

Conference proceedings | © 2021

Proceeding of Fifth International Conference on Microelectronics, Computing and Communication Systems

MCCS 2020

Editors: [Vijay Nath](#), [J. K. Mandal](#)

Presents research works in the field of microelectronics, computing, and communication systems

Provides original works presented at MCCS 2020 held in Ranchi, India

Serves as a reference for researchers and practitioners in academia and industry

Part of the book series: [Lecture Notes in Electrical Engineering](#) (LNEE, volume 748)

38k Accesses | **19** [Citations](#)

Sections

[Table of contents](#)

[About this book](#)

[Keywords](#)

[Editors and Affiliations](#)

[About the editors](#)

[Bibliographic Information](#)

This is a preview of subscription content, [access via your institution](#).

Table of contents (70 papers)

Search within book

← Previous

Page

2

of 4

Next →

[Real-Time Globally Accessible Accident Notifications and Tracking for the Motor-Vehicles](#)

Vismay Patel, Pruthvish Rajput, Abhi Zanzarukiya, Rutu Parekh

Pages 235-248

[Avenues to Improve Channel Estimation Using Optimized CP in STBC Coded MIMO-OFDM Systems—A Global Optimization Approach](#)

Shovon Nandi, Narendra Nath Pathak, Arnab Nandi

Pages 249-259

[A Comparative Study on Fault Detection Using Twin Support Vector Machines for Wireless Sensor Networks](#)

Jyotsana Singh, Ajay Singh Raghuvanshi, Namrita Shukla, Shashank Gavel

Pages 261-273

[Effect of Different Channel Material on the Performance Parameters for FinFET Device](#)

Himanshu Kumar, Mayank Kumar Jethwa, Ashwin Porwal, Rasika Dhavse, Hardiki Mukesh Devre, Ritu Parekh

Pages 275-288

[Single Inverter Control to Resolve Power Quality Issues in Fuel Cell Grid Integration](#)

Jeevisha Sehgal, Divya Asija, Pranjal Singh, Tejasvi Bhatnagar

Pages 289-304

[A Survey on Data Security Challenges and Their Solutions in Cloud Computing](#)

Ruchi Billore, Manish Pandey

Pages 305-314

[Analysis of Hybrid Vehicle Battery Models for Real-Time Parameter Estimation](#)

Kausik Bhaumik, Divya Asija

Pages 315-326

[AES-Based Android Video Encryption and Decryption App](#)

Anubhav Dinkar, B. Sahana

Pages 327-339

[Area Optimized Hardware Architecture of Piccolo-80 Lightweight Block Cipher](#)

Shubham Mishra, Zeesha Mishra, Bibhudendra Acharya

Pages 341-350

[High Throughput Pipelined Architecture for AES Cipher](#)

Piyush Modi, Pulkit Singh, Bibhudendra Acharya, Shrish Verma

Pages 351-359

[Study and Design of Smart Embedded System for Smart City Using Internet of](#)

Things

Vidushi Goel, Ashish Kumar, Konthi Jyoti Prakash, G. S. Namith, Sanjay Kumar, Renuka et al.
Pages 361-369

Linear Precoding Techniques for MIMO Systems

P. N. Jayanthi, S. Rachana, M. Ramya
Pages 371-382

An Insight into the Existing Reversible Arithmetic and Logic Unit Designs

S. Girija, B. G. Sangeetha
Pages 383-400

Performance Analysis of Load Balancing Algorithms in Amazon Cloud

Ragini Kumari, Vijay Kumar Jha
Pages 401-412

Unacknowledged Mode LAPDm Protocol Development at MS Side of GSM Network

Saumya Borwankar, Rishi Pandya, Rachna Sharma
Pages 413-421

Wide Band Vivaldi Antenna Design by Using SIW

Chanchala Kumari, Neela Chatteraj
Pages 423-432

Issuing and Verifying of Blockchain Based Certificates

Yousuf Nizam, Tanvi Tadimeti, Prarthana, Ch. Jayanth Babu, R. Padmavathy
Pages 433-449

Spectrum Sensing Techniques in Cognitive Radio Networks: Challenges and Future Direction

Neha Chaudhary, Rashima Mahajan

[Scaling Blockchain by Autonomous Sidechains](#)

Abhishek Vispute, Siddhesh Patel, Yuvraj Patil, Shubham Wagh, Mahesh Shirole

Pages 459-473

[Blockchain Interoperability Using Hash Time Locks](#)

Snoviya Dcunha, Srushti Patel, Shravani Sawant, Varsha Kulkarni, Mahesh Shirole

Pages 475-487

[← Previous](#)

Page

2

of 4

[Next →](#)

[Back to top ↑](#)

About this book

This book presents high-quality papers from the Fifth International Conference on Microelectronics, Computing & Communication Systems (MCCS 2020). It discusses the latest technological trends and advances in MEMS and nanoelectronics, wireless communication, optical communication, instrumentation, signal processing, image processing, bioengineering, green energy, hybrid vehicles, environmental science, weather forecasting, cloud computing, renewable energy, RFID, CMOS sensors, actuators, transducers, telemetry systems, embedded systems and sensor network applications. It includes papers based on original theoretical, practical and experimental simulations, development, applications, measurements and testing. The applications and solutions discussed here provide excellent reference material for future product development.

[Back to top ↑](#)

Keywords

Microelectronics Devices

Nanoelectronics Devices

Machine Learning RF VLSI Design

VLSI Signal Processing Image Processing

VLSI for Bioengineering

Advanced Wireless Communication

Electronic System Design & Manufacturing

Green Energy Computer Vision

Real Time Embedded Systems

[Back to top ↑](#)

Editors and Affiliations

**Department of Electronics and
Communication Engineering, Birla
Institute of Technology Mesra, Mesra,
India**

Vijay Nath

**Department of Computer Science and
Engineering, Kalyani University,
Kolkata, India**

J. K. Mandal

About the editors

Dr. V. Nath was born in Gorakhpur (U.P.) India in 1976. He received his bachelor's degree in Physics and master's degree in Electronics from DDU Gorakhpur University, India, in 1998 and 2001. He received PGDCN (GM) from MMMUT Gorakhpur in 1999 and Ph.D. degree in VLSI Design & Technology from Dr. RML Avadh University Ayodhya in association with CEERI, Pilani, in 2008. From 2000 to 2001, he was Project Trainee in IC Design Group, CEERI, Pilani. Presently, he is Associate Professor in the Department of ECE, BIT Mesra Ranchi (JH) India, and joined this institute in 2006. His research interests include micro & nano-electronics, analog & digital VLSI design, ASICs, embedded systems designs, Internet of things & machine learning. He has to his credit around 195 publications in reputed Scopus & SCI journals and conferences, and 3 scholars were awarded Ph.D. degree under his supervision. He has successfully completed two R&D projects funded by DST New Delhi with DRDL Hyderabad and MHRD New Delhi, and the third project is in ongoing stage funded by RESPOND SAC ISRO Ahmedabad. He has received 100 crore projects as Co-PI in NM-ICPS (TIH) in BIT Mesra (Spokes) for development of e-farming platform for enhancement of production marketing and income of Indian farmers in August 2020. He is the editor of Nanoelectronics, Circuits & Communication Systems, Proceeding of NCCS-2015, NCCS-2017, NCCS-2018, & NCCS-2019 published in 2017, 2018, 2019 and 2020 & the editor of Microelectronics, Computing & Communication Systems, Proceeding of MCCS-2015, MCCS-2017, MCCS-2018 & MCCS-2019 published in 2017, 2018, 2019 & 2020 in Scopus book series: LNEE, Springer. He is a member of several professional societies and academic bodies including IETE, ISTE, ISVE and IEEE.

Prof. J.K. Mandal received his M.Sc. in Physics from Jadavpur University in 1986 and M.Tech. in Computer Science from the University of Calcutta and was awarded a Ph.D. in Computer Science and Engineering by Jadavpur University in 2000. Currently, he is Professor of Computer Science and Engineering and was Dean of the Faculty of Engineering, Technology and Management, Kalyani University, West Bengal, for two consecutive terms. He started his career as a lecturer at NERIST, Arunachal Pradesh, in September 1988, and has 30 years' teaching and research experience. His areas of research include coding theory, data and network security; remote sensing and GIS-based applications, data compression, error correction, visual cryptography, steganography, security in MANET, wireless networks and unify computing. He has to his credit more than 30 proceedings volumes, 6 books, 160 journals and 300 other articles. He is one of the editors for the Springer AISC and CCIS Series, and 23 scholars were awarded Ph.D. degree under his supervision.

[Back to top ↑](#)

Bibliographic Information

Book Title	Book Subtitle	Editors
Proceeding of Fifth International Conference on Microelectronics , Computing and Communication Systems	MCCS 2020	Vijay Nath, J. K. Mandal
Series Title	DOI	Publisher

[Lecture Notes in Electrical Engineering](https://doi.org/10.1007/978-981-16-0275-7) <https://doi.org/10.1007/978-981-16-0275-7> Springer Singapore

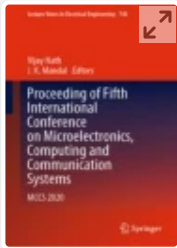
eBook Packages Engineering, Engineering_(R0)	Copyright Information The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2021	Hardcover ISBN 978-981-16-0274-0
--	---	--

Softcover ISBN 978-981-16-0277-1	eBook ISBN 978-981-16-0275-7	Series ISSN 1876-1100
--	--	---------------------------------

Series E-ISSN 1876-1119	Edition Number 1	Number of Pages XIV, 875
-----------------------------------	----------------------------	------------------------------------

Number of Illustrations 244 b/w illustrations, 377 illustrations in colour	Topics Electronics and Microelectronics , Instrumentation , Communications Engineering , Networks , Electronic Circuits and Systems , Electronic Devices , Nanotechnology
--	---

[Back to top](#) ↑



Proceeding of Fifth International Conference on Microelectronics, Computing and Communication Systems pp 249–259

Avenues to Improve Channel Estimation Using Optimized CP in STBC Coded MIMO-OFDM Systems—A Global Optimization Approach

[Shovon Nandi](#) , [Narendra Nath Pathak](#) & [Arnab Nandi](#)

Conference paper | [First Online: 10 September 2021](#)

546 Accesses | **3** [Citations](#)

Part of the [Lecture Notes in Electrical Engineering](#) book series (LNEE, volume 748)

Abstract

A new semi-blind channel estimation with optimized Cyclic Prefix (CP) assisted Space Time Block Coded Multi-Input Multi-Output Orthogonal Frequency Division Multiplexing (STBC-MIMO OFDM) system is proposed. The main hurdle of high complexity and low convergence in earlier systems are avoided by our proposed scheme in flat fading environment. In our work, the hyper parameters are optimized with proposed Lévy Krill-herd (LKH) algorithm and it is clear that the channel estimation performance is varied with this parameter values and by this global optimization

technique the incorrect selection of hyper parameters (local optima) are eliminated. The selection process of this algorithm can be simplified with the number of bounds used. The improvement performance is shown by using BER vs SNR plot of Forward-backward (FB) Kalman helical approach and different pilot carrier insertions. Also a comparative plot is shown among FB Kalman, Krill-herd (KH) and finally LKH approach by using Matlab software.

Keywords

MIMO-OFDM **Kalman helical process**

Lévy Krill-herd algorithm **Cyclic prefix**

Alamouti-STBC **BER**

This is a preview of subscription content, [access via your institution.](#)

▼ Chapter	EUR 29.95 Price includes VAT (India)
<ul style="list-style-type: none">• DOI: 10.1007/978-981-16-0275-7_21• Chapter length: 11 pages• Instant PDF download• Readable on all devices• Own it forever• Exclusive offer for individuals only• Tax calculation will be finalised during checkout	
<div style="border: 1px solid #ccc; padding: 10px; text-align: center;">Buy Chapter</div>	
> eBook	EUR 149.79
> Softcover Book	EUR 179.99
>	

[Learn about institutional subscriptions](#)

References

1. Wang G, Guo L, Gandomi AH, Cao L, Alavi AH, Duan H, Li J (2013) Lévy-Flight Krill Herd Algorithm. Hindawi Publishing Corporation, Mathematical Problems in Engineering, Volume 2013, Article ID 682073, p 14

2. Ladaycia AH, Anissa Mokraoui, KA-M, Belouchrani A (2017) Performance bounds analysis for semi-blind channel estimation in MIMO-OFDM communications systems. IEEE Trans Wirel Commun **16**(9): 5925–5938

3. Shoba B, Jayanthi K (2012) Performance improvement of MIMO OFDM systems through channel estimation. Int J Wirel Mob Networks 4(5):49

4. Larsson Erik G, Edfors O, Tufvesson F, Marzetta TL (2014) Massive MIMO for next generation wireless systems. IEEE Commun Mag **52**(2): 186–195

5. Fredrik R, Persson D, Lau BK, Larsson EG, Marzetta TL, Edfors O, Tufvesson F (2013) Scaling up MIMO: Opportunities and challenges

with very large arrays. IEEE Signal Process Mag **30**(1): 40–60

6. Roopa J, Kurian NC (2015) ISI Reduction in MIMO-OFDM with insufficient cyclic prefix-a survey ISI 3, no. 8 (2015)

7. Payaswini P, Manjaiah DH Analysis of effect of cyclic prefix on data rates in OFDM modulation techniques. Int J Adv Comput Math Sci (2012)

8. Nandi S, Nandi A, Pathak NN, Sarkar M (2017) Performance analysis of cyclic prefix OFDM using adaptive modulation techniques. IJEECS **6**(8), 214–220. ISSN 2348–117

9. Nandi S, Sarkar M, Nandi A, Pathak NN (2017) Performance analysis of CO-OFDM system in a CR network. In: Computer, Communication and Electrical Technology, Guha, Chakraborty & Dutta (Eds) ©Taylor & Francis Group, ISBN: 978–1-138-03157-9

10. Amar Al-Jzari, Iviva Kostanic (2015) Cyclic prefix length determination for orthogonal frequency division multiplexing system over different wireless channel models based on the maximum excess delay spread. Am J Eng Appl Sci **8**(1):82

11. Peter Fertl, Matz Gerald (2010) Channel estimation in wireless OFDM systems with irregular pilot distribution. *IEEE Trans Signal Process* 58(6):3180–3194

12. Tongliang Fan, Haowei Wu, Huang Hongcheng (2011) Channel estimation and interference cancellation for OFDM systems based on total least squares solution. *JCM* 6(8):640–647

13. Tri Pham, Le-Ngoc Tho, Woodward Graeme K, Martin Philippa A (2017) Channel estimation and data detection for insufficient cyclic prefix MIMO-OFDM. *IEEE Trans Veh Technol* 66(6):4756–4768

14. Ksekkaya Y, Bariş, Toker VC (2017) Joint transceiver FIR filter design for multiuser MIMO channel shortening equalization and full equalization using channel duality. *Turkish J Electr Eng Comput Sci* **25**(5): 4077–4090

15. Donatella Darsena, Gelli Giacinto, Paura Luigi, Verde Francesco (2012) Blind channel shortening for space-time-frequency block coded MIMO-OFDM systems. *IEEE Trans Wireless Commun* 11(3):1022–1033

16. Amo D, Prieto C, Julia Fernández-Getino García M (2013) Iterative joint estimation procedure

for channel and frequency offset in multi-antenna OFDM systems with an insufficient cyclic prefix. IEEE Trans Vehicular Technol **62**(8): 3653–3662

17. Swamy MNS (2018) Comb type pilot arrangement based channel estimation for spatial multiplexing MIMO-OFDM Systems. IRJET **5**(02) (2018)

18. Obaid UM, Alsusa E (2015) a virtually blind spectrum efficient channel estimation technique for MIMO-OFDM systems. University of Engineering and Technology Taxila, Techn. J. **20**(3): 91

19. Dey A, Nandi S, Sarkar M (2018) Security measures in IOT based 5G networks. In: 3rd International Conference on Inventive Computation Technologies (ICICT), Coimbatore, India, pp 561–566, <https://doi.org/10.1109/ICICT43934.2018.9034365>

20. Quadeer AA, Sohail MS (2010) Enhanced channel estimation using cyclic prefix in MIMO STBC OFDM systems. In: IEEE international symposium signal processing and information technology (ISSPIT), 2010. IEEE, pp 277–282

21. Nandi S, Nandi A, Pathak NN (2017)

Performance analysis of Alamouti STBC MIMO OFDM for different transceiver system. In: IEEE conference on ICISS 2017, pp 883 – 887, <https://doi.org/10.1109/iss1.2017.8389305>

22. Dragan O, Na C, LupasScheiterer R, Szabo A (2008) EM-based semi-blind channel estimation method for MIMO-OFDM communication systems. *Neurocomputing* **71**(10–12): 2388–2398

23. Lee Tae-Jun, Ko Young-Chai (2017) Channel estimation and data detection in the presence of phase noise in MIMO-OFDM systems with independent oscillators. *IEEE Access* 5:9647–9662

24. Chen, CYu, Wu W-R (2018) Joint AoD, AoA, and channel estimation for MIMO-OFDM systems. *IEEE Trans Vehicular Technol* (2018)

25. Ranjitha Prasad, Murthy Chandra R, Rao Bhaskar D (2015) Joint channel estimation and data detection in MIMO-OFDM systems: a sparse Bayesian learning approach. *IEEE Trans Signal Process* 63(20):5369–5382

26. Amir A, Farhang A, Reyhani AR, Doyle LE, Farhang-Boroujeny B, OFDM without CP in

massive MIMO. IEEE Trans Wirel
Commun **16**(11): 7619–7633 (2017)

27. Banerjee JS, Nandi S, Chakraborty A (2019) A text book on mastering digital electronics: principle, devices and applications. Aryan Publishing House, ISBN: 9788193894217

28. Alamouti SM (1998) A simple transmit diversity technique for wireless communication. IEEE J Sel Areas Commun **16**(8)

29. Nandi A, Kundu S (2011) Energy level performance of error control schemes in WSN over Rayleigh fading channel. In: IEEE symposium on industrial electronics and applications, pp: 194–199

30. Nandi S, Pathak NN, Nandi A (2020) A novel adaptive optimized fast blind channel estimation for cyclic prefix assisted space-time block coded MIMO-OFDM systems. Wireless Pers Commun 115:1317–1333.
<https://doi.org/10.1007/s11277-020-07629-z>

31. Nandi S, Pathak NN, Nandi A (2019) Efficacy of channel estimation and efficient use of spectrum using optimised cyclic prefix (CP) in MIMO-OFDM. IJEAT **9**(2) ISSN: 2249–8958.
<https://doi.org/10.35940/ijeat.b4093.129219>

32. Sohail MS, Al-Naffouri TY (2010) An EM based frequency domain channel estimation algorithm for multi-access OFDM systems. Sig Process 90(5):1562–1572.

<https://doi.org/10.1016/j.sigpro.2009.10.026>

33. Al-Naffouri TY, Quadeer AA (2008) A Forward-Backward Kalman Filter-based STBC MIMO OFDM receiver. EURASIP J Adv Signal Process **2008**, Article ID 158037.

<https://doi.org/10.1155/2008/158037>

34. Kundu K, Pathak NN (2019) Circular antenna array optimization using flower pollination algorithm. In: Advances in computer, communication and control. Springer, pp 407–414

Author information

Authors and Affiliations

Department of Electronics and Communication Engineering, Bengal Institute of Technology, Kolkata, W.B, India

Shovon Nandi

Department of Electronics and Communication Engineering, Dr. B C Roy Engg. College, Durgapur, W.B, India

Narendra Nath Pathak

**Department of Electronics and Communication
Engineering, National Institute of Technology,
Silchar, Assam, India**

Arnab Nandi

Corresponding author

Correspondence to [Shovon Nandi](#).

Editor information

Editors and Affiliations

**Department of Electronics and Communication
Engineering, Birla Institute of Technology Mesra,
Mesra, India**

Dr. Vijay Nath

**Department of Computer Science and
Engineering, Kalyani University, Kolkata, India**

Dr. J. K. Mandal

Rights and permissions

[Reprints and Permissions](#)

Copyright information

© 2021 The Author(s), under exclusive license to
Springer Nature Singapore Pte Ltd.

About this paper

Cite this paper

Nandi, S., Pathak, N.N., Nandi, A. (2021). Avenues to
Improve Channel Estimation Using Optimized CP in STBC

Coded MIMO-OFDM Systems—A Global Optimization Approach. In: Nath, V., Mandal, J.K. (eds) Proceeding of Fifth International Conference on Microelectronics, Computing and Communication Systems. Lecture Notes in Electrical Engineering, vol 748. Springer, Singapore.
https://doi.org/10.1007/978-981-16-0275-7_21

[.RIS](#)  [.ENW](#)  [.BIB](#) 

DOI

https://doi.org/10.1007/978-981-16-0275-7_21

Published	Publisher Name	Print ISBN
10 September 2021	Springer, Singapore	978-981-16-0274-0

Online ISBN	eBook Packages
978-981-16-0275-7	Engineering Engineering_(R0)

Not logged in - 103.102.123.142

Dr B. C. Roy Engineering College (3000708921) - AICTE Electrical & Electronics & Computer Science Engineering (3000684219)

SPRINGER NATURE

© 2022 Springer Nature Switzerland AG. Part of [Springer Nature](#).