USE OF INTERNET OF THINGS FOR BUILDING SMART CITIES IN INDIA

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ABSTRACT

Cities in India and around the world is a process that evolves gradually. Its not a sudden decision with preplanned infrastructure. The concept of Smart city has made us think in a planned city with such an impact that each activity conducted in the city is identified, monitored and controlled by the technology.

Internet of Things is an emerging technology in the world of IT that can be explored to its zenith to achieve the goal of building a Smart City. Only building is not enough but maintaining and sustaining its identity. Integrity and authenticity is another task to be thought processed and implemented.

There are various challenges in make a city SMART in India as there are various implicit and explicit hurdles that are to be confronted. A model of Smart City is not a solution as every city is unique in its existence. But a prototype development is need of the hour to have a logical layout of the Smart City using IoT.

Keywords: *Internet of Things, Smart City, Big Data, Cloud Computing, IT.*

INRTODUCTION

Making of cities, in the world, are an evolutionary process. People migrate to locations where they are facilitated by better and convenient way of acquiring basic needs of living like food, shelter and clothing. But human needs are endless. They strive to makes their lives more easy and adaptable by using technology (facilities that enrich people's lives). In today's world, Internet is a resource that helps to achieve this task. Today is the age of technology; and internet has accomplished a lot in managing various tasks at a click of the mouse. Now the global village (term used for world) is trying to work smartly and get connected to every part of the world instantaneously with very much of ease.

A City evolves by

1. growth in industrial and commerce in that area
2. Having rapid growth, bring a sort of stability that makes the citizens at easy with the facilities provided in the city.
3. When the facilities get renewed, then the city needs to be redeveloped to adapt to the new and effective lifestyles.

SMART CITY

The cities are made more and more people-friendly and accommodate all that is needed to them. Keeping a vision of 2050, a new concept is emerging "SMART CITY".

A Smart City is a city that is intelligent. It helps to make our work easier that could only be imagined. All the devices are connected to each other. The data can be collected from every part of the devices that are around us and that would help us in future predictions. This can be achieved by establishing interactivity between humans, machines, hardware devices and software.

Internet is a mode that helps to achieve this interaction. Using wired and wireless mode of transmission, Internet is penetrating in every strata of life. It is been used not only in sectors related to technical aspects but also in non-technical fields as well where there was less scope for its usage.

INTERNET of THINGS

After the advent of Big Data and Cloud Computing, the need of acquiring of data from remote area and storing them for future aspects have grown up. This has led to a new level of thinking called, Internet of things (IoT).

Internet of things is an upcoming concept that brings all the devices together. It is growing exponentially and is reaching different verticals and industries. Lot of innovation is happening around IoT across different verticals and technologies. It is one of the most talked about technology trends today. There is a broad consensus among technology vendors, analysts and other stakeholders that IoT would have a significant impact on the technology landscape and society in the coming years.

In India, the IoT ecosystem is mainly driven by Government, Industry and Startups. India is showing a keen interest in making use of IoT. The 'Make in India' initiative started by the Central Government is a major leap towards the IoT. Government has rightly recognized its potential and working towards its usage in having good governance. The government has taken initiative and framed a draft policy to fulfill a vision of developing a connected, secure and a smart system based on our country's needs.

Government of India's IoT Announcement: Department of Electronics and Information Technology, has come out with a draft IOT Policy document which focuses on following objectives:

1. To create an IoT industry in India of USD 15 billion by 2020. It has been assumed that India would have a share of 5-6% of global IoT industry.
2. To undertake capacity development (Human & Technology) for IoT specific skill-sets for domestic and international markets.
3. To undertake Research & development for all the assisting technologies.
4. To develop IoT products specific to Indian needs in all possible domains. [1]

MISSION OF THE GOVERNMENT REGARDING SMART CITIES IN INDIA

Smart Cities Mission of the Government of India is a bold, new initiative. It is meant to set examples that can be replicated both within and outside the Smart City, catalyzing the creation of similar Smart Cities in various regions and parts of the country. The core infrastructure elements in a smart city would include:

i. adequate water supply,
ii. assured electricity supply,
iii. sanitation, including solid waste management,
iv. efficient urban mobility and public transport,
v. affordable housing, especially for the poor,
vi. robust IT connectivity and digitalization,
vii. good governance, especially e-Governance and citizen participation,
viii. sustainable environment,
ix. safety and security of citizens, particularly women, children and the elderly, and
x. health and education.

SOME OF THE KEY ASPECTS OF A SMART CITY WILL BE

- Smart parking
- Intelligent Transport System
- Smart urban lighting.
- Waste management.
- Smart city maintenance
- Tele-care
- Citizen safety
- Smart Grid
- Smart Energy
- Water Management[2]

The IoT uses following technologies to fulfill its acts:

1. Sensing

High quality Sensors and technology that uses Radio-frequency identification (RFID) and wireless sensing networks that capture large variety of data can be used. This data may be further used for the better urbanization in the Smart world.

2. Authentication

The data acquired through sensing is continuously authenticated via location and condition validity checks.

3. Monitoring

The data collected and authenticated needs to be monitored regularly and that at real time. This is a major task as the data is to be monitored when the system is really in function.

4. Control

Monitored data is analyzed in real time and the optimum control information is determined and transmitted.

5. Cloud computing

Robust remote backup functions capable of withstanding local disasters can provide required information without users being aware of the location of hardware and data. Moreover, rapid and flexible response is enabled for services whose contents change according to the situation and the lapse of time. For example, residential services can be tailored to individual districts and resources can be flexibly allocated for maximum effect when large amounts of processing are required. [3]

TECHNOLOGIES EVERY SMART CITY SHOULD HAVE

For an intelligent functioning of a smart city it must have good assembly of technologies. A few are listed below:

1. City guiding apps
2. Wi-Fi
3. Machines that display real-time information dynamically
4. Disaster Management System
5. 24x7 surveillance
6. Device charging stations
7. Good amount of sharing methodology for data and other resources
8. Good Internet penetrations
9. traffic rerouting facility
10. Better accountability of data
11. An efficient Human Resource Development

LIST OF CITIES SELECTED TO BE MADE SMART IN INDIA[4]

Sr. No.	State	Cities
1	Odisha	Bhubaneswar
2	Maharashtra	Pune, Solapur
3	Rajasthan	Jaipur, Udaipur
4	Gujarat	Ahmedabad, Surat
5	Kerala	Kochi
6	Madhya Pradesh	Bhopal, Indore, Jabalpur
7	Andhra Pradesh	Kakinada, Visakhapatnam
8	Karnataka	Belagavi, Davangere
9	New Delhi	New Delhi Municipal Corporation
10	Tamil Nadu	Coimbatore, Chennai
11	Assam	Guwahati
12	Punjab	Ludhiana

TABLE 1.1 *List Of Smart Cities In India*
(Source:http://www.thehindu.com)

CHALLENGES FOR SMART CITY IN INDIA

Though we are planning for a big leap towards future using IoT but there are many challenges to overcome. They are observed and counted below:

1) The biggest challenge lies with the infrastructure. The development of high-tech infrastructure is a herculean task as the current cities are less adaptive. Practically, if we see the Indian cities in current scenario, are very ill equipped with respect to internet. In India the use of internet is expanding but not as fast as is required. The roads, offices, educational institutes, service sectors need to be well organized to be made adapted in the smart city.

2) Unplanned cities are available in India. These needs to be reshaped which is not a simple assignment.

3) Some of the cities are ancient. Their original identity would become a past in the race of making the city smart. This may add up to more intangible tasks.

4) Population in India is vast. Providing technological freedom and maintaining a control over it is itself a bigger aspect of discussion.

5) Issues of cyber security and handling crimes related to cyber world would multiply leaps and bounds. Hence proper precautions have to be also taken legally.

6) Connectivity in vast regions also considering the geographical challenges is a major hindrance that needs not to be forgotten.

7) With advent of new technologies and newer protocols, etc, the older ones needs to be made compatible to them. Upward compatibility has to be thought of in the initial stages itself keeping a window open for the new technologies to be brought in and old ones to be phased out.

8) One must also think of the scenario of accounts maintenance of those who will not be alive after being a part of Smart City for decades.

9) Balancing the eco system of the city is a major challenge. Adding new technology may hamper the eco system of the entire life chain that is currently dwelling in the city.

The challenges are many but a few are mentioned above. The list still goes on.

OBSERVED SOLUTIONS TO THE CHALLENGES TO BE OVERCOME TO BRING IN SMART CITY AS A REALITY

1) The cities that are selected now has lots of unmanaged pockets of spaces that need to be found, acquired from the illegal occupants and planned.
2) The people need to be made aware of the use of IoT. Training to be imparted, the techniques should be made available as pilot projects to the mass so that they start adapting to the concepts.
3) Management of Wastes in the city needs to be taken as a task of highest priority. Recycling of waste to make reuse of it is the need of current hour.
4) Proper utilization of water and better management of pollution is to be seen as one of the next features.
5) Data needs to be made available of each and every thing that is present in the City. It requires lots of infrastructure. Each device needs to be attached with sensors. Hence the required electronic devices to be made cheaper so that it suits the pockets of Indian common man.
6) Laws to be amended in the Constitution of India, as many legal complications may have to be faced in Smart City. The IT Act, 2000, needs to be made more robust in that case to curb the cybercrimes that may usurp.
7) An advisory committee to be set up by the Governing body that will be giving proper advice at regular basis to the proper functioning of the smart cities. Also they will guide to check anything wrong happenings in the system.
8) Separate Research and Development need to be encouraged that will help in bringing newer and better quality products and services in society thus helping the functioning of the Smart City System.
9) There are many industries that use little of computer or computer related technology. These industries must be brought into the stream of computing.
10) Proper logistics to be maintained. Logistics is a major concern as this would become a major source of information in the planning new things. Also to have future predictions this will play a major role.

ADVANTAGES OF IOT

IoT can be explored to its fullest in the project of Smart City. It is said all atoms in the world can be given an ID and can be used to collect data. So, in this respect, IoT plays a major role in making the smart city a reality. IoT has its emerging use in sectors discussed below:

1. Agricultural sector
2. Water Management
3. Pollution Management
4. Educational Sector
5. Wildlife management
6. Transportation sector
7. Traffic Management
8. Weather Forecasting
9. Earthquake predictions
10. Telecom Sector
11. Military Services
12. Health Sector

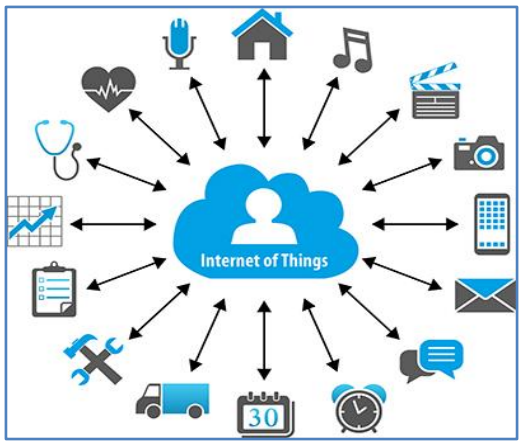

Fig 1: IoT in use of various sectors
(source: http://www.channeltimes.com)

All these sectors and many more can use the services of IoT. All these areas are part of the Smart City which will be easily benefitted to other aspects also.

CONCLUSION

Building a smart city is a huge task. But making it possible without IoT is an impossible task. Thus, IoT is a major concern of our age to think and implement in all walks of our lives. One must start imbibing this technology into the current scenario cities. This will help to develop new protocols, new technology, build understandability about smart city amongst the masses, etc.

A smart City Model is to be constructed. This idea is still in its inception but needs a high level of thought processing and research & development too.

REFERENCES

1. http://deity.gov.in/content/internet-things
2. http://www.iotleague.com/current-state-of-internet-of-things-iot-in-india/
3. http://nl.nec.com/nl_NL/global/ad/campaign/smartcity/index.html
4. http://www.thehindu.com/news/national/list-of-first-20-smart-cities-under-smart-cities-mission/article8162775.ece
5. http://www.channeltimes.com/story/top-ten-emerging-iot-technologies-by-gartner/
6. http://smartcities.ieee.org/component/search/?searchword=IoT&ordering=popular&searchphrase=any
7. http://smartcities.gov.in/
8. http://www.smartcitieschallenge.in/