light control. Based on this technology, an isolated junction condition is simulated using the proposed algorithm. The performance of the traditional fixed time controller and the genetic algorithm controller were then contrasted.

2.4 Shwe Yi Aye 2013 demonstrated LAN networking-based vehicle traffic control system. The acquired findings demonstrated a decrease in routine recurrence, a considerable improvement in operational tools for managing traffic incidents, a reduction in pollution and faster reaction times, an improvement in public transportation, and a decrease in emergency response times.

2.5 Visit Hirankitti et al.2016 suggested a multi-agent strategy that includes agents and their environment for intelligent traffic signal control (cars, networks, traffic lights ...etc). Each of these agents uses an observe-think-act cycle to manage all the traffic signals at a single road intersection. This method demonstrated how a rule-based multi agent strategy may elegantly resolve a challenging problem of traffic light control on a vast road network.

2.6 Lawrence Y. Deng et al. 2019 To accomplish the development trend in the intelligent transportation system, the video surveillance and self-adaptive urban traffic signal control systems were upgraded. The suggested solution used vision-based techniques to accurately determine real-time measurements in metropolitan roads.

2.7 Danko A. Roozemond et al. 2020 concentrated on how autonomous intelligent agents may be deployed in urban traffic light control systems. Intelligent agent technology is used to create adaptive traffic control units that respond to real-time traffic (short and long term) fluctuations. During operation, this system may give a balanced, coordinated, and ideal arrangement of the signal control scheme.

Challenges in Traffic Signal and Road Sign Systems

- **Maintenance Issues**: Sign visibility, signal malfunctions, and worn-out road signs can cause confusion and accidents.
- **Cultural and Regional Differences**: Variations in the design and meaning of road signs across different countries can lead to misunderstandings among international travelers.
- **Environmental Impact**: The impact of weather and environmental conditions on the visibility and effectiveness of traffic signals and road signs.

Conclusion

- **Summary of Findings**: Summarize key insights from the review. Traffic signals and road signs remain critical for safe, efficient road usage, but innovations like smart signals and adaptive road signs are showing promise.
- **Recommendations**: Propose potential improvements in current systems, based on the reviewed literature. For instance, the need for standardized road signs globally, or further integration of AI in traffic signal management.
- **Future Directions**: Discuss the need for ongoing research into the integration of new technologies, such as autonomous driving and smart infrastructure.

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