Lecture Notes in Electrical Engineering 982

Rajeev Agrawal
Pabitra Mitra
Arindam Pal
Madhu Sharma Gaur *Editors*

International Conference on IoT, Intelligent Computing and Security

Select Proceedings of IICS 2021

Springer

Lecture Notes in Electrical Engineering

Volume 982

The book series *Lecture Notes in Electrical Engineering* (LNEE) publishes the latest developments in Electrical Engineering—quickly, informally and in high quality. While original research reported in proceedings and monographs has traditionally formed the core of LNEE, we also encourage authors to submit books devoted to supporting student education and professional training in the various fields and applications areas of electrical engineering. The series cover classical and emerging topics concerning:

- Communication Engineering, Information Theory and Networks
- Electronics Engineering and Microelectronics
- Signal, Image and Speech Processing
- Wireless and Mobile Communication
- Circuits and Systems
- Energy Systems, Power Electronics and Electrical Machines
- Electro-optical Engineering
- Instrumentation Engineering
- Avionics Engineering
- Control Systems
- Internet-of-Things and Cybersecurity
- Biomedical Devices, MEMS and NEMS

For general information about this book series, comments or suggestions, please contact leontina.dicecco@springer.com.

To submit a proposal or request further information, please contact the Publishing Editor in your country:

China

Jasmine Dou, Editor (jasmine.dou@springer.com)

India, Japan, Rest of Asia

Swati Meherishi, Editorial Director (Swati.Meherishi@springer.com)

Southeast Asia, Australia, New Zealand

Ramesh Nath Premnath, Editor (ramesh.premnath@springernature.com)

USA, Canada

Michael Luby, Senior Editor (michael.luby@springer.com)

All other Countries

Leontina Di Cecco, Senior Editor (leontina.dicecco@springer.com)

**** This series is indexed by EI Compendex and Scopus databases. ****

Rajeev Agrawal · Pabitra Mitra · Arindam Pal ·
Madhu Sharma Gaur
Editors

International Conference on IoT, Intelligent Computing and Security

Select Proceedings of IICS 2021

Springer

Editors
Rajeev Agrawal
GL Bajaj Institute of Technology
and Management
Greater Noida, India

Arindam Pal
Commonwealth Scientific and Industrial
Research Organisation (CSIRO)
Canberra, ACT, Australia

Pabitra Mitra
Department of Computer Science
Engineering
Indian Institute of Technology
Kharagpur, India

Madhu Sharma Gaur
GL Bajaj Institute of Technology
and Management
Greater Noida, India

ISSN 1876-1100 ISSN 1876-1119 (electronic)
Lecture Notes in Electrical Engineering
ISBN 978-981-19-8135-7 ISBN 978-981-19-8136-4 (eBook)
https://doi.org/10.1007/978-981-19-8136-4

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Organizations

General Conference Chair

Prof. (Dr.) Rajeev Agrawal, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India

Program Chairs

Dr. Mohamed Elhoseny, Mansoura University, Egypt
Dr. Arindam Pal, Commonwealth Scientific and Industrial Research Organization (CSIRO), Australia
Dr. Maleq Khan, Texas A&M University–Kingsville, USA

Technical Chairs

Dr. Mamoun Alazab, Charles Darwin University, Australia
Dr. Selena He, Kennesaw State University, Georgia, USA
Dr. Chakchai So-In, Khon Kaen University, Thailand
Dr. Mohammad S. Alam, Texas A&M University-Kingsville
Dr. Dinesh Kumar Singh, GL Bajaj Institute of Technology and Management, Greater Noida

Organizing Secretariat

Dr. Shashank Awasthi, GL Bajaj Institute of Technology and Management, Greater Noida

Organizing Chairs

Dr. Sujay Deb, Indraprastha Institute of Information Technology, Delhi
Dr. Madhu Sharma Gaur, GL Bajaj Institute of Technology and Management, Greater Noida

Session Chair for Track 1

Dr. Brajesh Kumar, Mahatma Jyotiba Phule Rohilkhand University, Bareilly

Co-session Chair for Track 1

Dr. Divya Mishra, GL Bajaj Institute of Technology and Management, Greater Noida

Session Chair for Track 2

Dr. Krishan Kumar, National Institute of Technology, Srinagar
Dr. Deepak Punetha, Indian Institute of Technology, Bombay

Co-session Chair for Track 2

Dr. Rajiv Kumar, GL Bajaj Institute of Technology and Management, Greater Noida

Session Chair for Track 3

Dr. Nishant Kumar, Gurukula Kangri University, Haridwar
Dr. Abhinav Saxena, JSS Academy of Technical Education, Noida

Co-session Chair for Track 3

Dr. Astha Sharma, GL Bajaj Institute of Technology and Management, Greater Noida

Session Chair for Track 3

Dr. Surendiram B., National Institute of Technology, Puducherry
Dr. Emmanuel S. Pilli, Malaviya National Institute of Technology Jaipur

Conference Convener

Dr. Sanjeev Kumar, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India

Internal Advisory Committee

Dr. Shashank Awasthi, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Dr. Satyendra Sharma, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Dr. R. K. Mishra, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Dr. P. C. Vashist, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Dr. Sanjeev Pippal, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Dr. Mohit Bansal, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Dr. Vinod Yadav, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Dr. Sansar Singh Chauhan, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Dr. Prashant Mukherjee, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India

Internal Steering Committee

Dr. Rajiv Kumar, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Dr. Amrita Rai, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Dr. Upendra Dwivedi, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Dr. Astha Sharma, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India

Organizing Committee

Mr. Gaurav Bhaita, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Mr. Lalan Kumar, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Mr. Prem Sagar Sharma, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Ms. Anju Mishra, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Ms. Deepkiran, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Ms. Manjusa Gundale, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Ms. Aparna Sharma, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Ms. Priya Porwal, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Mr. Manish Kumar, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Mr. Anil Kumar Vats, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Mr. Virendra Kumar, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Mr. Bhavesh Kumar, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India
Mr. Vikram Singh, GL Bajaj Institute of Technology and Management, Greater Noida, Uttar Pradesh, India

Preface

With the emerging technologies, world is changing and technology intervention is bringing fast paradigm shift in the present era. The rapid development in IoT and intelligent computing technologies are happening day by day, and the things around us are becoming smart and intelligent. These new challenges posed and the ideas generated to solve problems need to be shared. However, this technology transformation is developing with higher security risk which requires discussion to bring awareness about necessary research in the field of intelligent computing and security.

This book presents selected proceedings of the International Conference on IoT, Intelligent Computing and Security: A Paradigm Shift. The Conference IICS-2021 was held on December 17–18, 2021, organized by the department of Master of Computer Applications (MCA), GL Bajaj Institute of Technology and Management, Greater Noida, Delhi NCR, India (affiliated to Dr. A. P. J. Abdul Kalam Technical University, Lucknow, Uttar Pradesh). The conference was conducted in hybrid mode (physical/online) mode due to COVID-19 pandemic.

The aim of IICS-2021 was to bring together vibrant stakeholders who share a passion for research, innovation, solution development partners, end users and our budding professionals around the world to deliberate upon the different challenging aspects and issues in the field of IoT, artificial intelligence, emerging computational intelligence and security solutions.

This two days' online international conference had participation from across the globe including, USA, Australia, France, Argentina, Russia, Nigeria. Norwegian and Bangladesh. The conference received 169 submissions, and review committee received 169 research papers out of which 53 papers were selected for final presentation after rigorous blind reviews involving more than 240 reviewers. The committees of the conference include more than 300 national/international committee chairs, advisory board members, technical program committee members, keynote speakers, presenters and experts from across the globe to share their views, innovations and accomplishments.

We are grateful to Respected Prof (Dr.) S. N. Singh, IIT Kanpur, Chief Guest, Dr. Satish K. Singh, IIIT Allahabad, Dr. Arti Noor, Senior Director, Center of Development in Advanced Computing (C-DAC) Noida, Uttar Pradesh, India, Guest of Honor for their gracious presence and motivation. We pay our heartfelt gratitude to Dr. Ram Kishore Agarwal, Chief Patrons, Shri Pankaj Agarwal, our Patron and our keynote speakers, Dr. Raj Jain, Professor of Computer Science and Engineering, Washington University in St. Louis, Dr. Carlos M. Travieso University of Las Palmas de Gran Canaria (ULPGC), Spain, Dr. K. C. Santosh University of South Dakota, USA, Mr. Daniel Lewis, CEO and Cofounder, Awen Collective (Industrial Cyber Security Software), University of Bristol, Pontypridd, Wales, UK, and Mr. Mitthan Meena, Founder and CEO at Microsec.AI Security for their valuable keynote address on day 1 and day 2.

Our sincerely thanks to all the national/international committee chairs, advisory board members, technical program committee members, keynote speakers, presenters and experts from across the globe and members of the organizing committee for their cooperation, hard work and support to make this conference successful.

We also thank Springer for publishing the proceedings in the Lecture Notes in Electrical Engineering (LNEE) series. Special thanks to all the authors and participants for their contributions in making an effective, successful and productive conference.

Greater Noida, India — Dr. Rajeev Agrawal
Kharagpur, India — Dr. Pabitra Mitra
Canberra, Australia — Dr. Arindam Pal
Greater Noida, India — Dr. Madhu Sharma Gaur
January 2022

Keynote I

Title: Blockchains with AI for Security and Risk Management

Keynote Address

Dr. Raj Jain
Barbara J. and Jerome R. Cox, Jr., Professor of Computer Science and Engineering, Washington University in St. Louis

Abstract

Blockchains have found numerous applications in Fintech, supply chains and contracts because it is an ideal distributed consensus where all nodes agree on the validity of transactions in a block without needing a central trusted party. The consensus is binary—agree or disagree—true or false. In this era of big data, we need to move blockchains beyond data storage to provide knowledge. In the real world,

there are many situations in which various participants may not fully agree, and their opinions may be probabilistic, leading to probabilistic agreements. In this talk, Prof. Jain will present his recent extensions using AI that allow blockchains to be used for group decisions that may not be binary. These extensions enable blockchains to be used for group decision making and risk management when the group sizes are large, and group members may want to remain anonymous. In particular, Prof. Jain will describe numerous use cases of this idea. Such situations frequently arise in network security and risky investments.

Biography

Raj Jain is currently the Barbara J. and Jerome R. Cox, Jr., Professor of Computer Science and Engineering at Washington University in St. Louis. Dr. Jain is Life Fellow of IEEE, Fellow of ACM, Fellow of AAAS and Recipient of the 2018 James B. Eads Award from St. Louis Academy of Science, 2017 ACM SIGCOMM Life-Time Achievement Award. Previously, he was one of the co-founders of Nayna Networks, Inc., Senior Consulting Engineer at Digital Equipment Corporation in Littleton, Mass, and then Professor of Computer and Information Sciences at Ohio State University in Columbus, Ohio. With 37,000+ citations, according to Google Scholar, he is one of the highly cited authors in computer science. Further information is at http://www.cse.wustl.edu/~jain/.

Keynote II

Title: Smart Affective States Identification for Neurodegenerative Diseases

Invited Speaker

Prof. Dr. Carlos M. Travieso-González
University of Las Palmas de Gran Canaria, Spain

Abstract

The use of image processing methods is a useful tool in order to extract information from persons for different application. In particular, soft biometrics application can be applied to detect race, age, gender, expression, etc. In this case, I have used that information to extract the grade of emotions. It can be an important and interesting indicator for medical doctors and to have more diagnostic evidences about a decision or criterion in neurodegenerative diseases.

There is that to difference the concept of expression and the grade of expression or arousal. For this kind of diseases, the important concept is the grade of expression because it says if the person loses or not that grade, with independence of the valence, positive or negative. The neurodegenerative disease is present on the arousal.

This kind of studies can represent new paradigms for the medicine and in great input from the technology field. The adding value of this kind of proposal is its low cost and easy use.

Biography

Carlos M. Travieso-González received the M.Sc. degree in 1997 in Telecommunication Engineering at Polytechnic University of Catalonia (UPC), Spain, and Ph.D. degree in 2002 at University of Las Palmas de Gran Canaria (ULPGC-Spain). He is Full Professor and Head of Signals and Communications Department at ULPGC. He belongs to ULPGC from 2001, teaching subjects on signal processing, pattern recognition and learning theory. His research lines are biometrics, biomedical signals and images, data mining, classification system, signal and image processing, machine learning and environmental intelligence. He has researched in more than 50 International and Spanish Research Projects, some of them as Head Researcher. He is Co-author of four books, Co-editor of 25 Proceedings Book and Guest Editor for eight JCR-ISI international journals and up to 24 chapters. He has over 460 papers published in international journals and conferences (83 of them indexed on JCR–ISI–Web of Science). He has published seven patents in Spanish Patent and Trademark Office. He has been Supervisor on nine Ph.D. theses (11 more are under supervision) and 130 master theses. He is Founder of The IEEE-IWOBI conference series and President of its Steering Committee, of The InnoEducaTIC conference series and of The APPIS conference series. He is Evaluator of project proposals for European Union (H2020 and Horizon Europe), Medical Research Council (MRC—UK), Spanish Government (ANECA), Research National Agency (ANR—France), DAAD (Germany), Argentinian Government and Colombian Institutions. He has been Reviewer in different indexed international journals (<70) and conferences (<240) since 2001. He is Member of IASTED Technical Committee on Image Processing from 2007 and Member of IASTED Technical Committee on Artificial Intelligence and Expert Systems from 2011. He will be APPIS 2020 General Chair and IEEE-IWOBI 2020 and was APPIS 2019 General Chair and IEEE-IWOBI 2019, IEEE-IWOBI 2018 General Chair, APPIS 2018 General Chair, InnoEducaTIC 2017 General Chair, IEEE-IWOBI 2017 General Chair, IEEE-IWOBI 2015 General Chair, InnoEducaTIC 2014 General Chair, IEEE-IWOBI 2014 General Chair, IEEE-INES 2013 General Chair, NoLISP 2011 General Chair, JRBP 2012 General Chair and IEEE-ICCST 2005 Co-chair. He is Associate Editor on Computational Intelligence

and Neuroscience journal (Hindawi—Q1 JCR-ISI), Sensors (MDPI—Q1 JCR-ISI) and Entropy (MDPI—Q2 JCR-ISI). He was Vice-Dean from 2004 to 2010 in Higher Technical School of Telecommunication Engineers in ULPGC and Vice-Dean of Graduate and Postgraduate Studies from March 2013 to November 2017.

Keynote III

Title: Infectious DiseaseX: AI for Healthcare, How BigData is Big, and Explainabilty

Invited Speaker

Dr. K. C. Santosh
University of South Dakota, USA

Abstract

When we consider AI for healthcare, infectious disease outbreak is no exception. Three major topics: #AI4Healthcare, how #BigData is big (in medical imaging informatics) and #ExplainableAI will be discussed during the talk. The talk will begin with machine learning models that help in not only predicting but also detecting abnormalities due to infectious diseaseX such as pneumonia, TB and COVID-19. I will

open my talk with infectious disease prediction models and unexploited data, where we will learn that predictive analytical tools are close to garbage-in garbage-out (at least for COVID-19). I will then cover multimodal learning and representation based on both shallow learning (handcrafted features) and deep learning (deep features) that typically apply on medical imaging tools. Like in computer vision, I will open an obvious question, how #BigData is big in addition to common techniques: data augmentation and transfer learning. Another crucial part of the talk is #ExplainableAI—I will discuss on where have we missed explainability? With all these facts, as most of models are limited to education and training, I will end up my talk with the statement "ML innovation should not limit to building models." What we need is #ExplainableAI in #Active Learning framework.

Contents

Editors and Contributors

About the Editors

Dr. Rajeev Agrawal has worked as Director and Professor at G.L. Bajaj Institute of Technology and Management, Greater Noida, India. He has an illustrated experience of more than 27 years in teaching and research and holds a B.E. degree in Electronics Engineering and M.Tech. degree in System Engineering. He received Ph.D. in the area of Wireless Communication Channels from the School of Computer and System Sciences, JNU, New Delhi. He was visiting professor at Kennesaw State University, Georgia, USA, under a joint research project in the area of Remote Patient Monitoring and Medical Imaging. His research areas include planning and performance analysis of wireless networks and medical image analysis for automated diagnosis, performance analysis of fog, and edge networks. He has more than 70 publications in international journals and proceedings. He has been awarded by various state and national agencies for his contribution to research and academics. He is also serving as a reviewer for several reputed international journals and member of the editorial board for two international journals and an editor of a book by Elsevier in the area of Health Informatics and two lecture series by Springer.

Dr. Pabitra Mitra (Member, IEEE) received the B.Tech. degree in electrical engineering from IIT Kharagpur, Kharagpur, West Bengal, India, in 1996, and the Ph.D. degree from the Department of Computer Science and Engineering, Indian Statistical Institute, Kolkata, India, in 2005. Currently, he is working as a professor in the Department of Computer Science and Engineering, IIT Kharagpur. He has supervised eight Ph.D. students and 12 M.S. students (by research) on different issues related to AI and machine learning. His research interests are machine learning, data mining, pattern recognition, information retrieval, and image processing. As a part of publications, he has 40 journal articles, 7 chapters, 3 books, 100 conference proceedings, 3 reviews, and 2 editorials in his credit.

Dr. Arindam Pal is a senior research scientist at Data61 in Commonwealth Scientific and Industrial Research Organization (CSIRO). He is also a conjoint senior lecturer in the School of Computer Science and Engineering at UNSW Sydney. He has over 14 years of industrial research experience in companies like Microsoft, Yahoo!, Novell, CSIRO, Cognizant, and TCS Research. He has over 10 years of experience in Analytics and Machine Learning. He has published several papers at prestigious conferences such as ACM SIGIR, ACM CIKM, ACM JCDL, IEEE ICRA, and IEEE ICC. He has been granted 4 US patents and has filed 15 patents in various countries like the USA, European Union, and India. He has given more than 30 invited talks in Australia, India, USA, and Italy. He has managed and delivered high-quality software and impactful projects in Australia, the USA, and India. He has worked on evacuation planning, intelligent transportation, multi-robot task allocation, phishing detection, data privacy, and security. He earned his Ph.D. in Computer Science and Engineering from IIT Delhi. He works on the business and research problems of CSIRO and collaborates with faculty members of universities, both in Australia and abroad. He publishes academic papers in conferences and journals. He is a senior member of both ACM and IEEE.

Dr. Madhu Sharma Gaur (Communicating Editor) is a professor and head of the Department of Master of Computer Applications, GL Bajaj Institute of Technology and Management Greater Noida. She has received Ph.D. Degree in the area of Security and Trust Management in Mobile Pervasive Environment and serving as an academician, researcher, and computer application development architect for the last 20+ years. Her area of research interests includes IoT, AI/ML, security, and trust management. She has presented and published various research papers in Springer, IEEE, and Elsevier International Conferences and Journals of repute and also received the most cited paper by Springer *International Journal Human-centric Computing and Information Sciences*, in 2018. She has extensive exposure to software development, app development, and provides solutions for various industrial/social problems. She has also completed many industrial projects like visitor pass manager, payroll, stock maintenance, invoice and stock management, and order dispatch system.

Contributors

H. Aditya Pai Department of Computer Science & Engineering, Deemed to be University, Dehradun, India

Reshu Agarwal Amity Institute of Information Technology, Amity University, Noida, India

Jitendra Agrawal School of Information Technology, Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal, MP, India

Prashant Ahlawat School of Information Technology, Manipal University, Jaipur, India

S. Asha School of Computer Science and Engineering and Centre for Cyber Physical Systems, VIT University, Chennai, Tamil Nadu, India

V. S. Bakkialakshmi Department of Computer Science and Engineering, Hindustan Institute of Technology and Science, Chennai, India

Usha Batra School of Engineering & Sciences, D Goenka University, Gurgaon, India

Mohd. Belal Department of Computer Science, Aligarh Muslim University, Aligarh, Uttar Pradesh, India

Hanu Bhardwaj Department of Computer Science and Technology, Manav Rachna University, Faridabad, Haryana, India

Rishav Bhardwaj School of Electronics Engineering, VIT-AP Campus, Amrawati, India

Kamika Chaudhary Department of Computer Science, M.B. Government P.G. College, Haldwani, Nainital, India

Gaurav Choudhary DTU Compute, Technical University of Denmark, Lyngby, Denmark

A. Christy Jeba Malar Department of Information Technology, Sri Krishna College of Technology, Coimbatore, Tamilnadu, India

M. Deva Priya Department of Computer Science and Engineering, Sri Eshwar College of Engineering, Coimbatore, Tamilnadu, India

Javier Diaz Faculty of Informatics, Research Laboratory in New Information Technologies (LINTI), National University of La Plata, La Plata, Buenos Aires, Mexico

P. Divya Department of Computer Science and Engineering, Sri Krishna College of Technology, Coimbatore, Tamilnadu, India

Shivangi Diwan National Institute of Technology, Raipur, Chattisgarh, India

Zamam Farhat Aligarh Muslim University, Aligarh, India

Nishat Fatima Department of Computer Science and Engineering, Centre for Advanced Studies, Lucknow, Uttar Pradesh, India

Arti Gautam G L Bajaj Institute of Technology and Management, Greater Noida, India

Aayush Goel Bharati Vidyapeeth's College of Engineering, New Delhi, India

Harshit Goel Department of Computer Science and Engineering, Delhi Technological University, Delhi, India

Deepa Gupta Infosys Ltd., Bangalore, India

Lipika Gupta Chitkara University Institute of Engineering and Technology, Chitkara University, Punjab, India

Mukul Gupta G.L. Bajaj Institute of Management, Greater Noida, India

Rishi Gupta Manipal University Jaipur, Rajasthan, India

Sandeep Kumar Gupta AMET University, Chennai, India

M. S. Guru Prasad Department of Computer Science & Engineering, Deemed to be University, Dehradun, India

Ivana Harari Faculty of Informatics, Research Laboratory in New Information Technologies (LINTI), National University of La Plata, La Plata, Buenos Aires, Mexico

Tarun Jain Manipal University Jaipur, Rajasthan, India

Priya Jaiswal Department of Computer Application, M.C.M.T, Varanasi, UP, India

Sengathir Janakiraman Department of Information Technology, CVR College of Engineering, Hyderabad, Telangana, India

R. Kanmani Department of Electronics and Communication Engineering, SNS college of Technology, Coimbatore, Tamilnadu, India

Shylaja VinayKumar Karatangi G L Bajaj Institute of Technology and Management, Greater Noida, India

Rahul Katarya Department of Computer Science and Engineering, Delhi Technological University, Delhi, India

Shaminder Kaur Chitkara University Institute of Engineering and Technology, Chitkara University, Punjab, India

Rohit Kaushik G. L. Bajaj Institute of Technology and Management, Greater Noida, India

Abdullah Ahmad Khan Department of Computer Science, Aligarh Muslim University, Aligarh, Uttar Pradesh, India

Aijaz Khan VIT Bhopal University, Bhopal, Madhya Pradesh, India

Ankit Khatri Dr B R Ambedkar National Institute of Technology Jalandhar, Jalandhar, Punjab, India

Ravi Khatri Dr B R Ambedkar National Institute of Technology Jalandhar, Jalandhar, Punjab, India

K. Krishnaveni Department of Computer Science, Sri. S. Ramasamy Naidu MemorialCollege (Affiliated to Madurai Kamaraj University, Madurai), Virudhunagar District, Tamil Nadu, India

Surendra Kumar Shukla Department of Computer Science and Engineering, Graphic Era Deemed to be University, Dehradun, India

Abhishek Kumar Department of Computer Science & Engineering, Chaudhary Devi Lal University, Sirsa, Haryana, India

Rajeev Kumar School of Computer and Systems Sciences, Jawaharlal Nehru University, New Delhi, New Delhi, India

Rajesh Kumar Department of Electrical Engineering, JSS Academy of Technical Education, Noida, U.P, India

Sachin Kumar Department of Computer Application, V.B.S.P.U, Jaunpur, UP, India

Sushil Kumar School of Computer and Systems Science, Jawaharlal Nehru University, New Delhi, New Delhi, India

T. V. Vijay Kumar School of Computer and Systems Sciences, Jawaharlal Nehru University, New Delhi, India

Vinesh Kumar Phonics Group of Institutions, Roorkee, India

Priyanshi Kumari Department of Electrical Engineering, JSS Academy of Technical Education, Noida, U.P, India

Shilpi Kumari Department of Electrical Engineering, JSS Academy of Technical Education, Noida, U.P, India

Usha Kumari Department of Electronics and Communication, DCRUST Murthal, Murthal, India

Estela Macas International Ibero-American University—UNINI MX, Mexico City, Mexico

Rajashri Mahato Centre for Cyber Physical Systems, VIT University, Chennai, Tamil Nadu, India

A. Christy Jeba Malar Department of Information Technology, Sri Krishna College of Technology, Coimbatore, Tamilnadu, India

Preeti Malik Department of Computer Science and Engineering, Graphic Era University, Dehradun, India

Vikas Mittal School of Computer and Systems Sciences, Jawaharlal Nehru University, New Delhi, India

G. Nivedhitha Department of Computer Science and Engineering, Sri Krishna College of Technology, Coimbatore, Tamilnadu, India

Sarvottam Ola VIT University, Chennai, Tamil Nadu, India

S. Padmavathi Department of Computer Science and Engineering, Sri Krishna College of Technology, Coimbatore, Tamilnadu, India

Nitin Kumar Pal Government Polytechnic College Puranpur, Puranpur, U.P, India

Saurabh Pal Department of Computer Application, V.B.S.P.U, Jaunpur, UP, India

Bhaskar Pant Department of Computer Science and Engineering, Graphic Era Deemed to be University, Dehradun, India

Harshil Panwar Department of Computer Science and Engineering, Delhi Technological University, Delhi, India

Monika Parmar Chitkara University School of Engineering and Technology, Chitkara University, Solan, Himachal Pradesh, India

V. Praba Department of Computer Science, Sri. S. Ramasamy Naidu Memorial-College (Affiliated to Madurai Kamaraj University, Madurai), Virudhunagar District, Tamil Nadu, India

Om Prakash School of Computer and Systems Sciences, Jawaharlal Nehru University, New Delhi, New Delhi, India

Prashant Department of Electrical Engineering, JSS Academy of Technical Education, Noida, U.P, India

M. Deva Priya Department of Computer Science and Engineering, Sri Eshwar College of Engineering, Coimbatore, Tamilnadu, India

Jyoti Pruthi Department of Computer Science and Technology, Manav Rachna University, Faridabad, Haryana, India

Henry Quisnancela National University of La Plata, Faculty of Informatics, Research Laboratory in New Information Technologies (LINTI), Buenos Aires, Argentina

T. Raghunathan Department of Computer Science and Engineering, Sri Krishna College of Technology, Coimbatore, Tamilnadu, India

Jagdeep Rahul Department of Electronics and Communication Engineering, Rajiv Gandhi University, Doimukh, India

Amrita Rai G L Bajaj Institute of Technology and Management, Greater Noida, India

Vandana Rawat Department of Computer Science and Engineering, Graphic Era Deemed to be University, Dehradun, India

Mónica R. Romero Faculty of Informatics, Research Laboratory in New Information Technologies (LINTI), National University of La Plata, La Plata, Buenos Aires, Mexico

S. Saadhikha Shree Centre for Cyber Physical Systems, VIT University, Chennai, Tamil Nadu, India

Mridu Sahu National Institute of Technology, Raipur, Chattisgarh, India

Olena Sakovska Uman National University of Horticulture, Uman, Ukraine

Abhinav Saxena Department of Electrical Engineering, JSS Academy of Technical Education, Noida, U.P, India

Shishir Kumar Shandilya Vellore Institute of Technology, VIT Bhopal University, Bhopal, M.P, India

Amit Kumar Sharma Department of Electrical and Electronics Engineering, Galgotia College of Engineering and Technology, Greater Noida, U.P, India

Ashish K. Sharma Bajaj Institute of Technology, Wardha, Maharashtra, India

Dhananjay Sharma Department of Computer Science and Engineering, Delhi Technological University, Delhi, India

Durgesh M. Sharma Shri Ramdeobaba College of Engineering and Management, Nagpur, Maharashtra, India;
Vellore Institute of Technology, VIT Bhopal University, Bhopal, M.P, India

Hitesh Kumar Sharma School of Computer Science, University of Petroleum and Energy Studies, EnergyAcres, Dehradun, India

Lakhan Dev Sharma School of Electronics Engineering, VIT-AP Campus, Amrawati, India

Manoj Kumar Sharma School of Information Technology, Manipal University, Jaipur, India

Sandhya Sharma Chitkara University School of Engineering and Technology, Chitkara University, Solan, Himachal Pradesh, India

Surendra Kumar Shukla Department of Computer Science and Engineering, Graphic Era Deemed to Be University, Dehradun, India

Devesh Pratap Singh Department of Computer Science and Engineering, Graphic Era Deemed to be University, Dehradun, India

Jay Singh Department of Electrical and Electronics Engineering, G.L Bajaj Institute of Technology and Management, Greater Noida, U.P, India

Kiran Deep Singh Chitkara University Institute of Engineering and Technology, Chitkara University, Rajpura, Punjab, India

Neelam Singh Department of Computer Science and Engineering, Graphic Era Deemed to be University, Dehradun, India

Nitu Singh School of Information Technology, Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal, MP, India

Prabhdeep Singh Department of Computer Science & Engineering, Deemed to be University, Dehradun, India

Ram Sewak Singh Department of Electronics and Communication Engineering, Adama Science and Technology University, Adama, Ethiopia

Satya Singh Department of Computer Application, M.G.K.V.P, Varanasi, UP, India

Shipra Singh Infosys Ltd., Bangalore, India