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A Comprehensive Review of Real-Time Scheduling in Internet of Things Application

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Introduction

The Internet of Things (IoT) is a telecommunication network in the next generation of applications, resulting from the rapid advancement of wireless sensor network techniques, which have impacted many spheres of life today. The IoT environment includes hardware, telephony, communications, storage, secure platforms, software and services, and data processing platforms. IoT sensors collect data from their surroundings and share it with the Internet gateway. These sensors frequently carry out tasks without the need for human intervention. This article will examine real-time scheduling in the IoT to fully comprehend the issues raised in this area from 2018 to 2022.

For selected studies, an IoT application classification based on practical application is provided. Healthcare, infrastructure, industrial applications, smart cities, commercial applications, environmental protection, and general IoT applications are among the studies chosen. Depending on the provided classification, studies are divided into groups based on related applications and compared based on indicators such as performance time, energy consumption, makespan, and assessment environments. Finally, this paper discusses the main concepts, disadvantages, advantages, and future work of all reviewed studies.

Description

The Internet of Things (IoT) is a system of integrated computations between digital and mechanical sensors that can provide data transmission over networks without the need for human intervention [1-3]. Things in the aforementioned system can be remotely controlled by network infrastructures. IoT is currently being used in a wide range of practical plans for education, healthcare, agriculture, the military, and industries. Because of the massive amount of data generated by IoT devices on a daily basis, real-time scheduling and fast data processing are critical. Industrial plans frequently require fault-tolerant guarantees and dependable practises while also requiring immediate results. In general, it is not possible to meet all of these requirements at the same time. A practical task can be divided into several tasks, each of which requires a specific computation capability. There are two duty-allocation sections: allocating duties to processing units and scheduling tasks, which include task prioritisation and data transmission arrangement between processing units.

Scheduling is a method of assigning duties based on priority and selecting the best option to complete the task. Efficient scheduling can result in a quick on-time response, which is advantageous in intelligent systems. In a smart health care system, for example, a prompt notification system is required to save a patient. To make the best use of devices with limited resources, efficient scheduling algorithm development is required. The goal is to reduce reaction time and take advantage of the network while consuming no more energy. This paper investigates the IoT's immediate scheduling. Technology and embedded systems of the IoT are evolving, and with time constraints or specific deadlines, responding in real-time and immediate computations are critical. As a result, task scheduling is critical for determining the best arrangement to perform the duties while utilising the available resources [4,5]. Immediate hard and soft system scheduling are the two types of immediate system scheduling. If a task in this system has a deadline and is completed after that deadline, the task is no longer applicable. A soft real-time system has tasks that are flexible and have fewer deadlines.

Conclusion

Hard instantaneous systems for automobiles include aviation systems, nuclear power reactors, and anti-lock brake systems. Soft real-time systems, multimedia playback systems, and automatic windscreen wipers are all options. The article proposed a custom adaptive and smart scheduling algorithm for optimal performance and management of soft and hard real-time activities in IoT systems. The article presented a creative job scheduling method in the form of a processing unit that is ideal for real-time embedded systems. The research is focused on the definition of a scalable approach based on extending the existing Earliest Deadline First (EDF)-based scheduling to the Guaranteed Earliest Deadline (GED) algorithm-based scheduling performed in four phases.

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