

# Intelligent Systems Reference Library

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## Series editors

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# Internet of Things and Big Data Analytics for Smart Generation

 Springer

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# Preface

The main objective of this book publication is to explore the concepts of big data and IoT along with the recent research development. It also includes various real-time/offline applications and case studies in the field of engineering, computer science, IoT with modern tools and technologies used. As populations grow and resources become scarcer, the efficient usage of these limited goods becomes more important. The campuses are getting IoT enabled, Sensors and the work data and involvement of networking, is creating smart campuses, corporate houses. The book will be covering edited chapters belong to the IoT and Big Data Technologies.

The book is organized into thirteen chapters. Chapter 1 discusses the insight about Big Data and its journey toward advanced levels for smart generations.

Chapter 2 throws light on IoT, Big data, their relevance, data sources, big data applications, IoT architecture and security challenges, standards and protocols for IoT, single points of failure, IoT code, etc.

Internet of things is the trending technology and embodies various concepts such as fog computing, edge computing, communication protocols, electronic devices, sensors, geo-location. Chapter 3 presents the comprehensive information about the evolution of Internet of things and its present developments to its futuristic applications.

Chapter 4 discusses revolution in the transport environment needs redesigning the infrastructure so that the production of embedded vehicles can be chained to an embedded traffic management system. This instinctual design of the traffic control and management system can lead to the improvement of the traffic congestion problem. The traffic density can be calculated using a Raspberry Pi microcomputer, and a couple of ultrasonic sensors and the lanes can be operated accordingly. A Web site can be designed where traffic data can be uploaded, and any user can retrieve it. This property will be useful to the users for getting real-time information and detection of any road intersection and discover the fastest traffic route.

Chapter 5, explore new encryption algorithm is proposed and designed which is followed by a verification algorithm used to access such Internet of things (IoT)-based systems. A three-layer encryption algorithm (3LEA) is designed to generate a cryptographic Quick Response (QR) tag. In order to use this QR-tag as a secret key

with IoT-based systems, a three-process verification algorithm (3PVA) has been proposed to verify QR-tag values. In order to make a decision either to approve or to disapprove a request to access an IoT-based system, a three-layer protection algorithm (3LPA) is proposed.

Chapter 6 explores the difficulties that are posed by the implementation of service automation and social robotics to assist tourists. The basic idea behind wall-climbing robots is that the vacuum can be generated inside a suction cup at the bottom of the robot chassis, which is used to create a grip on the wall on which the robot is to climb. Wall-climbing robots are beneficial to a home automation system as this can enable the robot to not interfere with any human activity in the room. This also reduces the chance of collision with any human or objects in the environment and also avoids any hindrance to human activity in the room in which the robot has been deployed.

Chapter 7 analyzes and presents the smart cities evolution, architectures, applications, technologies, standards, and challenges in detail. It helps the reader to understand the coherence of smart cities development using IoT.

The goal of Chap. 8 is to give a thorough review on the possibility of the sharp city other than their unmistakable applications, preferences, and purposes of intrigue. Likewise, a substantial segment of the possible IoT headways are displayed, and their capacities to focalize into and apply to the unmistakable parts of sagacious urban groups are discussed. The potential utilization of splendid urban territories concerning development headway later on gives another critical exchange in this area. In the meantime, some helpful experiences everywhere throughout the world and the key limits to its utilization are out and out imparted. IoT potential applications can help us for the evolution in smart city infrastructure. In this chapter, we discuss the different potential applications of Internet of things for smart city infrastructure. Discussion about the big data is also considered for enhancing the knowledge about smart infrastructure, and in the last section, I also provide the recommendation for adopting smart city infrastructure earlier.

In Chap. 9, the smart home resources have been taken and implemented through Restlet framework. The generated RDF graph is semantically interoperable and intercommunicated between the IoT-based smart home resources. The proposed framework has been implemented on IoT-based cloud platform and has been compared with the existing state-of-the-art schemes with obtained results. Finally, the obtained results show that the proposed framework is optimized toward the semantic interoperability in IoT domains for smart home applications.

Chapter 10 discusses the major case studies referred in this that are ATMS trail done across Chennai (2009), ATIS in Bangalore and Hyderabad, and APTS in Bangalore, Chennai, and Indore. The Bus Rapid Transport (BRT) across different places across India is an alternative to metro rail at Pune, Ahmadabad, and Chennai. Electronic toll collection (ETC) and advanced parking management are some of the applications of ITS which gained certain ground across India. Ultra-low-power Bluetooth 5 technology, 5G networks, and cellular IoT concept create a lot of opportunities in realizing ITS in India.

Chapter 11 aims to achieve more accuracy, for sarcasm detection, than the prevalent approaches by focusing on the data cleaning process. The purpose is to identify the levels of sarcasm from the text written by the users on social media blogs and online articles and determine their personality traits and any changes observed in the personality traits over a period of time. This classification is achieved using supervised classification algorithms, and a comparative study is performed. Gender-based experiments are conducted to observe changes in the level of sarcasm and personality traits in both the genders along with bloggers from varied professions. The outcome of this research is to understand the effect of events, seasons, gender, profession, etc., on sarcasm and personality traits over the period of time.

Chapter 12 focuses upon the potential knowledge of 4 V's of big data namely Volume, Velocity, Variety, and Veracity by a radical improvement through productivity bottlenecks being unlocked. This will bring a radical change in the quality and accessibility of healthcare automation.

Chapter 13 proposes a case study that will examine and explain a complete design and implementation of a typical IoT-ITS system for a smart city scenario set on typical Indian subcontinent. This case study will also explain about several hardware and software components associated with the system. How concepts like multiple regression analysis, multiple discriminant analysis, logistic regression, conjoint analysis, cluster analysis, and other big data analytics techniques will merge with IoT and help to build IoT-ITS will also be emphasized. The case study will also display some big data analytics results and how the results are utilized in smart transportation systems.

We are sincerely thankful to Almighty to supporting and standing in all times with us, weather its good or tough times and given ways to conceded us. Starting from the call for chapters till the finalization of chapters, all the editors gave their contributions amicably, which was itself a positive sign of significant teamworks. The editors are sincerely thankful to all the members of Springer (India) Private Limited, especially Prof. (Dr.) Lakhmi C. Jain, S. Tigner, and Aninda Bose for providing constructive inputs and allowing opportunity to edit this important book. We are equally thankful to a reviewer who hails from different places in and around the globe shared their support and stand firm toward quality chapter submission. The rate of acceptance we have kept was as low as 16% to ensure the quality of work submitted by the author.

The aim of this book is to support the computational studies at the research and postgraduation level with open problem-solving technique. We are confident that it will bridge the gap for them by supporting novel solution to support in their problem-solving. At the end, the editors have taken utmost care while finalizing the chapter to the book, but we are open to receive your constructive feedback, which will enable us to carry out necessary points in our forthcoming books.

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# Key Features

1. This book will provide in-depth information about big data and IoT.
2. Technical approach in solving real-time/offline applications.
3. Practical solutions through case studies in big data and IoT.
4. Companies may get different ways to monitor data coming from various sources and modify their processes accordingly to prevent it from catastrophic events through case studies.
5. The Big data and future horizon.
6. The interdisciplinary tools and cases of IoT and Big data.



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