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SMART CITY IMPLEMENTATION MODEL BASED ON IOT TECHNOLOGY

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Abstract : **The Internet of Things (IoT) can be defined as an environment where internet capabilities are applied to everyday objects that have earlier not been considered as computers to provide a network connectivity that will enable these objects to generate, exchange and consume data. According to a forecast given by the Ericsson Mobility report issued in June 2016, there will be as many as 16 billion connected devices that will get Internet of Things (IoT) technology enabled by 2021. Apart from having its uses in personal wellbeing and comfort, IoT will be a key factor in the planning of smart cities specially in the time when government are focused on the development of smart cities. This technology can be implemented not just for communication networks but also for sanitation, transportation, healthcare, energy use and much more.**

Keywords: Internet of Things (IoT) Information and communication technology (ICT) Smart city Sensors Radio frequency Identifiers(RFID)

I. Introduction (*Heading 1*)

The Internet of Things is all about installing sensors such as GPS, laser scanners etc in the objects and connecting them to the internet through specifically defined protocols for information exchange and intercommunications in order to achieve intelligent recognition, location, tracking, monitoring and management. Recognizing the scope of this technology, Tech giant IBM announced in late march 2015 that it would invest $3 billion over the next four years in IOT. In this paper, the definition, status and scope of Internet of Things are discussed, and possible models that can implement IoT Technology in different departments of a smart city are considered. Companies such as Sterlite Technologies Ltd and Aeris India are working towards building network infrastructure in smart cities to enable IoT technologies with the aim of linking intelligence and information with devices which will help in achieving the main purpose of making smart cities that is to improve the quality of life of the residents of the city by improving the efficiency of services and meeting resident's needs.

Iot offers a plenty of applications in day to day life. Iot is a technology that will help in making internet even more immersive and penetrating. However, the heterogeneity of this paradigm makes it very complex and the implementation of this paradigm is also hindered due to a lack of clear and widely accepted models[1]. Another issue related to this topic is that as if now there is no formally defined definition of smart cities. Its aim is roughly defined as increasing the efficiency of the existing services and administration systems of the city and reducing the cost of these operations. It has been projected that by 2025, we will have around 88 smart cities in the entire world. Some countries like Singapore are aiming for an even higher and more complex objective of achieving a smart nation rather than a smart city. It is to be considered that it is an achievable task for a country like Singapore as it has more than 90% availability of broadband in home and more than 86% of the citizens of the country use smart phones. On the other hand, it is more difficult for a developing and vast nation like India to implement the concept of smart cities by using features of IOT. This paper is organized as follows. Section II provides a brief overview of the applications of Iot in different departments of a Smart City. Section III provides an overview of the related work which has been proposed earlier and the work which has already been implemented. Section IV contains the proposed framework with its diagrammatic models and working procedures and section V contains the results and the conclusion.

II. APPLICATIONS OF IOT IN SMART CITIES

1.Smart parking: Finding a parking space during rush hours in crowded city can be time consuming and frustrating. Furthermore, drivers blindly searching for parking spaces

create additional congestion. Smart parking make the search for parking space easier and convenient for drivers. Smart parking are powered by Iot systems that detect the number of empty parking slots and send the information over the internet to smart parking applications back -ends. These applications can be accessed by the drivers from smart-phones, tablets and in-car navigation systems. In smart parking, sensors are used for each parking slot, to detect whether the slot is empty or occupied. This information is aggregated by a local controller and then send over the internet to the database.

Smart parking was first introduced in 1990's. Nowadays in most of the public places like shopping mall, commercial places the parking is equipped with the counter sensors which are placed in entry and exit gates of the parking. These sensors basically keep track of number of vehicle entering and leaving a parking places and thus it keeping a records of how many slots of the parking are available i.e how many empty parking slots are empty. Then it is displayed in entry gates of the place.

Design and implementation of a prototype smart parking system based on wireless sensor network technology with features like remote parking monitoring, automated guidance and parking reservation mechanism can be implemented.

Above diagram describe how the smart parking system works. It follows some steps like checking the availability of parking space, and direction to the available space and paying for the parking according to duration all steps explained below.

i. First the driver checks the availability using application installed in the smart phone then it displays the available spaces, then the driver moves accordingly.

ii. The next step is to finding the direction of the available space for the parking. Direction is also provided in the application that is already installed in the driver's phone. Using this the driver navigate to the parking area.

iii. Then driver navigate to the parking area then occupies the free parking area and then the occupancy sensors gathers the real time data.

iv. The payment must be made accordingly by using the payment methods like credit/debit payment, UPI, paytm etc.

2.Smart Lighting: Smart lighting systems for roads, parks and buildings can help in saving energy. According to an IEA report, lighting is responsible for 19% of global electricity use and around 6% of global greenhouse gas emissions. Smart lighting allows lighting to be dynamically controlled and also adaptive to the ambient conditions. Smart lights connected to the internet can be controlled remotely to configure lighting schedules and lighting intensity. Custom lighting configurations can be set for different situations such as a foggy day, a festival, etc. Smart lights equipped with sensors can communicate with other lights and exchange information on the sensed ambient conditions to adapt the lighting.

3.Smart waste management : The management of waste has been a serious concern in many cities because of the lack in the storage structure for garbage and inefficiency in the service. The use of Iot technology may result in significant improvement in waste management. For example, smart waste containers which use a sensor to detect the level of the load which use a sensor to detect the level of the load which in turn can allow an optimization of the waste collector's trucks route, can help to make this process both fast and efficient and can also help in improving the quality of recycling of these products. The smart waste containers should be connected to the control centers which processes the information which can then be transferred to the waste collector's truck. This approach is still not applied to the cities because it is very expensive than traditional approach.

4.Smart Hospitals : A health care center is one of the most important part of a city**.** There are many applications of internet of things which can be used in hospital's which can be a solution to many problems. Problems like shortage of staff, tracking patient's reports at the late hours. What if a

patient is not able to come to the hospital due to his critical stage then these internet of things helps in getting information of a patient and doctor can prescribe the medicine through internet only.

Smart healthcare plays an important role in human services applications by installing sensors and actuators in patients and their prescription for observing and tracking purposes.

Also smart healthcare helpful in maintaining the patients information about his physical statuses of patients by using sensors to gather and analyze the data and then sending patient's information remotely for preparing focuses to take suitable measures. And also helps in giving best services and care to the patient.

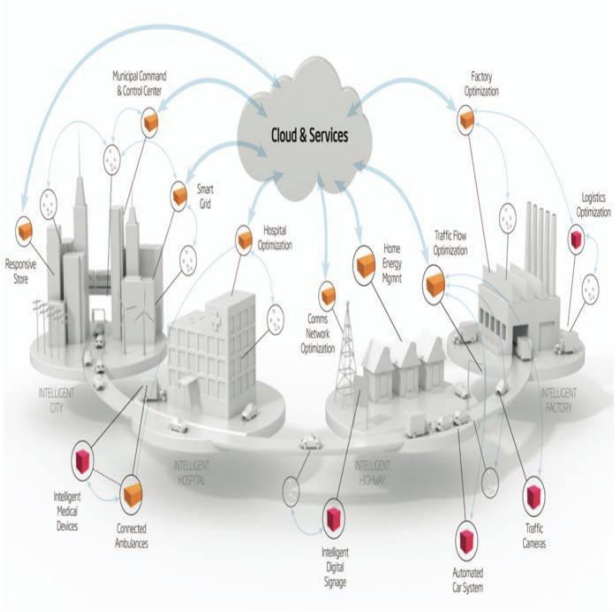
5.Structural health monitoring : It uses a network of sensors to monitor the vibration levels in the structures such as bridges and buildings, The data collected from these sensors is analyzed to assess the health of the structures. By analyzing the data it is possible to detect cracks and mechanical breakdowns, locate the damages to a structure and also calculate the remaining life of a structure. Using such systems, advance warnings can be given in case of imminent failure of the structure. An environment effect removal based structural health monitoring scheme in an Iot environment is proposed. Since structural health monitoring systems use large number of wireless sensor nodes which are powered by traditional batteries, researchers are exploring energy harvesting technologies to harvesting ambient energy, such as mechanical vibrations, sunlight and wind.

6.Smart roads : Smart roads , also known as smart highways , is a term used to describe roads that use sensors and Iot technology which makes driving safer and greener. Smart cities and self -driven cars of the near future would not be 'smart' enough without smart roads.

Smart roads can provide real-time information to drivers about weather conditions such as icy roads and traffic information such as congestion and parking availability. Smart roads are particularly useful on risky or mountainous roads to make driving safer by warning about incoming traffic or landslides. Smart roads can also generate energy to use for street lights or to charge electric vehicles on the move.

6.Surveillance : Surveillance of infrastructure, public transport and events in cities is required to ensure safety and security. City wide surveillance infrastructure comprising of large number of distributed and internet connected video surveillance cameras can be created. The video feeds from surveillance cameras can be aggregated in cloud-based scalable storage solutions. Cloud -based video analytics applications can be developed to search for patterns or specific events from the video feeds.

These are some of the Iot based smart city applications. The following diagram shows each and every applications need to developed to make city as a smart city.



III. Conclusion

In this paper, the solutions available for the implementation of Iot technology in smart cities have been analyzed. The discussed technologies are close to being implemented and similar models have already been implemented for experimental basis and many people related to this industry are now very actively participating in the production of these devices to take advantage of these technologies for enabling the applications of interest, though the range of design options or models for Iot systems is rather wide, its implementation cannot be just on the basis of these models. The issues related to the cost of implementation and the security concerns are to be considered.

IV. References

[1] Bahga, Madisetti, "Internet of things – A hands-on approach", 2015

[2] A. Laya, V. I. Bratu, and J. Markendahl, "who is investing in machine to machine communications?" Oct. 2013, pp. 20-23.

[3] K.Ashton, that "internet of things" thing, RFiD journal,[Online], 22 June 2009

[4] Edoardo patti and Andrea Acquaviva, "Iot platform for smart Cities: requirements and implementation case studies" 14 November 2016