

# Chapter 1

## Integrating AI With IoT: Challenges and Solutions

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### ABSTRACT

*One of the most popular technologies of the modern day is the Internet of Things (IoT), which has a big impact on our lives in many different ways, including societal, commercial, and economic ones. The current and next IoT technologies are significant in terms of digitization, productivity, and customer comfort in a variety of application areas, such as smart cities and education have a lot of potential to raise the standard of living for people in general. However, in the Internet of Things context, risks and cyberattacks have a significant impact on smart applications. Delivering a constantly upgraded and current security system for the next generation IoT system requires using artificial intelligence (AI) capabilities, particularly machine and deep learning solutions. IoT is considered as a technology for developing smart environments, including intelligent building management systems, intelligent cities,*

DOI: 10.4018/979-8-3693-8547-0.ch001

*and intelligent healthcare systems.*

## **INTRODUCTION**

The dispersed and transparent services provided by the Internet of Things (IoT) are becoming a new, ubiquitous network paradigm. A vast number of smart gadgets, including sensors, smartphones, and other smart devices, are connected via the Internet of Things. These smart gadgets can exchange information and communicate with one another. As to the IDC statistics analysis, the global IoT device count exceeds 50 billion, and by 2020, it is expected to generate more than 60 ZB of data. The construction of complex systems to improve quality of life, such as machine condition diagnosis, human body activity monitoring, health monitoring, localization, and structural monitoring, is made possible by gathering data from these Internet of Things devices and analysing it to sense and understand the environment. As IoT grows in popularity and usage, a vast array of sensors and devices produces enormous amounts of data, and a variety of IoT apps are being created to provide customers with more precise services. Such Big data from IoT devices may be further processed and analysed to give consumers and IoT service providers information. To effectively use massive IoT sensing data, the rising IoT applications require several data-driven analytical techniques. AI algorithms have lately been included into IoT data analysis processes. With the development of cloud computing, graphics processing unit (GPU) computing, and other hardware advancements during the last ten years, artificial intelligence (AI) has achieved remarkable success. The most used AI algorithm is machine learning, which has been used in a variety of domains including computer vision, computer graphics, speech recognition, natural language processing (NLP), decision-making, and intelligent control. In a similar vein, computer networks may also benefit from machine learning (Sood and Mahajan, 2017).

The primary technology for autonomous smart/intelligent network management and operation has been identified as machine learning. In particular, the majority of IoT systems are growing more sophisticated, diverse, and dynamic; managing such IoT systems is challenging. To draw in additional users, these IoT systems' offerings also need to be enhanced in terms of efficacy and variety. Numerous research has advanced the use of machine learning on the Internet of Things. We may thus conclude that IoT can gain from utilising machine learning support. Because machine learning may offer workable ways to mine the information and features buried in IoT data, its application to the Internet of Things (IoT) enables users to gain deep insights and construct effective intelligent IoT applications (Cui et al., 2018). The IoT idea has developed into a significant focus on the primarily private end user in modern practice. The objectives of facilitating simplicity of use, which

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