

Intelligent Traffic Management Using Internet of Vehicles: A Study into Opportunities and Challenges

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Abstract

The increasing rate of public and private vehicle on the roads especially in the highly crowded urban areas have been bring forth a critical issues of the accidental cases as well as increase the rate of pressure while making a suitable trafficking management. The assistance of various modern gadgets within intelligent trafficking and the internet vehicles helps to reduce the load in trafficking areas and help to reduce the escalating rate of accidental cases all around the world. Although, the implication of ITS while availing IoV also have been its involvement with various opportunities as well as challenges. Though, the entire study has been involving itself through evaluating the challenges and opportunities which have been involved with intelligent trafficking using internet of vehicles. A number of concepts which are relevant with ITS and IoV has been discussed with an in detailed manner within the study. The study have been found that the support of ITS using IoVs most significantly assists to perform trafficking operation more effectively, reduce accidents as well as improve ticking or tolling operations. The poor infrastructure, high cost, poor knowledge of using modern gadgets identified as key challenges while implement ITS using IoV within the study.

Keywords

Intelligent trafficking, Internet Vehicles, operation.

INTRODUCTION

The excessive loads in the trafficking sectors have caused serious trouble in the livelihood process of the customers throughout the world. The escalating rate of public and personal travel vehicles on the road brings forth serious trouble to maintain the traffic within an urban area. The overall process of intelligent traffic management has its superior assistance to maintain the overcrowding issues in roads as well as helps to reduce the risk of accidents while maintaining the traffic more prominently in the global business market area. The increasing rate of accidental cases can be most significantly mitigated through implying the intelligent traffic management within a country area. People are able to move more efficiently in urban areas and are able to reach their ultimate destination within a desired time. It most significantly helps to manage the excessive load of traffic within a crowded area as well as helps to improve the lifestyle of the countrymen within a certain area.

The increasing rate of trafficking issues all around the globe has been also creating a serious threat of air and sonic pollution which most negatively impacted on the psychological and physical wellbeing of the people in the global periphery. The process of intelligent traffic management helps an enterprise to manage the extravagant traffic maintenance pressure through using a number of modern technologies and devices. The entire process of intelligent traffic can be defined as the technique to connect the roads and traffic-oriented information and helps to predict best suited trafficking decisions across a city and provides the key assistance to maintain the entire traffic system of the area

more efficiently in nature [1]. Various contemporary countries all around the globe have already started to follow and gain assistance from the intelligence traffic in order to manage the traffic issues within the country most effectively. It helps to reduce the high burden of overcrowding and trafficking within a certain area.

Although, the entire process of performing traffic management using intelligent traffic management can be executed most significantly through using the internet of vehicles. The overall concept of internet of vehicles can be defined as a larger network which connects pedestrians, vehicles and other associated infrastructure of trafficking within a certain area [2]. A large number of modern-day technologies, software's, hardware's, and IoT devices are used within internet vehicles. The entire process of managing traffic becomes significantly easier through using an intelligent vehicle system. The overall tasks of performing intelligent trafficking are also enhanced while applying the process of internet vehicles on the roads. Though, it has also involved a number of challenges and disadvantages which will be analysed within the study included with the opportunities and advantages which can be avail in intelligent trafficking using internet vehicles.

The increasing rate of trafficking issues has caused a serious stumble block. The process of intelligent traffic management using internet vehicles has its superior capability to avoid overcrowding and also helps to manage the entire vehicle transportation more effectively and more lucidly in nature. The entire study has kept its focus on evaluating the assistance of intelligent trafficking through using internet vehicles. The entire opportunity and challenges

associated with the process will identify and evaluate within the entire process. A number of different concepts associated with intelligent trafficking as well as about internet vehicles will be discussed in a detailed manner within the entire study. It will provide the key assistance to know the associated opportunities and confront associated with intelligent traffic management using the internet of vehicles. The overall adoption process of intelligent traffic management using the internet of vehicles will become tranquil through gaining insight about the topic within the study.

MATERIALS AND METHODS

The entire study has been going to evaluate both opportunities and threats of intelligent traffic using internet vehicles. The support of various key materials and methodologies which provides a key assistance of the study has been mentioned within this discussion. The guidance of the overall mentioning process of the methods and materials would provide the key helping hand to understand how the entire study has been performed to come forth with the most absolute output results. A number of concepts and ideas on intelligent traffic maintenance and internet vehicles have to be collected as key data to evaluate the topic within the study. The information which provides insight of intelligent traffic management using internet vehicles and its associated opportunities and challenges demand to be gathered in order to make an empirical study. Hence, it demands to collect a huge set of topic-oriented data within the study. An inductive design helps to gather a large number of topic-oriented data [3]. Hence, an inductive design has been followed while performing the entire study. It not only helps to gain ideas about intelligent trafficking and intelligent vehicle systems but also provides the support to evaluate the topic through exploring both pros and cons of intelligent traffic management using internet vehicles.

The entire study has its recruitment to gather non-numeric data, the textual information about the topic most significantly helps to derive an absolute output for the study. A qualitative type of data within a certain study has come forth with a large number of textual and no-numeric data [4]. Though, the entire study on intelligent traffic management using internet vehicles has gathered various qualitative types of data in order to find proper results of the study. There is a large amount of available information and data which have been showcased in the internet about intelligent traffic management using internet vehicles. The process of gathering insights from online sites not only assists to gather a large set of data but also reduces the time of the entire data collection process. A secondary data collection process helps to gather information from various reliable online sites on a certain topic [5]. Hence, secondary data collection taken to explore the overall study. Information published in various peer reviewed and authentic online sites, articles, journals published onwards 2019 taken within the inclusion category within the study. Primary data as well as online information published before 2019 has been taken in the exclusion

category.

RESULTS

Concepts of Intelligent Trafficking

The world is evolving with a robust pace through the assistance of a huge number of technological supports since the last few years. The entire livelihood process as well as the available services within a country has also been witnessing a critical advancement through impaling a number of modern tech gadgets and technologies in versatile areas. In order to cope up with the competitive market atmosphere and highly tight working schedules most of the individuals throughout the globe have been used to avail assistance of various private and public vehicle services to meet the demand of the clock. It has increased the load of the traffic as well as making it difficult to maintain the bootlegging of vehicles on the road. Intelligent transportation system (ITS) technologies include various wireless, automated, electronic technicalities to manage and integrate vehicles on roads and improve the infrastructure of the road [6]. A large number of modern days technological processes, software's and hardwires combined uniformly to establish a superior traffic management infrastructure through connecting the roads through updated and automated information.

The entire density of a crowd, potential vehicle arrivals, and proper assumptions for the traffic situation can be gained through using ITS and its associative sensory applications. The technology oriented with ITS has its superior involvement with various modern technologies such as AI, decision automaker, motion sensors, robotics, IoT devices which provides a key assistance to maintain the entire traffic management tasks and helps to reduce the load of the traffic management within a certain area [7]. In most urban areas the application of intelligent trafficking provides the most significant support to maintain the high rate of vehicle transmission with a smoother process and helps to take the edge off the high freight of traffic managing operations. The entire process of ITS has its key concerns on three basic categories which are mobility, safety and environment. The application of ITS involves ticketing system automation, taking live action and notification while violating traffic rules and helps to obtain a safer transportation process within a certain area [8]. It provides advanced solutions for the administration of certain overcrowded and urban areas all around the world while supporting the management of high congestion in trafficking.

In recent days, the high rate of vehicle transmission impacted most negatively on the environment as well as escalated the chance of road accidents. The implication of ITS significantly manifest the maintain the wellbeing of the environment and take essential steps against individuals breaking the environmental regulations in traffic. The upgraded sensory technicalities used within ITS most significantly helps to predict the arrivals of large and medium sized vehicles as well as the movement of the two wheelers and the pedestrians which helps to avoid accidental incidence

in roads [9]. The entire management performance of the trafficking gained most significant assistance through the implication of the intelligent trafficking in crowded areas. In the fiscal year of 2020, the overall market share of the

intelligent traffic management or transportation system has been valued approximately 22 billion U.S. dollars [10]. It showcased the increasing demand of intelligent trafficking all around the globe.

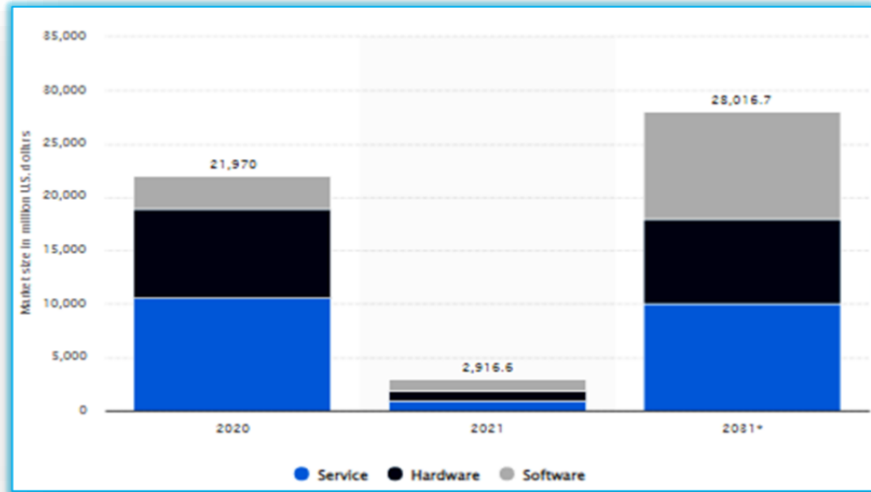


Figure 1: Market size of Intelligent Trafficking management

Concepts of Internet of vehicles

The application of Internet of vehicles is a highly effective technology which helps to take care of the vehicles, reducing the chance of freaky hazards of the cars in its ultimate run time. The overall concepts of applying the uses of various modern equipment which have its involvement with versatile devices with the internet can be defined as the internet vehicle. The internet of vehicles is actually a network which makes a superior interconnection in between each part of urban trafficking infrastructure, vehicles and the pedestrians

[11]. A number of sensors, equipment with artificial intelligence, IoT devices, hardware equipment, and software are used within the entire process IoV to increase the reliability and communication process among the trafficking and vehicles within a certain area. It makes the internal system of a vehicle smarter and increases the facility to take most suited decisions to avoid various traffic oriented decisions. The transportation becomes easier through the application of IoV and helps to improve the traffic maintenance infrastructure of a certain area in the global market.

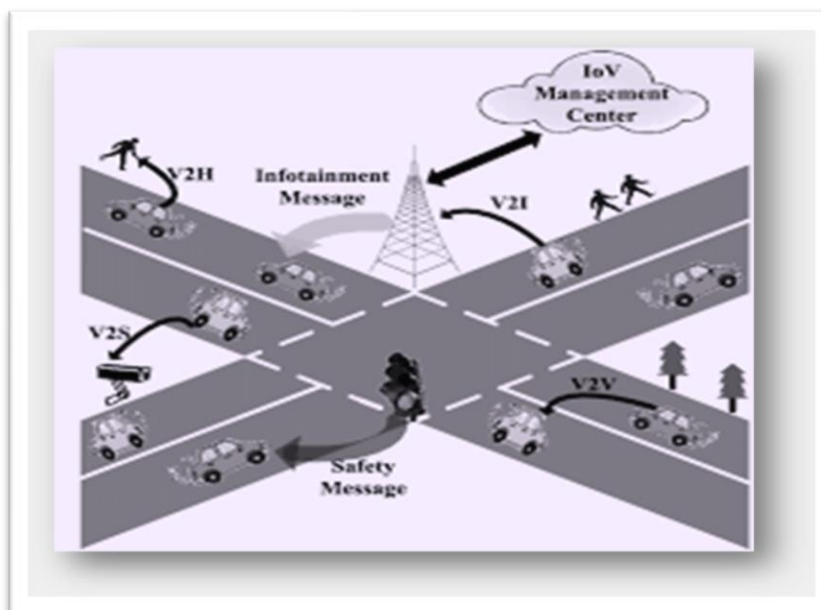


Figure 2: Internet vehicle

The entire application of intelligent trafficking becomes more effective through the assistance of the IoV facilities within a highly crowded place. The assistance of various technological equipment connected through the internet provides up to date information about the traffic towards the drivers and provides the support to take the most suited track to reach the destination without wasting unnecessary o'clock in traffic. The concept of IoV is a highly efficient network which provides the scope to link up with the internet and helps to exchange necessary data and information while maintaining the agreed standards through the implication of a large number of modern software's, hardwires and other technological standards. The application of IoV makes integrations of three basic networks which are respectively vehicular mobile internet, intra vehicle networks, inter vehicle networks [12]. It connects different vehicles on the road and traffic maintenance uniformly which most

significantly supports to maintain the entire traffic management effectively and to avoid accidental chances.

A number of facilities and trump cards provided by Internet of vehicles towards the riders and drivers which improve the riding experience of an individual most effectively and enhance the pace to reach the destinations. Different applications and facilities offered with the IoV are respectively vehicle autonomy, traffic oriented guidance, electronic collection of toll, efficient vehicle control, safe navigation, monitoring the traffic updates, crash prevention and many others technological convenience within a vehicle [13]. It actually increases the demand of IoV all around the world. In the fiscal year 2021, the overall market size of connected cars with IoV facility has been measured approximately 65 billion U.S. dollars [14]. It actually portrayed the increasing demand of IoV in the international business market surroundings.

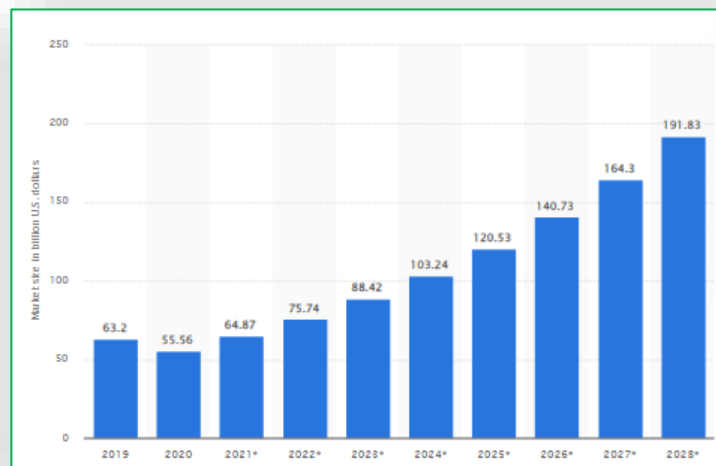


Figure 3: Market size of IoV

Opportunities of intelligent trafficking using internet vehicle

Improve traffic management operations

The entire implication of intelligent trafficking using the Internet of vehicles provides the key assistance to manage the overall traffic management operations in urban areas most effectively. The entire operation of appalling ITS using IoV facility involves itself with a large number of technological gadgets and upgraded equipment which helps to build an empirical connectivity among vehicles and the traffic maintaining authorities within an area [15]. The entire guidelines provided by ITS using IoV most significantly helps improve communication among vehicles and traffic managing infrastructure and helps to reduce unnecessary overcrowding of vehicles within a certain place and enhance the traffic management process.

Smart parking facility

The smart parking facility is one of the most significant

assistance which can be gained through intelligent trafficking using the Internet of vehicles. The up to the traffic monitoring facility, safe navigation, superior prediction of the upcoming arrival of the cars helps to make the most suited parking decision for the drivers as well as traffic managing authorities within a certain place which helps to enhance the parking of vehicles. The entire process of ITS using IoV provides the assistance to explore smart parking facilities for the vehicle drivers within a certain place.

Improved toll and ticketing operations

The entire process which has its involvement in intelligent trafficking using IoVs have been used to apply a number of software's, hardwires, AI, online payment facilities, navigation facilities which make the toll and ticketing activities easier. The entire ticketing, payment, Tolling, payment updates notification to the vehicle drivers engaged with various IoT devices and updates from time to time which helps to perform the overall toll and ticketing operation more efficiently. The risk of overload in toll cites can be mitigated through applying ITS using IoVs and helps

to perform entire ticketing oriented tasks in a quicker and effective way.

Reduce pressure in trafficking

The increasing rate of pressure in the management of trafficking reduces through availing the facilities which are offered through intelligent trafficking using Internet of vehicles and enhances the traffic management process most effectively. In recent days excessive loads in the traffic maintenance area can be mitigated through applying ITS using IoV facilities all around the globe especially in urban areas.

Reduce the rate of accidents

The predictions of the overall vehicle transportation through upgraded IoT devices, software's, sensors used in the ITS and IoVs not only helps to reduce pressure in trafficking management but also helps to reduce the chance of accidental events in the busy roads. The technological assistance provided in ITS using IoVs mostly helps to improve communication and enhance the process exchange of information which mostly helps to regulate the transport of vehicles and reduce the risk of accidents in the global periphery.



Figure 4: Intelligent trafficking using internet vehicle

Challenges associated with intelligent trafficking using internet vehicle

High rate of costing

The overall price of the technologies, software's and many other digital equipment which are related with the intelligent trafficking and internet vehicle is significantly high. The high rate of costing of the gadgets used within the IoVs and ITS make it highly difficult to afford the expenditure implicating intelligent trafficking using Internet of vehicles. The high price rate of the digital equipment involved within intelligent trafficking using the Internet of vehicles can be taken as one of the key challenges which are involved with its application.

Underprepared infrastructure

The overall application of intelligent trafficking has its superior involvement with various effective infrastructure in order to gain most suited assistance from intelligent trafficking using Internet of vehicles. The entire implication of ITS using IoV technology demands to establish a highly efficient infrastructure while in most of the urban and crowded places the trafficking infrastructure is significantly poor which reduces the impact of ITS using Internet of vehicles. The poor and underprepared infrastructure for using

intelligent trafficking using intelligent vehicles can be identified as the most crucial challenge involved with the implication of intelligent trafficking using Internet of vehicles.

Security issue

The rate of cyber crime has come forth as a critical challenge to use the internet in the overall process of using the assistance of IoT devices in trafficking. The increasing cyber security threat all around the world brings forth the most critical challenge to implement intelligent trafficking using Internet of vehicles in urban areas to resolve overcrowding issues.

Disruption in availability of the Internet

The use of the internet in trafficking has its high dependency on the availability and accessing process of the networks. The unavailability of the internet network due to various operational and functional disasters caused most critical issues in time of availing the assistance of the intelligent trafficking using the support of the internet vehicle in a certain area. In many cases, due to various natural disaster situations and poor weather conditions, unavailability of internet networks in various areas. It

actually comes forth with a critical challenge of using ITS using the process of IoV in urban localities.

Poor knowledge of the users for using ITS and IoV

The knowledge and understanding of most of the users in recent days on the global periphery is not up to the mark. The poor knowledge of using various software's and technical assistance provided through intelligent trafficking using the Internet of vehicles has reduced the effectiveness of intelligent trafficking while using Internet of vehicles all around the globe.

DISCUSSION

The entire study has been performed in order to evaluate the overall opportunities as well as the threats which have been involved with the intelligent trafficking using Internet of vehicles. The concepts which related with the intelligent trafficking as well as the internet vehicle have been discussed in detailed manner in the initial area of the study. The study has found that the process of various modern tech equipment like artificial intelligence, robotics, software's and sensors and many other upgraded technicalities to manage the trafficking in a certain place is actually known as intelligent trafficking. The technical support provided by intelligent trafficking most significantly supports to manage the trafficking operations as well helps to manage the excessive load in trafficking in recent day's environment. A number of wireless, automated technicalities involved within the intelligent trafficking which has been shown within this particular study. The study also found that the application of IoV integrates the application of intelligent trafficking in an urban area.

The entire study has also discussed the concepts of Internet of vehicles which explain the use of various internet of things in order to improve the inter-connection among vehicles and trafficking infrastructure and enhance the management of trafficking. The study has portrayed that the use of IoV also has its involvement with a number of up to date facilities and technological assistance which have been mostly oriented with IoT services which helps to improve communication and data exchange between vehicles and trafficking authorities and enhance the traffic management within a certain area. It has also been evaluated that the overall process of availing IoV has also been involved with a number of technical facilities as safe driving, traffic updates, automation, superior navigation system which helps the driver to drive a certain vehicle with more relaxed and effective process. The entire study has also showcased that the application of intelligent trafficking using Internet of vehicles most effectively supports reducing the rate of accidents in roads through providing the assistance to manage the trafficking and transportation process in a certain place.

The overall support which can be explored through implicating ITS using the facility of the IoVs has also been analyzed within the entire discussion. The entire process

which has been involved with toll taxing and ticketing can be performed with a quicker and more effective way through getting the assistance of the intelligent trafficking using Internet of vehicles. The process of intelligent trafficking using Internet of vehicles has provided a facility to make online payments through using internet networks which actually helps to make payment in tolling junctions within a lesser time. The overall updates of the payments and notification of ticketing can be fetched through the internet while processing with intelligent trafficking using the Internet of vehicles. On the other hand, the key challenges involved with the implication of ITS using IoV have been identified as the excessive costing, underprepared infrastructure and poor knowledge of the users while using intelligent trafficking through using Internet of vehicles.

CONCLUSION

The increasing bustle of the people all around the globe has increased the load of trafficking in urban areas. A huge number of people have been involved themselves while using various public and personal vehicles in order to reach their destination within a desired time. The concept of intelligent trafficking using intelligent trafficking using internet vehicle provide the key assistance to perform the trafficking operations within a certain area more effectively. Hence, the study has kept its concentration on evaluating the opportunities and challenges which are involved with intelligent trafficking using the Internet of vehicles. The entire study has been discussing various concepts through accessing a large number of literature sources which helps to evaluate the topic most effectively. It provides the key assistance to understand the use of ITS and IoV effectively within a certain crowded area. The challenges and opportunities of ITS using IoVs also discussed with an in depth process within the entire study. An inductive design while taking secondary data collection method to gather a large number of qualitative and textual data from various peer reviewed and authentic articles journals published in 2019 has been taken within study. The study has found that the implication of intelligent trafficking using Internet of vehicles provides the assistance to manage the trafficking more effectively as well as helps to perform tolling and ticketing operations within a quicker process. On the other hand, the high costing of the technologies, poor infrastructure and knowledge of the users while using modern gadgets and technicalities involved with ITS using Internet of vehicles have been identified as the key challenge for implementing intelligent traffic management using internet of vehicles.

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