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Application of Intelligent Transport System

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ABSTRACT

Intelligent Transport System represent a transformative paradigm in the realm of transportation, leveraging advanced technologies to enhance the efficiency, safety, and sustainability of contemporary transportation networks. This abstract provides a comprehensive overview of ITS, encompassing its key components, applications, and the profound impact it has on urban mobility. Key applications of ITS span a wide spectrum, ranging from real-time traffic monitoring and control to intelligent navigation systems, automated vehicle management, and smart parking solutions. These applications leverage data from various sources, including sensors embedded in roads, GPS technology, and vehicle- to-vehicle communication, to provide users with timely and accurate information, enabling informed decision-making and improving overall travel experience.

KEYWORDS: *traffic monitoring, sensors embedded; timely and accurate information*

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I. INTRODUCTION

ITS is the application of computer technology to the transport sector. ITS systems gather data about the transport system, process it, and then use the processed data to improve the management of the transport system, and/or to provide the transport user with more and better information on which to base their transport decisions.

ITS can help transport planners to achieve policy objectives in many different ways. It can help to tackle congestion, pollution, poor accessibility and even social exclusion. It can also help to reduce journey times and improve reliability – either in actuality, or simply by changing people's perceptions. And it can improve the efficiency with which transport systems function. In certain circumstances – for example, parking guidance systems – it can help to support economic and retail vitality. When thinking about ITS it is vitally important to consider it, not as an end in itself, but as a means to achieve your (transport) policy objectives. It is possible that in some circumstances ITS may not be the best means of achieving transport policy objectives, but in other circumstances, it will. The trick is to select it for the latter situation, not the former.

A. Example of ITS

a) Real time information, both for public transport and private road transport, so that users have up-to-the minute information on services, where they are, and on incidents/delays and how to avoid them. On the roads, such information can also improve safety

b) The use of geographical information systems (GIS) and relational databases to keep inventories of transport infrastructure in an area (e. g the condition of the road network) to better manage and priorities maintenance work.

c) Detailed route planning information (often in real time) for both public transport and car users.

d) Parking guidance systems, to reduce parking search time.

e) Public transport information in various formats (e.g. audible) for disabled people

f) Traffic signal control, in real time, to improve the efficiency of traffic flow, or to afford priority to particular user groups such as bus passengers, or pedestrians, within a network.

B. Application of ITS

1. **Detection of Incident** : ITS can be used to detect when there has been an incident on any transport system, and to communicate this knowledge to a control centre. ITS can, further, be used to put into effect information and/or traffic management strategies in response to certain types of incidents, in order to reduce their impact. For example, an accident may occur on a motorway. This is detected by roadside CCTV cameras, and picked up in the control room. Variable message signing (VMS) is then activated to: (a) manage the traffic that is too close to the accident to take another route (by e.g. lane closures, lane control, temporary speed limits); and (b) the VMS is used to advise traffic further away from the accident to take another route.

Fig. 1.1 Traffic Accident Detection

2. **Variable Speedlimit:** Due to the speed flow relationship in traffic, above a certain speed (around 80 kph on motorways), flow in vehicles per hour past a given point begins to decline – the effect of higher speed is cancelled out by the larger gaps that drivers leave between vehicles. Therefore, at peak periods, it can be effective to lower speed limits to maximise road capacity and also to reduce congestion caused by the over-reaction of drivers to changes in speeds, and the "wave propagation" effect that this has. In order to do this, variable speed limit signing is required together with, if possible, some form of automatic enforcement (e.g. average or point speed cameras). The reduced congestion and speeds have a knock-on benefit on energy consumption.

3. **Ramp Control:** Ramp control is used at peak periods to regulate the flow of traffic along a slip road (ramp) onto a motorway or other grade-separated road. Sensors on the main road detect traffic density and then the optimum level and spacing of joining traffic is calculated, and its access onto the main road regulated by traffic lights. This should in theory minimise the congesting effect on the main road of the joining traffic.

4. **Traffic Signal Control:** ITS is used to manage linked and isolated traffic signal led junctions more efficiently, in relation to actual demand on the network in real-time. Inductive loop detectors in the pavement surface detect traffic levels, speeds and queue lengths. They communicate this to a local signal control computer and this in turn if necessary communicates with a computer controlling the signals for a whole area of a town or city (a "cell") – but communications are kept as local as possible to minimise communication times and costs. The signal controllers compute the most effective cycle times and green times for their signals, but these have to be within user-defined maxima and minima – so if the maximum cycle time is 120 seconds, the signal controller cannot override this pavement surface detect traffic levels, speeds and queue lengths. They communicate this to a local signal control computer and this in turn if necessary communicates with a computer controlling the signals for a whole area of a town or city (a "cell") – but communications are kept as local as possible to minimise communication times and costs. The signal controllers compute the most effective cycle times and green times for their signals, but these have to be within user-defined maxima and minima – so if the maximum cycle time is 120 seconds, the signal controller cannot override this.

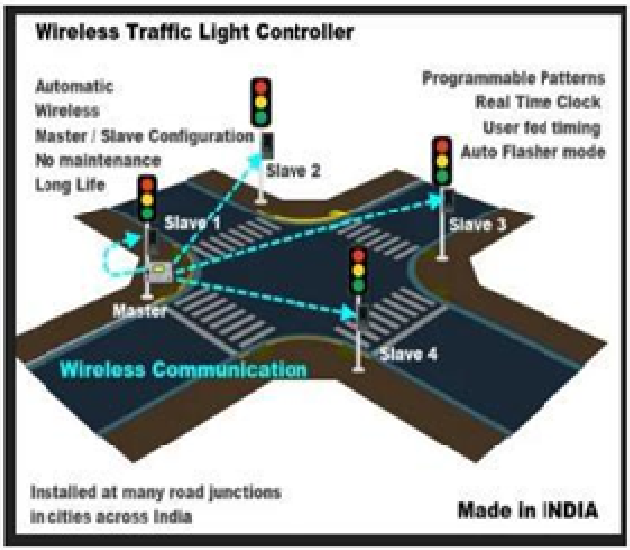

Fig. 1.2 Traffic Signal Controller (Source: www.indiamart.com

5. **Parking Management:** ITS has a number of possible applications in relation to these objectives. Parking guidance systems have traditionally linked counters (microwave, inductive loop or infrared) at the entrances and exits of off-street car parks (which monitor

occupancy and queuing) to variable message signs on key links into and around the town or city centre, in order to advise drivers where they are most likely to find a space, close to their final destination.

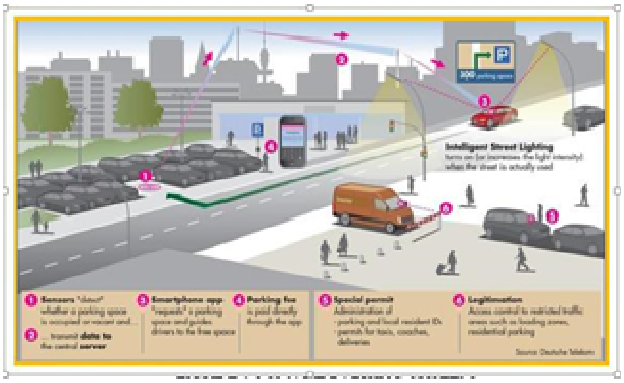

Figure 1.3 Smart Parking System- (Source:https://www.pinterest.com/)

II. LITERETAURE REVIEW

- ***Dong-seong kimet al. (2022) [1]*** They discusses the challenges and advancements in the field of the metaverse, artificial intelligence, and virtual reality. It also explores the applications of augmented reality in various domains such as education, vehicle security, and maintenance. The document highlights the importance of 5G technology in enabling the development of virtual and augmented reality experiences.
- **Zulkarnain et al. (2021) [2]**The research focus in the subtopic of traffic signals is integrating traffic signals with vehicles using a wireless connection There are more studies regarding driving behavior modeling than driver behavior modeling The distribution of the topic of ITS in general and public/urban transport has decreased dramatically over time.
- **Sumit Mallik et al. (2014) [3]** Investigated the various applications of ITS inroad transportation and its impact on public transport services. It highlights the use of advanced technologies such as GPS, Wi-Fi, and GPRS in ITS. The paper emphasizes the importance of ITS in improving public safety, security, and economic efficiency, discusses the concept of Intelligent Transportation System (ITS) and its benefits in terms of reducing vehicle pollution, congestion, and travel time.

III. METHODOLOGY ADOPTED

- **Problem: 1:According to survey it has been noticed that the due to the improper knowledge of traffic signs and not following the instruction which are given by government, the number of accidents are increasing in india for reducing this accidents we are going to adopt a following technique**.
- Solution: Designing the software which reads the traffic sign automatically and giving that information to the driver directly through voice message.

FIGURE 3.1 TRAFFIC SIGN DETECTION

- **Problem:2: Due to not following the traffic signal the number of accidents are increasing.**
- Solution: for solving this problem we are providing a barricades at signal to reduce the number of accident

Figure3.2 Provision Of Barricade at Traffic Signal

CONCLUSION

As the road accidents are multi-causal which requires multi-pronged measures to mitigate the problems through concerted efforts of all agencies of both Central Government and State Governments. The Ministry, along with various other related organizations as well as stakeholders has formulated a multi-pronged strategy to address the issue of road safety based on Education, Engineering (both of roads and vehicles), Enforcement and Emergency Care.

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