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*Editor*

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## PREFACE

I welcome you all to the 6<sup>th</sup> International Conference on Intelligent Computing, Communication & Devices (ICCD-2023) which has been held at Hong Kong, China during March 3-5, 2023. ICCD has been providing a platform to academicians, researchers, scientists and professionals to share their knowledge and expertise in the field of Intelligent Computing, Communication and Devices. The advancement of technologies like Artificial Intelligence, Robotics, Big Data Analytics and smart phones along with the widespread integration of Internet of Things (IoT) and cloud computing has led to the evolution of new paradigms, intelligent computing, intelligent systems and devices by converging the above mentioned technologies. These intelligent systems and devices are designed not only to interact intelligently with their environments but also with human entities and other similar systems and devices for information exchange. Furthermore, these systems and devices equipped with intelligent computing are disrupting almost all application sectors. These systems behave mimicking human beings adopting diverse range of abilities such as perceiving, reasoning, interpreting, learning, planning, deciding, and carrying out tasks to achieve goals.

Again, intelligent devices and systems exhibit their capabilities by combining the real and digital worlds technologically in such a way that the systems recognize, receive, analyze, and respond to their surroundings. They further project their response on the basis of data collected from their surroundings. However, Artificial Intelligence serves as the foundation for any intelligent system, combining it with a variety of other behavioral principles and computational paradigms to demonstrate cognitive abilities. Also, with the interaction of humans, the environment, and other agents, intelligent systems become more capable of dealing with uncertainty and ambiguity in the real world. In addition to that, the widespread application of computational techniques, machine learning, Big Data, IoT, and cloud computing has enabled previously incompatible systems and systems of systems to communicate and collaborate in response to specific requirements.

The ICCD-2023 had added three tracks such as Intelligent Computing, Next generation Communication and Networking and Intelligent Devices for the researchers to exchange their ideas, information, and their findings.

Editor

Prof. (Dr.) Srikanta Patnaik, Director,  
IIMT, Bhubaneswar, Odisha, India

## Editorial

On the behalf of the organizing committee of the 6<sup>th</sup> International Conference on Intelligent Computing, Communication & Devices (ICCD-2023) held at Hong Kong, China during March 3-5, 2023, I am to present the proceeding of ICCD-2023. This edition of ICCD presents a perfect blend of academia and industry as the key focus of this year's conference. It brings together innovations from industrial experts as well as academics coming from diverse fields of intelligent computing, advanced communication & intelligent devices to a common platform which has always been the primary goal of this conference since its conception. This conference encourages research and development activities in areas other than intelligent computing, advanced communication, and intelligent devices, while exchanging knowledge, ideas, and information among researchers, practitioners, and scholars from around the world. Researchers who contributed to the conference shared their findings and experiences with other researchers and attendees. Many attendees who did not submit a research paper were also permitted to attend the conference in order to gain knowledge in their respective fields. In current rapid technological advancement scenario, the convergence of technologies such as artificial intelligence, robotics, big data analytics, and smart phones, as well as the widespread integration of the Internet of Things (IoT) and cloud computing, has resulted in the evolution of new paradigms, intelligent computing, intelligent systems, and devices. These intelligent systems and devices are intended to interact intelligently not only with their surroundings, but also with human entities and other similar systems and equipment for information exchange. Furthermore, intelligent computing systems and devices are affecting practically all application industries. These systems attempt to imitate human behavior by adopting a wide range of abilities such as seeing, reasoning, interpreting, learning, planning, deciding, and carrying out tasks to attain goals.

Furthermore, these intelligent systems and devices can detect and sense even the smallest changes in their respective environmental settings. Again, they seek to automate IoT-based systems in order to accelerate the development process, which can be performed by facilitating these systems' contact with related domain experts to make better decisions as needed. Furthermore, intelligent networking lays the groundwork for the creation of a complete ecosystem of intelligent interactive systems. Synchronization of interactions across heterogeneous systems in a number of applications, such as object recognition, recommender systems, speech recognition, and search engine optimization, complicates the system and its environment. As a result, new challenges and issues involving both human intelligence and machine intelligence or artificial intelligence emerge. Intelligent computing systems have a wide range of applications, including industrial and manufacturing processes, transportation and logistics, residential, healthcare, and public safety and security. Recently, researchers and practitioners interested in

examining new challenges and opportunities have become interested in intelligent learning environments, information retrieval, recommender systems, cognitive science, natural language processing, decision support systems, conversational agents, web intelligence, smart wearable devices, Human-Robot Interaction, and AI-based games.

This volume of Intelligent Computing, Communication & Devices (ICCD-2023) attempts to present a diverse collection of research articles centered on novel designs and analysis of intelligent computing devices and systems as well as their applications. Around 180 papers have been received from various researchers. Out of which approximately 106 papers were selected on the basis of various review criteria such as novelty of the work, research quality, scope of the conference theme, organization of content, conceptualization and illustration of the proposed idea. The selected research papers provide a wide coverage to all the aspects of next generation technologies, communication and intelligent devices. The papers are broadly categorized into four major tracks (i) intelligent computing (ii) advanced communication & networking and (iii) intelligent Devices & Systems.

The first track “intelligent computing” addresses research works that have adopted intelligent computing algorithms and techniques for core development purposes. It includes around 46 papers on various related research areas such as Simulation of apron taxiway layout pattern, Joint Source-Channel coding, Scenario based intelligent desensitization, traceability algorithm for electric distribution data resources, influence of artificial intelligence technology on modern art creation, grid based on electric distribution network composite evaluation, power time synchronization system, Investment benefit analysis of energy storage systems, design of electrolytic capacitor-less LED driver, optimization design of the load-bearing structure, design of nonlinear integral fuzzy sliding mode control and collision avoidance route planning for USVs. It further covers a diverse range of application sectors for intelligent computing including vector dynamic equilibrium model of international trade, talent training evaluation model, Simulation of music style classification model, Comprehensive assessment model of teachers' innovation ability, personalized recommendation system for pop music, handwritten signature cell modulation and sound transmission loss evaluation.

The second track termed as “advanced communication & networking” includes excellent research works on intelligent computing based network and communications. This section consists of selective 15 works which includes abnormal behavior detection of 5G terminal, UAV inspection based on transmission line, intelligent maintenance and diagnosis for power channel, micro-power wireless Ad Hoc network, distribution network planning model, OLSR protocol for micro-nano satellite Ad Hoc networks, resource aggregation control communication channel, Reactive power optimization and design of reconfigurable antenna etc.

Finally, the last track “intelligent Devices & Systems” showcases intelligent applications in various application sectors to increase flexibility, scalability and productivity of the sector while coping with various challenges and circumstances.

This section comprises around 45 relevant research works. Some of them include insulator resistance detection robot, intelligent car with self-tracing, design of intelligent connected vehicles, intelligent centralized reservation system, performance evaluation of production vehicle, intelligent cultural heritage inheritance and protection system, e-commerce platform precision marketing classification model, of remote health intelligent nursing system, live detection robot system for the insulators in the substation and Cross-border E-business logistics network risk management model. Some other application based research works include intelligent firefighting robot system, sheathless separation device based on standing surface acoustic waves, modeling and performance analysis of tracked vehicle, road emergency transportation support equipment system, dynamic modeling methods of elastic aircraft, acoustic parameters of singing voice for singing speech intelligence, intelligent question answering system design and Construction of gastroscope image recognition model and diagnosis system etc.

With this very broad coverage the proceeding of ICCD-2023 presents a diverse collection of significant research works in the field of intelligent computing, communication and devices in various application domains. While presenting this proceeding to the researchers and authors, I hope the readers shall find a lot of insights in this domain.

Editor

Prof. (Dr.) Srikanta Patnaik, Director,  
IIMT, Bhubaneswar, Odisha, India

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We are immensely thankful to the authors for their contributions in this volume. We are also very thankful to the reviewers for contributing their time and expertise to maintain the quality of this proceeding.

We are thankful to the team of SPIE Conference Content Management Publication Services in general and Dr. Kert Edward in particular for their constant support to bring out this proceedings of the conference i.e. ICCD-2023 in time. It is noteworthy to mention here that constant support from the members of the publishing house makes the conference fruitful.

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Last but not the least we are extremely thankful to Interscience Research Network (IRNet) International for organizing this conference and providing constant support and services for organizing this event successfully.

We are sure that the readers shall get immense benefit and knowledge from this edited volume. Also, we look forward to your valued contribution and support to next editions of the International Conference on Intelligent Computing, Communication & Devices (ICCD-2024).

Editor  
Srikanta Patnaik, Director,  
IIMT, Bhubaneswar, Odisha, India

