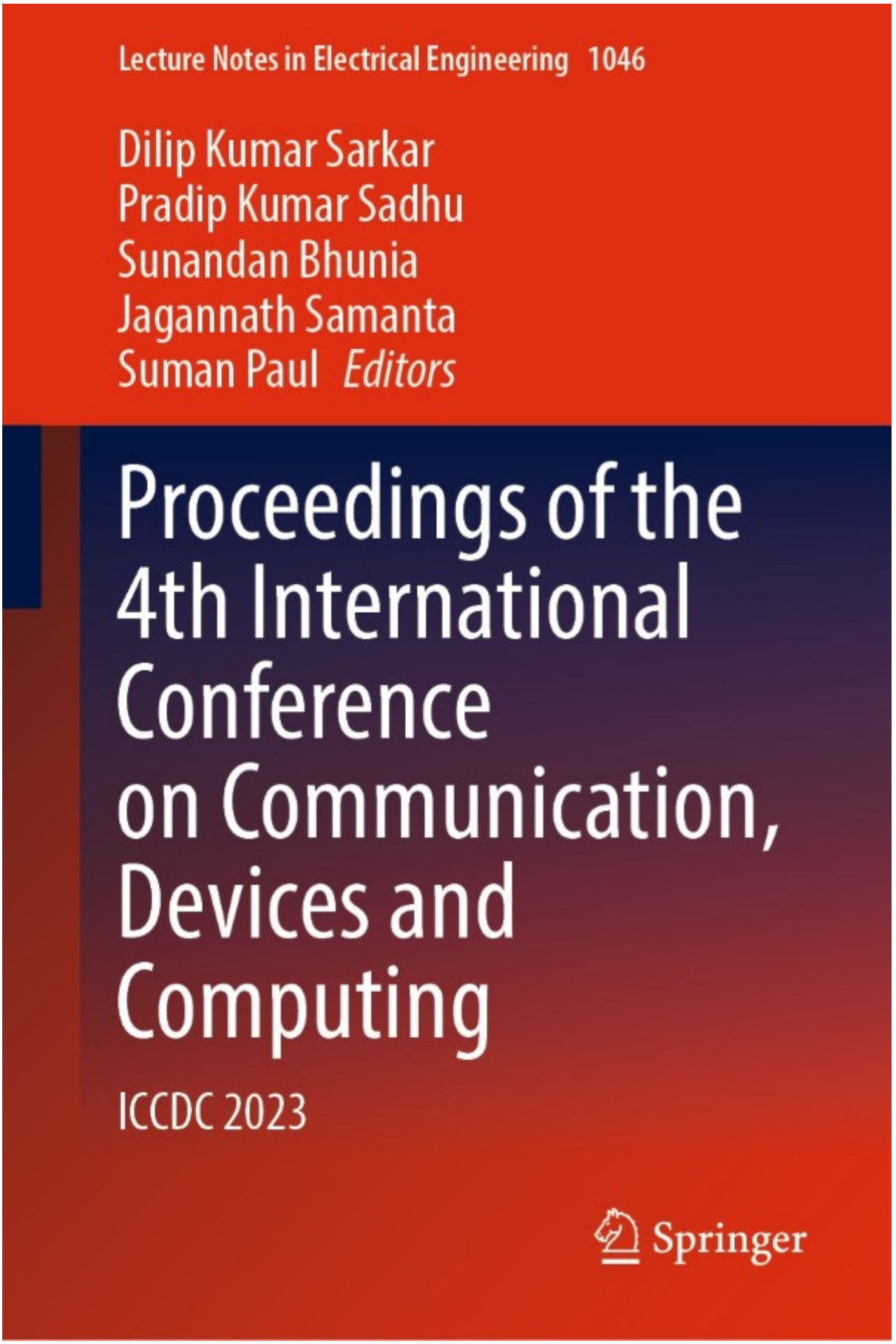
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Proceedings of the 4th International Conference on Communication, Devices and Computing
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Volume 1046

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Preface

The 4th International Conference on Communication, Devices and Computing (ICCDC 2023) was held at Haldia Institute of Technology, Haldia, from March 1 to 3, 2023. Haldia is a city in Purba Medinipur district of Indian state West Bengal. Haldia Institute of Technology is dedicated to the objectives of creating highly trained professional manpower in various disciplines of engineering. It has gained reputation through institutional dedication to teaching and research.

In response to call for papers of ICCDC 2023, a total of 136 papers were submitted for presentation and inclusion in proceedings of conference. These papers were evaluated and ranked based on their novelty, significance and technical quality by at least two reviewers per paper. After a careful and blind refereeing process, 55 papers were selected for inclusion in the proceeding. These papers cover current research in communication, signal processing, image processing, wireless network, semiconductor devices, VLSI design, antenna design and machine learning. The conference hosted three offline talks by Prof. Arokiaswami Alphones, Nanyang Technological University, Singapore, Prof. Chinmoy Saha, Indian Institute of Space Science and Technology, Kerala, India, and Prof. Md. Saidur Rahman, Bangladesh University of Engineering and Technology, Bangladesh. The conference also hosted three virtual invited talks by Prof. Shaibal Mukherjee, Indian Institute of Technology Indore, India, Prof. (Dr.) Durbadal Mandal, National Institute of Technology Durgapur, India, and Prof. Ramesh Bansal, University of Sharjah, UAE.

A conference of this kind would not be possible without the full support from different committee members. The organizational aspects were looked after by the organizing committee members who spent their time and energy in making the conference a reality. We also thank all the technical program committee members and additional reviewers for thoroughly reviewing the papers submitted to the conference and sending their constructive suggestions to improve the quality of papers. Our hearty thanks to Springer for agreeing to publish the conference proceedings.

Special thanks to the Defence Research and Development Organisation (DRDO), Government of India, for their financial support to conduct the conference for grant success.

We are indebted to Haldia Institute of Technology for sponsoring and supporting the event. Last but not the least, our sincere thanks go to all speakers, participants all authors who have submitted papers to ICCDC 2023. We sincerely hope that the readers will find the proceedings stimulating and inspiring.

Chicoutimi, Canada — Prof. Dilip Kumar Sarkar
Dhanbad, India — Prof. Pradip Kumar Sadhu
Kokrajhar, India — Dr. Sunandan Bhunia
Haldia, India — Dr. Jagannath Samanta
Haldia, India — Dr. Suman Paul

Message from the Volume Editors

It is a great pleasure for us to organize the 4th International Conference on *Communication, Devices and Computing* (ICCDC 2023) held from March 1 to 3, 2023 at the Haldia Institute of Technology, Purba Medinipur, West Bengal, India. Our main goal is to provide an opportunity to the participants to learn about contemporary research in communication, devices and computing and exchange ideas among themselves and with experts present in the conference as invited speakers. It is our sincere hope that the conference will help the participants in their research and training and open new avenues for work for those who are either starting their research or are looking for extending their area of research to a different area of current research in *communication, devices and computing*.

After an initial call for papers, 136 papers were submitted for presentation at the conference. All submitted papers were sent to external referees, and after refereeing, 55 papers were recommended for publication for the conference proceedings that will be published by Springer in its Lecture Notes on Electrical Engineering (LNEE) series.

Special thanks to the Defence Research and Development Organisation (DRDO), Government of India, for their financial support to conduct the conference for grant success.

We are grateful to the speakers, participants, reviewers, organizers, sponsors, and Haldia Institute of Technology for their support and help, without which it would have been impossible to organize the conference. We express our gratitude to the organizing committee members who work behind the scene tirelessly in taking care of the details in making this conference a success.

Prof. Dilip Kumar Sarkar
Prof. Pradip Kumar Sadhu
Dr. Sunandan Bhunia
Dr. Jagannath Samanta
Dr. Suman Paul

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About the Editors

Dilip Kumar Sarkar is a professor in the Department of Applied Sciences, University of Quebec at Chicoutimi, Canada. He received his Ph.D. from Kalyani University, India, in 1999. He has received various awards and worked in different international institution. He had completed more than 15 research projects, and few are ongoing. He has published three books and more than 100 research articles in various national and international conferences and journals. His areas of interest are nanostructured superhydrophobic thin films surfaces, energy storage system, advanced surface structure for metal, etc.

Pradip Kumar Sadhu received his Bachelor, Postgraduate and Ph.D. (Engineering) degrees from Department of Electrical Engineering, Jadavpur University, Kolkata, West Bengal, India. Currently, he is working as a professor (HAG) and the ex-head of Electrical Engineering Department of Indian Institute of Technology (ISM), Dhanbad, India. Also, he served B.I.T., Mesra, Ranchi, as a faculty member of Electrical and Electronics Engineering Department. Prior to join B.I.T. Mesra, also he served the different industries for twelve years. He has total experience of 35 years, out of which 23 years in teaching and 12 years in industry. He has thirteen (13) Granted Patents. In addition, nineteen (19) more patents in his name are under process. He has several journal and conference publications in national and international levels including *IEEE Transactions on Industrial Electronics*, *IEEE transactions on Power Systems*, *IEEE Transactions on Instrumentation and Measurement*, *IEEE Sensors Journal*, *IEEE Access*, *Solar Energy*, *Renewable Energy*, *Building and Environment*, *Renewable and Sustainable Energy Reviews*, *IET Generation*, *Transmission and Distribution*, *IET Science Measurement and Technology*, *IET Smart Grid*. He is a principal investigator of few government-funded projects. He has developed hybrid charging system for e-vehicles that allows charging in static as well as dynamic condition; technology for which the patent application has been filed can herald a new era for adoption of electric vehicles as principal mode of road transport. He is a reviewer of various international journals like *IEEE Transaction on Power Electronics*, *IEEE Transactions on Industrial Electronics*, *Solar Energy*, *Renewable*

Energy, etc. He has guided 19 numbers of doctoral candidates and a large number of M.Tech. students.

Sunandan Bhunia is an associate professor in the Department of Electronics and Communication Engineering, Central Institute of Technology, BTAD, Assam. He has obtained his B.Tech. and M.Tech. from Institute of Radiophysics and Electronics, Calcutta University, in 2002 and 2004, respectively. He has obtained Ph.D. degree in engineering from Jadavpur University in 2009. He was awarded gold medal from Vidyasagar University for first class first in Physics (H) in 1999. He has published about 50 research articles in reputed international and national journals and conferences. His area of research interest includes microstrip antenna, microstrip filter, frequency selective surfaces, VLSI, etc.

Jagannath Samanta is an associate professor in the Department of Electronics and Communication Engineering at the Haldia Institute of Technology, Haldia, West Bengal, India. He received the B.Tech. and M.Tech. degree in Electronics and Communication Engineering from West Bengal University of Technology, West Bengal, India, in 2005 and 2008, respectively. He received Gold Medal during M.Tech. degree. He received his Ph.D. (Tech) degree from the Institute of Radio Physics and Electronics, University of Calcutta, in 2018. His research interests include digital VLSI design, error-correcting codes, and IoT in emerging applications. He has published more than 50 research papers in international journals that include IEEE Transactions, Springer, and international conferences. He is the reviewer of referred journals like IEEE Transactions, Springer, Elsevier, etc.

Suman Paul is currently an assistant professor in the Department of Electronics and Communication Engineering at the Haldia Institute of Technology, West Bengal, India, and interests in scheduling, QoS/QoE in communication networks, and applications of soft computing techniques in networking and IoT. Professor Paul worked as an associate researcher in the Indian Institute of Management (IIM), Calcutta, in a project on ZigBee-based wireless sensor network, funded by DIT, Government of India. He is a regular reviewer of SCIE/Scopus-indexed journals. Dr. Paul has published books on mobile ad hoc network, edited books on Springer Series, research articles in science citation indexed, Scopus-indexed journals of repute, chapters of Springer and presented papers in IEEE international conferences and filed patents to his credit. He was the joint convener of the International Conference, ICCDC 2019, Haldia, India, and a member of ACM, Machine Intelligence Research Labs, USA, and qualified Cisco Certified Network Associate.

Novel CMOS 1-Digit BCD-Adder Correction Circuit

| Conference paper | First Online: 28 July 2023

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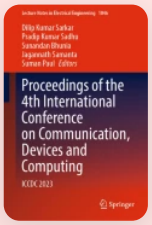

Proceedings of the 4th International Conference on Communication, Devices and...

(ICCDC 2023)

Shatabhisa Goswami, Ananya Mandal, Aishikee Mishra, Joyoshri Goswami & Aloke Saha

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Abstract

BCD (Binary Coded Decimal)-adder finds wide applications in favor of state-of-the-art decimal arithmetic in order to interface with binary computation. Conventionally, RCA (Ripple Carry Adder) is the building block used to generate the corrected base-10 output after two 1-digit BCD addition. The present study unfolds a novel correction strategy for speed-power efficient BCD addition. Proposed idea eliminates the complex full-adder logic cell and optimizes critical path carry propagation delay to achieve overall PDP (Power-Delay-Product) decrease with respect to conventional strategy. Proposed BCD-correction circuit is designed on 32 nm CMOS technology using BSIM4 device model and 0.9 V supply voltage at 27 °C temperature. Proposed circuit is validated and evaluated through extensive T-Spice simulations by applying all possible custom test patterns. The evaluated speed-power response is then compared with its conventional counterpart in identical operating condition and 100 MHz input to benchmark.

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