

Intelligent Transportation Systems for Traffic Management in Dehradun City



Engineering

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ABSTRACT

Dehradun is one of the oldest cities of India famous for its natural beauty and hence tourism. But it has not been too long since it has been declared as the capital of the state of Uttarakhand. Ever since then, there has been a boom in the population of city. With this increasing population, there has been a considerable increase in the number of vehicles in the city leading to major traffic congestion especially in the cross road junctions. On top of it, there is an increasing demand for public transport which, as of now, is of very poor quality and also cannot cater to the current demand. In order to cater to present traffic management, the city largely lacks infrastructure. Thus, proper traffic management is the need of the hour. To cater to that need, intelligent transportation system is one feasible solution for it.

INTRODUCTION

The Intelligent Transportation System can be defined as the applied use of various engineering disciplines, enabling technologies and management strategies to facilitate modern transport operations and policy development. The Intelligent Transportation Systems (ITS) are those utilizing synergistic technologies and systems engineering concepts to develop and improve transportation systems of all kinds. The Intelligent Transportation Systems Society advances the theoretical, experimental, and operational aspects of electrical engineering and information technologies as applied to ITS, defined as those systems utilizing synergistic technologies and systems engineering concepts to develop and improve transportation systems of all kinds. The Dublin City Council states that the intelligent transportation system involves the integrated application of a range of technologies, communications and management strategies to transport problems in order to increase the safety and efficiency of the surface transport system. The investment in ITS offers the potential of increasing the convenience, reliability and accessibility of all transport modes while also saving lives, time and money.

APPLICATIONS OF INTELLIGENT TRANSPORTATION SYSTEM

Perhaps the most-recognized ITS applications, the Advanced Traveller Information Systems (ATIS) provide drivers with real-time travel and traffic information, such as transit routes and schedules; navigation directions; and information about delays due to congestion, accidents, weather conditions, or road repair work. The most effective traveller information systems are able to inform drivers in real-time of their precise location, inform them of current traffic or road conditions on their surrounding roadways, and empower them with optimal route selection and navigation instructions, ideally making this information available on multiple platforms. The Advanced Transportation Management Systems (ATMS) include ITS applications that focus on traffic control devices, such as traffic signals, ramp metering, and the dynamic message signs on highways that provide drivers real-time messaging about traffic or highway status. The Traffic Operations Centres (TOC), centralized traffic management centres run by cities and states worldwide, rely on information technologies to connect sensors and roadside equipment, vehicle probes, cameras, message signs, and other devices together to create an integrated view of traffic flow and to detect accidents, dangerous weather events, or other roadway hazards. Another advanced transportation management system that can yield significant traffic management benefits is ramp-metering. The ramp-meters are traffic signals on freeway entrance ramps that break up clusters of vehicles entering the freeway, which reduces the disruptions to freeway flow that vehicle clusters cause and makes merging safer. The Intelligent Transportation

Systems have a central role to play in funding the transportation systems of the country. The most common application is electronic toll collection (ETC), also commonly known internationally as road user charging, through which drivers can pay tolls automatically via a DSRC-enabled on-board device or tag placed on the windshield (Stephen Ezell, 2010).

An increasing number of cities throughout the world have implemented congestion pricing schemes, charging for entry into urban centres, usually at certain peak hours, as a means to not only reduce congestion but also to generate needed resources to fund investments in public transportation and to reduce the environmental impact of vehicles. The Advanced Public Transportation Systems (APTS) include applications such as automatic vehicle location (AVL), which enable transit vehicles, whether bus or rail, to report their current location, making it possible for traffic operations managers to construct a real-time view of the status of all assets in the public transportation system. This system help to make public transport a more attractive option for commuters by giving them enhanced visibility into the arrival and departure status and overall timeliness of buses and trains. This category also includes electronic fare payment systems for public transportation systems, which enable transit users to pay fares contactless from their smart cards or mobile phones using near field communications technology. The vehicle-to-infrastructure integration is the archetype for a comprehensively integrated intelligent transportation system. Another application enabled by vehicle-to-infrastructure integration is intelligent speed adaptation (ISA), which aims to assist drivers in keeping within the speed limit by correlating information about the vehicle position with a digital speed limit map, thus enabling the vehicle to recognize if it is exceeding the posted speed limit.

PRESENT TRAFFIC CONDITIONS IN DEHRADUN CITY

The city, Dehradun is one of the oldest cities of India famous for its natural beauty and hence tourism. But it has not been too long since it has been declared as the capital of the state of Uttarakhand which was ripped out of the state of Uttar Pradesh as a new state in November, 2000. Ever since then, there has been a boom in the population of Dehradun city with people migrating from different other towns and cities. Also, the city is a hub for education, both schooling and further. Hence, people from all over the country are expected to migrate to the city temporarily. With this increasing population, there has been a considerable increase in the number of vehicles in the city leading to major traffic congestion in the city especially in the cross road junctions like Ballupur and Chakrata Road. This congestion is not just due to the vehicles owned by the people residing in the city but also because of the vehicles visiting the city from nearby cities or states for tourism or business purpose. On top of it, there is an increasing demand for public transport which, as of

now, is of very poor quality and also cannot cater to the current demand. In order to cater to present traffic management, the city largely lacks infrastructure. The roads are in poor condition and the administration is lame. There is a lack of parking space which encourages people to park in the road itself thus hindering free flow of other vehicles. Thus, proper traffic management for the city is the need of the hour.

Ballapur, out of many junctions of Dehradun city, is one of to the most congested junction especially during the peak hours. It is mainly congested by the traffic coming from colleges, offices, tourist vehicles and public transport. Although, the number of vehicles during the peak hours is huge, the roads are not wide enough to accommodate all the vehicles. The junction is dislocated and the alignment of roads in both the directions, North-South and East-West is not straight. The sides of the roads are broken due to storm-water. The public transport is not latest technology enabled and is of poor quality. The frequency of the public transport is not constantly periodic. Hence, most of the traffic congestion is due to the vehicles parked on the side of roads hindering the free flow of traffic especially for the vehicles taking a left. The traffic signaling is the only system largely installed in this junction and in fact in the whole of the city. The other systems are installed in small parts and are not very functional. We shall now try to improvise this traffic model with the help of intelligent transportation systems.

RECOMMENDATION OF INTELLIGENT TRANSPORTATION SYSTEMS FOR DEHRADUN CITY

The traffic in the city can benefit from several possible applications of ITS and one set of applications is for traffic management. At intersections, deciding the total signal cycle and the split of green times among different flows is one of the most basic traffic management applications. The locations of accidents or vehicle breakdown are important to handle the emergency situations. Knowing what kind of vehicles, and in what proportions, ply a certain road stretch, helps to choose appropriate road width and pavement materials. The monitoring of pollution and road quality monitoring are necessary for taking corrective measures. Long term data helps to plan new infrastructure, calibrate traffic signal times, adds public transport and so on. Another set of applications can aid the commuters on roads. The information about arrival of public transport helps in choice of travel mode and reduces wait delays. Getting information about parking places or estimates of carbon footprints help owners of private vehicles. The emergency services after accidents are a

vital necessity. Lesser time and enhanced ease in finding out the cause of congestion and accidents using ITS and hence ease in making strategies to control the same. The important changes to be introduced before systems to be installed include scope for road widening and drainage lines. The systems that can be installed in the city include Advanced Traveller Information System for real-time traffic information system and route guidance, Advanced Transportation Management System to adapt traffic signal system and ramp metrics, and Advanced Public Transportation System to provide real-time status information for public transit system and electronic fair payment.

CONCLUSION

Intelligent Transportation System (ITS) worldwide has been very successful to cater to the increasing traffic congestion all around the world. The developed countries now are completely using ITS and have seen mark improvement in managing the traffic. However, in India, this system is in the stage of infancy especially for small cities. But, once ways are found out to enhance and install intelligent transportation systems in the city, higher amount of funding shall be required in the initial stage but it shall lead to various advantages in future ranging from social to financial. Hence, the recommendation is to start installing ITS from the first stage with parallel improvement of the road infrastructure for it.

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