



## IOT BASED ON AUTOMOTIVE INTELLIGENT TRANSPORT

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**Abstract:** Internet of things (IoT) transforms the real world into virtual world by making physical objects and living beings interact with each other through wireless networks. IoT reduces the human intervention by improving efficiency, accuracy, economic benefits embedded with sensors and actuators. In IoT things are expected to become active participants and enables them to communicate with the environment and among themselves.

Automotive industries has significant and a growing business opportunities. Due to the development of IoT the driver's seat is claimed by both auto makers and software providers. Cars link to smartphones, register traffic alerts and offer emergency road side assistance at the touch of a button. Intelligent transport system is an integration of communication technologies, sensors, computers and management strategies by improving safety, reducing congestion and convenience to travellers. At present vehicles are connected by embedded and tethered ways in which built in antenna and chipset are used in embedded whereas as the latter use hardware to connect cars through smart phones. ITS is based on real time traffic monitoring system for controlling and monitoring the traffic. The important segment of ITS is connected vehicle that can connect with other vehicles and also with the signals, roads, toll, bus stops using wireless communication. Smart phone act as a link between driver monitoring system and cloud server. The various applications of ITS are telematics server, content server, GPRS, E call, parking space systems using GSM, ZigBee, Wi-Fi, WiMAX wireless communications. This paper analyses the architecture of ITS.

**Keywords:** IoT, SENSORS, ACTUATORS, ITS, CLOUD SERVER, AUTOMOTIVE.

### INTRODUCTION:

Internet of things (IoT) is inter-connection via computing devices embedded in daily used objects, enabling them to them to send and receive messages. It makes the real world into virtual world by making physical objects and living beings interact with each other through wireless networks. In IoT Smart phones and tablets with sensors are connected to the internet. Machines, cars, wearable devices, jet engines, machines etc. interact with respective devices to collect and exchange data. Due to IoT and machine to machine technology there are vast business opportunities available to health care, transport and agriculture, security, airlines etc. In IOT the physical objects are accessible through internet. The physical objects are assigned with IP address and sensors so that they can access through internet so that the physical objects can collect or transfer the information without the intervention of human beings. Without IoT we need to observe, analyse and if physical devices are not working properly we should make them repaired but with the intervention of the internet they themselves can identify, observe themselves without the intervention of the human. Since they are connected with the internet they can be controlled from anywhere which ensures more safety and efficiency. An organization with IoT has a great advantage by improving their performance in more secure way which in turn provides better results. They also can increase the efficiency and reducing the cost through tracking of the objects through sensors and

actuators and deriving the benefit from real time insights and analytics.

Automotive is the term generally relating to or concerned with motor vehicles. As we know internet of things is connecting motor vehicles to the internet enabling them to send and receive messages.

### HISTORY OF IOT:

In 1949 the beginning of the 'Internet of Things'(IOT) starts when Norman Joseph Woodland invented the bar code. He obtained his idea when he drew four lines in the sand at a beach in Miami. Woodland then received the patents for the linear bar code in 1952. In October 1950, Morton Heilig developed "Sensorama", the first head mounted display that gave the user the experience of riding a motorcycle in Brooklyn. In 1955 Invention of first wearable computer inside a shoe, used for predicting roulette wheels by Edward O. Thorp. In 1967 Hubert Upton invents an analog wearable computer with eyeglass-mounted display to aid in lip reading. In 1969 the US Dept. Of Defense sent the first message over the ARPANET, the predecessor of the Internet. Mario Cardullo receives the first patent for a passive, read-write RFID tag which revolutionizes retailing in 1973. Less than 12 months after the RFID is developed, the universal product code (UPC) label is used to process purchases at a supermarket for the first time (Wrigley's

Chewing Gum). In the early 80's members of the Carnegie-Mellon computer science department installed micro-switches in the Coke vending machine to monitor number of bottles. In 1994, "Forget-Me-Not" is invented by Xerox Euro-PARC a wearable device that uses wireless transmitters to communicate between people and devices while storing the information in a database. This same year Steve Mann developed the first wireless wearable camera. In 1995, Siemens developed the "M1", the first machine to machine (M2M) communication application over a wireless connection used for point of sale terminals, remote monitoring and tracking. In the same year, Nicholas Negroponte and Neil Gershenfeld from MIT published an article in Wired called "Wearable computing. In late 1990s before the turn of the century, Sanjay Sarma, David Brock, and Kevin Ashton begin connecting objects together using RFID technology at the Auto-ID Center at MIT. In 2001, David Brock published a paper "The Electronic Product Code (EPC): A Naming Scheme for physical Objects" to propose a unified directory of identification numbers of products to track them throughout their life-cycle. In 2003, Bernard Traversat published "Project JXTA-C: Enabling a Web of Things "suggesting an open source set of protocols for peer to peer computing. A theory that would allow multiple objects to communicate between each other. In 2004, configuring home lights and switches, home healthcare, and shipping monitoring. In 2005, faculty members of Interaction Design Institute IVREA (IDII) in Italy, designed the "Arduino", an inexpensive and user-friendly microcontroller to help in the interaction of two objects. In 2008-2009, Cisco internet Business solutions Group claimed "The Internet of Things" was born because there were more objects connected to the internet than people. Since, 2014 "Internet of Things" is evolving rapidly. Technology and companies are adapting to this new reality.

## **REVIEW OF LITERATURE**

The Internet of Things is breaking fresh ground for car manufacturers by introducing entirely new layers to the traditional concept of a car. This upgrade the connected, smart car comes as a revolutionary way to drive and stay in touch with the world around at the same time.[1]

Internet of things is based on The Driver Centric Platform (DCP) which reads the car data using the on-board diagnostics device and send data to central database where consumer can observe car health-check issues with car[1].

The Internet of Things, can be a person with a heart monitor implant, a farm animal with a biochip transponder, an auto mobile that has built-in sensors to alert the driver when tire pressure is low -- or any other natural or man-made object that can be assigned an IP address and provided with the ability to transfer data over a network. So far, the Internet of Things has been most closely associated with machine-to-machine (M2M) communication in manufacturing and power, oil and gas utilities. Products built with M2M

communication capabilities are often referred to as being smart.[4]

The intelligent transport system has three components; the sensor system, monitoring system and the display system. The sensor system has Global Positioning System (GPS), Near Field Communication (NFC), Temperature and Humidity sensors, which are always connected with the internet via a GSM network to track the location, commuter and ambience inside the bus. The monitoring system is used to extract the raw data from the sensors database, convert it in to a meaningful context, triggers some events with in the bus and provide information to the bus driver. The display system is used to show the context data (bus and travel related information) to all the commuters in the bus stop.[3]

Based on the technology of radio frequency identification (RFID), global positioning system (GPS), GPRS, GIS, according to some agreements of internet of things, the intelligent transportation system connected with the internet, and carried out the intelligent recognition, location, tracking and monitoring of buses through exchanging information and communication. The intelligent transportation system mainly included the vehicle subsystem, the station subsystem and the monitoring centre, and the blue print of the hardware and software of the system.[2]

Internet of Things (IoT) links the objects of the real world to the virtual world, and enables anytime, anywhere connectivity for anything that has an ON and OFF switch. It constitutes to a world where physical objects and living beings, as well as virtual data and environments, interact with each other. Large amount of data is generated as large number of devices are connected to the internet. So this large amount of data has to be controlled and converted to useful information in order to develop efficient systems. IoT based intelligent transportation systems are designed to support the Smart City vision, which aims at employing the advanced and powerful communication technologies for the administration of city and citizens.

## **CONCLUSION:**

- In Internet of things we need to analyze information about the car and drivers B2B channel configuration through wireless networks.
- Each object needed to be assigned with IP address and should be connected with the sensors and actuators which should be able to communicate the information in a secure way since the objects are connected with internet, security is the most important factor needed to be considered.
- The three components thus used in intelligent transport system are sensor, monitor and display system which are used to track the location, ambience, converting raw data to meaningful information and conveying information to the driver and thereby displaying the data to all computers in bus stop.
- Intelligent transport system which includes plenty of networks and sensors will be able to provide efficiency with advanced

technology which will have a huge impact on organizations that will be able to reduce their cost by tracking the objects and driving the benefit from real time insights and analytics.

➤ Due to IoT transport system will be in well advanced stage using advanced technologies .

#### OBJECTIVES:

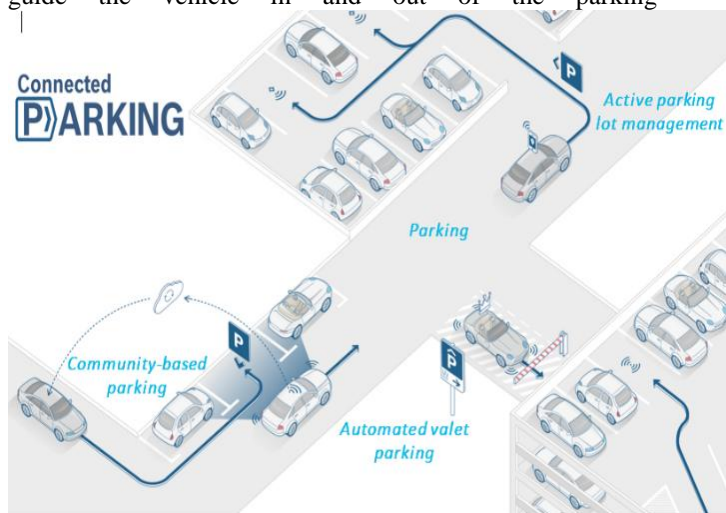
- 1) To study the need and importance of IoT in India.
- 2) To analyze an intelligent transport system based on IoT.
- 3) To study the impact of IoT on improving the efficiency of the economy.

#### NEED FOR THE STUDY:

Due to IoT The physical objects such as cars can be easily tracked. Through IoT the situation can be enhanced and can be reported to the insurance companies so that immediate action can be taken.so through IoT the accidents can be controlled and physical objects can perform their work without the intervention of human.so there is need to study IoT based on automotive intelligent transport system.

#### CONCEPT:

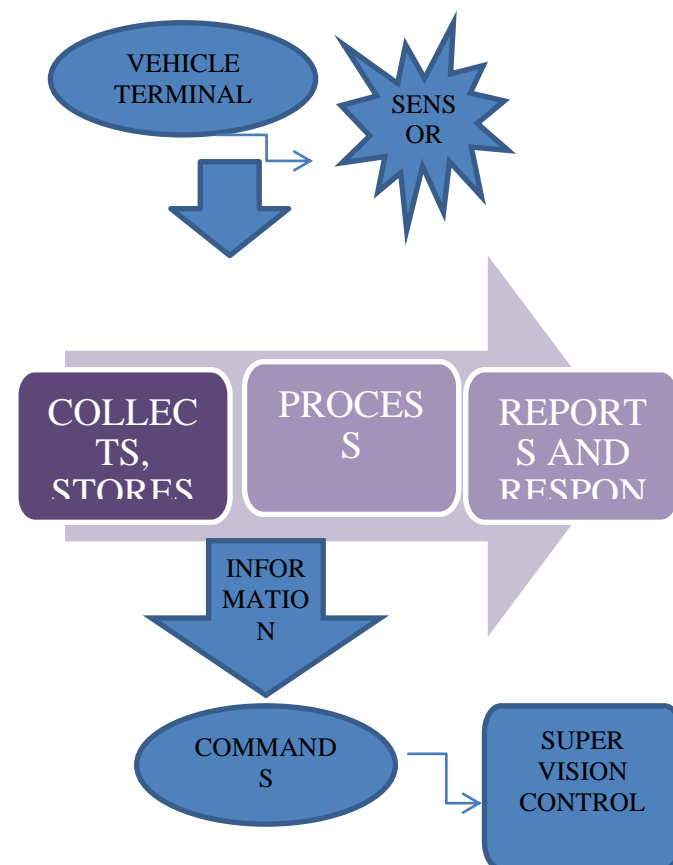
The flow diagram of IoT based parking system. The cars entering and leaving the parking slot are considered. Active parking lot management the vehicle can identify the vacant spots for parking through connected sensors on the floor which intern report information to IoT cloud. So, the vehicle gets information without searching for the place to park the vehicle. Community based parking is similar to the street parking. Information is sent to cloud, application will be updated about the vacant parking to the citizens. Automated valet parking involves logical and technical applications. Ultrasound sensors scan the surroundings and the size of the vehicle and allot suitable parking spaces. System electronics guide the vehicle in and out of the parking



space

Vehicle terminal is connected to the sensors that will be able to collect, store, process, reports and responds information to commands from supervision control. vehicle terminal consists of GPS module, wireless communication transaction module, real time clock, microprocessor and data storage.

Vehicle terminal may also satisfy the basic demands from government and enterprises by vehicle video monitoring and driving recording.



#### BODY:

##### AUTONOMOUS CAR:

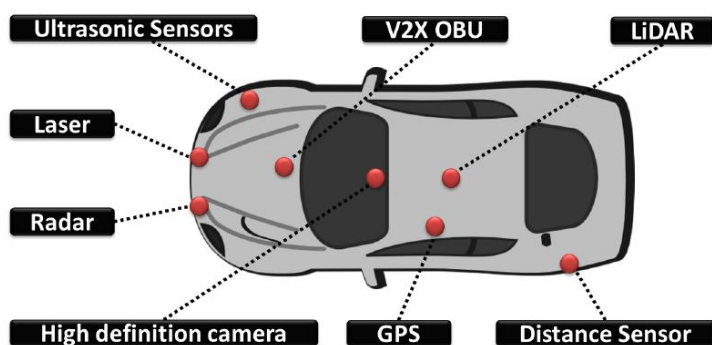
Autonomous driving is also known as automated driving which has built in wireless networks. In automated car, the driver will become the passenger and these automated type of cars are likely to be evolved by 2020.

The different technologies that are integrated in automated car are:

- High definition cameras are used for pedestrians and animals to spot road hazards.
- LIDAR, RADAR to create a 360 degree view of the car to prevent accidents.
- Distance sensor enables the distance from the neighboring vehicles

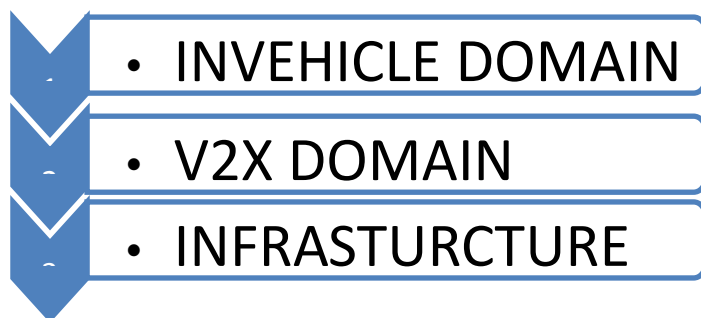
- The presence of obstacles are detected by ultrasonic sensors.
- V2X communication technologies are used to communicate with service provided and infrastructure.
- Global navigation satellite system provides the exact position of the car.

Due to the autonomous car there will be increase of roadway and parking capacity by reducing accidents and traffic congestion, car theft.



#### PROPOSED SYSTEM FOR INTELLIGENT TRANSPORT SYSTEM:

Intelligent transport system has recently emerged as a promising technology with the advanced technologies in cloud computing, wireless networks etc. ITS architecture consists of three domains such as invehicle domain, V2X domain and infrastructure domain.



1. INVEHICLE DOMIAN: It consists of connected vehicle which is equipped with electronic control units(ECU), wireless networks such as GSM, ZIGBEE, WIFI, WIMAX. ECU collect data about the vehicle location, local road traffic management, neighboring vehicles.
2. V2X DOMAIN: it is also known as adhoc domain which consists of vehicle on board units (OBU'S)and road side units(RSU'S) which are deployed along the side of the road. V2X communication include:

- i. V2V – vehicle to neighboring vehicles
- ii. V2P- vehicle to pedestrian's
- iii. V2I – vehicle to infrastructure surroundings such as OBUS, RSU'S.

3. INFRASTRUCTURE DOMAIN: it consists of trusted third parties such as service providers, vehicle manufacturers and traffic authority. Service providers are helpful for the delivery of value added services such as managing software updates. Traffic authority plays a role in the registration and authentication of RSU'S AND OBU'S.

#### CHALLENGES:

The challenges for the requirement of IoT are :

- CONNECTIIVTY: There will no one to connect the things to internet. The wireless standards should connect automatically.
- SECURITY: since the connection is through internet, the data must be secured. We should educate the customers about the integration of security in their devices.
- COMPLEXITY: manufacturers are trying to connect the internet to the things which involves lot of circuits and complex architecture. The challenge is the consumers must understood the setup with lack of technical background.
- Rapid evolution: IoT is a new concept and is evolving tremendously. The things, connections and cases are unknown to even manufacturers. So there is need to the flexibility in all facts of development.

#### CONCLUSION:

IoT based automotive and intelligent transport system is the advanced technology based application that is likely to be evolved by 2020 that is embedded with the sensors and actuators enabling the vehicles to detect by their own with wireless networks. intelligent transport system are considered as the key emerging technologies that can reduce the traffic, accidents and road safety.in the proposed system the information can be easily exchanges between the neighboring vehicles, pedestrians and the infrastructure through road side units and on board units and variety of wireless networks. Thus IoT plays an important role in intelligent transport system.

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