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The new paradigms and tremendous advances in computing, communications and control have provided and supported wide range of applications in all domains of live, in particular, bridging the physical components and the cyber space leading to the smart Internet of Things (IoT). As a result, several smart protocols and algorithms are needed to communicate IoT devices and exchange data between them. Smart communication protocols and algorithms make use of several methods and techniques in order to achieve reliable and efficient communication in several recent applications. This include, machine learning, decision making, knowledge representation, network management, network optimization, problem solution techniques, adaptive methods, and smart algorithms and protocols. Smart protocols and algorithms are usually used in order to perform adaptive decisions and take smart actions based on learning form the environment of operation. The notion of IoT has extraordinary significance for the future of several industrial domains and hence, it is expected that the complexity in the design of IoT applications will continue to increase due to the integration of several cyber components with physical and industrial systems. This book will present a comprehensive reference on the state of the art and recent advances in this area, given the recent amount of publications in this topic.

Chapter 1 presents smart energy system through IoT based management of smart microgrid. The present power grid is going through a substantial and radical transformation process. Unification of existing electrical infrastructure with information and communication network is an unavoidable requirement of Smart Grid deployment and operation. The key characteristics of Smart Grid technology are full duplex communication, advanced metering infrastructure, integration of renewable and alternative energy resources, distribution automation and complete monitoring as well as control of entire power grid. Smart grid communication infrastructure consists of varied and hierarchical communication networks. Application of Smart grid can be realized in the various the facets of energy utilization. Internet of Things also plays a pivotal role in Smart grid infrastructure as provides a ubiquitous communication network. This chapter describes an implementation of Internet

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of Things (IoT) based wireless energy management system for Smart microgrid communication infrastructure.

Chapter 2 discuss Cloud IoT based Mobile Agent Framework for real-time traffic information acquisition, storage and retrieval. Traffic is an inevitable problem for metro cities around the globe. Intelligent Traffic Management System helps to improve the traffic flow by detecting congestions or incidents and suggesting appropriate actions on traffic routing. A new and dynamic internet-based-decision-making tool for traffic management system was proposed and implemented in the authors' previous work. The tool needs weather, road, and vehicle related integrated information from different data repositories. Several online web portals host real-time weather data streams. However, road and vehicle information are missing in those portals. In addition, their coverage is limited to city level congregate information but precise road segment-based information is necessary for real-time TMS decision. Internet of Things (IoT) based online sensors can be a solution for this circumstance. As a consequence, in this chapter, an IoT-based framework is proposed and implemented with several remote mobile agents. Agents are securely interconnected to the cloud, and able to collect and exchange data through wireless communication.

Chapter 3 proposes a Self-Learning Framework for the IoT Security. The Internet of Things (IoT) is a complex system of heterogeneous devices connected to a network. While IoT can significantly add value to everyday activities for everyone around the world, there are numerous security risks and privacy breaches imposed by the IoT landscape. Traditional security solutions are not applicable for the IoT as they required high-end processing capacity. The objective of this chapter is two-fold. Firstly, it provides a comprehensive summary of the recent advancements in the IoT and identifies their vulnerabilities. Secondly, it proposes the paradigm of self-learning as an intelligent and sustainable mechanism that is capable of automatically detecting suspicious activities in the IoT. Overall, this chapter presents a contemporary coverage of the recent developments in the IoT scene, the security and privacy challenges confronting the security experts, a proposal of a self-learning framework for performing health check of the IoT environment, and finally a set of high-level implementation guidelines and conclusions.

All Pervasive Surveillance Techniques and AI Based Applications is discussed in Chapter 4. Surveillance is the process of close observation of a person, place or object to avoid and minimize the risk of any undesired dangerous situations or suspicious activities to maintain normalcy. However, manual surveillance techniques have certain constraints including unavailability of trained manpower and erroneous observation triggering tricky situations. The proliferation of the use of information and communication technologies (ICT) have increased the levels automation and have made it a part of surveillance application. The aspects of automation have greatly reduced human intervention and have made systems more reliable and efficient.

The new advancements in Internet of Things (IoT) and artificial intelligence (AI) have made automation in surveillance security even more convenient and efficient. It has been found that the application of IoT and AI based learning mechanism have made significant performance improvement for automated surveillance purpose. Here we discuss some of the recent trends and challenges faced by all pervasive surveillance systems.

An analysis of cryptographic algorithms in IoT is presented in Chapter 5. The underlying vision of the Internet of Things (IoT) is create a world where the real and the virtual realms are converging to create smart environments that makes energy, transport, cities and many other areas more intelligent. With the IoT, the physical world is being interfaced through the things to the virtual world in heterogeneous environment. In heterogeneous environment privacy and security are the major challenges. The secure information exchange is most critical pitfall to ensure the system security. This study gives a detailed analysis of cryptographic algorithms in IoT. A comparison of lightweight cryptography algorithms on basis of block size, key size, gate equivalents, and throughput is given. Moreover, the various security issues in IoT are discussed along with possible solution.

The main two objectives of the Smart Accident Detection and Prevention System (SADPS) is analyzed in Chapter 6: i) Accident Prevention ii) Accident Detection. Based on the survey, 1.3 million people died every year in the road way accidents. The main reason for this type of accident is the over speeding of the vehicles. So, the proposed SADPS focused on finding the speed parameters of each vehicles and give the notification to the over speeding vehicles to its corresponding owners threw sms that can be used to prevent accidents. The second objective is accident detection. For this task, each vehicle accelerometer values will be taken for communication to the SADPS system. When an accident occurs, the location as well as the related details is sending to the SADPS system. This proposed system takes the immediate remedy by give the alert to the nearby police station and hospitals.

Chapter 7 presents the miracles of Healthcare with Internet of Things. Today, IoT in therapeutic administrations has ended up being more productive in light of the fact that the correspondence among authority's and patients has been improved with versatile applications. These applications are made by the associations with the objective that the pros can screen the patient's prosperity. If any issue has hopped out at the patient, by then the authority approaches the patient and gives the correct treatment. In this proposition, particular focus is given to infant human administrations, in light of the fact that the greatest fear of gatekeepers is that they would lose their infant kids at whatever point. Therefore, in this part a business contraption has been recognized which screens the consistent information about the infant's heart rate, oxygen levels, resting position. In case anything happens to the tyke, the information will get to the adaptable application which has starting

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at now been made by an association and is mechanically available by finishing a representation field test for the kid, the information which is recorded is examined.

Chapter 8 presents the relevance of Technologies for Smart Cities. Most of the work to develop a Smart City is how to connect physical urban infrastructure to the digital world to use it as a solution space for citizens and authorities to take best decisions to reach the best quality of life every day. Every city as a complex system needs to adequately manage their different dimensions. In this chapter, is propose the second approach with a top-down architecture identifying a set of Information Technologies linked in processes that every city service need as part of their Digital Transformation process in their urban space. Hence, this chapter introduce six technological layers in a work-flow pipe line that are explain as an approach to develop every smart system of a city. However, in the proposed workflow of technologies to implement, we give a central focus to the IoT infrastructure as the base to build information of quality, to have reliable services even after getting insights from analytics to come back to the IoT with their connected actuators to take actions.

Chapter 9 presents sustainable Smart Farming for Masses using Modern Ways of Internet of Things (IoT) into Agriculture. Modern technologies are revolutionizing the way humans have lived ever. The world's population is expected to reach 9.6 billion by year 2050 and to serve this much population, the agricultural industries and layman farmers need to embrace IoT and e-agriculture or ICT in agriculture. Feeding the global population has been rising as a biggest problem of world. The terminology has advanced from IIoT (Industrial Internet of Things), IoFT (Internet of Farm Things), IoSFT (Internet of Smart Farming Things) etc. The agriculture industries are open for ideas, advances and technically trained workforce to help sustain ever increasing needs of food and allocate better choices of resources. Smart farming is less labor intensive and more capital intensive, advanced cutting-edge technology to imperishable and incessant cultivation. Smart farming is Third Green Revolution around the globe by using various ICT technologies in agriculture.

Radio Frequency Identification Systems Security Challenges in Supply Chain Management is discussed in Chapter 10. The Radio Frequency IDentification (RFID) is a wireless technology that enable automatic identification and extraction of stored information from any tag object within a supply chain management (SCM) environment. A simple RFID system uses radio waves to collect and transfer data from an RFID tag attached to an object linked to an RFID reader for the purpose of identifying, tracking, and data capturing. However, RFID based systems are challenged by numerous security and privacy threats for the deployment of such technology for supply chain automation purpose. This chapter explains the technical fundamentals of RFID systems, and its security threats. It also classifies the existing security and privacy threats into those which target the RFID components such as the tag, the communication channel, and the overall system threats. Finally, the chapter

discusses the open research challenges that need further investigation, especially with the rapid introduction of diverse RFID applications in SCM.

This book will provide current researchers and students in the area of IoT with a comprehensive reference for recent and up-to-date technologies in smart communications, protocols, and algorithms in IoT.

We hope this book will shed a light recent on advancements in smart devices, applications, and protocols for the IoT in next generation networks.

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