

EAI/Springer Innovations in Communication and Computing

Jitendra Kumar Verma  
Deepak Saxena  
Vicente González-Prida *Editors*

# IoT and Cloud Computing for Societal Good

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# **EAI/Springer Innovations in Communication and Computing**

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Jitendra Kumar Verma • Deepak Saxena  
Vicente González-Prida  
Editors

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# Preface

Internet of Things (IoT) and Cloud Computing are two recent innovations that have transformed business and industry. These innovations have immense potential for societal good. The main purpose of this book is to highlight the applications of IoT and cloud computing for the benefit of humankind. To fulfil this purpose, the book is organized into four parts focusing on different aspects of IoT and cloud computing.

Part I focusses on perhaps the most important aspect that has the widest societal implications – on tackling climate change. Cloud computing infrastructure requires massive amount of energy, sometimes exceeding the requirement of a mid-size town. In this regard, Chap. 1 discusses research directions and methodological approach towards energy-efficient cloud computing. Chapter 2 presents a solution for IoT-based smart air quality control system and discusses its role in the prevention of Covid-19. Chapter 3 digs deeper into this aspect and focusses on the forecasting of particulate matter. Such systems may prove to be useful for pollution control and environmental planning. Chapter 4 focusses on smart agriculture and discusses the problem of fruit segregation and taxonomy system. Chapter 5 takes a social perspective and discusses the creation of a web-based platform for bike-sharing, a potential solution to reduce vehicular pollution by promoting the use of shared bicycles.

Part II of the book covers a variety of applications from diverse domains. Chapter 6 provides a general introduction to applications from areas such as agriculture, health, and military. Chapters 7 and 8, respectively, focus on the use of artificial intelligence and personal assistants in the domain of digital health. Moving to digital learning, Chap. 9 discusses the application of digital technologies in the area of corporate learning, and Chap. 10 takes an applied perspective and examines the behavioral intentions of Generation-Z towards the adoption of digital learning applications. Chapter 11 looks at how IoT and smart factories underpin lean manufacturing in the context of Industry 4.0.

Part III deals with the optimization of existing IoT and cloud technology. Chapter 12 discusses multi-modal feature analysis for precise human hand gesture recognition. This would find useful application particularly in the domain of virtual reality. Chapter 13 offers plausible risk management models for the integration of

cloud and IoT by calculating the optimal frequency of maintenance, addressing an important infrastructural issue in IoT and cloud. Chapter 14 focusses on the provision of middleware for IoT protocol interoperability. This is crucial since currently IoT protocols are not standardized. Chapter 15 moves towards a more intangible asset of information and discusses how active influential nodes can be mined to assess information diffusion in social networks.

Finally, Part IV of the book deals with the security and privacy in IoT and cloud computing. Chapter 16 discusses the application of artificial intelligence for enhancing security of IoT devices. Chapter 17 takes an outward perspective by focusing on cyber-attacks, attack vectors, and remedies in the context of IoT devices. Chapter 18 proposes a privacy-secure link utilization routing algorithm for improving performance in IoT and cloud computing. Finally, Chap. 19 outlines the design of a smart home appliances controlling application with a highly secretive system to ensure privacy.

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## About the Editors

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He is an awardee of the prestigious DAAD “A new Passage to India” Fellowship (2015–16) funded by the Federal Ministry of Education and Research – BMBF, Germany, and German Academic Exchange Service. He worked at Julius-Maximilian University of Würzburg, Germany (mother of 14 Nobel Laureates), as a visiting research scholar.

His core research interest includes software engineering, Internet of Things, social computing, image processing, artificial intelligence, and soft computing techniques. Dr. Verma has organized several international conference, seminars, and workshops. He has delivered several invited talks. He is associate editor and guest editor of many international journals. Dr. Verma is a member of several societies and professional bodies including ACM, IEEE Industrial Applications Society, IEEE Young Professional, IEEE, Hyderabad Deccan ACM Chapter, and Institut De Diplomatie Publique. He serves as a reviewer for various international journals, conferences, and workshops.

**Deepak Saxena** is assistant professor at Birla Institute of Technology & Science, Pilani. Prior to this, he was a research fellow at the Trinity Centre for Digital Business. He holds a Ph.D. in business from Trinity Business School, Trinity College Dublin (Ireland), and M.Tech. (industrial and management engineering) from the Indian Institute of Technology Kanpur.

Before moving to Ireland for his Ph.D., he worked with the Indian Space Research Organisation, Council for Scientific and Industrial Research, and Defence Research and Development Organisation. He is interested in the area of digital transformation, with a special focus on public service organizations.

Dr. Saxena has previously taught at Trinity College Dublin, Dublin Institute of Technology, and American College Dublin. His research is published in the *Australasian Journal of Information Systems*, *Journal of Information Science*, *Electronic Journal of Information Systems Evaluation*, and *Electronic Journal of e-Government*. He has presented his papers in the British Academy of Management, European Conference of Information Systems, European Academy of Management Conference, the UK Academy for Information Systems Conference, and the Midwest Association for Information Systems Conference.

**Vicente González-Prida** currently works for a private company as project manager sharing his professional performance with teaching activities for degree programs in Spain and LATAM, as well as the development of research projects for the university.

In the academia, he has been honored with the following recognitions:

- Extraordinary Prize of Doctorate by the University of Seville
- National Award for Ph.D. Thesis on Dependability-RAMS by the Spanish Association for Quality
- National Award for Ph.D. Thesis on Maintenance by the Spanish Association for Maintenance
- Best Nomination from Spain for the Excellence Master Thesis Award bestowed by the European Federation of National Maintenance Societies
- First Class Honours in the Executive Master in Business Administration, by the Chamber of Commerce

Dr. González-Prida has edited four books, (IGI-Global 2015, 2017, and 2019; Springer Verlag 2018), regarding maintenance modelling, RAMS, asset management, and decision making, and authored two books (Confemetal 2018; Springer Verlag 2014) about ISO-55000 and after-sales management.

His research works have been presented in conferences such as WCEAM, ESREL, IEEE, and ESREDA, and published in journals such as *Reliability Engineering and System Safety*, *Production Planning and Control*, *IMA Journal of Management Mathematics*, and *Computers in Industry*, among others.

His main interest is related to ILS, RAMS, life cycle optimization, as well as the Industry 4.0 and disrupted technologies.

Finally, Dr. González-Prida is member of the Technical Committee of the Engineering Institute of Spain, fellow of the Club of Rome (Spanish Chapter), and member of the Technical Advisory Board for the Observatory of Intelligence, Security and Defence, among other institutions.