APPRAISING THE ROLES OF INTELLIGENT TRANSPORT SYSTEM ON ROAD SAFETY: A REVIEW SYNTHESIS

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ABSTRACT

The severity of accidents resulting in injuries, deaths and property damage has been recognized by the World Health Organization (WHO) as a public health problem. Intelligent transport systems (ITS), based on communication and information technologies, have the potential to improve road safety for all types of road use. This article presents an analysis of ITS and its benefits, as well as the importance of ITS on safety, and explores how ITS can affect all significant changes (e.g., exposure, risk, and severity) of issues of security. In the event of an accident, we study how ITS can affect all important variables such as injuries, risk and severity of the accident, and identify the safety of ITS for road users. Let's compare ITS implementation and ITS effectiveness before and after implementation. Several studies are presented and road safety related to ITS applications is discussed. This is an attempt to create a state of the art of their impact on thinking by classifying machines according to the level of measurement method used. Since ITS activities are effective in reducing the number of incidents, changes in ITS behavior are considered and discussed, particularly with regard to the payment process.

Keywords: ITS, intelligent transport, safety, road accidents, road deaths.

1.0 Introduction

Intelligent transport systems (ITS) aim to provide new services related to different modes of transport and traffic management without relying on intelligence itself, providing better information to more people and making them safer, more compatible and “smarter”. Use of the transport network. ITS can refer to all modes of transport, but EU Directive 2010/40/EU of July 7, 2010 in the context of the development of intelligent vehicles in transport and their interactions with other modes of transport defines ITS as: defined like the same system. Information and communication technologies are used in transport, traffic management and traffic management, including infrastructure, vehicles and users, as well as to deal with other EU transport. The Constitution (2020). ITS is an umbrella term for various technologies designed to improve the quality, safety and efficiency of transportation. One way to analyze these systems is that their applications include traffic management and control, tolls, road pricing, security and legal aspects, public transport information and tickets, driver information and shipping, cargo and fleet management, and fleet management. is classified as: security.

All these applications have been developed with the support of research and experimental work in Europe, the United States and Japan. In England, the Department for Transport has supported a number of initiatives, including DETR (2000), to support the ten-year plan. These
include support for Urban Traffic Management (UTMC), Direct Traffic, Highway Travel Information, Clear Zones, Smart Maps, Roadside Recovery, Active Traffic Management (ATM) and ITS. The UTMC program develops an open architecture specifically for urban transport management. The new specifications will provide more flexibility in purchasing and developing new applications. Transportation Direct is a national information service that helps people plan trips and compare routes and prices. Including travel within the UK by air, rail, bus, train and car. The Road Data Superhighway allows local authorities and road data providers to connect to the network and receive data to send to other agencies. The Clear Zones project aims to reduce pollution and traffic in the city and improve productivity and exports by developing new technologies and transport solutions. The Department is supporting the development of several smart cards through the Pathfinder Project, ITSO and the Transportation Forum. As well as increasing the level of payment for HGVs in the UK, which is due to be introduced in 2007, the Department is exploring the possibility of introducing user payment for all vehicles from 2010. The Department listed several benefits, including: ITS included in traffic reports. The ITS Services Directorate provides advice, guidance and information to local authorities on the development and deployment of ITS solutions.

According to Adebiyi (2011), traffic jams are partly caused by road users themselves, with Lagos Road users known to be very impatient and do not follow the rules of the road. In fact, traffic jams are often caused by drivers refusing to yield to other drivers. Accidents have many effects, some of which directly impact driver health, including time spent sitting in traffic and changes in behavior. Drive a car. This behavior may include profanity, verbal abuse, intentionally acting in a dangerous or threatening manner, or making threats. Intelligent Transportation Systems (ITS) provide proven methods to address issues related to increasing safety and reducing accidents while increasing growth. Take public transportation and move goods. ITS improves safety and mobility, as well as data-based communication and electricity. When integrated into transportation infrastructure and the vehicles themselves, these technologies reduce accidents, improve safety and increase productivity. In-vehicle integration offers the opportunity to enable many services currently provided by in-vehicle ITS infrastructure to benefit from improved in-vehicle communications and infrastructure. ITS deployment can affect the transportation sector in six main areas: safety, mobility, labor, productivity, energy and environment, and customer satisfaction. Various performance measures are used throughout the evaluations discussed in this report to measure ITS performance in each of these objectives. Safety is measured by changes in accident rates or other named measures such as speed, road accidents and traffic violations.

2.0 Literature Review

When it is not possible to avoid a transport or accident, the response of emergency services called to quickly eliminate the situation is important. The extent of economic damage and the number of victims often depend on this. The continued growth and development of transportation as well as the collection of large amounts of (mostly inappropriate and incomplete) information on various accidents and road accidents in the Arctic make it very difficult to use the registration
process (Zong et al. 2013). Artificial intelligence is now a good way to help make good decisions in emergency situations in a limited time (Ballay et al. 2017, Dogru and Subasi 2018, Martinez et al. 2010). For example, this approach is used for road accident control (RTA) (Malygin et al. 2018, Safiullin et al. 2018), used to predict the occurrence of emergencies (Bogdanova and Matveev 2018) and other security tasks. There are many ways to implement intelligent decision-making systems (DSS), including expert, knowledge representation and extraction, machine learning-based DSS, artificial neural network-based DSS and DSS using bio-inspired techniques. Another way to create smart DSS usually relies on the combination and integration of basic smart DSS methods (Hatzilygeroudis and Palade 2018). The efficiency and safety of transportation depends on the strength of the working pillars that support it, which in turn depends on the strength of the organization's foundations. Transportation remains an important part of commerce that connects all industries.

The strength of any organization's mission depends on how it relies on the cooperation and participation of project participants.

Based on this data collection, the impact of ITS in reducing road accidents is assessed based on the main points of road accidents in developing countries, as described below. In recent years, the Department of Transport of the FGBIS was established under the name N.S. Solomenko of the Russian Academy of Sciences (ITP RAS) develops the theory of house change (Asaul et al., 2017; Malygin et al., 2015; Malygin et al., 2016). Their particularity is to improve the performance of existing ITS by relying on continuous research and the use of self-learning methods both for transport and for incoming transport. The application of training and self-learning mechanisms to the subsystems of the road safety management system shows that the continuous use of knowledge mechanisms, in particular the body of knowledge, is intelligent for the process of continuous autonomous monitoring of transport and driving status, road infrastructure, road conditions and autonomous response on a real-time scale.

The problem of transport safety awareness has become important, because now in the world of transport there are two types of transport: regular transport with a driver and private transport. At the same time, the proportion of traffic and the degree of transport heterogeneity will obviously increase, which means that traffic will be smarter, regardless of the level of self-sufficiency and knowledge of transport infrastructure.

Furthermore, the identified management issues can argue that the environmental and economic benefits of ITS will only be realized if stakeholders consider this system as an important tool in the transportation of the future. In order to explore this, research has been carried out internationally to develop a model on the importance of ITS in strategies and how these models differ based on technical objectives, how transport affects environmental issues, global carbon or Economic Growth. There are many ways to use conceptual models to understand personal choices and economic sharing in transportation, but to date no published evidence has been found of this type of propensity to model STI policy (or general transport policy). However, understanding these important future tasks is an important issue at the international level, as shown by the European ITS Advisory Group.
(Brussels, March 17, 2012). The standard provides very different rules for other methods, such as change analysis. The reason for creating the model is that if country characteristics and indicators are used as independent variables in the model, they can be used to show how changing the unit in the importance of the indicators will lead to changes in the ITS values.

A multinomial logistic model was chosen for this work because it can be used when the dependent variable is a dichotomous W.H. variable. Green (1993). Predictive values in the analysis can be defined as an outcome (a 0 or 1 outcome) or participation in a target group (categorical dependent variable). Three distinct models were developed to address the role of ITS in future business operations, bringing about the following three changes: 1) ITS as a key strategy for the future to improve the environment, 2) ITS as an important strategy for the future to reduce carbon emissions, 3) ITS is the most important for the future to promote business development, with an answer of 0 for each.

Therefore, the multinomial model was used to classify the responses into significant classes based on the following results:

Independent variable. The design criteria are: The ability to interpret the model meaningfully is more important than adequacy. Such changes in published data are more important as are differences that require interviews and primary data collection (issues applicable to the model), and finally, some parsimony in the appropriate model. The modeling of traffic analysis in a transport network presents a model whose main objective is: to increase the satisfaction of road users by reducing their travel time, and to manage all the obstacles that may be encountered on the path. We create a communication system adapted to the road network, a model in which participants in the management process can easily communicate with each other. Compared to some existing models in the literature, our idea is a distributed system that ensures the independence and freedom of the input modules. In this module, we solve the problem with some optimization methods. To solve optimization problems associated with intelligent transportation, we introduce autonomous computing, a new computing concept. Therefore, to be effective in the context of developing countries, our proposal presents four points.

3.0 Types and Mechanism of ITS

3.1 ITS and Road Safety

Rapid economic growth and urbanization have increased the number of cars and vehicle traffic, slowing traffic, increasing emissions and polluting the city’s air quality. At the same time, transportation problems have also led to huge economic losses. The traditional way to solve transportation problems is to expand infrastructure, but less land use means less land to build on. Moreover, the transportation system is complicated, its size is large, and it is not enough to solve the transportation problem by considering only cars or separate roads. In this context, the concept of intelligent transportation (ITS) R. Abduljabbar, H. Dia, S. Liyanage, S.A. Bagloee (2019) appears to be a compromise and solution for transportation and resources by combining vehicles and roads, and ITS provides contractual management of transportation, people and services by combining the transportation equipment and transportation to meet transportation needs. In the smart city, the demand for smart and sustainable ITS is increasing to reduce traffic congestion,
improve traffic costs, and reduce traffic congestion, energy consumption and environmental pollution. The ITS vision can be realized through science and technology. Since ITS was proposed, changes have occurred in our daily lives. Some examples are electronic toll collection systems (ETC), traffic management systems (TMS) and intelligent parking systems (IPS). ITS leverages technology and development as critical enablers of 5G. The four main characteristics of 5G technology: wide area expansion, hotspots and high capacity, low power consumption and wide connection, low latency and reliability make the Internet of Things (IoT) a powerful infrastructure. A solid foundation for ITS. Compared to 4G, 5G is not only faster. Low latency and high reliability provide easy conditions for ITS to move traffic to intelligence. 5G technology accelerates the integration of communications, sensor networks, control networks, power grids and business information management platforms. 5G plays an important role in helping ITS realize the Internet of Things (IoE). 5G will accelerate the development of self-driving cars and provide incredible power for evolving applications.

Rapid development of industry and urbanization has increased the number of cars and trucks, slowed traffic, increased emissions and polluted urban air. At the same time, the transportation problem has also caused a huge economic crisis. The way to solve the transportation problem is expansion, but less land use means less land to build on. Additionally, transportation is complex and large-scale, and it is not enough to solve transportation problems by considering vehicles or separation alone. In this context, the concept of Intelligent Transport (ITS) R. Abduljabbar, H. Dia, S. Liyanage, S.A. Bagloee (2019) states that the integration of vehicles and roads appears to be a compromise and solution to transport and resource problems, while ITS provides a contract of transport, of the same people and services by combining goods and transportation to meet needs. transport... In smart cities, there is a growing need for smart and sustainable ITS to reduce traffic congestion, improve transportation costs and reduce traffic, energy consumption and environmental pollution. The ITS vision can be realized through science and technology. Since ITS was proposed, many changes have occurred in our daily lives. Examples include electronic toll collection (ETC) systems, traffic management systems (TMS) and intelligent parking systems (IPS). ITS leverages technology and development as an important part of 5G. Four main characteristics of 5G technology make the Internet of Things (IoT) a powerful force: wide coverage, high access points and capacity, low power consumption and wide connectivity, and low latency and reliability. A solid foundation for ITS. Compared to 4G, 5G is not only faster. Low latency and reliability provide the conditions for ITS to easily move traffic to intelligence. 5G technology accelerates the integration of communications, sensor communications, control networks, power grids and business information management systems. 5G plays an important role in helping ITS realize the Internet of Things (IoE). 5G will accelerate the development of autonomous vehicles and deliver incredible performance for evolving applications.

Collaborative intelligent transportation systems (C-ITS) can connect different entities with similar functionality, for example from one vehicle to another, and/or between various elements of the transportation network, including vehicles and infrastructure, through example from vehicles to infrastructure or infrastructure...
management systems. Vehicle management systems) Indeed, these systems allow vehicles to “communicate” with each other and with the infrastructure. These systems have significant potential to improve transportation.

Research conducted within ITS provided the basis for much of what became C-ITS. Its concepts such as survey data generation and collection, print recording, and dedicated short-range radio communication (DSRC) at 5.8 GHz provided many foundations for C-ITS. It is important to note that C-ITS is not designed to control or replace transportation equipment, technology or facilities. C-ITS provides a system to efficiently collect and distribute traffic data, but does not require replacing existing systems. However, many existing data collection systems can fail due to their storage and distribution.

The difference between an "ITS system" and a "C-ITS system" is that the C-ITS system relies on interaction and data exchange with other vehicles and/or systems to receive information and open your work. Or, provide information to other vehicles/facilities to operate the C-ITS system. C-ITS, as an organization, therefore has the potential to include "collaboration" and joint exchange of information and, in some cases, mergers or redundancies make the decision to provide services to one or more employees. It is important to understand that this is not C-ITS.

Although an end in itself, it is a combination of technologies, processes, procedures and work systems that result in a “collaborative”/common service. However, if we look at some of the works previously done by other writers in the following list:

Cars: Networked Wireless technology has revolutionized transportation in recent years. The first project is that construction systems and vehicles equipped with radios can communicate with victims in a radio network, working in a way that makes the job easier. Researchers have developed a vehicle-to-vehicle network called Vehicular Ad Hoc Network (VANET). VANET is primarily designed to support vehicle-to-vehicle (V2V) communication, thereby supporting vehicle-to-vehicle (V2I) communication. P. Papadimaraos, Al La Fortelle, K Evenssee, R. Brignolo thiab Cosenza, S. (2019). VANETs have a hybrid design and integrate voluntary networks, wireless computer networks and cellular technologies. H. Abid, L.T. Phuong, J Wang, S. Lee and S. Qaisa (2011) on ITS. VANET applications focus on driver safety and provide features such as traffic monitoring and updates, emergency alerts, and route guidance. S. Olariu, I. Khalil et M. Abuelara (2011). Cloud Computing in Automotive: Cloud computing aims to improve transmission packages and services in automobiles. Olariu et al (2011) proposed to create an air transportation system by integrating existing transportation systems, various sensors, on-board equipment and cloud computing. Many vehicles are equipped with devices that can access the Internet. By sacrificing the process of decomposing high-level systems into small subsystems tailored to their functionality, the transportation cloud service platform will be divided into many real services and subsystems, such as vehicles.

This is especially true since the package called SaaS is popular because cloud computing includes three services called PaaS (Platform as a Service) and IaaS (Infrastructure as a Service), such as management, routing services, IP, contract analysis and mining, etc. . . ), a combination
of SaaS, PaaS and IaaS should be used to create a cloud service. Additionally, cloud can be divided into private cloud, public cloud and hybrid cloud. Therefore, the cloud transportation service platform can be built as a hybrid cloud, in which some services, such as user data requests, are usually hosted on public cloud platforms, etc. missing important services, such as traffic management, must be hosted on the cloud platforms. Leng et L. Zhou (2011). A taxonomy was created to classify weather-related VANETs into three types: 1) weather damage and 2) air travel. and 3)

AI has had a huge impact on many industries, including healthcare, retail, business, insurance, entertainment, manufacturing, and transportation. Many applications of AI in transportation have been tested and accepted, proving that this industry is booming. Advancements in AI-related technology have pushed the transportation sector to use cutting-edge technologies in vehicles. This makes it possible to create an ITS from the data generated by the devices. AI in its current form has the ability to solve transportation problems in real time, control transportation and transportation design, operation and planning. Other applications include travel demand analysis, transportation, and tracking of travelers and herds. AI technology enables these applications to benefit all aspects of transportation management: vehicles, drivers, infrastructure, and how transportation services are delivered. D. Sustekov, Knutelsla Dr. (2019). AI methods provide intelligent solutions in areas where the relationship between characteristics is difficult to understand.

Transportation Systems R. Abduljabbar, H. He is a member of S. Liyanage, S.A. Baek, Roy (2019). K. Kosma's (2018) research focuses on two areas: AI and transportation. On the one hand, AI offers great opportunities, but on the other hand, it also poses significant security problems. Since the mid-2000s, the private transport sector has led to significant developments in this area, giving rise to new research and programs. The International Union of Public Transport (UITP) and the Land Transport Authority (LTA) conducted a joint study titled “AI in Public Transport”, which was conducted through a literature review, quantitative analysis, reference materials, expert blogs and hands-on training. The report describes the different uses of the AI application Emerj (2019) in public transport and what the future holds for AI in public transport. Consulting firm PwC conducted a national survey via an online format to understand the impact of AI on decision-makers and full-time employees in various fields such as finance, technology and manufacturing. Young people have been shown to be more receptive to transportation-related technologies (PWC, 2018). Early adopters and public transport players hope that AI will become a more important part of the future of mobility. J. Ho, C. Moret (2018). AI can be approached through different approaches, methods and strategies at different levels that enable visualization, problem solving and learning. AI can be hardware (robots) or software (Google Maps). Data-driven AI combines machine learning techniques with techniques used to search and analyze large data sets. AI helps analyze business transactions. Identify the risks. Relieve traffic jams; Reduce greenhouse gas emissions and air pollution. Create and manage transportation. Identify travel needs and habits.

(Niestadt, Debyser, Scordamaglia and Pape, Artificial Intelligence in Transportation, 2019) Niestadt, M. Debyser, A. Skodamadelia, D. & Pape, M.
Data and AI-driven applications and services form the main basis for realizing the vision of providing an optimal solution. Creating effective and efficient urban mobility requires an effective approach to transport management. Connected vehicles transmit information in real time, generating large amounts of data. As transportation needs continue to grow, so does the growth of materials. More intelligent traffic management is therefore required. Siemens (2019). S.G. Ritchie's (1990) research focused on advanced monitoring, control and management systems for intelligent vehicles. The discussion here is about conflict in collaboration. In this research, many real-time, Research D.A. Roozemond (2019) investigates the applicability of Smart Urban Management (UTC). The methods proposed by this study can be designed, implemented, optimized and adapted to UTC for dynamic environments. The usefulness of this model is recommended by traffic officers at many smart intersections. These agents can respond to events in real time and maintain security and integrity. B. Burneister, A. Haddadi, G. Matlyse (1997). Thanks to today's technology, modern cars are equipped with devices that help drivers on the road and make driving safer and more comfortable. Intelligent Transportation Systems (ITS) are designed to maximize traffic flow and the safety of residents and road users. Chang K. et Lee I. (2011) show that many accidents are caused by human error. ITS is there to help you in the event of an accident. Environmental conditions such as poor communication, signal and visibility problems Sigh S. Nelakuditi. S. Roy Choudhury, R. & Tongi (2012). The main purpose of ITS is to expand the driver's field of vision. It uses technologies such as global positioning system (GPS) and wireless ad hoc networks. Generally, sensors are used to check the status of the car and map the car, among which Marzouki R. Samanta Rau, AK Pathak, PM and Buamama BO. (2012). Today, ITS is used to help drivers better control their cars (Advanced Driver Assistance Systems (ADAS), systems that help people find the best path). (ATIS (Advanced Traveler Information System) and a way to improve traffic flow in the existing communication system (ATMS (Advanced Traffic Management System) Argiolu R. Van der Heijden, R and March V. (2007). He transported a smart car made recognition, recognition and work that makes the use of electricity such as Lane Safe. Parents, Chls E. Thorpe (2028). Smart cars can assess driving situations and react to danger, saving lives by eliminating up to 90% of road accidents caused by human error. Alberto Broggi, Alexandre Zelinsky, Michel; Parents, Charles E. Thorpe (2028). Most of today's cars have integrated systems that make driving safer, more reliable, and of higher quality. Coung Tran and Mohammed Manubhai Trivedi, T.B. Moeslundet. all. (2011).

A smart assistant is a concept provided by artificial intelligence that identifies the king of the system. Its entire role is to help the user's decision-making. This type of system makes it clear that the operator is responsible for making decisions. The system is therefore not designed to replace the operator, but is intended to provide assistance such as filtering and interpreting data to identify sensitive data. , What is the analysis, Justice of the conclusions?

3.2 Some Critical Challenges of ITS
Intelligent transport systems (ITS) aim to provide new services related to different modes of transport and traffic management without intelligence itself, providing better information to more people and making
them safer, more compatible and “smarter”. Enter the transportation network, Khorasani, G. Tos, A. Yadeli, A. and Rahima. M. (2013) The importance of ITS is growing rapidly as today’s cities face rapid transportation challenges. Many people are starting to solve them using new transport and praise.

In 2030, the electricity building must prove that problems have problems with companies and the infrastructure services industry. At the same time, as technology and user needs evolve, the nature of the process will change. Finally, financing the maintenance of existing infrastructure and the use of new systems, as well as the management of route changes through different zones, even if there are obstacles, will constitute self-inflicted communication challenges in 2030. (2006)

ISBN 92-64-02398-4 - C OECD 2006 Terrestrial communications until 2030 (land, maritime and electric transport)

- According to Kirikova et al., Eriskson O (2002). “The development of advanced information in the work of processes and management Kluwer Academic 2002” means that knowledge must be developed in these areas, but above all that there must be employees capable of sharing their knowledge in these areas. There are experts in GIS, transportation modeling, and information development, but few people are able to share their knowledge from different perspectives. To develop ITS, knowledge and integration will be key points and will depend on the level of development of the city, its physical characteristics, the level of transport and public interest. For example, Amsterdam and Chicago are both large cities, but have very different characteristics. It has the characteristics of transportation. In Amsterdam, more than 50% of daily trips are made on foot or by bicycle, while in Chicago, by 2030 (2006), less than 90% will use the private car.

ISBN 92-64-02398-4 - C OECD 2006 Terrestrial communications to 2030 (land transport, water and electricity)

- Meanwhile, Dr. Tom V. Mathew, please list ITS problems and solutions in a table comparing ITS problems, solutions and performance.

### Table 1: Relationship between problems, conventional approach and ITS approach

<table>
<thead>
<tr>
<th>Problems</th>
<th>Possible Solutions</th>
<th>Conventional Approach of ITS</th>
<th>ITS Approach</th>
</tr>
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<tbody>
<tr>
<td>Lack of mobility and accessibility</td>
<td>Provide user friendly access to quality transportation services</td>
<td>Expand fixed route transport and para-transit services Radio and TV traffic report</td>
<td>- Multimodal pre-trip and enroute traveler information personalize public transformation. - Enhance force card</td>
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</table>
Likewise, Dr. Tom V. Mathew is interested in customer service and the requirements needed to work differently to achieve it. These job descriptions are called user services. Requirements are specified for each user of the service. As features are added, new requirements are defined. Table 1 shows user requirements for user service management. Traffic Control (TC) provides the ability to control traffic on roads and highways.

### 4.0 Conclusion

Here we want to show how ITS applications can play an important role in transport.

In large cities in particular, over the past decade, ITS has struggled to depend on public culture and geographic knowledge. The future direction of research is not a data recovery created in ITS, but a transfer from one city to another according to certain criteria, so we are trying to create a framework to integrate dynamic rules (models based on models) Rivero. J, Luna. E. (2013). ITS equipment used in transportation has the ability to simplify and standardize driving, supporting the strongest aspects of human control behavior and compensating for weaknesses in this character. If we can realize its potential, it will lead to a real improvement in security. However, there are still significant obstacles before this becomes a reality. Generally speaking, the problem is that the positive effects of ITS largely depend on the level of use, i.e. the level of penetration. The solution to this type of problem is to connect to the working model in ITS. A more detailed analysis reveals that the basis of human driving behavior is often smarter and more complex than what appears on the surface. Current “intelligent” methods (31) often prove too simple to provide broad and reliable support for their behavior. Developing a robust, affordable and functional ITS will require significant research. Additionally, human nature, which is flexible, will create problems that may only be predictable. Therefore, ITS development is not a “one-off” activity and subsequently requires monitoring and coordination. In short, there are still significant scientific, technological and organizational challenges to overcome, but the results will be significant. Achieving these benefits will require collaboration between government and industry.
Reference


Communication infrastructure (land, transport, water and electricity) by 2030: Communications, land transport, water and electricity by 2030 - ISBN 92-64-02398-4 - © oed 2006

Khorasani G. Tatari, A. Yadollahi S. and Rahima M.: Evaluation of intelligent transportation systems in safety. International Journal of Chemical, Environmental and Biological Sciences (IJCEBS_ Volume 1, Number 1 (2013)).
