



## Smart Cities, Intelligent Transportation and Internet of Things: Pros and Cons

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**Abstract:** *With each passing day in the modern period, the concept of smart cities grows in popularity. Intelligent transportation is the essential component of smart cities. The art and technology of travelling from one location to another has been an integral aspect of our lives throughout history. From chariots and horses to carriages, vehicles, steam trains, and spaceships, humankind has always been on the move. This paper provides a summary of activities performed in actual Smart City scenarios utilising IoT Technologies for Intelligent Transportation Systems (ITS). The Internet of Things can address issues such as traffic congestion, automatic fare collection detection, road safety accidents, and limited parking spaces for vehicles. In this paper, It is expected to note that the use of internet of Things in this scenario, as made transportation in the present day so easy in the metropolitan area . As we all known that at ones door steps someone can book an Uber operator at ones comfort zone to the desire destination.*

**Keyword:** Intelligent Transportation System, IoT, Smart cities, Traffic, Uber operator , Vehicles

### Introduction

Intelligent Transportation is a well-known assessment measure since it addresses several day- to-day issues and has a substantial influence on a modern smart city. In addition, the nature of the issues it answers necessitates the application of IoT and AI technology. This analysis will explore the current trend in the usage of artificial intelligence (AI) and the internet of things (IoT) in smart transportation as well as the research included in each smart transportation category. Thus, the assessment concentrates on the most recent research that affects IoT and AI tactics for addressing smart transportation categories. (Stergiou, Psannis, & Gupta, 2018)

Intelligent Transportation Systems (ITS) are a collection of tools used to improve the safety and efficiency of transportation networks. This is according to the United States Department of Transportation. For the time being, we can put our visions of the future of transportation on hold and consider how we might define intelligent transportation in terms of administration,

efficiency, and security. In other words, intelligent transportation takes advantage of new and developing technology to improve the quality, efficiency, and safety of urban transportation. (Kuma et al. ,2020)

Due to the rising rate of urbanisation, motorization, and modernization, the urban population is increasing, quicker vehicles are being produced, and urban traffic congestion is deepening. Nowadays, population expansion, urban transportation infrastructure pressure, and the associated environmental noise, air pollution, and energy waste are detrimental to the planet. In both developed and developing nations across the world, urban transportation has become a major problem. As illustrated in figure 1, as the number of cars on the road continues to increase, there is an obvious need to update our traffic signals and transportation systems with new technologies such as IoT, autonomous vehicles, etc. Otherwise, in the next days there will be a significant deal of uncontrollable chaos. Internet of Things is revolutionizing the economics importance of transportation industry



(Razzak, 2022). Intelligent transportation systems of the next generation will

Benefit the economy, public safety, and the environment by optimising the movement of people and goods.

In a smart city, smart technology provides various advantages for transportation, such as eliminating the "human element" in accidents, making transportation better controlled, more efficient, cost-effective, and providing quick insights. In order for public managers to keep tabs on operations, record maintenance needs, and pinpoint key sources of concerns, data

collection is crucial. In addition, intelligent transportation delivers immediate insight into difficulty locations or citywide concerns influencing traffic congestion, public safety, and emergency response systems. Security, supply chain resilience, environmental concerns, and safety are a few of the many advantages of intelligent transportation technology for people everywhere, regional authorities, and the global community (Desai, 2017). As cyber assaults have become more frequent, security is a key concern.

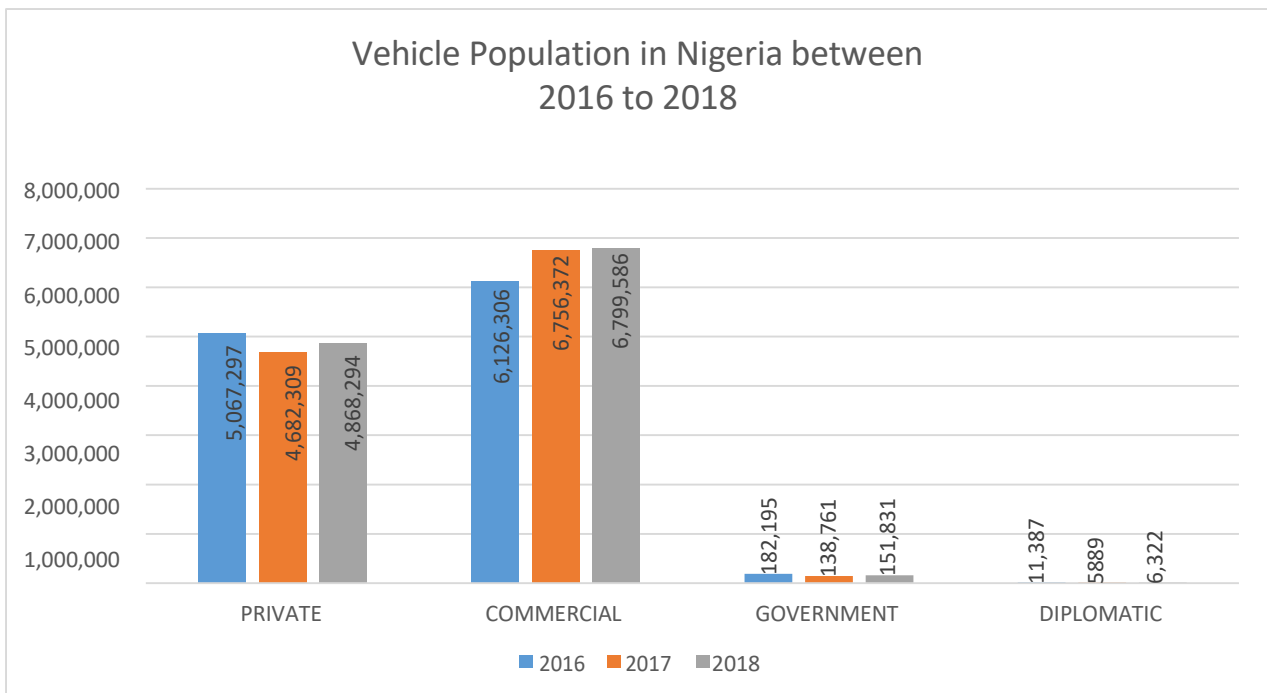


Figure 1: Vehicle population in Nigeria as at 2018. (Source: West Africa Automotive Show (WAAS), Victoria Island, Lagos, Nigeria)

The proliferation of Internet of Things devices and 5G connectivity technology is principally responsible for the expansion of ITS implementation. The former makes it possible to integrate low-cost sensors and controllers into virtually any physical equipment for remote management. The latter provides the high-speed connectivity necessary for low-latency, real-time management and control of transportation networks.

Smart transportation is not a futuristic concept; it is now being implemented in a number of cities, whose triumphs and failures are being used to improve the transportation systems of other cities. First, you may be surprised by the number of cities with new transportation systems. Clearly, worldwide cities such as New York City have incorporated intelligent transportation for a more advanced city. But, Wyoming is also a prominent testing location for linked vehicles. This is because the cowboy state is a major freight



corridor – autonomous movement of commodities throughout the country can dramatically improve supply

Efficiency and reduce the need for long-haul truckers who must balance strict deadlines with the human need for relaxation.

**Relevant Work**

The constructed integrated system analysis environment aids ITS in the integration of diverse models, resulting in the development of an existing structure that performs significantly better than prior models. As a result, the procedure for system integration

has been shortened, allowing it's to be installed nationwide without difficulty.

Multivariate analysis provides the simultaneous statistical examination of numerous variables (Hair, Black, Babine, & Anderson, 2019; Sharma, Singh, & Panja, 2021). This approach facilitates the examination of numerous variables simultaneously. Many approaches to multivariate analysis have been presented and can be utilised as appropriate.

Table 1: Related work on Smart Transportation

Ref. No.	Suggested method	Traffic Security	Low-Energy Consumption	Merits
(Grob & Iseo, 2009)	Pollution-free transportation	No	Yes	Effectively controls the flow of traffic
(Costa & Seixas, 2014)	Emission Reduction Transportation	Yes	Yes	Reduced CO2 emissions due to the adoption of electric vehicles
(Mehtar, Zeadally, Remy, & Senouci, 2015)	Eco-friendly Transportation	No	Yes	Sustainability in traffic management is given significance.
(Chopra, Singh, Aggarwal, & Gupta, 2022)	Sustainable and Secure Transportation	Yes	Yes	Traffic congestion is effectively managed
(Iturrate, Gurrutxaga, Oses, & Calvo, 2015; Harilakshmi & Rani, 2016)	Eco-friendly Transportation	Yes	No	Suggest a pollution-free method that facilitates vehicle travel
(Fabbri, et al., 2016; Abdalla & Abaker, 2016)	Transportation without collisions	Yes	No	Determination of the braking and steering response times
(Jurecki, 2016; Desai, 2017)	Transportation without collisions	Yes	Yes	System design for safety with collision warning



(Petrov, Dado, & Ambrosch, 2017)	Congestion-free transportation	Yes	Yes	Localization based on time of arrival (TOA), with automated braking for accident avoidance
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Many are the advantages of smart technology and the mobility benefits it provides in a smart city.

By combining machine learning with the Internet of Things and 5G, it has been demonstrated that By removing the "human element" that often causes accidents and injuries can be minimised with the use of autonomous transportation systems. Computers are incapable of experiencing fatigue, distraction, or emotion.

Why Intelligent Transportation is more effectively managed Data collection is a fundamental aspect of competent infrastructure management by the public sector. Because of the wealth of information, it gives about the transportation system as a whole, smart transportation helps managers keep tabs on things like performance, maintenance needs, and major points of failure.

Why intelligent transportation is more efficient: increased management results in more effective usage. Using precise data allows for the identification of efficiencies that can be improved. Perhaps a minor adjustment to rail schedules will increase ridership, or perhaps reorganizing the stops on bus routes would better serve the neighborhood.

- Intelligent transportation is economically efficient. Preventative maintenance, reduced energy consumption, and fewer resources dedicated to accidents are just a few ways in which intelligent transportation has the potential to save money. as it makes better use of current resources. Users can save money when low-cost public transit is competitive with private car ownership in terms of efficiency.

- Smart transportation allows for instantaneous analysis: Rapid visibility and notifications for trouble spots or city-wide issues impacting city street congestion, public safety, and emergency response systems are made available to city traffic management centres (TMCs), allowing them to

take action or communicate more effectively with other agencies and emergency response systems.

In addition to the previously mentioned advances in management, safety, and production, the general public, local governments, and the global community can reap a number of other benefits. These are security, environmental issues, and resilient supply chain.

#### **Security**

Cyber-attacks are a big problem for many smart city skeptics.

As the world becomes increasingly interconnected, cyber attacks on critical infrastructure, such as power grids and Internet-connected financial systems, have become common among hackers and even countries.

But the attacks themselves are not new; there are only tools used to carry them out.

Before the advent of computers, banks, power grids, and other critical infrastructure, including transportation, were vulnerable to physical attacks.

As vehicles and infrastructure become integrated, networked, and autonomous, so do physical threats such as car theft, terrorists using vehicles as weapons (like the 2016 French truck incident), and other threats.

Bad actors taking hostages on public transport can be minimized.

It is significantly easier to defend against cyber-attacks than the physical threats discussed above.

Efficient software updates, encrypted communications through virtual private network (VPN) tunnels, and other multi-layered security processes help reduce the risk of cybercrime attacks.

By reducing the likelihood of physical and cyber attacks, smart mobility for smart cities can help make modern public transportation safer overall.

#### **Concerns About the Environment**

The history of the environment and transportation are closely linked.

From coal- and wood-burning steam cars to today's gas-guzzling combustion engines, transportation has



a negative impact on the planet's resources and environment.

While scientific discoveries are being made every day to identify alternative energy sources for Public transportation is better for the environment than private cars, but it is rarely used in the United States and other countries because it is often impractical.

Using smart transportation technology to improve efficiency can make modern public transportation cost-effective for the majority of people.

Successful ideas can be replicated and distributed to other regions seeking smart city benefits as urban transportation technology advances in major cities.

#### *Robust Supply Chain*

Transnational disasters like the coronavirus pandemic have demonstrated the vulnerability of global supply networks to disruption.

When employees and drivers get sick and traveling between regions poses a threat to public health, automated freight transportation can save lives.

Projects like Wyoming's Connected Car Initiative could be key to developing automated supply chains fueled by city-to-city logistics and transportation systems for food distribution.

medical products and supplies in case of emergency without endangering the driver.

As automation, artificial intelligence and robotics can increase safety and productivity, minimal human labor can be added to the supply chain.

The good news, experts say, is that these technologies will help create new, safer jobs for the developers, technicians, analysts and administrators involved in bringing them to market and maintain them.

Despite its obvious advantages, smart urban transport systems can pose a number of complications.

These challenges mainly affect energy consumption and data management.

Smart cities need sensors – lots of sensors – and they all need power.

Batteries will be needed for sensors mounted on moving objects.

Solar power can be an alternative to fixed collectors, although these may require connection to the city's power grid.

The billions of sensors planned for the global transition to smart cities pose a major problem for powering so many devices.

Even with sensors connected to the grid, the amount of raw materials (like copper) needed is

transportation, smart transportation technology also enables communities to manage existing resources responsibly. more responsible

still significantly more than what the world's population uses to produce them.

Beyond power, there is significant dispute around internet personal data in the twenty-first century. Data is the lifeblood that supports the functionality of smart cities. This will entail a mental and behavioral transformation among communities, despite the anonymity of the majority of the required information. It will be necessary for autos to get positional information and for sensors across a city to passively collect the signals a smartphone emits throughout the day. To ensure the continued existence of smart cities in the future, it will be important to establish regulations and processes governing the administration of data, irrespective of its anonymity.

#### *Examples of Technologies for Intelligent Transportation Systems*

Intelligent urban transportation: Intelligent traffic control in Miami-Dade County, Southern Pennsylvania Transportation Authority (SEPTA) uses positive train control (PTC) and The SMART Dispatch System (Suburban Mobility Authority for Rapid Transportation) are examples of intelligent urban transportation.

#### *Intelligent Traffic Management System for the County of Miami-Dade*

With more than 2.

5 million residents, Miami Dade County is the most populous county in Florida.

Miami-Dade County is responsible for traffic control throughout the metropolitan area including the City of Miami and surrounding areas, including the operation of approximately 2,700 signalized intersections.

According to the traffic management website, the number of signalized intersections and mid-block intersections increases by hundreds each year.

#### *SEPTA PTC*

The Southeastern Pennsylvania Transportation Authority (SEPTA) operates light rail, subway, and bus services in Philadelphia.

With more than a million passengers every day, these services must always be reliable and safe.



SEPTA built a Positive Train Control (PTC) system to signal trains, prevent derailments and accidents, and monitor speed and signal violations.

#### SMART

Public transport in smart cities is an important area for the development of connected technologies. More than 300 buses across the city of Detroit are operated and distributed by SMART (Suburban Mobility Authority for Rapid Transit). As the main means of transport, it is important that these buses are punctual, safe and free of defects. The city used a similar radio network with three radio towers to dispatch buses and track their locations.

#### Conclusion

The adoption of smart cities in the present day life of the people as really called for major development and entrepreneurship due to the fact that people can work from home once, there is internet connection. Moreso, this technology has brought about the advance for which the whole world look inwards to. It worth to say that the following can be inferred from its deployments, effective decision –making based on data availability, Creation of conducive and safer communities, Improve urban transportation system of the people, evolution towards the Intrnet of Things(IoT) , and implementation of new business opportunities .

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