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A Review On IOT Based Traffic Control Management

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Abstract— Conventional street monitoring systems for traffic analysis have the disadvantages of having a limited life span, high energy consumption, and data redundancy, resulting in a lack of durability and a high cost of ownership, respectively. In order to improve the resilience and performance of the road-embedded set of interventions, an asphalt vibration monitoring framework based on the Internet of Things is being developed and tested (IoT). The paper proposes an architecture that integrates the internet of things with agent technology into a single platform, where the agent technology is in charge of ensuring successful communication and interfaces among an enormous number of heterogeneous, highly appropriated, and decentralized gadgets within the IoT. Using active radio-frequency identification (RFID), remote sensor technologies, object ad- hoc systems administration, and Internet-based data systems, the architecture enables tagged traffic items to be addressed, tracked down, and queried within an organization.

Keywords: Identification, Energy Consumption, Radio Frequency, Traffic Control, IOT.

1. INTRODUCTION

It is the location where traffic is compelled by the administration framework, which controls the traffic lights in accordance with the persistent condition of the traffic moving From each unprecedented bearing in a junction, that is referred to as a smart traffic management system. This never-ending stream of data is gathered from a variety of sensors stationed at the intersection at precisely the same intervals of detachment. In order to monitor traffic loading up at intersections, this information is gathered and fed into a control framework that automatically determines the optimal timing for the appearanceof the green signal at each specific direction in order to check traffic loading up. This research intends to use the Internet of Things, agents, and a variety of other technologies to improve traffic conditions and reduce traffic congestion. Information generated by IoT traffic and gathered on everything streets can be made available to explorers and other clients through various channels. The system is able to perceive current traffic activity, traffic flow conditions, and estimate future traffic flow based on the information acquired from real-time traffic data collection. The system may provide some of the most recent real-time traffic statistics, which can assist drivers in selecting the most effective routes. As a result, the system is completely capable of administering, screening, and controlling moving vehicles. It is advantageous to develop an intelligent traffic system that is dependent on the Internet of Things since it improves traffic conditions, reduces congestion and management costs, has high dependability, is safe and is not affected by weather conditions; these are some of the benefits.

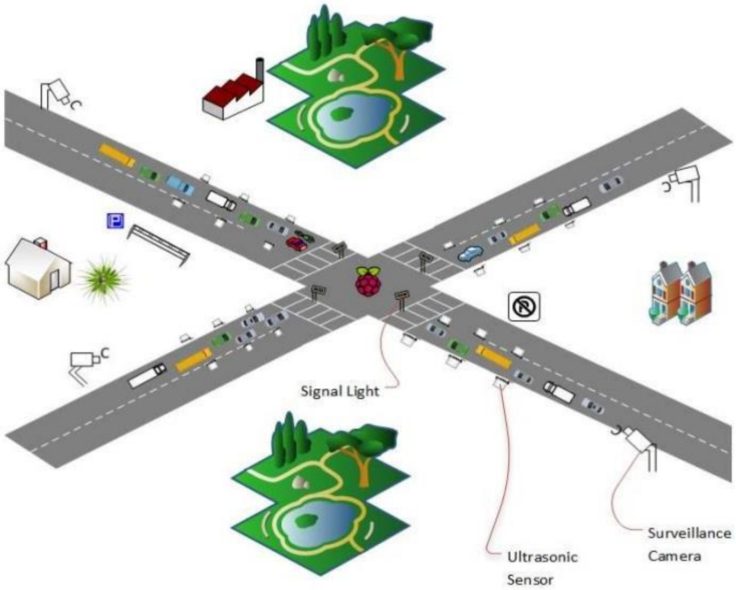

Figure 1: IOT Based Wireless Sensor NetworkAs a result, it has been determined that active trafficcontrol is required. Fixed time signals regulate traffic in the vast majority of countries, whereas centrally controlled systems regulate traffic in some of the world's largest urban areas. Several traffic management systems have beendeveloped to incorporate the Internet of Things (IoT) perspective. Supposedly, it has been determined that theexisting traffic management systems have been implementedto this day. It is possible for such systems to crash if there is an incident involving system administration concerns. Likewise, there is less emphasis placed on changes in the volume of traffic. In this way, the suggested system deals with traffic on both local and integrated servers by combiningthe concepts of the Internet of Things and artificialintelligence (AI) together. The representation of traffic information in a factual framework can also be beneficial to professionals who are responsible for directing and overseeing traffic in real time. Additionally, it may be beneficial for future planning purposes, as well. A programmed control system at the lowest level of abstractionis responsible for such capabilities as stabilization and automatic adjustments in the boundaries of the item in accordance with the settings that are specified by theautomated control system at the highest level of abstraction. Technical approaches, such as digital controllers and traditional continuous controllers, are employed at the level of the programmed control system. Using automated controlsystems, the administration of a constrained organization of items that are dependent on the fitting optimizer is optimizedto the highest possible level of efficiency. The duties of trafficmanagement at this level of the system may differ from the general assignment of the system's working at a higher level of organization. Regardless, it is critical to take into account the highlights of the subsystems that are subservient to the optimize. The technical approaches employed at the level of automated control systems and at higher levels of the hierarchy should make use of the most recent technological breakthroughs, high-speed connectivity, and data preparation offices, among other things. For facilitated management of crafted by local optimizer that is accomplished in order to fulfill the overall purpose of the system, the coordination levelis responsible. Optimization is accomplished by the use of criteria that allow it to be performed at any level of the system. The level of operational decision-production necessitates the administration's reliance on heuristic solutions for global system-level optimization concerns at the Administrative level. In this stage of the hierarchy, the system's broad aims and targets are transformed into settingsfor the subsequent levels of the hierarchy. In the same way, management assets are dispersed throughout the various subsystems, and decisions are taken in response to various emergencies.

2. LITERATURE SURVEY

In [1]Al-Dweik et al. proposed a scalable enhanced roadside unit, the fundamental segments of which are the speed adaptive traffic control system, the pollution adaptive traffic control system (PATC), weather information system, and master control center (MCC). It plans to improve traffic flow by opening or shutting specific routes through PATC and use MCC to screen weather, coordinate street maintenance administrations, and drive and maintain in awful weather. [2] Abdelghaffar, H.M.; Rakha, H.A presents anovel de−centralized flexible phasing scheme, where the traffic signal controller utilizes a Nash bargaining game−theoretic framework. [3]SanghyunAhn et al. proposedanother mechanism by choosing the vehicles performing V2I communications dependent on the idea of street sectorization. This mechanism can adequately reduce transmission overhead. Practically speaking, the vehicle communicates something specific packet in a specific territory. The message packet might be lost because of environmental factors, and the traffic signal controller doesn't get the information of thevehicle.

It is referred to as RFID (Radio Frequency Identification) because it makes use of tags that function as labels and are affixed to the items that must be identified by their RFID tags. When taken on their own, RFID tags do not necessitate the usage of a battery or any other form of power supply. A radio frequency identification reader (RFID) is used to provide them with the necessary information [4]. In Most cases, when RFID tags are implanted into the dashboards of automobiles or other vehicles during the manufacturing process, they are virtually completely invisible to human vision for a significant portion of that period. Designed to function in situations involving emergency vehicles, the RFID technology is intended to be effective. On the ambulance, an RFID tag has been installed, and a reader has been installed in the traffic system. The data from the RFID tags must be read in order for the ambulance to be recognized as it approaches a traffic light system. The data from the RFID tags must also be read in order for the ambulance to be recognised. However, there has been little discussion of the downsides of this strategy in a number of different papers up to this point. Consider the following scenario: in the absence of an emergency or the need for a rapid response, would the light remain the same color or would it turn green to allow the ambulance to pass through the intersection? Would the light remain the same color or would it turn green to allow the ambulance to pass through the intersection? Some of the research papers I've seen don't make it clear whether or not a solution to this dilemma has been identified, which is a concern of mine. If there is no emergency necessitating an immediate and swift response, emergency vehicles such as ambulances and other emergency vehicles would not be given any precedence when passing through a junction.

Some solutions are offered in one study paper [5] for improving vehicle identification accuracy by installing what is known as a Wireless Sensor Network (WSN), which involves the use of magnetic sensors to identify moving objects and is described in more detail in another study paper[6]. The capacity of a system to identify automobiles is one of the most important elements that should be considered when designing a new system. What exactly is it about this function that makes it so important? In the case that vehicles are successfully identified, the information supplied to the traffic control system is also correct. Because of this, the system is more efficient than it was previously in managing Traffic volume, lane occupancy, and vehicle speed detection. In this model, a threshold is determined by analyzing raw data, which allows for more precise vehicle detection [6] to be accomplished. There is a metric known as the Signal-to- Noise Ratio (S/N) that indicates the most severe drawback ofthis method, and it is referred to as the S/N ratio. It is possiblethat if this parameter is set too low, it will have negative repercussions for the quality of vehicle detection, such as an increase in the number of false alerts that are generated or an increase in the number of missed detection's owing to a lack of system performance.

Many researchers, like M. Bathula et al. [7], have said that the use of a combination of magnetic and infrared sensors can aid in the improvement of vehicle detection as well as the overall effectiveness of the detection system. Despite this, the biggest issue they are encountering with this process is the trajectory of the arriving vehicles, which is particularly difficult in construction zones.

For the first time, M. Bugdol and colleagues [8] used magnetometer detectors for vehicle detection in intelligent transportation systems, marking the first time this had been done (ITS). Driving near a magnetic detector causes a partial distortion of the local magnetic field generated by the detector, which causes the vehicle to lose control. Anytime that the vehicle passes through the middle of the magnetic field generated by the detector and the last portion of the magnetic field generated by the detector, the entire local magnetic field is twisted. (See Figure 1.) Following then, thedata received by the detectors is transferred to a central controller, which then processes the information. The primary function of this controller is to monitor and evaluate incoming traffic flow patterns, and then to use the information gathered from these analyses to govern the traffic signal systems at several intersections at the same time, as described above.

In addition, the use of mobile-based traffic measurement systems [9] has been suggested as a technique Of alleviating traffic congestion. This technology allows for the monitoring and management of traffic congestion onmotorways and other public routes, as well as other modes oftransportation. There are seven levels to this system, startingwith the individual smartphone and progressing to the top- layer business model, and it has the ability to determine all ofthe many components of traffic flow on roadways at some point in the near future. In turn, this will enable the mobile application to obtain information on traffic congestion on specific roads and to estimate the amount of time one might be delayed as a result of traffic congestion, in addition to suggesting suitable alternative routes, approaches, and other improvements. A revolutionary concept for the Intelligent Traffic System was proposed by the authors Badura and Lieskovsky [10] in their paper (ITS). The cameras stationed at the junctions scan and monitor the region inside the boundaries of their respective jurisdictions. The recorded data is promptly delivered to a topology independent data deliverysystem in order to perform general picture analysis (TIDD). Data delivery systems perform a variety of roles, one of which is to provide a communication framework and to ensure that data is transferred through mobile Ad-hoc networks (MANET). Through experiments, they have effectively demonstrated the utility of real-time data transportin a number of scenarios.

In their paper [11], Salama et al. advocated the use of photoelectric sensors to control traffic signal timing. One of the most crucial considerations to make is the precise location of the sensors that will be placed in the building. Partof the reason for this is that the traffic management agency wants to monitor the movement of vehicles at various times of day, particularly during rush hour. To make use of the acquired information, it is required to send it to a traffic control center, where the readings from the sensors are entered into an algorithm that assigns a relative weighting to each road in the system. Following the completion of this computation, a traffic direction for the side of the road that ismore congested than the other side will be opened, which will Allow for more time for traffic congestion to be alleviated when compared to the other less congested side of the road. For the purpose of controlling traffic congestion, this system has the potential of allowing for human intervention in rare circumstances. In the techniques section of the study, the characteristics of photoelectric sensors will be discussed in greater detail.

3. RFID Based Framework

There are various limitations to the typical traffic monitoring system, which is based on image processing technology. One of these effects is the influence of the weather. It is not possible to photograph a licence plate if there is a thick layer of dust or severe rain, among other things, because the license plate cannot be seen clearly. The development of RFID-based e-plates offers a promising opportunity for intelligent traffic monitoring, as well as vehicle identification and tracking systems. Regardless of whether or not the agents are associated with RFID tags, theycan function as a separate group of projects for tag processing And communicate with one another using established software agent protocols on the off occasion that there are no agents associated with RFID tags. The inventor suggests thatusers use the agent technology contained inside the e-plate based on RFID and other traffic items in order to fully comprehend the combined capacity of RFID and software agent technology, according to the designer. For the logic and data associated with a smart traffic object, an RFID-based smart traffic object requires a significant amount of memory space. The RFID systems can be used to store a versatile agent into the RFID tags, which will allow the tags to be integrated with various components of the traffic management system. This technology will eliminate the needto look up the related RFID-code information from a database, as well as reduce overall system reaction time by retrieving assistance information from the tags. As a result, faster help reactions and on-demand activities will be accomplished for various objects in a variety of situations. Each RFID item in a smart car is composed of two pieces, namely, object processing logic's and object data, which are both interconnected.

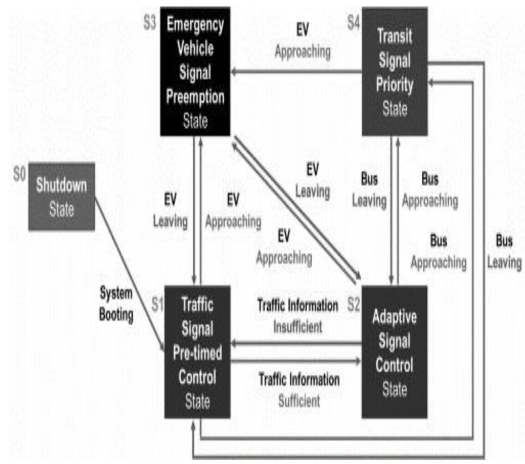

Figure 2: Proposed RFID

The Internet of Things networks will have to accommodate billions of devices, each of which will beuniquely recognized. The IPv6 protocol provides a solution to this problem by providing a bigger address space with a 128-bit address field to support the growing number of devices in the Internet of Things, making it possible to provide a unique IPv6 address to any feasible gadget within the IoT company. As a transponder in a car registration plate equipped with an RFID tag and sensors, RFID can be used to ensure that every vehicle receives the information it requires on the spot and delivers it to the designated destination. Among the information stored about the car and its owner is the plate number, vehicle type, speed, time when the automobile arrives at the monitoring site, driver's name, and license number, among other things. Vehicle information is captured by a fixed or portable RFID reader at a monitoring station and is then sent to a central worker unit for collection, processing, and archiving. It is possible to use this technology to assess things like the number of vehicles on a street, average speed of vehicles, and thickness of vehicles, among other things. When the framework communicates with theWeb, all information about vehicles on each street segment is instantly saved in a database, which can then be used for any cause or for any type of application. Upon passing through each monitoring station along the roadway, the RFID per users at those points will naturally examine the tag information associated with the car and its owner, and they will interact with the wireless sensor active nodes at the appropriate spots. These nodes communicate with the cluster head node by sending aggregated information. A GPS receiver installed at the monitoring station may communicate with GPS satellites at the same time, allowing it to obtain its location data, which is used to determine the vehicle's position boundaries. At that point, the information is transmitted via the GPRS network to a real-time central database, where the information is updated on a regular basisto ensure information reliability.

4. RESULT ANALYSIS

Identification Ratio

tion Adaptive TrafficControl System	alized Flexible Phase	Proposed Radio Frequency Identificat ion
13	7	22
18	15	27
21	20	35
24	22	44
30	26	51

Table 1: Identification Ratio Values

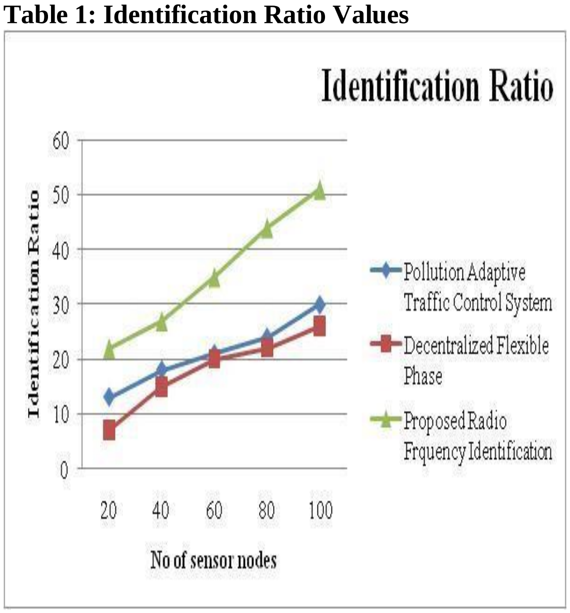

Figure 3: Comparison chart of Identification RatioFigure 3 & Table 1 demonstrates the comparison of identification ratio the benefits of Pollution Adaptive TrafficControl System, Decentralized flexible phase and proposed Radio Frequency Identification. Existing 1 PollutionAdaptive Traffic Control System explains the identification Energy Consumption Ratio Values are from 13 to 30, Existing 2 Decentralized Flexible Phase values are begins from 7 to 26 and proposed Radio Frequency Identification values are from 22 to 51. The proposed process demonstrates the better outcomes.

tion Adaptive Traffic Control System	Decentralized Flexible Phase	Proposed Radio Frequency Identification
67.2	57	83
69.7	59	84.8
67.8	62	87.9
72.6	66	74
75	69	93.6

Table 2: Energy Consumption Ratio Values

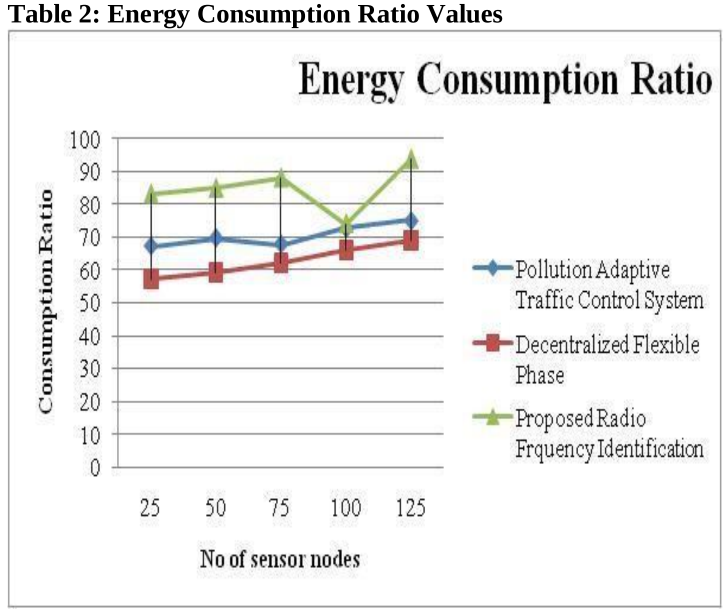

Figure 4: Comparison chart of Energy Consumption Ratio

Figure 4 & Table 2 demonstrates the comparison of Energy Consumption Ratio the benefits of Pollution Adaptive Traffic Control System, Decentralized flexible phase and proposed Radio Frequency Identification. Existing 1 Pollution Adaptive Traffic Control System explains the identification values are from 67.2 to 75, Existing 2 Decentralized Flexible Phase values are begins from 57 to 69 and proposed Radio Frequency Identification values are from 83 to 93.6. The proposed process demonstrates the better outcomes.

5. CONCLUSION

Smart traffic management system has given the best outcomes to with waiting and voyaging time of a passenger has been reduced and emergency vehicles can move without obstacles or barriers. The system utilizes wireless sensors to get real-time traffic information, for example, traffic condition on every road, number of vehicles, average speed, etc. Utilization of wireless sensors is suitable because of their low force consumption, minimal expense, distributed processing and self association. To accomplish large-scale network layout the system utilizes wireless bunch sensor network. The proposed system can give another method ofMonitoring traffic stream that assists with improving traffic conditions and asset utilization. Furthermore, transport administration department, utilizing real-time traffic monitoring information, can in time detect potentially dangerous circumstances and make important moves to forestall traffic congestion and minimize number of mishapsaccordingly guaranteeing safety of road traffic.

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