Intelligent Governance (I – Governance) of Smart Cities using Information Communication Technology

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Abstract- Development of Internet communication technology has changed the world tremendously. Today Urban population use communication technology in daily life for many house hold activities and this trend in upcoming generation is increasing day by day. The concept of modern cities or Smart Cities where almost all the activities of the human being are supported with the use of communication technology, which leads us in designing Smart Cities for effective Intelligent Governance: I-Governance. This paper proposes the day to day life activities dependent on hardware to interact with each other as using Internet of Things and extract meaningful knowledge from Big Data for the better development of population through effective I-Governance. Proposed design of Smart Cities will have traditional services of city blended by ICT enabled services, Digitizing them using different hardware architecture and clubbing the data to make Big Data useful for the governance of city. Using this Big Data produced, using different Internet services through interconnected devices policy drafts for the development of Smart Cities could be framed by respective stakeholders. Various components of Smart city would include Intelligent Transport system, Intelligent Administration, Intelligent Energy, Intelligent Health Care System, Intelligent Education System, Intelligent community services, Digital transaction, Digital Currency, Smart Mobile Applications, Smart Mobile wallets, Intelligent Governance and so on. Combination of two fast emerging technologies that is Internet of Things (IoT) and Big Data (BD) will enable us to design the proposed concept of Smart Cities for effective Intelligent Governance: I-Governance. Using existing physical hardware we will network all the devices and digitalize information to single point of control. This single point of control will use this information for planning and implementation of various smart services in Smart City. This development of Smart City infrastructure will deliver best I-Governance and I-Services for the population living in smart cities and uplifting their life style tremendously to make life more safe and easy.

Keywords- Smart City, Internet of Things, BigData, Intelligent – Governance (I-Governance), Intelligent - Services (I-Services), Digital Currency, Mobile wallet

I. INTRODUCTION

Study on different research papers have been done on smart cities, Internet of Things, BigData and E – Governance. These research publications published in various journals helped in analyzing the present work done and detecting the lacunas which remains unsolved in the current work.

Annalisa Cocchia in their paper "Smart and Digital City: A Systematic Literature Review" [01] suggested that within last few years of twenthy century, two salient events have been occuring in the development of world population: movement of rural population towards cities and growth of Information Communication Technologies (i.e.ICT). Concentration of population in cities is growing at rocket speed that created both positive and negative impact at world level. On one hand it has positive impact by increasing the upliftment in the living standard of people, cultural level, opening of new job options and development of economic conditions. On the other hand, heavy growth of population in cities created negative impact by increasing traffic jam, less space for living, less use of ICT enabled services, emission of carbon dioxide and greenhouse gases and solid waste disposal with consequences on health conditions. The new concept of smart cities is emerging, these cities are capable to resolve urban problems by paying attention to the environment using latest technologies of Internet of Things and Big Data.

Hollands, R. G. in their paper "Will the real smart city please stand up? City: Analysis of Urban Trend, Culture, Theory, Policy, Action,"[02] suggested that in the international context, in order to achieve the objectives established in the Kyoto Protocol, the Smart City concept was born and has been adopted by many institutions (e.g. European Commission, Setis-EU, OECD, etc.) which labeled as "smart" initiatives and projects relevant to cities sustainability. Especially, Smart City and Digital City are often used without specifying their similarities and differences.

During our research work would be using two main emerging technologies for designing a model of Smart cities framework for effective Intelligent Governance namely i) Big Data and ii) Internet of Things.

i) Big Data

Today a world without data cannot be imagine. Every organizations has to reterive useful knowledge and information, implement extensive studies by analyzing the data stored in structured format and fromulate meaningful Intelligence from that data. Anything ranging from product names and product description, to products availablity, to final purchases made by client, to wrok froce hired, etc. has become necessary for day-to-day activities. Thus data is the core entity on which any organization exists.

In reference paper "Big Data Analyitics" [03] suggested that Big data means to datasets that are not only massive, but also huge in diversity and momentum, which makes them challenging to manage using traditional tools and techniques. Due to the increasing growth of such data, solutions are required to be need and made available in order to handle and reterive exact values and information from these datasets. Furthermore, Strategic planers need to be able to access

meaning ful information and generate Intelligence from frequently updating data. This kind of tracking of volumenous data can be tracked using algorithms of BigData by logical analysis.

A Practical Guide to Transforming the Business of Government. In: TechAmerica Reports [04] suggested about are latest BigData mechanisms available that are useful for controlling the exponential increase in network generated data, as well minimise database issues by developing the ability to reterive exact required data by the demand of user query.

Another : SAS Reports[05] review suggested that BigData implementation is useful in core industries like service oriented companies, manufacturing industiries, ICT based companies, Engineering and Technology based organizations. This database implementation and analysis is helpful in increasing the productivity and client satisfaction of the organization by suggesting valuable inputs on the basis of data collected and analyzed.

ii) Internet of Things

The Internet of Things (IoT) means interconnection of digital devices used in every day life connected via wired or wireless internet. An example of a simple IoT object that digital survilance camera installed in drawing room, kitchen, looby poarch of home, main gate etc of a Smart Home could be connected through mobile using internet connection. Services related to digital gadgets can be controlled through mobile application by widening the Internet to a network of interconnected objects" [06], the IoT will have a wide range of network of devices. These devices will include sensors to open the main gate lock, control the appliances available in kitchen, digital lights control mechanism of looby, recording of favourate TV channel and other sensors to control digital devices. These devices will genearte unstructured data that has to be converted usng proper alogrithms in meaningful information to control the digital gadgets and perform physical actions in apporpriate manner.

Research paper *[07]* states that development and designing of architecture of Internet of Things (IoT) is very complex challange as the range of digital devices to be interconnected in the system is endless. Evey new digital device entering in the system has a different protocol and structure, so common structure and standard formulation had to be developed for providing services of IoT. This architecture should be secure as well as open to integrate the development and addtition of new digital devices. Thus interconnecting devices should use commnon platfrom to store and reterive data and meaningful infromation for various actions to be performed.

"Convergence of MANET and WSN in IoT urban scenarios," [08] pointed that the IoT concept, will in future make services of internet more interactive and user friendly. With the increasing use and development in wide range of services of IoT potentially large volume of data will be created by these devices. This volumnous data will create meaningful infromation that will be used for Intelligent Governance (I-Govenance). This new kind of Intelligence will generate entirely different kind of services helpful for the growth and development of society. Administration at local and celtral level will user this intelligence for proper planning and implementaion of various social welfare schemes. Common people will use this kind of platform for the ease of their day to day activity and smooth conduction of lifestyle.

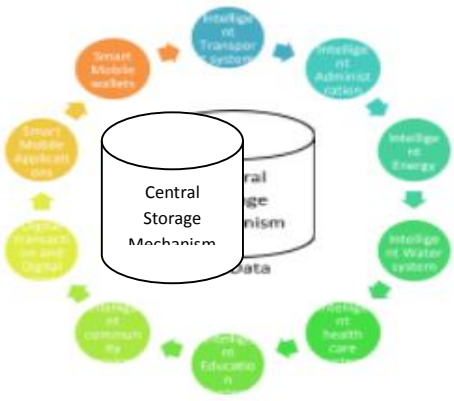
Although till now we do not have any formal and structured defination of "Smart City" Our focus is to reduce the operational cost of public administration and make Intelligent governance. This could be acehieved by making utilization of the public resources in proper and best manner, enhancing the service quality provided to the citizens of that city.

To develop and design Smart City network of services, Internet of Things will be useful for integration of hardware together whear as, BigData will be helpful in storing the data in systematic manner to reproduce meaningful Information to be used as services for Intelligent Governance. This infrastructure of Smart City Integration along with Government policies make effective utilization of Intelligent Governance by implementing IoT, BigData and latest hardware integration, should bring number of advantages in the management and effective utilization of services being provided in Smart Cities.

II. SERVICES OF SMART CITY

Objectives of our research paper is to identify the application model of Internet of Things (IoT) alongwith Big Data (BD) in the establishment of Intelligent Governance (I-Governance) System in Smart Cities. Using these emerging technologies of Information Communicatin Technology, we can transform E-Governance system to Intelligent Governance (I-Governance) system. Identify the core areas, where use IoT and BD for developing the intelligent system in smart cities. These core areas include the various services to be brought under one umbrella for efficient use of data for every service. Various services that could be brought under one umbrella of Smart city would be following

- Intelligent Transport system
- Intelligent Administration
- Intelligent Energy
- Intelligent Water system
- Intelligent health care system
- Intelligent Education System
- Smart community services
- Digital transaction and Digital Currency
- Smart Mobile Applications
- Smart Mobile wallets



All these leads to the Designing of Smart cities for Intelligent Governance (I-Governance).

All these systems will be integrated with central data bank. With the increase in storage capabilities of highend ultra mordern hardware and mechanism of data collection, large volume of data could be generated easily and rapidly. Every moment, data is being generated and needs to be examined and saved to reterive effective value. With the development of latest hardware, so organizations need as much as value as possible from the huge volume of stored data. Huge amount of data sizes are increasing very fastly, currently starting from a few dozen terabytes (TB) to many petabytes (PB) to Exabytes(XB) to Zettabytes(ZB) to Yottabyte (YB) of data in a one data set. This unstructured formant of large data is now stored in database. The volume, variety, and constant change of such data require a new type of data analytics, Big Data Analytics, as well as new mechanism of data storage and analysis mechanism. Such unscalable amounts of big data need to be analyzed properly, and interconnedted knowledge should be reterived.

We will develop model through which every information of all different hardware working to get data in various different forms would be clubbed together using IoT to formulate Big data that will be utilized efficiently for the Intelligently designing policies for the development of Smart Cities including both infrastructure development and enhancement of common man living standards.

III. IMPLEMENTAION OF SERVICES

During the course of research work, focus on the following methods to complete our research work. Prepared a frame work for connecting various technologies to generate Big Data. Used all latest hardware device and joined them through wireless network and physical wired connectivity, so as to generate central data bank in form of Big Data. These neworked devices are managed through Cloud based services made available to the stake holders of the smart city. These cloud based services and newtorked devices are controlled using architecture of Internet of Things. Now, after building the infrastructure for the smart city, all the previously mentined services of Smart City are clubbed together for generate Big Data.

From this Big Data using various algorithms of reveriving data services of smart city are being made available to both administration and people living in city. Using this automated data for services, governance of smart city will become very useful for all the stakeholders. Thus, automated services will provide Intelligent Governance (I – Governance) taking E – Governance a step ahead. This will help city administration as well as people living in the smart city in living more comfortable and smart life.

This Intelligent governance system will keep track of almost every services to be provided in Smart City. Intelligent Governance (I –Governance) is helpful using Iot and BigData in sustainable development of Smart Cities. Therefore, development of "Smart cities" concept will focus mainly on the Intelligent Governance for the growth of population as well as of infrastructure.

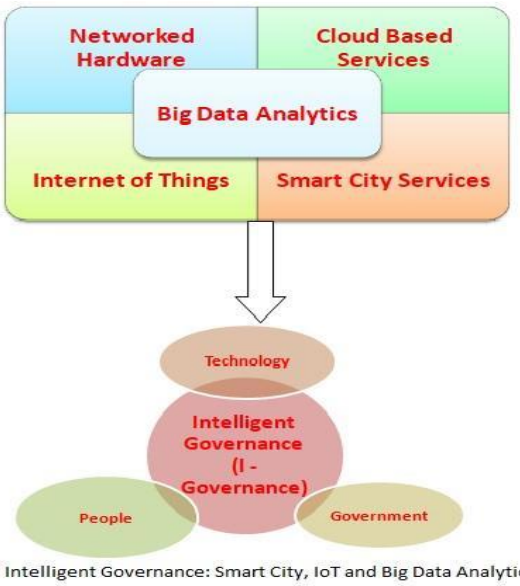


Fig: Intelligent Governance: Smart City, IoT and Big Data Analytics

IV. CONCLUSIONS

Thus proposed framework for the use of Internet of Things (IoT) and Big Data (BG) in developing Smart cities for the effective use of infrastructure using latest technologies for Intelligent Governance (I- Governance). Use of interconnected devices through Internet of Things and Big Data will upgrade the lifestyle of people living in such Smart cities upto next degital level. This design of Smart cities will promote Intelligent Transport system, Intelligent Administration, Intelligent Energy, Smart health care system, Intelligent Education System, Intelligent community services, Digital transaction, Digital Currency, Smart Mobile Applications, Smart Mobile wallets. Thus using proper and Intelligent planning effective Intelligent Governance system will manage the up gradation of standards and growth of economic facilities.

Further there will be scope of improvement of every services available in the smart city. With the establishment of more Intelligent hardware and more complex data analytics better model of the smart cities could be converted to intelligent self sustainable cities.

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