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Review various technologies used to manage Traffic Management System using IOT

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Abstract: **Internet of things (IoT) is the network of the devices includes the updating in technology, various devices are using sensors, actuators, embedded computing and cloud computing. This type of system leads to smart architecture in the home, cities and smart world. IoT plays an important role in traffic controlling and managing. In this paper, we give an overview of the various methods of traffic control management. With the help of this IOT kit, which includes different sensors to collect the data and process it accordingly with the help of big data analysis and deep learning algorithms, most accurate and efficient results are obtained for traffic management.**

Indexed Terms- **Internet of things, Big data, Deep Learning (*Keywords*)**

I. INTRODUCTION

Connection between sensing and causative devices provides the flexibility to develop a standard in operation image for information sharing across platforms and alternative innovative applications through an integrated framework. This will be done by data information representation using data sensing, data analytics and cloud computing. Internet of Things can be realized in three modules- sensor (hardware), data computing (middleware) and data visualization and interpretation and IOT can be encapsulated as a standard communication protocol-based network of interconnected objects around the world.

There are three IoT components that are responsible for allowing seamless Ubicomp: a) sensors (hardware), actuators and embedded communications hardware b) middleware - on demand storage and computing tools for data analytics and c) presentation - visualization and interpretation. Novel tools are easy to understand that can be designed and accessed in any corner of the world.

Data storage and Analytics:
Data centers are the space where the huge amount of data will be stored through network and should base on collecting energy and are centralized must be energy efficiency as well as dependability. The data must be to be processed properly for smart monitoring and actuation. It is important to develop efficient AI algorithms which can be centralized and distributed the data as required.

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IOT based Applications:
The applications will be arranged on the bases of scale, network availability, heterogeneity, coverage, repeatability, impact and user involvement. We classified the applications into these four domains: (1) Utilities (2) Enterprise (3) Personal and Home and (4) Mobile.

Utilities: This network commonly for the service optimization rather than the consumer consumption. The network will be used between cellular, Wi-Fi and satellite communication. Video based IoT help to develop a new innovations and researches with the video, infrared, microphone and network technologies.

Quality assurance of drinking water and water network monitoring is done by using IoT at very advance level now days and critical parameters of water are measured in aim to ensure high supply.

Enterprise: Monitoring environment activities in which sensing the measure of the number of occupants and manage the network within the area (e.g. lighting). Sensors can be used in industries for security and automation.

Personal and Home: The information tracked by the sensors is used for the individuals to own the network. Sensors can be used to control of home appliances such as washing machines, refrigerators, air conditioners etc., will allow the energy management and comfort of the individual. Smartphone are used as interface to do the communication.

IOT Architecture:
The point comes of the creation of this IOT, so there are four stages involved in IOT architecture as per Fig 1.

1. IOT Gateways and Devices.
2. Communication Network
3. Cloud or Server
4. IOT application

Explaining the different stages, let us begin with

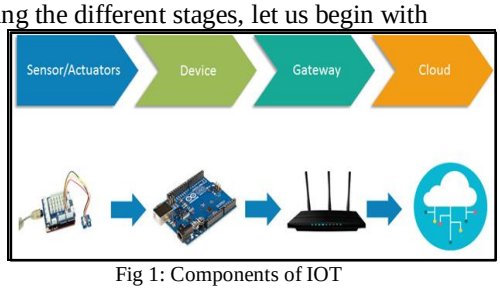

Fig 1: Components of IOT

a) **Sensors:** Sensors convert the information obtained from real-time object processing into data for analysis. These devices are capable of influencing physical reality. For example, turning on and off house lights and adjusting room temperature. Because of this, the sensing and actuating stage covers and adjusts the components of the physical world to yield useful insights for further analysis.

b) **Gateways:** The development of IoT still means working in the vicinity of sensors and actuators, Internet access methods and data acquisition systems (DAS) also appear here. Specifically, later connections to the network sensor and central output, while Internet escape operates via Wi-Fi, LANs are wired and further developed. The main purpose of this stage is to process a large amount of data collected in the previous stage and extract it in full size for further analysis. Apart from that, the necessary changes in time and composition occur here. Stage 2 makes the data digitally and compiled.

c)**Edge IT:** During this time between stages of IoT architecture, prepared data is transferred to the IT world. In particular, cutting-edge IT systems enable advanced analytics and advanced processing here. For example, it refers to machine learning and visual technology. At the same time, additional processing is possible here, before the data center entry phase. Similarly, stage 3 is closely linked to previous phases in the construction of IoT infrastructure. As a result, the availability of IT systems on the edge is closer to where the sensors and actuators are located, forming a cable cabinet. At the same time, living in remote offices is also possible.

d) Cloud: The main processes in the final phase of IoT architecture take place in a data center or in the cloud. Specifically, it enables in-depth processing, as well as feedback tracking reviews. Here, the skills of both IT and OT professionals (operational technology) are required. In other words, this category already incorporates state-of-the-art analytical skills, both in the digital and human world. Therefore, data from other sources can be included here to ensure in-depth analysis. After meeting all the standards and quality requirements, the data is returned to the physical world - but to a more sophisticated and well-analyzed look.

II. LITERATURE REVIEW

Following are the various researcher find out to manage traffic life system using IOT.

Platooning-based video information: Zhou, Zishuo, et al [1], to strengthen the safety and stability of autonomous vehicles, a Deep learning approach that introduces the use of cameras and sensors selected for Baidu's Apollo autonomous vehicle and in this highlighted data is seen by AI. Sensors are used to capture directional information and the range of barriers and communication technology used to share information. The system allows vehicles to be parked individually with different vehicles during the various locks to enhance their stability and safety.

In this four tests are taken, for Test1, they turn off the wireless device and that they predict collisions increasing with increasing rate and reaction distance decreases with the increasing velocity and inevitable collisions happen when suddenly invisible and moving obstacles are emerges. And test 2 is done by switching to a wireless device. when cars are traveling at high speed a decrease in crash times occurs. and test 3 shows the worst results, the car would lose all safety if the machines did not work as it turned off the wireless devices. Then we turn on the wireless phone for testing. Collision times are high. Vehicles will receive indirect data on the various vehicles connected to them. In summary, four tests prove that the distribution of data based on platooning shows positive effects on private vehicles.

Authenticated Key Management Protocol: Wazid, Mohammad, et al. [3] presented design for secure Fog computing-based with IoV deployment a secure authenticated key management protocol designed is called AKM- Internet of Vehicles. And they also use session keys to secure connection to IoV. In the security analysis AKM-IoV is tested using official security analysis under the widely accepted "Real-Or-Random (ROR)" model, to ensure that informal and legal security is done using the widely accepted Automated Validation of Internet Security Protocols and Applications (AVISPA) " tool.

AKM-IoV consists of three stages: 1) between the fog server and the vehicle, 2) between RSU and the fog server, and 3) between the cloud server and the fog server. They organize the scheme into four stages: i) Initialization, ii) Registration, iii) key management, and iv) Installation of Dynamic service. Active demonstration of AKM-IoV was performed using NS2 simulation (Network simulator type 2). And the updated results shown are:

1) Impact on Throughput: Network transmission is rated as a bit of transfer rate at each time, and is constructed as $(\nu_r \times|\delta|)/T_d$, where T_d represents total time (in seconds), $|\delta|$ is the size of a packet, and ν_r is the total number of received packets". In comparison they analyze the AKM-IoV using smaller messages.

2) Impact on End-to-End Delay(EED): EED is accurately defined as "the average time in which a data packet spends time arriving at the receiving business after the transfer of Fredzcdom the sending entity". They found that the EED was too small in the event of an AKM-IoV. The use of small messages to confirm key establishments leads to a reduction in EED.

3) Impact on Packet Loss Rate: is another key network parameter defined as "packet loss rate per unit time". The rate of packet loss is high compared to other schemes.

ACO-based Dynamic Decision Making: Bui, Khac-Hoai Nam, and Jason J. Jung [2] propose a system that focuses on the dynamic decision-making of connected vehicles based on the efficiency of ants. With the help of the Swarm Intelligence based algorithm, connected vehicles act as artificial ants that can calculate themselves and make powerful decisions. By sharing traffic information, using a communication framework After that, using the SI concept, vehicles are connected. In addition, to calculate the performance of a program, they create a framework for simulation and simulation of the automotive system major congestion. In the event of a high density, congestion will occur.

In order to change it, the program involves two steps, first

of all, a stable framework for interaction and communication between connected vehicles .the algorithm makes an excellent decision.

Identification and management of vehicle behaviour: Ding, Fan, et al [7] said that Now a days the improper operations performed by motor drivers such as rash driving, alcoholic driving etc. are giving very harmful results. traditional researches were unable to work on it but with the help of IOT it has somehow become possible. Many researchers are also trying to work on it. The modeling accuracy of the gaussian feature algorithm is 80% and basically, this works on foot motion of a driver. Though the technical versions have come nowadays like sensors, and other technical advancement this has made some ease. Some scholars also suggested how to model the behavior based on the driver's state.

With the development of IoT it has become much easier and it has become easier to analyze the performance of the car. First, an IoT-based electronic analysis management system is being introduced and now the result can be clearly seen how much easier it has been in all aspects of technology. There are certain steps for the identification and management of Io-based car systems, the development of a vehicle ethics management system - depending on how we build a vehicle and various parameters, the construction of a Model data analysis platform based on spark - companies such as Alibaba and Hadoop basically see the interaction of vehicle and the various operation connected to the main center or the other hotspots

A study of the prediction model based on the recruitment of gates - there are other algorithms analyzed by this study basically the structure of the entire GRU network

There were different experiments performed and result are driven. First is data source and preprocessing in this basically the driving speed, torque, accelerations of the motor vehicles are analyzed. Second is the accuracy validation of prediction model in this accuracy of a motor vehicle is analyzed by using and predicted model

Evaluation of a Wi-Fi Signal: Sharif, A., Li, J. P., & Sharif, M. I. [4] introduces a Wi-Fi signal-based traffic monitoring system. The tester is designed to collect Wi-Fi signal data. Detectors are based on IoT and support solar energy. A mining and filtering algorithm was introduced to retrieve traffic state data and a visual field survey was conducted to assess the effectiveness of the proposed system, with monitoring of the provinces. When you have finished comparing between the data loop and the loop detectors it shows that the speed of the traffic was not constant. And the absolute percentage error was 3.55% and the mean percentage error was 3.55%.

Based on the results of the field test, the specification system was summarized and the maximum speed obtained was 144 km / h. The minimum was 3.4 km/h due to shoulder walking (which usually occurs in rural areas) and the very short time difference between the records obtained 1 s and the distance between nearby detectors receiving 200 m, so the maximum speed obtained can be up to 200 m/s. In addition, the supported mining algorithm, the largest time difference was 10 min when installing an extended recovery window; therefore, the minimum speed obtained for the system is 20 m / min per view. Logical field inspections were also carried out on the busy highway, G2 Jinghu Expressway in Jiangsu province, China. In terms of field test results, the system reaches 3.18km/h meaning total road speed.

IoT public traffic adaptive detection system: Sharif, A., Li, J. P., & Sharif, M. I. [5] tells an IOT is basically developed to clarify or to sort out the problems related to the technical aspects, various aspects are there such as traffic management system. Till an IOT wasn't developed there were various major problems in this management system such as the such as audio detection system, image detecting system, GPS control. So, there are various algorithms made one of them is heuristic algorithms which restrict the set of nodes, between the primary and end point of the pathway, so that the shortest time is taken to complete the pathway. Dynamic Internet of Things real time routing so basically by the technique of C.D.P(cloud dynamic programming) this technique is implemented to see the timing of the restricted pathways.

For this purpose, speed tables and timetables are used to maintain the speed of traffic and mean travel times at any time. moreover, the location of all nodes differs in traditional and international system. which takes care of the speed table and schedule review system to find the shortest route among other possible routes, by providing the entire area under the direction of the destination just once.

Low cost Real-Time smart traffic Management System: Rizwan, P., Suresh, K., & Babu, M. R. [6] proposes A low-cost real-time smart traffic management system (SMST-critical feature for Smart Cities) to provide better service by deploying traffic indicators to update traffic details instantly. A mobile application has been developed programmatically to find out the traffic density at different locations and suggest the best way to control the traffic. An application has been developed which consists of three modules i) User Interaction Module, ii) Big Data, iii) Internet of Things. And IoT modules including sensor kits and vehicle detection sensors are embedded in the middle of the road for every 500 meters or 1000 meters to capture the information and use data analytical tools to analyze traffic density and perform predictive analysis. To provide solutions through Real-time reports that are accessed by the user interaction module to deliver information.

Optimized emergency vehicle tracking algorithm: Gowtham, P., et al [11] works to provide solution for emergency vehicle which have to be reach on time by passing various traffic light system. They have provide an algorithm which has two stages: firstly image recognition through OCR capability and the secondly do the emergency vehicle sound analysis. Infrared based digit cameras along with sound detector system connects with raspberry pi and provide input to traffic surveillance unit. It work on various parameters like velocity, distance,

traffic density, emergency vehicle counting etc. Then controller run its algorithm and chooses the traffic signal and reset the traffic signal for emergency vehicle. When vehicle passes, it again again reset the signal to its ordinary position.

III. TRAFFIC DETECTORS METHODS

To implement traffic control system, first step always come in mind that how to detect the traffic. There are different methods that we can use for traffic detection based on our technology that we will implement. Following are some of these methods:

Loop Finding: it prepares an electric track. When vehicle cross that track, it causes reduction in loop inductance, finder senses this change and sends information of traffic to network controller through electronic unit.

Audio detection system: Through vehicle sound(created by different way) or through vehicle tire sound , it detect vehicle passage, existent and speed.

Image detection system: Using video camera, we can detect the crossing of vehicle based on the affected

Radar system: it measures the vehicle speed and length due to transmission of radar system in traffic area that communicate to the primary receiver.

Infrared system: Due to vehicle occurrence, temperature changes and infrared system detects that.

Magnetic system: Magnetic system changes when Vehicle passes through it due to existence of metal object in vehicle and magnetic system sensors detect that

GPS system: in every vehicle, there is GPS detection system that include data storage and power supply unit

IV. WORKING OF DIFFERENT TECHNOLOGY

Table 1 is explaining the working done by various authors using various technologies:

Table- I: Working of each Technology

Paper Reference	Technology Used	Working
P[1]	deep learning platooning-based, sensor technology, communication technology	Experiment used in four lessons: Test 1: Wireless Device (Off) The collision increases as the speed increases and the reaction distance decrease as the velocity increases. Test 2: Wireless Device (On) Collision decreases as velocity increases and response distance is insufficient due to platoon-based information-sharing Test 3: If the detectors don't work the vehicle will lose complete protection. Test 4: Wireless Device (On) Collision time is longer but improved.
P[3]	Authenticated Key Management Protocol protocol in fog computing-based IoV deployments	AKM-IoV consists of three phases: 1) Authenticated Key Management between the vehicle and the Fog Server, 2) Authenticated Key Management between the RSU and the Fog Server, and 3) Authenticated Key Management between the Cloud Server and the Fog Server.
P[2]	Ant colony optimization based on Swarm Intelligence (SI) algorithm	Includes 3 x 3 road topology with vehicles moving with different sources and destinations. It consists of two phases: i) first introducing a sustainable framework for communication and collaboration between connected vehicles; ii) ACO-based intelligent algorithm has been proposed in the context of enabling connected vehicles to take decisions to pass through certain areas.
P[7]	Models based on Internet of Things, Deep Network Data Mining, Hadoop	The number of queries increases with the increase in the query time of the database but not linearly.
P[4]	IoT-Based Wi-Fi Signal Detector Including Solar Power Module, High Efficiency Module, IoT Functional Module.	MAE (Mean Absolute Error) in terms of traffic speed is 3.18 km/h, data obtained from loop detectors
P[5]	Heuristic algorithm, IoT real time routing algorithm cloud dynamic programming (CDP) technique	In this author has used cloud dynamic programming to find the shortest path for emergency vehicles
P[6]	Smart Traffic management system (STMS)	Iot Information Collecting module, Big data real time streaming Data computation, Mobile application interface
P[11]	Optimized emergency vehicle tracking algorithm	In this author uses image recognition, sound identification methods for detecting emergency vehicle identification at traffic signals and then using resbarri pi, it control traffic lights of emergency vehicle areas

V. CONCLUSION

Taking a look on the advancements and the digitalization of this globe, IOT is the future of developments. Comforting the human life and minimizing the hard efforts of the human race, this developing technology, will not only makes the life easier but also, will result in the more efficient lifestyle. One of the biggest issues of this rapid moving homoserines is the Increasing Traffic. IOT provides several solutions for this rising problem in the world. With the help of this IOT kit, which includes different sensors to collect the data and process it accordingly with the help of big data analysis and deep learning algorithms, most accurate and efficient results are obtained for traffic management

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