Big Data and IoT in Smart Transportation System

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Abstract*: Every day, humans are innovating numerous technologies that may facilitate contour efforts towards various operations with ease. One such technology is the internet of Things (IoT) and another one is big data. internet of Things (IoT); the new technology which interconnect physical devices by communicating each other. The IoT and big data technology applied in production, farming, banking operations, healthcare and food services etc., Also it is going to be the main technology for implementation of smart cities. IoT has the variety of data which is collected by devices and is processed quickly for quicker decision-making that minimizes the time taken to finish a particular process. Here, we are going to discuss IoT and big data in transportation. IoT and big data will be applied in numerous applications of transportations like self driving cars, logistics, traffic prediction, maintaining vehicle performance, freight transportation, Accident management etc., big data and IoT makes the many impacts on the above to boost. the objective of this can be to move the items from one place to another without any congestion and avoiding accidents. This paper gives the survey of smart transportation system in several applications.

***Index Terms*: Smart Transportation System, Internet of Things, Big data, traffic prediction, Accident management.**

I. INTRODUCTION

Nowadays, big data has become a new topic in each world and trade. IoT is additionally power-assisted by the sensors which communicates the data from one connected physical electronic object to another. Through these objects, the surroundings are inspected and analysed, and communicating electronic objects are programmed to act per the knowledge received . big data represents massive and complicated data sets obtained from all types of sources. Most of the data analysis techniques contain big data techniques, together with data processing, machine learning, computing, social networks so on. Smart transportation systems (STS) are developed before 50 years. These kinds of systems make the transportation systems to be safer. STS incorporate innovative technologies that includes electronic sensing element technologies, data analysis and transmission technologies, and intelligent management technologies into the smart transportation systems [1]. The aim of STS is to supply higher services for drivers and passengers in transportation systems. The four important applications of IoT and massive knowledge are sensible cars, freight transportation, traffic flow prediction, Industrial transportation.

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This paper presents the basic architecture of smart transportation system using big data and IoT..This paper describes the applications of big data and IoT, Architecture of smart transportation systems and the transportation system in India . Countries that have adopted IoT and big data analytics in their transportation systems are also discussed, and also the discussed about the impacts of smart transportation systems. Nowadays technology is evolving with image processing applications and big data also have lot of applications in Education system also. Like marking attendance in class using facial recognition [9].Big data is also applied in predicting the search behavior of the user using the search log analysis[10].

IoT is used in providing remote medical assistant by verifying the user[10].

II. APPLICATIONS OF IOT AND BIG DATA

The transportation sector is going to be smart with the technology called IoT and big data technologies.With the implementation of electronic sensors in the vehicles and environments , the data will be communicated between the devices and the data will get transferred for analysis. After analysis of the data it will produce the information needed for the particular area like traffic information, location information, path rerouting. Using smart transportation system, one can reduce the accidents happening in risky areas by seeing the analytical data of the particular place and will take the necessary actions. The tracking technology of Global Positioning System (GPS) is associated with IoT technology which used by the cargo services with the help of RFID(Radio Frequency Identification Technology)[2]. Now, nearly the whole supplying chain deposition, goods transportation, and the door delivery, traffic prediction uses the IoT technology.

IoT also used in Accident management system by giving the alert to the nearest hospitals and clinics using the sensing technologies. After the alert message passed to the nearest areas, the hospitals will send the first aid team with the ambulance [3]. We can make many changes in transportation systems based on IoT and Big data like Automatic Vehicle speed control system. Collision avoidance system to indicate the vehicles stalled in the longers roads which was implemented in japan [4]. The Big data technology is applied for each minute data received through sensor for getting analytical data. Applied in traffic prediction system, Accident management system to find the accident-prone areas [6]. Also, nowadays it has been applied in smart health monitoring system also [7]. IoT and Big data needs lot of resources and storage for processing the data . For this we can use shared resources in cloud [8].

III. SMART TRANSPORTATION SYSTEM ARCHITECTURE

The Fig. 1 shows the model of smart transportation system which uses IoT. Here the term called Internet of Vehicles have been used. Each vehicle is connected to another vehicle using Global positioning system [5]. Based on the data the traffic on that particular area can be analyzed.

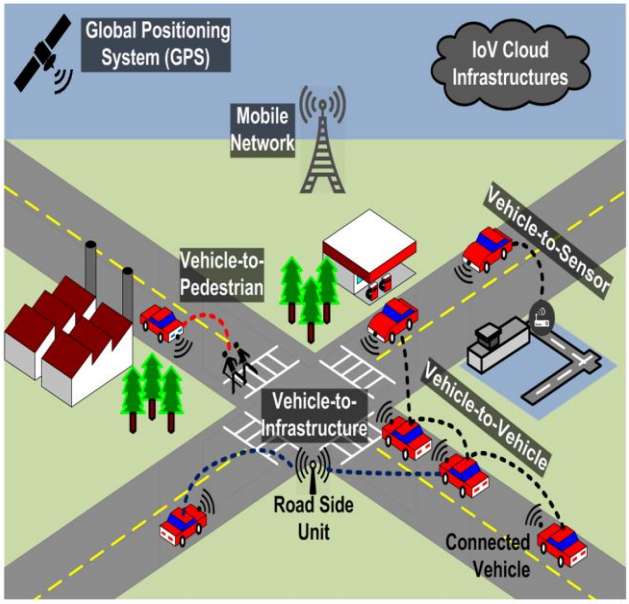

Fig 1Model of Smart Transportation system

Fig 2 represents the whole architecture of Smart transportation system for traffic data analysis. It has different levels to maintain the system.

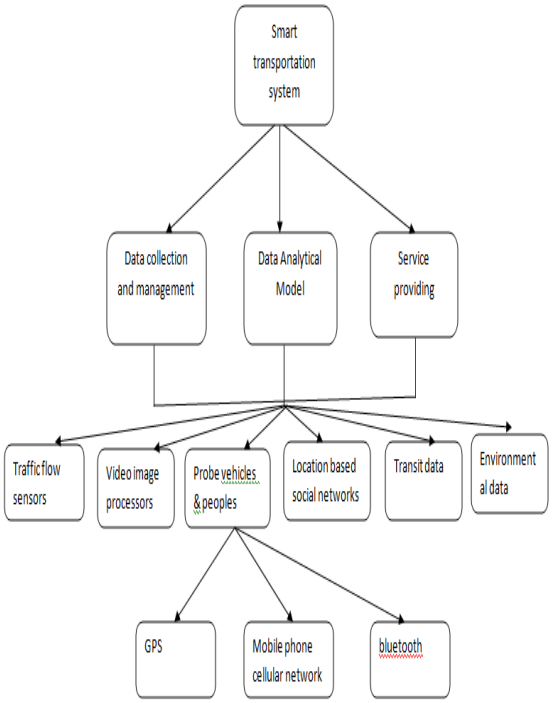

Fig 2 Architecture of Smart transportation system

The following are the levels of smart transportation system.

1. Data collection
2. Sources for traffic data
3. Data source of subgroups

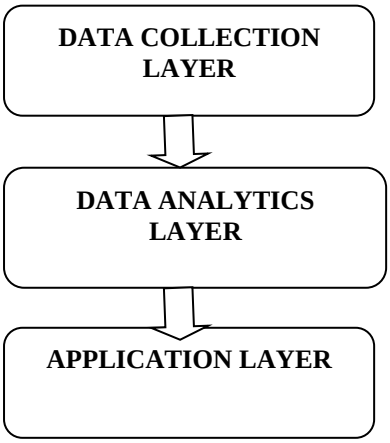

Fig 3 Flow of data in Smart Transportation System

Fig. 3 represents the architecture for analytics in smart transportation system . Data collection layer represents the data sources like sensors, GPS, RFID, road site sensors etc., Data analytics layer represents the data storage, management, mining, analysis and sharing. Application layer represents the traffic control and public transportation planning.

IV. SMART TRANSPORTATION SYSTEM IN INDIA

A total of 599 route comes covering around twelve,903 kilometre of national highways are sanctioned, acquisition associate expenditure of office 108,000 large integer (US$ sixteen.2 bn) over the following five years. underneath the sensible Cities theme, Government of India has already earmarked office fifty,802 large integer (US$ seven.6 bn) for the project with a planned budget of office forty eight,000 large integer (US$ seven.2 bn) to be utilized for developing 1st two sensible cities 1/2.

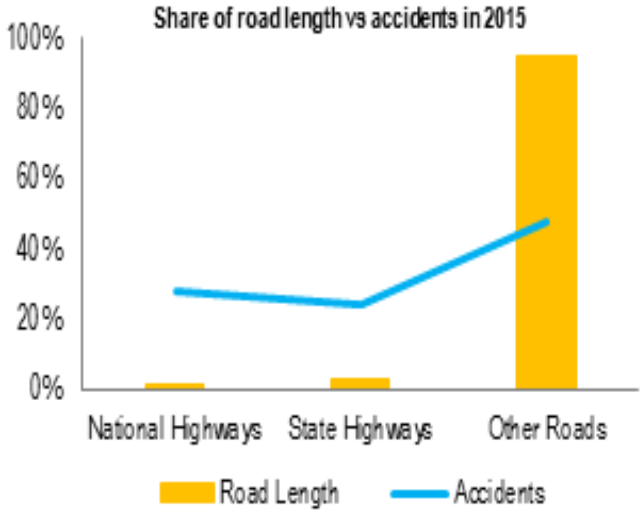

Fig 4. Road accidents in India

A Sensitive part of the work is providing good quality economical and conveyance system. India plans to make National Highways, Expressways, Big fast Transport, Bus quick Transport, pedestrian walks, walkways, and cycle tracks, in cities. The Government has to plans for developing two hundred cheap airports in tier-II and tier-III cities across the country. All the plans should reduce the road congestion in India. The plan

has to reduce the number of road accident per year.

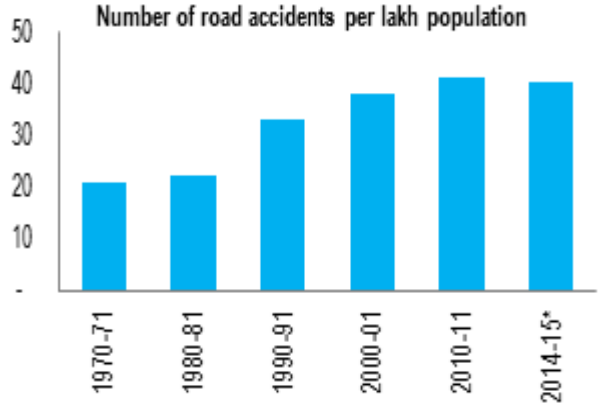

Fig 5 Road accidents from 1970 to 2015

The Fig 4 shows the percentage of road accidents in india. Fig. 5 shows that accicent ranges from 1970 to 2015.
If Smart transportation system have been implemented in India in the next 10 years definitely the the percentage of accidents will get reduced and the traffic also will be in correct manner.

V. CONCLUSION

There are large opportunities available by implementing IoT and Big Data. Countries like Germany, European countries and Singapore have been listed under top countries for implementing smart transport system with the application of IoT and Big data analytics to unravel variable issues in their transportation sectors. There are many issues available in day to day life related to transport management like traffic, accident, problems faced by the bus passengers etc., Notably, IoT and Big data is involved in broader industrial applications also. After the implementation of IoT and Big data the transport system will be more and more smarter with more flexibility and more security. In future with smart transportation system we can make the accident free environment and self driving cars which make everyone to travel from one place to another without the help of others.

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