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STUDY OF SMART CITY USING INTERNET OF THINGS

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ABSTRACT

AS we know that the traffic is becoming the new problem of any city. As the population of the city is going to increase side by side the traffic is also increasing. Manually we are unable to manage the traffic. One more problem that arise that traffic increase in the city because peoples will not follow the rules. Although they are educated enough but unable to follow the traffic rules that can be cause to the traffic problem. The Internet of Things is based on the Internet, network wireless sensing and detection technologies to realize the intelligent recognition on the labelled traffic item, trailing, monitoring, managing and processed automatically.This research presents an overview of a framework distributed traffic simulation model. Apart from this, the second major problem is water distribution. The manual process not only waste the loss of water but although we do not have any monitoring system which can monitor the utilization of water. The third problem is garbage management. In India, we will see on the daily basis that municipal corporations are not doing their work properly. Everywhere we can see the waste on the road and no action will be taken. There is no transperent system that govement has provided so that the proper monitoring and action can be taken place. In this research paper, we will study all those parameters which can help to improve the lifestyle of the city and try to become that city to be a part of smart city.

KEYWORDS: Smart city, ?Internet of things, water, traffic, garbage.

INTRODUCTION

The **Internet of Things** (**IoT**) is the network of physical objects—devices, vehicles, houses and other items which are equipped with electronics, software, sensors, and network connectivity—that enables these objects to collect and exchange data. With the help of it, we can not only sensed the object but also controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit; when IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure.

BENEFITS OF THE IOT PLATFORM FOR SMART CITIES

Smart city enabled with IoT sensor networks would benefit the citizen in various ways -
1. Increasing Relevant Use of the Resources with Internet to Tell Us when and where to Save
2. Systems that save Time, Energy and Money
3. Improve Quality of life and Systems that save in emergency
4. Smart metering to monitor the optimum usage of energy , gas water etc

Smart City based on IoT could benefit the authorities in various ways -
1. Energy management
2. Water Management
3. Transport management

4. Noise and Pollution management
5. Waste disposal management
6. Citizen Information system
7. Waste management

LITERATURE WORK

- **Intelligent Traffic Information System :**
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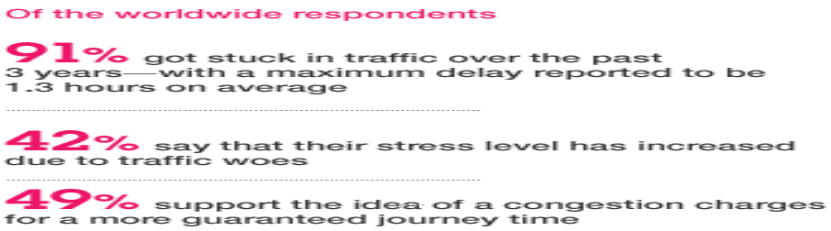

VEHICLE ARTS (BY INDIAN GOVT) :

- **RRR-** rules of road regulation(1989)
- **MVA -** motor vehicle act(1988)
- **CMVR-** central motor vehicles rules

✓ **India's first wireless road traffic controller technology** 'WiTraC' that runs on solar power was unveiled New Delhi(**25 JULY 2013**).The state-of-the-art technology developed by the Centre for Development of Advanced Computing (CDAC) was handed over to private partners for production by Telecom Minister Kapil Sibal New Delhi.

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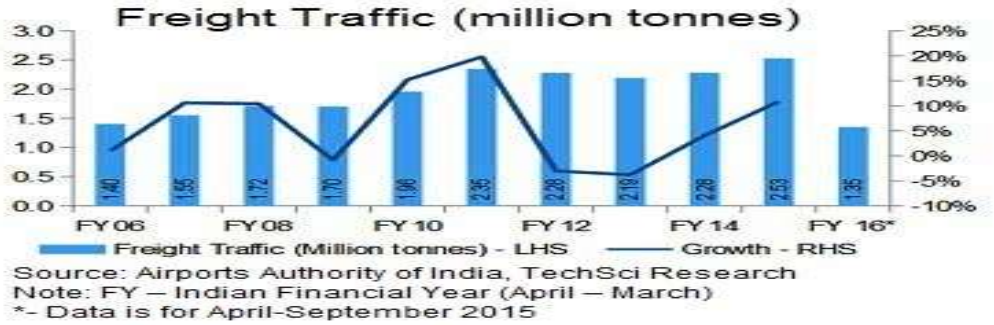


- **Water Distribution**

IMC has its origin in the year 1818, when the Holkars shifted their capital from Maheshwar to Indore. If we see differently than we will able to find some lacking of plan of development in regards to amenities like how water supply takes place, poor drainages, sanitation and no thing provide for waste disposal, the first municipality was comprised in Indore in the year 1870 and Bakshi Khajan Singh was appointed the chairman. In 1906, Indore

municipality started its own source of power and established a new water supply system from the bilaoli water body. Then in the year 1912, it became the first city to have an elected municipal government responsible for the enlargement and benefit of the city. After independence, Indore city was included into Madhya Bharat and declared as the first category of municipality by the local government department of Madhya Bharat.

- **Garbage Management**

Solid waste policy in India specifies the duties and responsibilities for providing hygienic so they have to focus upon waste management for cities and citizens of India. This policy was framed in September 2000, based on the March 1999 Report of the Committee for Solid Waste Management in Class 1 Cities of India to the Supreme Court, which urged statutory bodies to comply with the report's suggestions and recommendations. These also serve as a guide on how to comply with the MSW rules.[1] Both the report and the rules, summarised below, are based on the principle that the best way to keep streets clean is not to dirty them in the first place. So a city without street bins will ultimately become clean and stay clean.[2] They advocate daily doorstep collection of "wet" (food) wastes forcomposting, which is the best option for India. This is not only because composting is a cost-effective process practiced since old times, but also because India's soils need organic manures to prevent loss of fertility through unbalanced use of chemical fertilizers.[3]

Municipality Solid Waste Rules To stop the present unplanned open dumping of waste outside city limits, the MSW rules have laid down a strict timetable for compliance: improvement of existing landfill sites by end-2001, identification of landfill sites for long-term future use and making them ready for operation by end-2002, setting up of waste-processing and disposal facilities by end-2003, and provision of a buffer zone around such sites. Biodegradable wastes should be processed by composting, vermicomposting etc. and landfilling shall be restricted to non-biodegradable inert waste and compost rejects.

PROBLEMS FOCUSED

Intelligent Traffic Information System :

- **Routing protocol issue** in V2V(vehicle to vehicle) communication Routing is a very important aspect in the field of V2V communication as it is a type of distributed processing with a great number of nodes and a constrained and highly variable network topology.
- **Privacy and security issue** The IoT is extremely vulnerable to attacks as its components spend most of the time unattended, so it became very easy to attack them. Apart from this, one more thing is that, most of the communication is wireless which makes snooping very easy. This is probably one of the biggest concerns for consumers when it comes to IoT

Congestion and overload issue Congestion is occurred due to simultaneous messages from several devices that can lead to peak load situation and may have a tremendous impact on the network (3GPP, 2010). This affects the performance of the network, and may lead to failure of the network if the network is overloaded

WATER DISTRIBUTION

- **Inefficient use of water for agriculture. If we consider the different countries than** India is top country in the field of agricultural. Therefore consumption of water to for this field is highest. Traditional techniques of irrigation causes maximum water loss due to evaporation, drainage, percolation, water conveyance, and excess use of groundwater. As more areas come under traditional irrigation techniques, the stress for water available for other purposes will continue. The solution lies in extensive use of micro-irrigation techniques such as drip and sprinkler irrigation.
- **Leakages and Burst Pipelines**: There is no WD system anywhere in the world without some leakages and burst pipelines. Speight noted that about 23 – 27 bursts occur per 100 miles of pipeline in the US[2]. Although production increased in Akure by $5.4x10^6m^3$/yr or 61 percent between 2003 and 2012, the volume of water available to the consumers remained almost constant at $5.9x10^6m^3$/yr and $5.8x10^6m^3$/yr respectively[8]. The increase was wasted. In existing Nsawam water distribution, Nsawam, Eastern Region of Ghana, 26 percent leakage was observed during investigation with a 53.2 percent Non-Revenue Water[9]. Some of these leakages often come from buried joints, valves, flow meters, aged and weak pipelines and are physically non-detectible until water starts to boil or sinkholes created. Instances abound. Until pipe

burst occurred at the military barracks in Akure during the dry season in 1990, nobody reasoned that the green vegetation on the hill top was being watered underground by leakages from an underground pipeline. More than 100m stretch of Ogodu Road, Ojota, Lagos State, Nigeria collapsed in 1995 due to underground pipeline leakages. A sinkhole shut down three lanes of a major interstate highway for about two weeks in Denver in 2008, USA

- **Aging pipeline***:* The structural and hydraulic integrities of WD pipeline networks degrade with age. As corrosion progresses in steel and galvanised iron pipelines, they become weak and readily burst whilst still in service. Similarly, encrustation in cast iron and Asbestos Cement (AC) pipelines not only reduces their internal diameters leading to reduction in discharge but increases headloss and brings higher hoop stresses culminating in more frequent pipe bursts especially where booster pumps are involved.
- **Inappropriate Technology***:* In Africa, As-built drawings are often misplaced soon after operations start thus making line tracing and an appropriate modification a Herculean task. Also in Africa, most of the booster stations rely on power to operate high lift and booster pumps. Since power is erratic, WD is also erratic. Reducing dependency on power remains a challenge.
- **Inadequately skilled workforce***:* Most operatives do not know that transient pressure (water hammer) is induced with rapid closure of valves at reservoirs located on high grounds. And developing a team of skilled workforce is a problem as it takes time to assemble and train them. By the time they have gained sufficient technical knowhow and capabilities, some of them may be old and less agile, close to their retirement age or have been redeployed to other districts/zones. Some may even retire or join new employments thus creating a vacuum within the water agency

GARBAGE MANAGEMENT

As you can see in India's waste management projects and policies it is mainly focused on treatment of wastes and garbage they cant focused on "smart waste management".

Now question arises **why smart waste management** ?

There are two innovative functions of smart waste management: operational efficiency and waste reduction. Below, we'll give an introduction to both of them, and further explain why these functions are so important for waste management service providers of all types.

1. Reduce the amount of time and energy required to provide waste management services.

Although public services and waste management companies have been around for a long time, they have seen only limited innovation with operational efficiency—until the last few years. One big problem that they've faced is that it is better to pick up trash receptacles too often than to allow something like this to occur:They could only do so much to improve route efficiencies, while still meeting the needs of their customers. Even with great route optimization, the sanitation specialists must still physically go to the dumpster to check trash levels. Because of this, trucks often visit containers that do not need emptying, which wastes both time and fuel. But with the rise of the Internet of Things (IoT), smart sensors and sensor-level M2M technology have begun popping up in all kinds of places—including trash receptacles.

2. Reduce the amount of waste created.

The other side of smart waste management deals with managing the sheer quantity of waste created on a daily basis. Consumers and businesses toss millions of pounds of garbage each year. Educating these entities on how to reduce waste is particularly important for municipalities, who must pay for the landfills and waste removal services.

PROPOSED METHODOLOGY

Intelligent Traffic Information System :

- ✓ **FUTURE RESEARCH :**

It's a challenge for future research to ensure the security of smart objects in the traffic monitoring management system in case of a cyber attack or an intentional interest to a member of the IoT infrastructure. IoT requires modification of network connectivity models and readiness for massive increase in amount of real-time information.

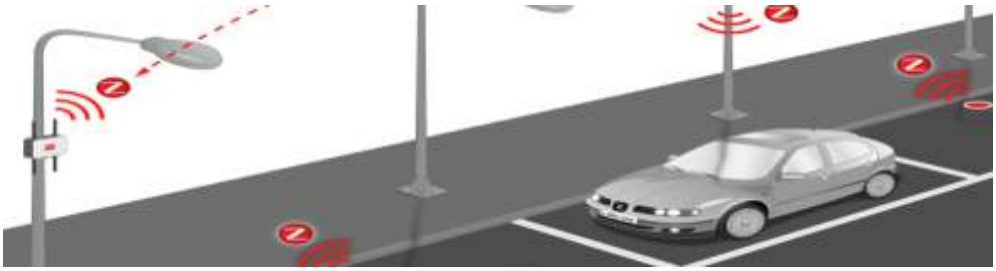
To achieve that, interaction communication models must be redesigned to include machine to machine and people to machine communications

✓ **3D ASSISTED DRIVING :**

Vehicles like cars, buses and trains along with the roads and rails equipped with sensors may provide valuable information to the driver to provide better navigation and safety. With the use of assisted driving, we will be able to find the right track with prior information about traffic jams and incidents

✓ **SMART PARKING :**

The new Smart Parking sensor's to be buried in parking spaces to detect the arrival and departure of vehicles. The Smart parking provides extensive parking management solutions which helps motorists save time and fuel.



WATER DISTRIBUTION :

The Internet of Things Oriented Approach:-

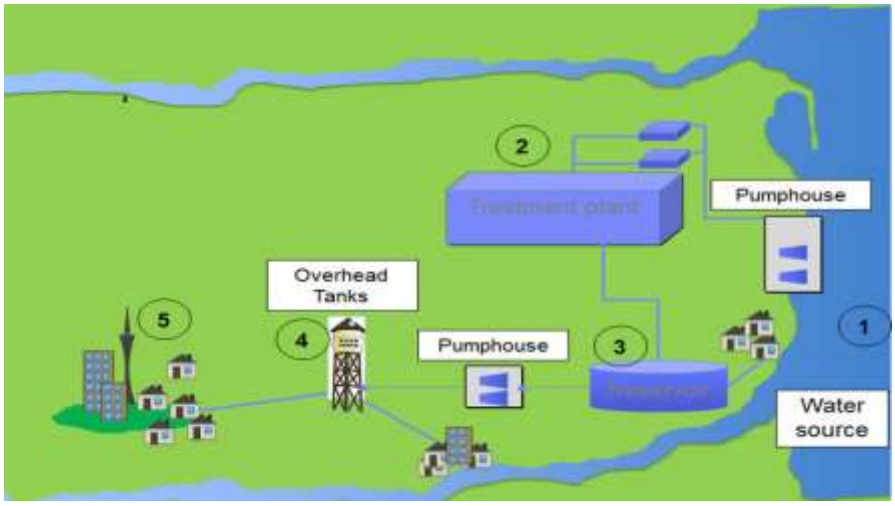
An Internet of Things oriented solution must take into consideration all these aspects. Furthermore, it must ensure the autonomy of a variety of IoT entities and resources, such as sensors, smart devices, sensor networks (considering ad-hoc or self-organizing networks), etc. Water utility monitoring and control systems use the following types of devices:

• dispersed devices - that are spread over a wide area;
• concentrated devices – that are close to each other.

In the last years, various solutions have been developed, such as, serial-to-Ethernet converters; these solutions enable the connection of these devices to the Internet, and implicitly the connection in an active mode to the IoT. In the active mode, the thing is connected to the Internet, allowing it to send real-time information to the IoT. An IoT-based solution must take into account the existing systems and tools for monitoring and controlling the water utility. Despite various limitations imposed by different aspects such as functional capabilities, geographical locations and administrative ownership, it also could propose to extend the current implementations towards internet-connected things. Furthermore, an IoTbased solution must be quickly deployed and easyto-use, adaptable to a variety of problems common for water utility monitoring and control. Before explaining the solution let me give a view of how water flows into the taps in your houses. Cities usually source water from rivers, lakes, and ground water reservoirs. From these water sources, the water is pumped (from pump houses) into treatment plants through pipes. Water is cleaned at the treatment plant and from there it is piped into reservoirs. The reservoir is the storehouse for the treated water. Water is pumped from these reservoirs to the overhead tanks spread across the city. The water

then gets distributed to houses and factories through a network of pipes working on gravitational force. In some cases, the water is directly supplied from the reservoirs to the houses.

The solution that we are going to discuss is about **water and energy conservation in the distribution of water USING IOT**



1. Level sensors send the information regarding the level of the water in the tanks and reservoirs at regular intervals.
2. The information is received by the integration engine.
3. The information is stored in the data repository.
4. Predictive analytics is run to forecast the demand of water for the next day, and the requirement of the water that needs to be pumped is ascertained taking into consideration the existing water present in the tanks and the reservoirs.
5. Energy prices for the following day are fetched from the energy application.
6. Information on pump maintenance scheduling and breakdowns is fetched from the maintenance management applications for water works.
7. The information generated in steps 5 and 6 is captured by the integration engine.
8. The optimisation algorithm is run to determine pump scheduling.
9. The information is shown in the portal for the city authorities to act upon .

GARBAGE MANAGEMENT :

This project IOT Garbage Monitoring system is a very innovative system which will help to keep the cities clean. This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. For this the system uses ultrasonic sensors placed over the bins to detect the garbage level and compare it with the garbage bins depth. The system makes use of AVR family microcontroller, LCD screen, Wifi modem for sending data and a buzzer. The system is powered by a 12V transformer. The LCD screen is used to display the status of the level of garbage collected in the bins.

Whereas a web page is built to show the status to the user monitoring it. The web page gives a graphical view of the garbage bins and highlights the garbage collected in color in order to show the level of garbage collected. The LCD screen shows the status of the garbage level. The system puts on the buzzer when the level of garbage collected crosses the set limit. Thus this system helps to keep the city clean by informing about the garbage levels of the bins by providing graphical image of the bins via a web page.

- ✓ **Hardware Specifications**
- AVR family microcontroller
- Wifi Modem
- LED's
- LCD Display
- 12V transformer
- Ultrasonic sensors
- Resistors
- Capacitors
- Diodes
- ✓ **Software Specifications**
- Arduino Compiler
- MC Programming Language: Embedded C

CONCLUSION AND FUTURE WORK

- **Intelligent Traffic Information System :**

This paper presents a real-time traffic information collection and monitoring system architecture to solve the problem of real-time monitoring and controlling road vehicles.The proposed architecture employs key technologies: Internet of Things, RFID, wireless sensor network (WSN), GPS, cloud computing, agent and other advanced technologies to collect, store, manage and supervise traffic information.Interface and performance evaluation of the simulation results Agents provide an effective mechanism for communication amongst networked heterogeneous devices within the traffic information system. The proposed system can provide a new way of monitoring traffic flow that helps to improve traffic conditions and resource utilization. In addition, transport administration department, using real-time traffic monitoring information, can in time detect potentially dangerous situations and take necessary actions to prevent traffic congestion and minimize number of accidents thus ensuring safety of road traffic. In general, the IoT will play an important role in the traffic management enhancing the efficiency of information transmission, improving traffic conditions and management efficiency, traffic safety, and reducing management costs. However, the proposed traffic system based on the IoT consists of a large number of RFIDs and sensors that transmit data wirelessly. This calls for improved security to protect such massive amounts of data and privacy of users.

WATER DISTRIBUTION

Study conducted on the urban cities of india showed significantly high incidence of water and sanitation related diseases in slum and squatter communities than elsewhere. The environmental problems in slums are aggravated due to a number of factors like: their location at environmentally unsafe sites (near polluted waterways), no sewerage and sani- tation in the communities, poor personal hygiene due to less availability of water, poverty and lack of environmental education. While the environmental conditions and consequent human sufferings are almost comparable among various slum communities, they appear much harsher for pavement dwellers as resulted from ANOVA analysis.

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