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RESEARCH ARTICLE OPEN ACCESS

Applications of Big Data usingWirelessSensor Networksin imparting Smart Nation

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ABSTRACT
Government are considering to adopting the smart nation concept i.e., smart city, smart towns as well as smart villages by the implementing of big data applications using Wireless Sensor Networks that support smart nation components to reach the required level of sustainability and improve the living standards. The main contribution of this paper is reviewing the application of big data in smart nation and exploring the opportunities and challenges for utilizing big data in smart nation. In addition, the paper investigates the general requirements for the design and implementation of big data based applications for smart nation applications and services. To adopt the proposed concept, services basic like roads, health, transportation, energy, education, banking, food supply services and water services leading to higher levels of comfort of their citizens will improve its performance and such involves reducing costs and resource consumption in addition to more effectively and actively engaging with their citizens. The digitization has become an integral part of day to day life, data collection has resulted in the accumulation of huge amounts of data that can be used in various beneficial application domains. Goal was to develop effective approach for the domain of monitoring applications, for the whole nation monitoring in particular.
Keywords:Big data, Wireless sensor network, Digitization and Monitoring,

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I. BACKGROUND

While fabricating any system, collection, storage, processing, analysis, and visualization of data are steps that need to be followed in a system. In a current reseach a big data system is proposed with Wireless Sensor Netwoks (WSNs) in imparting the concept of national digitization(smart nation) with the aim of its applications, data collection and services. In addition, there may be numerous applications and tools that can implement these purposes in the smart nation. Thus, the applications that are data-intensive being formulated to benefit from them. Chen et al. [1] deal with the big data systems problems specifically with computing infrastructure such as granular computing, bio-inspired computing, cloud computing and quantum computing. Chen et al. [2] gives a brief overview of big data systems, concentrating on the four phases of value of big data. In their study, they discuss the technical aspects. Oussous et al. [3], which comes up to new data proficiency and tools, with the intention to select a right combination of technologies according to the needs, requirements and specifications.

As mentioned in the this study, the first step to build a proposed system is data collection. Among the available data-generating sources, wireless sensor networks (WSNs) are incurring significant research attention with respect to environmental monitoring. The second step is the management of data in WSNs, which focus on two things. First data storage and the second is the energy preservation. Energy preservation signifies that every operation should reduce energy expenditure as much as possible. The energy of sensor nodes is easily discharged since the sensor nodes are powered by batteries.

A WSN constitutes of a prominent number of sensor nodes that monitor and memorize the conditions, services of particular place, and the data are stored at place or node called sink node. As proposed in this study the WSNs are used to measure services: such as roads, health, transportation, energy, education, banking, food supply services and so on. However, the restrained capacity as compared to typical networks cause problems.

"Big Data in Ubiquitous Wireless Sensor Networks" edited by Xiao et al. [4]; in this issue, large number of research papers are demonstrated to express advances of big data systems with ubiquitous. Halde et al. [5] demonstrated the issues and challenges of data collection through WSNs. The authors focused on heterogeneity of WSNs and consumption of energy. Harb et al. [6] demonstrated

data management issues in WSNs by innovating different algorithms for data collection, aggregation, correlation, compression, and prediction.

In the following sections, Section 1 presents a brief introduction of big data using wireless sensor networks for monitoring. Section 2 presents an overview of the proposed work. Section

3 presents an overview of data collection through the proposed work. Section 4 presents benefits of proposed work.Section 5 represents thechallenges in the proposed system. Section 6presents the conclusion and the last section presents the recurrences.

II. PROPOSED WIRELESS SENSOR NETWORK FOR THE SMART NATION

The proposed approach focus on the digitization of a notion thorough big data using wireless sensor network. A system is proposed to provide the basic services to the citizen by monitoring the public facilities such as transportation, education, health care and so on. To develop such a system with the help of wirelesssensor networks wherein the sensor nodes are established at its proper locations which will generate data, in the form of figures, pictures, graphs, video etc. the same generated data will be managed at node level both by offline as well as through online modes. Data will help the government to monitor the region, and will take necessary actions at its earliest to tackle the situations happened at a particular region

As far as the benefits are considered both will get benefited the government as well as the citizen through the use of proposed system. The proposed system will save man power and also will benefit the governmentfinancially. As far as the citizen prospective is considered, the government benefits will be provided to each citizen at their doorsteps. The below figure gives pictorial representation of the proposed approach

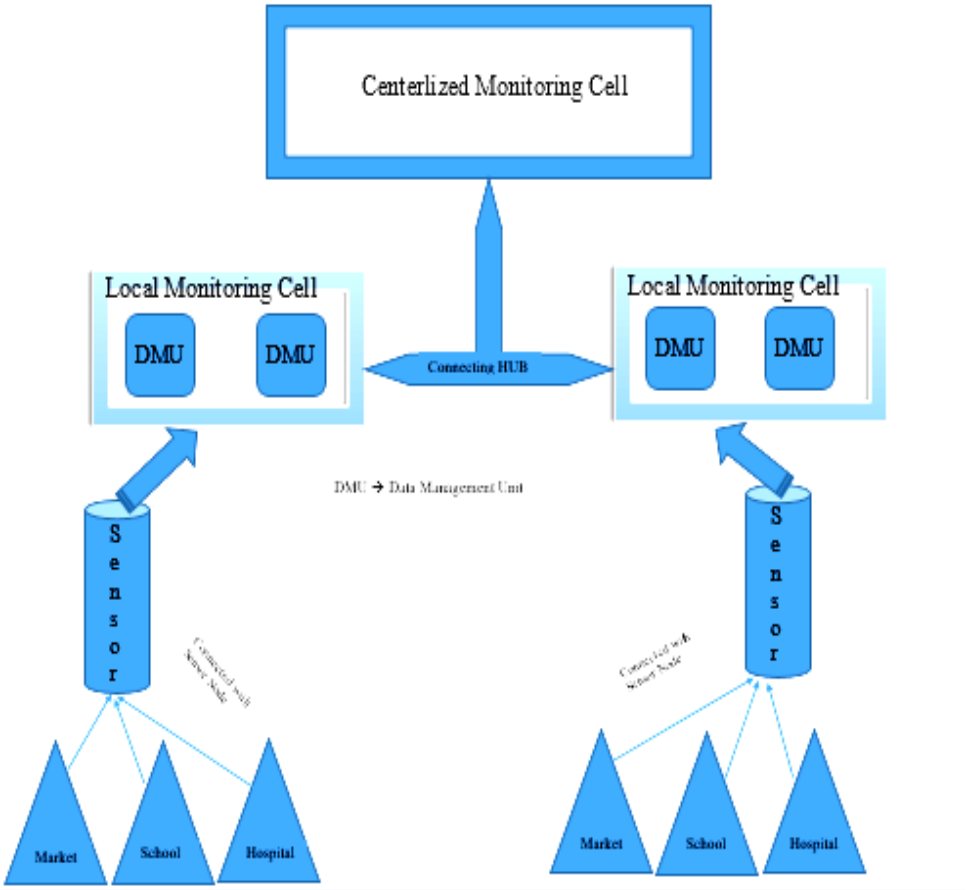

Figure 1: Proposed WSN system for smart nation

III. DATA COLLECTION THROUGH PROPOSED SYSTEM

Sensors generate data grows exponentially. Technologies used for data processing in conventional systems such as relational databases and servers are too costly to cope up with these data. Moreover, they cannot cope with the processing needs that can be required for real- time processes. In addition, most of the events monitored at regular intervals are largely redundant or minor variations leading to a large waste of information storage resources and communication energy at relay and sensor nodes. This implies that much of these data are of no interest, meaningless, and redundant. Thus, unlike the case of typical WSNs, it is essential to gather and transmit a large amount of data while minimizing data latency in WSN-based big data systems. In addition, energy can be improved efficiently by the process of eliminate data redundancy. The convergence between big data systems and WSNs lies in the purpose of local network data processing techniques [7]. For the WSNs side the proposed approach, would save their limited resources. At the same time, receiving a neat or clean, non-redundant, and relevant data and should reduce the excessive data volume at the side of the big data system. Thus, it would reduce rapidly overload by discovering values from these data.

IV. BENEFIT OF THE PROPOSED APPROACH

Monitoring area would be the common applications of proposed approach. Aforesaidapproach would be deployed over an area where some phenomenon or services are monitored continuously. The most compromise application of wireless sensor network technology is to monitor far-flung area for small frequency data rates. Following areas can be benefited by adopting the proposed approach:

a. **Health care monitoring** : Several types of sensor are available for medical daigonsis such as wearable, implanted and environment-embedded. Some of them are adjusted, inserted or wearable in human body. Such types of devices collect information about particular person's health, fitness, and energy expenditure.

b. **Environmental monitoring**: By integrating proposed systems, following applications of the environment can be monitored: Air quality in a region, quality of goods in supply chain management, fire security system, monitor the concentration of harmful gases present in the air for a region. Installing Sensor Nodes in a forest to observe the conditions in a redion. Such devices can be equipt with sensors to assess temperature, humidity and gases which are produced by ina region. The early information is crucial for a successful action. Monitoring Water quality involves analyzing water properties in a region. Use of wireless sensors provides the creation of a more accurate figure of the water status in a region, and allows the deployment of monitoring cell in harsh region, without the need of manual data retrieval.

c. **Monitoring Educational Institution :** By integrating proposed systems, following applications of the educational institutions can be monitored: Staff attendance, students attendance, Use of wireless sensors provides the creation of a more accurate figure of the institution status in a region. Also allows the department to monitoring function of an institutions.

There would be more such services which can be monitored by the government to provide proper services to their citizens. For the regions where it would be difficult (in terms of cost, employee involvement, transportation etc.,) in such place government would establish a cell at a proper location to monitoring such regions without the need of manual data retrieval. The sensor network not only allows to exchange information and control data across the network, but nodes are enabled to cooperate in executing more complex tasks. Services of many sensor network are useful for region monitoring: local places, tagging [8], data accumulation [9], and, of course, energy efficient multihop routing [10]. By considering such a study to deployed in a notion, it must be required to assess the reliability of the proposed approach, reliability means " the ability to do its purpose in a given period of time with specified environment." [11, 12, 13, 14, 15]. In a future study reliability should be include in the proposed approach.

V. CHALLENGES

The major challenges faced while deploying the current system in a nation is hardware requirement, security of such devices in a regions and man power.

Power supply would be the major challenge in far flung areas. Data transmission would also be the major challenge in conflict zones in a nation.

Natural disaster such wind, hailstone and flood may cause serious damages to the installed devices.

Unskilled persons employed to operate the proposed system may cause damage to the system.

And One of the major challenge is one time cost which would be very high while to deploy this system.

VI. CONCLUSION

A big data systems with wireless sensor networks are proposed for the smart nation to find the solutions for the governmentadministration, people and the services provided by the government. In this, the data is converted into the figure, pictures or graphs, usually the government services will be efficient, improved and satisfactory. The government service based on big data and WSN will improve the accessibility to the services (by using the concept of Digitization). Also, it could overcome the challenges of managing limited services in the far flung areas.

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