Chapter 5
Innovative Model of Internet of Things for Industrial Applications

Jay Kumar Jain
https://orcid.org/0000-0002-9590-0006
Sagar Institute of Research and Technology, India

Dipti Chauhan
Prestige Institute of Engineering Management and Research, India

ABSTRACT

The internet of things is one of the most significant and promising innovations today. In this chapter, the authors proposed the dual probability-based energy estimation model in the wireless sensor network. The dual probability-based function measures the expected value of energy for the transmission of data. This function creates a subgroup of networks based on energy function and carries out the operation of energy management in the context sensor node data processing. This function also integrates cloud-based services with the sensor networks. The benefit of this function is that it increases the throughput of network and quality of service. The proposed model was simulated in MATLAB R-2014a environment, and the results were obtained using different scenarios of network density. Finally, the authors analyzed the performance of our proposed work with respect to the following metrics: data utility, energy consumptions, and data reconstruction error.

INTRODUCTION

The concept of the internet of things integrates all devices with the internet. It includes sensors, actuators, and edge devices. The life of network devices depends on the consumption and utility of energy in the sensor node or network. The wireless sensor network in cooperative technology is a challenge in IoTs. The application of IoTs is linked with the edge network (Nguyen et al., 2021). The edge network supports the concept of the dynamic nature of cloud-based services. The edge-based component has a problem with bandwidth and energy. Energy is a major factor in the sensor node for data transmission

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and data receiving. Due to the mobile nature of the sensors node, the consumption of energy is very high and the life of IoT devices (Ullah et al., 2021). In the current decade, the minimization of energy in a wireless sensors network is a big issue. For the minimization of energy, various low-cost based energy protocols are designed. The success story of wireless sensor network deals with the success of IoT based services over cloud environments. The minimization of energy in wireless sensor networks is possible to use various routing and MAC layer based protocols. The duty cycle based routing protocol also reduces energy consumption during the transmission of data over the sink node. Some authors also suggested the cluster-based routing protocol for the minimization of energy in wireless sensors networks (Kaur et al., 2017).

The internet of things (IoT) is a group of internet enables things. The internet of things provides services to all societal areas. The things basically deal with electronic communication objects connected through the internet. The acceptability of IoTs is increasing every day due to easy installation and low-cost maintenance. The IoTs change the scenario of remote area data accessing, for accessing the remote area data, such as temperature, pressure, weather and fire event in the forest sensor networks are used. The sensors collect the information and transmit it to the base station with IoTs devices. Nowadays the IoTs application is integrated with cloud-based services. The cloud-based services are deployed over smart devices (Huang et al., 2014). The cloud services basically support the static infrastructure. The IoTs integrate these services with dynamic infrastructure. The dynamic nature of the cloud enhances the reachability of IoTs services to the most distant the universe. Along these lines, IoTs can bring forth colossal valuable applications and administrations that we never envisioned. With the progression in innovation, the device's processing power and storage capacity significantly expanded while their sizes diminished. These smart devices are normally outfitted with various kinds of sensors and actuators. In addition, the physical objects are progressively outfitted with RFID labels or other electronic standardized identifications that can be scanned by smart devices, e.g., smart mobile phones or small installed RFID scanner. IoTs is the Internet's stretching out and growing to the physical world and its related properties incorporate center, content, gathering, figuring, correspondences and network situations. These properties demonstrate the consistent association among individuals and objects or between the items and objects.

The current trend of research focuses on minimization of energy in terms of data transmission and data receiving in wireless sensor network for IoTs. The researchers proposed the techniques based on clustering, low route cost, heuristic based optimization to improve energy efficiency of sensor nodes. The sensor nodes usually work for long time in idle because it causes the waste of energy in WSNs. Now the concept of active and sleep mode, based on duty cycle, enhanced the efficiency of energy. The active and sleep mode increase the use of energy but degrade the performance of network in terms of quality of service, delay and loss of data packet. In this paper, dual probability based energy estimation function for the reduction of energy during the transmission of data to the sink node has been proposed (Sharma et al., 2021). The dual probability based energy function works on the concept of dynamic optimization of route cost and energy. The function of energy works on different layers of energy such as high energy, middle energy and low energy.

The grouping of energy layers deals with subgroups of sensor nodes. The reduction of energy cost increases the life of sensor nodes and networks (Jain & Sharma, 2017). The life of network enhances the reliability of IoTs based services over the cloud computing. Instead of dual probability based energy function, some compressed sensing technique for the minimization of energy in IoTs based services over the cloud networks have also been used. The contribution of this paper is summarized as follows:

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