

Foundation and Emergence of

Computing and Communications

Few Selected Topics

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Edited by

P.K. Paul, A. Bhumali, K.S. Tiwary, R. Rajesh, L. Sahoo and R. Vahitha. K. Thangam



**NEW DELHI PUBLISHERS
NEW DELHI, INDIA**

“Foundation and Emergence of Computing and Communications Few Selected Topics”
edited by P.K. Paul *et al.* published by New Delhi Publishers, New Delhi, India

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First Edition 2021

ISBN: 978-81-948993-9-6

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NEW DELHI PUBLISHERS

Head Office: 90, Sainik Vihar, Mohan Garden, New Delhi – 110 059

Corporate Office: 7/28, Room No. 208, Vardaan House, Mahavir Lane, Ansari Road, Daryaganj, New Delhi-110002

Branch Office: 216, Flat-GC, Green Park, Nerendrapur, Kolkata - 700103

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Website: www.ndpublisher.in

Editorial Note

Environmental Systems, Monitoring and Management Vis-à-Vis AI, Robotics & Technologies

Environment is an important concern and all we are associated with the environment and ecology. There are many subjects associated with the Environment *viz.* Environment Science, Environment Studies, Environment Engineering, Environment Management, etc. The technological subjects and fields concentrated with the environment is called Environmental Informatics. Emerging IT and Computing solutions to the environment and ecologies lead the development of environmental systems. Environmental Informatics is also known as Environmental Information Science and treated as the way to solve the issues, tools, techniques and sub-technologies of Computing and IT for the purpose of Environment, Ecology and Environmental Management. Among the core technologies applicable in Environmental Informatics are include Database Technology, Networking Technology, Multimedia Technology, Web Technology, Software Technology etc. Recently few other emerging technologies such as IoT, Cloud Computing, Artificial Intelligence, Big Data Analytics, Computational Intelligence, Human Computer Interaction, etc. are also being widely used in environmental management and systems. Environmental Informatics is preparing sustainable and healthy environmental development using various technologies and systems and in this regard Artificial Intelligence, Robotics, Machine Learning, Deep Learning, etc. are important and major concerns for the environmental Management specifically for the Land, Air and Water.

Artificial Intelligence and allied technologies are required in managing the land *viz.* soli management, soil pollution, intensive and healthy agricultural development, etc. Here with robotic based systems automatic data collection become possible and all such normally stored in the databases and decision. Land-friendly crops become possible with AI based monitoring, further in plant disease detection, poacher root prediction, erosion monitoring, species identification, and animal migration also AI, Robotics and allied technologies *viz.* cloud computing may be worthy and important.

Air Management is also perfectly supported with the Artificial Intelligence including allied technological help for faster and more accurate air pollution identification. With AI Air pollution more efficiently become possible to find out and obviously the reduction of the harmful emissions also supported by the AI. In Water related management and quality monitoring *viz.* proper and healthy Water System development, monitoring and management, in cleanliness of the water, identification

of water depth, ocean water management for the lives also AI and allied technologies including Cloud Computing and Virtualization are important.

In significant amends in respect of land, air, and water and cleans it up for a healthier planet therefore AI, Robotics and similar technologies become worthy and important. Environmental Informatics is rising for the development of environmental, societal and anthropological improvement using AI and ML, big data analytics, cloud computing, IoT, converged network and communication etc.

As Environment is a global concern therefore Artificial Intelligence applications are rising internationally in the developed countries but other countries also need to hold proper effort for the development of the environmental promotion and here efforts can be possible from the government bodies, institutions and policymakers for better AI and allied technological integration in the environment. Further this may indirectly helpful in agriculture, oceanography, climatology, forestry, anthropology and other areas. In the current trend of Computing and Communications therefore Computation and healthy Communication involvement in the ecology and environment should be the prime important from the end of government, policy makers, NGOs, Research Centers and Educational Institutes worldwide to develop the Sustainable Environment intelligently!

Editors

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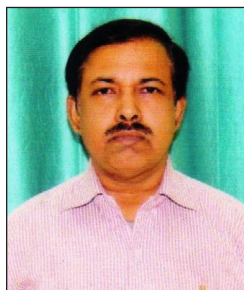
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Dr. P.K. Paul is working as an Executive Director, MCIS & Assistant Professor, Dept. of Computer & Information Sciences. He also holds the additional position of Information Scientist of the Raiganj University. He is associated as Honorary Professor of Logos University Int., Louisiana, USA (and Campus at Brazil, South America; Serbia, Europe & worldwide Online Operations). Dr. Paul holds Ph.D.-Information Science and Technology (IST) from India's premier & oldest Public Engineering Institute IEST Shibpur (An Institute of National Importance), He has completed Post Doctoral Fellow Certificate (PDFC) Program in Environmental Informatics, M. Tech (By Research) in Information Science and Technology, MS (By Research) in Information Assurance and IT Management, M.Sc. (Double), MBA-InfoSys. He is actively engaged in the research and academic activities in the field of IST and Engineering Sciences related with Information Processing and Management. He has been associated with Raiganj University, Raiganj, West Bengal for the teaching and learning activities. He is also CEO and VP of IST Foundation. Virtually he is among the few Indian Information Science professional who holds Post Graduate Qualification in all the dimensions of Information Sciences; ranging from Computer Sciences, Management Science, Information Studies and Information Technology. He is in favor on starting programs and specialization in emerging IT & Computing subjects that are applied and having social and business touch. He was engaged as consultant for designing country's first MBA-Information Management programme for VMS University, Sikkim. He is also mastermind for designing India's first interdisciplinary Masters (MSc) program on computing i.e. MSc-Computer & Information Science based on principles of interaction of information-technology-people. The first of its kind program already been started in the Government University RGU, India. He has credited many writing/research first and few among the Indian Researcher which including; first research/ policy paper on Cloud Computing Applications in Information Science, Systems, Information Centre/ Green Computing or Green IT in Information Field/ I-Schools aspects/ Usability Engineering in Information Science

and Services/ HCI in Information Uses/ Information Science Educational aspects/ [IST]/ Information Scientist/ Geo-Information Science, Quantum Information Science and so on. And he holds 200+ Authored Indexed, Refereed Papers, Articles, Chapters in his credit and about 25 National and International Authored and Edited Books. Moreover, He is Chief Editor of IJASE, New Delhi, India. He is also responsible as a Chief Editor for IJISC, New Delhi, India. He is also involved as Editorial Board Member and Reviewer of more than 100 National and International Journals in diverse field ranging from Computer Science, Informatics, Management, Engineering Science to Education, Social science, Health Science, Pharmacy and so on like Journal of Organizational and End User Computing, International Journal of E-Adoption, International Journal of Web Services Research, International Journal of E-Health and Medical Communications, International Journal of Healthcare Information Systems and Informatics, JECO, IJIRR, IJHCITP, IJOSSP, IJMDEM, IJTHI, IJDET, IJITPM, IJISSCM, IJSSSS, IJBDCN, IJWP published from United States, Dubai, India, Nigeria, South Africa and so on. Moreover, he has also performed with several international conferences and event as committee members, chairs, reviewers etc. and among these few important are International Conference on Computer and Digital Manufacturing (ICCDM 2017), 4-6th May, 2017, Singapore, Fourth International Conference on Artificial Intelligence and Applications (AIAPP 2017), 25-26 March, 2017, Geneva, Switzerland, 5th International Conference on Information Technology and Science (ICITS 2017), 25-27 June, 2017, Beijing, China, 2nd International Conference on *Information Systems Engineering* (ICISE2017), 1-3 April, 2017, South Carolina, USA, Sixth International Conference on Software Engineering and Applications (SEA-2017), 25-26 March, 2017, Geneva, Switzerland, IND-17 Lisbon, Portugal, 7th International BDSM-17, Spain, 5th International Conference on Information and Computer Networks (ICICN 2017) 26-28 February, 2017, Bangkok, Thailand, 8th International Conference on ICT: Big Data, Cloud and Security (ICTBDCS 2017), 21-22 August, 2017, Singapore and other 50+ reputed International events. He was also served in various visiting, invited and guest position in various events and few important are ICRDSTHM-17, Kuala Lumpur, Malaysia 28-29th April, 2017, NSETRAR-17, Tamil Nadu, India, ICIRHT-17 etc. He has performed many Invited Talk in leading and reputed academic and industrial establishments' viz. SRM University, Sikkim University, VIT University, Srinivas University, Mangalore University, TCG Digital, CloudNet India. He has received many Awards and Fellow position such as Best Researcher Award in Information Sciences (from IARA, Trichy), David Clark Blair Young Scientist Award in Computer & Information Science (from BSS, India), International Young Scientist Award (from ISROSET) for the contribution in Health Informatics, Citation Award (from SSCET/ Sri Sai University), International Social Science and Digital Society Think Tank Award-2020 and so on.



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Prof. Dr A Bhuimali is the Vice Chancellor at the Raiganj University, Raiganj in the State of West Bengal in India. He is one of the dedicated educationist, economist in the region. Dr. Bhuimali holds MA (Economics) and Ph.D. (Economics) from the University of North Bengal. Prof. Dr A Bhuimali also received the prestigious Post Doctoral Degree— D.Litt (Economics) from The Vidyasagar University, West Bengal, India. He joined teaching profession in the University of North Bengal and held the position of Head, Department of Economics, North Bengal University from various period. He was also the coordinator of Special Assistance Program (SAP-DRS-III) in the Department of Economics for five years.

He has authored several research papers, policy papers, review papers in several conferences, seminar of national and international repute. Dr. Bhuimali's work spread over economics to development studies to Information Management. He has authored and edited several National text and research based books from time to time. At his new job he is actively engaged in infrastructure development of the Raiganj University towards a modern experience of learning from Bachelors to Doctoral level from the foundation year of the University. Till date under the Vice Chancellorship of Prof. Bhuimali 15 Department started MPhil and PhD Program and about 20 Academic Units started PG degrees leading to MA/MSc/MCom/LLM. He has striking experience in guiding Doctoral students as well. He has guided about 25 Ph.D. students in different Interdisciplinary subjects. He is also member of several societies and organization of national and international repute. His work and administration widely appreciated and therefore in many colleges, universities and projects he has involved as an advisors, consultant and member.

Naturally due to his contribution and dedication he has received many prestigious national and international award among them few (received recent past) are Ambedkar Social Service Award, (From IARA at Trichy, India) Outstanding University Administrator and Academic Excellence Award (From SRD at Malaysia), Paul Samuelson Economist Award (From SAMA at Bangkok), Parul Samman (The University of Calcutta, India), Life Time Achievement Award (The Confederation of India, New Delhi) and so on. He has been offered Fellow position to many organizations as well such as Fellow of ISROSET, India, Fellow of IARA, India and so on.



Prof. Dr. Kalishankar Tiwary, PhD, D.Sc., FIMA (UK)

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Prof. Dr. Kalishankar Tiwary has brilliant careers. He is a professor of Mathematics, Raiganj University, West Bengal, India. Professor Tiwary obtained his post graduate (MSc), undergraduate (BSc) and Doctor of Philosophy (PhD) from the university of Kalyani, West Bengal, India. He obtained his D.Sc. Degree in Mathematics from Raiganj University, West Bengal, India. He stood first in order of merit in post graduate and 2nd in undergraduate examinations. He was awarded National Merit scholarship in School as well in University examinations. He was Research Associate of CSIR. He is the Fellow of IARA, Trichy, India, Fellow of ISROSET; India. Very recently he has received the prestigious Fellow status from The Institute of Mathematics and Its Application, UK and referred as a FIMA.

He has supervised a number of students for Ph.D. Degree in different universities of West Bengal. Professor Dr. Kalishankar Tiwary has research collaborations with many eminent research workers in India and abroad. He has a credit of nearly 130 publications in India and abroad. He is associated with many research societies. Apart from this he is keen interested in History and literature. Professor Dr. Kalishankar Tiwary has many articles and a book on political affairs as well. He was associated with Lions club. He is associated with St John's Ambulance. Currently He is the Dean of the Faculty of Science and Management of Raiganj University, West Bengal. He also holds Director IQAC and Coordinator of NAAC. He has worked in different organizations and conferences as a committee members. He is also Editorial Board Members in different Journals of repute. He has participated in many research conferences. His current research area is Analysis, Topology and Graph theory etc.



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Dr. R. Rajesh is currently working as a Principal in Rohini College of Engineering and Technology, Anjugramam, India, had done his Bachelor degree in Mechanical Engineering and Master degree in Production Engineering from Annamalai University, Chidambaram. He did Doctor of Philosophy in “Manufacturing Engineering” at Annamalai University, Chidambaram.

He has more than 20 years of working experience in teaching. He has been awarded as best educationist award, Best PhD thesis award and Best Faculty award. Four Ph.D. scholars successfully completed their PhD degree under his excellent guidance. Through his intellectual and innovative ideas, final year Mechanical engineering students have fabricated and successfully operated “Driverless Car” couple of years back, which has been published in the daily Newspaper.

He is an eminent personality as he has published 65 papers in international journals and 18 papers in national journals. He also has published three articles in national magazines and another four article in regional magazines. He has published 45 papers in proceedings of international conferences and 2 papers in proceedings of national conferences. He has presented 15 papers in international conferences. He has published 2 books and edited 6 books.

He is the editor in chief, editor, associate editor and editorial board members in various journals. He is also involved as Reviewer of more than 50 National and International Journals in diverse field ranging from Computer Science, Informatics, Management, Engineering Science to Education, Social science, Health Science, Pharmacy etc.

Moreover he is also responsible and associated with several completed international conferences and event as committee members, chairs, reviewers etc. and among these few important are International Conference on optimisation and Computing in collaboration with Elsevier.



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