Chapter 11
An Architectural Layer Classification of Energy Conservation Techniques in Internet of Things

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ABSTRACT

Using three-layered architecture IoT can be methodically understood. These layers are sensing and data collection layer, data processing and network layer, and application layer. In sensing and data collection layer, sensors are used to sense its surrounding environment. The processing layer is moreover like a middleware layer. The application layer is liable for conveying a particular facility to the client. All of these layers are energy constrained. Hence, it is a sensitive issue to efficiently reduce the energy consumption in IoT. To increase energy efficiency in IoT networks, a large number of techniques have been developed by different researchers. The chapter introduces a classification of energy conservation techniques based on the IoT architecture layer in which they work. The energy-efficiency techniques are also discussed in brief. The chapter also analyses the techniques with respect to their advantages and disadvantages. Moreover, future directions have also been presented in brief.

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INTRODUCTION

Internet of Things (IoT) is a rising essential innovation used in upcoming enterprises and day to day life of individuals. Here a heap of battery worked smart things, actuators and sensors are associated with the Internet (Abbas et al., 2015). Figure 1 demonstrates a scenario of IoT were different kinds of sensors, actuators work cooperatively on the internet, gather data from their surroundings and transmit significant data for some specific purpose. The applications of IoT include smart transportation frameworks, smart homes, smart urban areas, smart corporations, independent vehicle, brilliant medicinal services (Kaiwartya et al., 2016; Grieco, 2014). A few other significant IoT function spaces incorporate computerized safety gadgets, for example, alerts and observation frameworks, computerized networks utilized in mechanical metering as help for route and fleet organization etc (Aijaz et al., 2015). The combination of IoT with approximately every part of personal lives is because of the focal point of development of a greener planet (Arshad et al., 2017). Figure 2 shows the growth of the number of internet linked devices with respect to time (Arshad et al., 2017).This approximate move demonstrates the exponential extension speed of IoT world and our reliance on IoT empowered gadgets (Evans, 2011; Atzori et al., 2010). Therefore, the communication of huge quantity of data among billions of nodes creates large energy requirement.

Figure 3 demonstrates the components and information movement in IoT framework (Kaur et al., 2015). The constrained battery of the equipment is depleted while gathering and transmitting information. If the information gathered and examined is more, and more accuracy of the data is required, more energy is consumed. Due to energy insufficiency, there is a need to maintain a trade-off between data processing and energy utilization by IoT frameworks. Additionally, the lifetime of any asset in IoT relies on the accessibility of energy. The loss of energy influences the entire condition under perception. Subsequently, there is an obvious need to reduce energy utilization for the longer lifetime of assets.

Architecture

The architecture of IoT consists of, sensing and data collection layer, data processing and network layer and application layer. Figure 4 shows the architecture.

Sensing And Data Collection Layer

It is physical layer and this layer has sensors which gather crude data in huge volumes. They sense the environmental condition and send the sensor estimations to data handling and system layer.