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Manodipan Sahoo

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B. E. in Instrumentation and Electronics Engineering from Jadavpur University,
M. Tech. in Instrument Technology from Indian Institute of Science, Bangalore
PhD in Engineering from IIEST, Shibpur
Now serving as Associate Professor in Dept. of ECE, IIT (ISM), Dhanbad

Objective: To work in an academic environment, that will provide me a good platform to utilize my teaching & administration skills and will help me to enhance my research activities in the field of Very Large Scale Integration for Scientific applications by providing me enough space for independent and innovative thinking.

Research Interests: Emerging materials based Interconnects and Devices, VLSI Circuits and Systems.

Skills Profile:

Operating Systems	Linux, Windows
Programming Skills	C, MATLAB, VHDL, Verilog, Verilog-AMS
Simulators	Cadence, Mentor Graphics, Synopsys, SPICE, ModelSim, Xilinx
Scripts	Tcl, Ocean

Educational Qualification:

Degree/ Examination	Institution	Year of Passing	Results
Ph.D (Engineering)	Indian Institute of Engineering Science and Technology, Shibpur (Erstwhile	2016	Date of Award: 4th March, 2016 (Effective from 25th January,2016, Reg.No.:PhD/R/2013/0018)

	Bengal Engineering and Science University, Shibpur)		
M.Tech. (Instrument Technology)	Indian Institute of Science, Bangalore	2006	Overall CGPA: 7.2 out of 8 (Including 'A' Grade for M.Tech Project) (Was Topper in the class) (First Class with Distinction)
B.E. (Instrumentation and Electronics Engineering)	Jadavpur University, Kolkata	2004	Last 4 Semesters: 84.47%, All Semesters: 84.91% (First Class with Honours)
Higher Secondary (W.B.C.H.S.E.)	Ramakrishna Mission Residential College, Narendrapur	2000	88.2% (First Division)
Secondary (W.B.B.S.E.)	Haldia Govt. Sponsored Vivekananda Vidyabhawan	1998	90.5% (First Division)

Total Experience Details:

Sl. No.	Organisation	Designation	Pay Scale	From (Date)	To (Date)
1.	IIT(ISM), Dhanbad	Associate Professor	IIT Pay Level 13A2	12/07/2024	----------
	IIT(ISM), Dhanbad	Assistant Professor	IIT Pay Level 13A1	15/06/2023	11/07/2024
2.	IIT(ISM), Dhanbad	Assistant Professor	IIT Pay Level 12	15/06/2020	14/06/2023
3.	IIT(ISM), Dhanbad	Assistant Professor	IIT Pay Level 11	15/06/2018	14/06/2020

4.	IIT(ISM), Dhanbad	Assistant Professor	IIT Pay Level 10	15/06/2017	14/06/2018
5.	Haldia Institute Of Technology, Haldia, West Bengal	Associate Professor	PB-4 & AGP-9000	01/02/2016	14/06/2017
6.	Haldia Institute Of Technology, Haldia, West Bengal	Assistant Professor	PB-3 & AGP-6000	05/01/2015	31/01/2016
7.	IIEST, Shibpur	Project Faculty	26500 INR per month	23/12/2011	31/12/2014
8.	Haldia Institute Of Technology, Haldia, West Bengal	Assistant Professor	PB-3 & AGP-6000	13/07/2011	22/12/2011
9.	Academy Of Technology, Hooghly, West Bengal	Assistant Professor	PB-3 & AGP-6000	10/08/2010	12/07/2011
10.	Cosmic Circuits	Design Engineer	60000 INR per month	01/10/2009	23/07/2010

Courses taught:

UG Courses taught:

1. Microelectronics & VLSI Design
2. Semiconductor Device Modeling and Simulation
3. Analog Integrated Circuits
4. Signals, systems and circuits
5. Sensors and Transducers
6. Circuit Theory and Networks
7. Digital Signal Processing
8. Control Theory

9. Biomedical Instrumentation
10. Advanced Process Control
11. Industrial Instrumentation

PG Courses taught:

1. Analog IC Design
2. Neuromorphic Engineering
3. VLSI Circuits and Systems
4. Low Power VLSI Circuits
5. Digital Signal Processing

Projects supervised:

PhD:

Awarded: 04, Ongoing: 04

1. Mr. Sudipta Bardhan (R/2015/128) was awarded PhD degree for pursuing his research work on "Modeling, Simulation of Graphene FET for VLSI Circuit Applications" under the joint supervision of me and Prof. Hafizur Rahaman in School of VLSI Technology, IIEST, Shibpur (awarded in January, 2020).
2. Ms. Bhawana Kumari (17DR000407) is pursuing as a full time research scholar in "Modeling and Analysis of Graphene Nanoribbon Interconnects for Future VLSI Circuit Applications" under my supervision in Department of ECE, IIT (ISM), Dhanbad (PhD Degree awarded in October, 2022).
3. Mr. Niraj Kumar Singh (17DR000648) is pursuing as a full time research scholar in "Modeling and Simulation of Carbon Nanomaterial based FET for Emerging Applications" under my supervision in Department of ECE, IIT (ISM), Dhanbad. (Awarded in December, 2023).
4. Ms. Monika Kumari (18DR000681) is pursuing as a full time research scholar in "Nanomaterial and its Applications in VLSI Circuits" under my supervision in Department of ECE, IIT (ISM), Dhanbad. (Awarded in May, 2024)
5. Ms. Arti Kumari (22DR0060) is pursuing as a full time research scholar in "Design and Development of Nanomaterial based Sensors" under my supervision in Department of ECE, IIT (ISM), Dhanbad. (Ongoing).
6. Ms. Ayesha Rahman (24DR0053) is pursuing as a full time research scholar in "Development of Compact Models for 2D Material-based FET" under my supervision in Department of ECE, IIT (ISM), Dhanbad. (Ongoing).
7. Mr. Rahul Kumar Verma (20DR0108) is pursuing as a full time research scholar in "Nanomaterial based Interconnects" under my supervision in Department of ECE, IIT (ISM), Dhanbad. (Ongoing).
8. Mr. Dora Sai Kumar (22DR0293) is pursuing as a full time research scholar in "Hardware Implementation of 5G and beyond-5G Communication" under my co-supervision in Department of ECE, IIT (ISM), Dhanbad. (Ongoing)

PG:
Awarded: 23, Ongoing: 04

1. Modeling and Analysis of Graphene and 2D material FET based circuits (Ongoing)
2. Performance analysis of multilayer GNR interconnects (Ongoing)
3. CNTFET based digital circuit design
4. Low power Comparator Based Switched Capacitor Sigma-Delta ADC design
5. Low power reconfigurable SAR ADC for Biomedical Applications

I have supervised 8 M. Tech. students of School of VLSI Technology, IIEST, Shibpur during my tenure as Project Faculty from 2012-2015. 15 PG students have graduated under my supervision and presently, I am supervising 2 M. Tech. students in Dept. of ECE, IIT (ISM), Dhanbad.

UG:
Awarded: 45+, Ongoing: 06

1. Modeling and Simulation of Emerging materials based Interconnects and Devices
2. 8 bit Cordic rotation algorithm implementation in VHDL and VLSI using SPICE
3. Implementation and performance comparison of different multiplication algorithms in VHDL

Till now I have supervised around 30 B. Tech. students in my teaching career since 2010.

Research Area:

Modeling and Analysis of Carbon Nanotube and Graphene Nanoribbon based Interconnects

Guide: Dr. Hafizur Rahaman, Professor, Dept. of Information Technology, IIEST, Shibpur, Howrah, India.

Dissertation Project (M.Tech) : **Investigations of the Effect of Process Parameters on the Structure and Composition of DC Magnetron Sputter Deposited NiTi Shape Memory Alloy Thin Films.**
Guide : Dr. Sangenneni Mohan, Professor, Instrumentation Dept., IISc, Bangalore, India.

Undergraduate Dissertation Project (B.E.): **Design and Implementation of FPGA based various types of Digital Filters using Distributed Arithmetic.**
Guide: Dr. Bivas Dam, Professor, Instrumentation Dept., Jadavpur University, West Bengal, India.

List of publications related to my Research work

Books and Book Chapters:

1. Published a Book on ``**Modelling and Simulation of CNT and GNR Interconnects"** in Lambert Academic Publishers **(2019).**

2. Published a Book Chapter on ``**Modelling Interconnects for Future VLSI Circuit Applications"** in IET Book entitled **"VLSI and Post-CMOS Devices, Circuits and Modelling" (2019).**

3. Published a Book Chapter on **"Hybrid Cu-Carbon as Interconnect Materials and Their Interconnect Models"** in Book entitled **"Nano-Interconnect Materials and Models for Next Generation Integrated Circuit Design"** published by CRC Press **(2023).**

International Journals

J27. S. Bardhan, **M. Sahoo**, J. Samanta, and H. Rahaman, "A Quasi-Ballistic Model For Short Channel Monolayer Graphene Field Effect Transistor Including Scattering Effects", IETE Journal of Research, *Taylor and Francis Publishers*, 2024, DOI: 10.1080/03772063.2024.2352154.

J26. N. K. Singh, and **M. Sahoo**, "Comparative Investigation of Different Doping Techniques in TMD Tunnel FET for Subdeca Nanometer Technology Nodes", Journal of Electronic Materials, May, 2023, DOI :10.1007/s11664-023-10505-8, Link: https://rdcu.be/ddEh2.

J25. N. K. Singh, and **M. Sahoo**, "Comparative Investigation of Different Doping Techniques in TMD Tunnel FET for Subdeca Nanometer Technology Nodes", Journal of Electronic Materials, May, 2023, DOI:10.1007/s11664-023-10505-8, Link: https://rdcu.be/ddEh2 .

J24. S. K. Dora, H. B. Mishra, **M. Sahoo**, "Low Complexity Implementation of OTFS Transmitter using Fully Parallel and Pipelined Hardware Architecture", Journal of Signal Processing Systems, pg. 1-10, 2023, DOI: https://doi.org/10.1007/s11265-023-01847-x.

J23. M. Kumari, N. K. Singh and **M. Sahoo**, "A detailed investigation of dielectric-modulated dual-gate TMD FET based label-free biosensor via analytical modelling", Nature Scientific Reports, 12:21115, 2022, DOI: https://doi.org/10.1038/s41598-022-24677-6, Link for the paper: https://rdcu.be/c09iE.

J22. B. Kumari, R. Y. Sharma and **M. Sahoo**, "Electro-Thermal Modeling and Reliability Analysis of Cu-Carbon Hybrid Interconnects for Beyond-CMOS Computing", *Applied Physics Letters*, 2022, DOI: https://doi.org/10.1063/5.0101329.

J21. N. K. Singh, M. Kumari and **M. Sahoo**, "All Region Analytical Modeling of 2-D Transition Metal Dichalcogenide FET by Considering effect of Fringing field and Region-wise Mobility", *Physica E: Low-dimensional Systems and Nanostructures, 2022, DOI:* https://doi.org/10.1016/j.physe.2022.115480.

J20. B. Kumari, P. Santosh, R. Y. Sharma and **M. Sahoo**, "Thermal-Aware Modeling and Analysis of Cu-Mixed CNT Nanocomposite Interconnects ", *IEEE Transactions on Nanotechnology, vol. 21, pp. 163-171, IEEE Publishers,* DOI: 10.1109/TNANO.2022.3160870.

J19. B. Kumari, R. Y. Sharma and **M. Sahoo**, "Performance and Reliability Improvement in Intercalated MLGNR Interconnects using Optimized Aspect Ratio ", *Nature Scientific Reports, 12:1475 (2022), DOI: 10.1038/s41598-022-05222-x*,
Link: https://rdcu.be/cFOQT.

J18. N. K. Singh and **M. Sahoo**, "Analytical Modeling of Short-Channel TMD TFET Considering Effect of Fringing Field and 2-D Junctions Depletion Regions", *IEEE Transactions on Electron Devices, IEEE Publishers, February, 2022, vol. 69, no. 2, pp. 843-850,* DOI: 10.1109/TED.2021.3135367.

J17. B. Kumari, R. Kumar, R. Y.Sharma and **M. Sahoo**, "Design, Modeling and Analysis of Cu-Carbon Hybrid Interconnects", *IEEE Access, IEEE Publishers, vol. 9, pp. 113577 – 113584,* ***DOI:*** *10.1109/ACCESS.2021.3104299, 2021.*

J16. M. Kumari, N. K. Singh, M. Sahoo and H. Rahaman, "2-D Analytical Modeling and Simulation of Dual Material, Double Gate, Gate Stack engineered, Junctionless MOSFET based Biosensor with Enhanced Sensitivity", Silicon, Springer, July, 2021, pp. 1-12, DOI: https://doi.org/10.1007/s12633-021-01223-z

J15. M. Kumari, N. K. Singh, M. Sahoo and H. Rahaman, "Work function optimization for Enhancement of sensitivity of Dual Material(DM), Double gate(DG), Junctionless MOSFET based biosensor", Applied Physics A, Springer, January, 2021, DOI: https://doi.org/10.1007/s00339-020-04256-0.

J14. N. K. Singh, M. Kumari and M. Sahoo, "A Compact Short-Channel Analytical Drain Current Model of Asymmetric Dual-gate TMD FET in Subthreshold Region including Fringing Field effects", IEEE Access, *IEEE Publishers, November, 2020, vol. 8, no. 11, pp. 207982-207990,* DOI: 10.1109/ACCESS.2020.3038421.

J13. N. K. Singh and M. Sahoo, "Investigation on the Effect of Gate dielectric and other Device parameters on Digital Performance of Silicene Nanoribbon Tunnel FET", *IEEE Transactions on Electron Devices, IEEE Publishers, July, 2020, vol. 67, no. 7, pp. 2966-2973,* DOI: 10.1109/TED.2020.2992016.

J12. B. Kumari, and **M. Sahoo**, `` Performance and Signal Integrity Analysis of Intercalation Doped Multilayer Vertical Graphene Nanoribbon Interconnects", IET Circuits, Devices and Systems, *IET Publishers 2019,* DOI: https://doi.org/10.1049/iet-cds.2019.0072.

J11. S. Bardhan, **M. Sahoo** and, H. Rahaman, ``A Boltzmann Transport Equation Based Semiclassical Drain Current Model for Bilayer GFET Including Scattering Effects," IET Circuits, Devices and Systems, *IET Publishers 2019,* DOI: https://doi.org/10.1049/iet-cds.2018.5104.

J10. B. Kumari and **M. Sahoo**, `` Stability Analysis of Multilayer Vertical Graphene Nanoribbon Interconnects", IOP Science, Materials Research Express, DOI:https://iopscience.iop.org/article/10.1088/2053-1591/ab1b92, vol. 6, pp. 08560, 2019.

J9. B. Kumari and **M. Sahoo**, ``Performance and Power Optimization for Intercalation doped Multilayer Graphene Nanoribbon Interconnects", IETE Journal of Research, *Taylor and Francis Publishers*, 2019.
DOI: https://doi.org/10.1080/03772063.2019.1621214

J8. S. Bardhan, **M. Sahoo** and, H. Rahaman, `` Empirical Drain Current Model of Graphene Field-Effect Transistor for Application as a Circuit Simulation Tool," IETE Journal of Research, *Taylor and Francis Publishers*, 2019.

DOI: https://doi.org/10.1080/03772063.2019.1620639

J7. S. Bardhan, **M. Sahoo** and, H. Rahaman, ``A Surface Potential Based Model for Dual Gate Bilayer GFET Including the Capacitive Effects", Journal of Circuits, Systems and Computers, *World Scientific Publishers*. **https://doi.org/10.1142/S0218126619502414**, 2019.

J6. **M. Sahoo**, and H. Rahaman, "Analysis of Crosstalk Induced Effects in Multilayer Graphene Nanoribbon Interconnects", *Journal of Circuits, Systems, and Computers, World Scientific Publishers*, Vol. 26, No. 6 (2017) 1750102, pp. 1-21, https://doi.org/10.1142/S021812661750102X, 2017.

J5. **M. Sahoo**, and H. Rahaman, "Modeling and Analysis of Crosstalk Induced Overshoot/Undershoot Effects in Multilayer Graphene Nanoribbon Interconnects and

Its Impact on Gate Oxide Reliability", Microelectronics Reliability (2016), Elsevier Publishers, Vol.63, August 2016, pp. 231–238, https://doi.org/10.1016/j.microrel.2016.06.017.

J4. **M. Sahoo**, P. Ghosal, and H. Rahaman, "Modeling and Analysis of Crosstalk Induced Effects in Multiwalled Carbon Nanotube Bundle Interconnects: An ABCD Parameter Based Approach", *IEEE Transactions on Nanotechnology*, *IEEE*, Vol. 14, no. 2, pp. 259–274, March 2015, https://doi.org/10.1109/TNANO.2014.2388252.

J3. **M. Sahoo**, and H. Rahaman, "Modeling of Crosstalk Induced Effects in Copper-Based Nanointerconnects: An ABCD Parameter Matrix-Based Approach", *Journal of Circuits, Systems, and Computers*, *World Scientific Publishers*, Vol. 24, no. 2, pp. 1-22, 2015, https://doi.org/10.1142/S0218126615400071.

J2. **M. Sahoo**, P. Ghosal, and H. Rahaman, "Performance Modeling and Analysis of Carbon Nanotube Bundles for Future VLSI Circuit Applications", *Journal of Computational Electronics, Springer Publications*, Vol. 13, no. 3, pp. 673-688, 2014, https://doi.org/10.1007/s10825-014-0587-7.

J1. **M. Sahoo**, H. Rahaman, and Bhargab B. Bhattacharya, "On the Suitability of Single-Walled Carbon Nanotube Bundle Interconnects for High-Speed and Power-Efficient Applications", *Journal of Low Power Electronics, American Scientific Publishers*, Vol. 10, no. 3, pp. 191-206, September 2014, https://doi.org/10.1166/jolpe.2014.133.

International Conferences

C35. M. Kumari, and **M. Sahoo**, "Sensitivity Enhancement of TMD MOSFET-Based Biosensor by Modeling and Optimization of Back Gate Parameters", IEEE VLSID, January 2024, DOI: 10.1109/VLSID60093.2024.00007.

C34. S. K. Dora, H. B. Mishra, M. Sahoo and K. Yadav, "Hardware Implementation of OTFS Modulation Using CORDIC Algorithm", IEEE SPCOM (Accepted).

C33. M. Kumari, and **M. Sahoo,** "Sensitivity Enhancement of TMD MOSFET-Based Biosensor by Optimization of Back Gate Parameters and Noise Analysis", IEEE CODEC, December 2023, DOI: 10.1109/CODEC60112.2023.10466064.

C32. S. K. Dora, R. K. Yadav, **M. Sahoo** and H. B. Mishra, "VLSI Architecture for Low Complexity Zero Forcing Equalizer in OTFS Modulation", IEEE ELEXCOM, August 2023, DOI: 10.1109/ELEXCOM58812.2023.10370165 .

C31. N. K. Singh, R. Shankar, S. Verma, and **M. Sahoo**, "Design of low-power and high-performance 10 nm SRAM using Electrostatically doped TMD TFET", IEEE ISDCS 2023, May, 2023, pp. 1-6, **DOI:** 10.1109/ISDCS58735.2023.10153525.

C30. M. Kumari, and **M. Sahoo**, "Impact of Process Induced Strain on the Sensitivity of Charge Plasma Doped TMD TFET Biosensor", 6th IEEE ICEE, Bangalore, December, 2022, pp. 1-6, DOI: 10.1109/ICEE56203.2022.10118170.

C29. B. Kumari, R. Sharma and **M. Sahoo**, "Stability Analysis of Nanoscale Copper-Carbon Hybrid Interconnects ", *IEEE ECTC*, 2022 (Accepted).

C28. B. Kumari, S. Pandranki, **M. Sahoo**, R. Sharma, "Copper-MWCNT Composite: A Solution to Breakdown in Copper Interconnects", *2021 IEEE 21st International Conference on Nanotechnology*, July 2021, **DOI:** 10.1109/NANO51122.2021.9514276.

C27. B. Kumari, R. Kumar, **M. Sahoo** and R. Sharma, "Performance Analysis of Self Heated Multilayer Vertical Graphene Nanoribbon Interconnects", *Proceedings of the 71st IEEE Electronic Components and Technology Conference, Lake Buena Vista*, May 2021, **DOI:** 10.1109/ECTC32696.2021.00256.

C26. P. Howladar, K. Mondal, **M. Sahoo**, "Machine Learning based Supraventricular Tachycardia Detection Model of ECG signal", International Conference on Data Analytics & Management, Jaipur, June, 2021 **(Got Best Paper award).**

C25. P. Howladar, **M. Sahoo**, "Machine Learning based Ventricular Tachycardia Detection of ECG Signal", 8th International Conference on Microelectronics, Circuits & Systems, Kolkata, May, 2021 **(Got Best Paper award).**

C24. R. Kumar, B. Kumari, S. Kumar, **M. Sahoo** and R Y. Sharma, "Temperature and Dielectric Surface Roughness dependent Performance Analysis of Cu-Graphene Hybrid Interconnects", *Proceedings of the IEEE Electrical Design of Advanced Packaging and Systems (EDAPS)*, Shenzhen, China, December 2020.

C23. K. Sable and **M. Sahoo,** ``Electrical and Thermal Analysis of Cu-CNT Composite TSV and GNR Interconnects", Accepted in *International Symposium on Devices, Circuits and Systems (ISDCS)*, Howrah, March, 2020.

C22. N. K. Singh and **M. Sahoo**, ``Investigation of Silicene Nanoribbon Tunnel FET for Low power Digital VLSI circuit application with variation of Device parameters", Accepted in X International Conference on Communication, Circuits and Systems (ICCCAS, 2018) held in Chengdu, China during December 22-24, 2018.

C21. P. Jha, B. Kumari and **M. Sahoo**, ``Investigation on the Impact of Various Intercalation doping on the Signal Integrity in ML-GNR Interconnects", Accepted in X International Conference on Communication, Circuits and Systems (ICCCAS, 2018) held in Chengdu, China during December 22-24, 2018.

C20. B. Kumari and **M. Sahoo**, ``Width Optimization of Intercalation doped Multilayer Graphene Nanoribbon Interconnects", *2018 International Symposium on Devices, Circuits and Systems (ISDCS)*, Howrah, 2018, pp. 1-5, https://doi.org/10.1109/ISDCS.2018.8379653.

C19. B. Kumari and **M. Sahoo**, ``Thickness Optimization of Intercalation doped Multilayer Graphene Nanoribbon Interconnects", IEEE ICDCS-2018, March, 2018.

C18. M. Kumari, **M. Sahoo** and J. Kumar, ``Modelling and Optimization of Double barrier AlGaAs/GaAs/AlGaAs Resonant Tunneling Diode for THz applications", Accepted in 4th IEEE ICEE, 2018 to be held in Bangalore in December, 2018 **(Got Best Poster award).**

C17. **M. Sahoo**, and H. Rahaman, "Impact of Mutual Inductance on the Crosstalk Induced Effects in Single-Walled Carbon Nanotube Bundle Interconnects", *IEEE* ICDCS,KarunyaUniversity,2016,pp.286-290, https://doi.org/10.1109/ICDCSyst.2016.7570585

C16. S. Bardhan, **M. Sahoo** and H. Rahaman, ``Analytical Study of BTE Based Multilayer GFET Model", MicroCom 2016, NIT Durgapur, 2016, pp. 1-6, https://doi.org/10.1109/MicroCom.2016.7522594.

C15. S. Bardhan, **M. Sahoo** and H. Rahaman, ``A Verilog-A based Semiclassical Model for Dual Gated Graphene Field-Effect Transistor", *IEEE* ICDCS, Karunya University, 2016, pp. 37-42, https://doi.org/10.1109/ICDCSyst.2016.7570619

C14. M. Sahoo and H. Rahaman,"Modeling of Crosstalk induced Overshoot/Undershoot effects in Multilayer Graphene Nanoribbon Interconnects", *IEEE EICT, Khulna University*,December,2015, pp. 416-421, https://doi.org/10.1109/EICT.2015.7391988.

C13. S. Bardhan, **M. Sahoo** and H. Rahaman,``Analytical Drain Current Model for Graphene Metal-Oxide semiconductor Field-Effect Transistor", *IEEE EICT, Khulna University*, December, 2015, pp. 422-427,https://doi.org/10.1109/EICT.2015.7391989

C12. M. Sahoo, P. Ghosal, and H. Rahaman, "An ABCD Parameter Based Modeling and Analysis of Crosstalk Induced Effects in Multiwalled Carbon Nanotube undle Interconnects", *IEEE 27th International Conference on VLSI Design*, IIT Bombay, India, pp. 433-438, Jan. 5–9, 2014,https://doi.org/10.1109/VLSID.2014.81.

C11. M. Sahoo, and H. Rahaman, "Modeling of Crosstalk Induced Effects in Nanoscale Copper Interconnects", *IEEE EICT*, KUET, Bangladesh, pp. 1–6, Feb. 13–15, 2014,https://doi.org/10.1109/EICT.2014.6777811.

C10. M. Sahoo, and H. Rahaman, "An ABCD Parameter Based Modeling and Analysis of Crosstalk Induced Effects in Multilayer Graphene Nano Ribbon Interconnects", *IEEE ISCAS*, Melbourne, Australia, pp. 1138-1142, June 1–5, 2014, https://doi.org/10.1109/ISCAS.2014.6865341.

C9. M. Sahoo, and H. Rahaman, "Impact of Line resistance variations on Crosstalk delay and noise in Multilayer Graphene Nano Ribbon Interconnects", 5th *IEEE International Symposium on Electronic System Design (ISED 2014)*, NITK Surathkal, India, pp. 94–98, Dec. 15–17, 2014,https://doi.org/10.1109/ISED.2014.27.

C8. S. A. Mandal, S. Pal, **M. Sahoo,** P. Mondal and H. Rahaman, ``A New Feedback Circuit Based Charge-pump for a Wide-range and Low-jitter DLL suitable for PET Imaging Applications", Proceedings of *IEEE ICDCS*, India, 2014, pp. 1-5, https://doi.org/10.1109/ICDCSyst.2014.6926125.

C7. S. Chakraborty, **M. Sahoo** and H. Rahaman, ``A 1.8 V 64.9 uW 54.1 dB SNDR 1st Order Sigma-Delta Modulator Design Using Clocked Comparator Based Switched Capacitor Technique", *IEEE Asia Symposium and Exhibit on Quality Electronic Design (ASQED)*, 2013, pp. 220-226, https://doi.org/10.1109/ASQED.2013.6643591.

C6. M. Sahoo, P. Ghosal, and H. Rahaman, "An ABCD Parameter Based Modeling and Analysis of Crosstalk Induced Effects in Single-Walled Carbon Nanotube Bundle Interconnects", *IEEE/ACM Asia Symposium and Exhibit on Quality Electronic Design (ASQED)*, Penang, Malaysia, pp. 264-273, Aug. 26–28, 2013, https://doi.org/10.1109/ASQED.2013.6643598.

C5. M. Sahoo, and H. Rahaman, "Modeling of Crosstalk Delay and Noise in Singlewalled Carbon Nanotube Bundle Interconnects", *IEEE INDICON*, IIT Bombay, India, pp. 1–6, Dec. 13–15, 2013, https://doi.org/10.1109/INDCON.2013.6725907. **(Got Best Paper Award)**

C4. M. Sahoo, H. Rahaman and B. B. Bhattacharya, "Impact of Inductance on the Performance of Single Walled Carbon Nanotube Bundle Interconnects", 4th *IEEE International Symposium on Electronic System Design (ISED)*, NTU, Singapore, pp. 16- 20, Dec. 12–13, 2013,https://doi.org/10.1109/ISED.2013.10.

C3. M. Sahoo and H. Rahaman, "Performance Analysis of Multiwalled Carbon Nanotube Bundles", 33rd *IEEE International Scientific Conference Electronics and Nanotechnology (ELNANO)*, NTUU, Ukraine, pp. 200-204, Apr. 16–19, 2013, https://doi.org/10.1109/ELNANO.2013.6552004.

C2. M. Sahoo, P. Ghosal, and H. Rahaman, "Efficient and Compact Electrical Modeling of Multi Walled Carbon Nanotube Interconnects", 3rd *IEEE International Symposium on Electronic System Design (ISED)*, Bengal Engineering and Science University, Shibpur Howrah, India, pp. 236-240, Dec. 19–22, 2012, https://doi.org/10.1109/ISED.2012.24.

C1. S. A. Kannan**, M. Sahoo**, S. Dwivedi, B. Amrutur and N. Bhat, ``Optimal Power and Noise Allocation for Analog and Digital Sections of a Low Power Radio Receiver", *ACM/IEEE ISLPED*, India, August, 2008, pp. 271-276, https://doi.org/10.1145/1393921.1393993.

National Conferences/Symposium

NC5. B. Kumari and **M. Sahoo**, ``Impact of Width on the Performance of Intercalation Doped MLGNR Interconnects", INUP Familiarization workshop, IISc, Bangalore, November, 2017.

NC4. I. Das, **M. Sahoo**, P. Roy and H. Rahaman, ``A 45 uW 13 pJ/conv-step 7.4 ENOB 40 kS/s SAR ADC for Digital Microfluidic Biochip Applications", International Symposium on VLSI Design and Test (VDAT) 2014, PSG College of Technology, Coimbatore, https://doi.org/10.1109/ISVDAT.2014.6881068.

NC3. M. Guha, A. Sengupta, **M. Sahoo** and H. Rahaman, "Effect of Defects on Performance and Signal Integrity of Multilayer GNR Interconnects", INUP Familiarization Workshop on Compact Modeling, IISc, August, 2014.

NC2. M. Sahoo and B. Amrutur, ``Comparison of OpAmp Based and Comparator Based Switched Capacitor Filter," *International Symposium on VLSI Design and Test (VDAT)*, 2012, Kolkata, Springer LNCS, vol. 7373, pp. 180-189, https://doi.org/10.1007/978-3-642-31494-0_21.

NC1. M. Sahoo, and H. Rahaman, "Analytical Modeling of Crosstalk Effects in Coupled Copper Interconnects in Deep Sub Micron Technology", 5th *IEEE International Conference on Computers and Devices for Communication (CODEC)*, IRPE, Calcutta University, India, pp. 1-4, Dec. 17–19, 2012, https://doi.org/10.1109/CODEC.2012.6509212.

Projects associated with

1. Got Project on ``**Modeling and Simulation of Graphene Field Effect Transistor for future VLSI Circuit Applications**" (FRS/117/2017-18/ECE) under Faculty Research scheme funded by IIT(ISM), Dhanbad of **10 Lakh** from 2018-21.

2. Principal Investigator in Project on "**Analytical Modelling of Multi-layered 2-D Transition metal dichalcogenide FET based Biosensor using Green's function approach**", funded by SERB, DST, India – (2022-2025), INR **6.6 Lakh**.
3. Co-coordinator in **"FIST-2019 Project of Department of Electronics Engineering",** Department of Science and Technology, India – (2020-2025), INR **1.9 Crore**.
4. Co-PI in "**Ultra-Low Power Neuromorphic Spiking Architecture for Assistive Smart Glasses",** Ministry of Electronics and Information Technology (MEITY), Govt. of India, (2022-2027), INR **86.00 Lakh**.
5. Got Minor Research Project on ``**Modeling and Simulation of Graphene Nanoribbon Based Interconnects for future VLSI Circuit Applications**" (TEQIP/PRJ/006/18-19) funded by TEQIP III of INR **2 Lakh** from 2017-19.
6. Principal Investigator in **"Smart Wearable devices for Safety of Working personnel in Underground Mines",** under Technology Innovation Hub, IIT(ISM), Dhanbad – (2021-2022) of INR **10.0 Lakh**.
7. Co-Principal Investigator in **"Design of Predictive Maintenance System for Mobile Assets in UG Metal Mines**", under Technology Innovation Hub, IIT(ISM), Dhanbad – (2021-2022) of INR **9.5 Lakh**.
8. Got INR **5,00,000** for organizing a High End Workshop on "**Emerging Nanomaterial-Based Devices for Future VLSI Applications"** under **Accelerate Vigyan Scheme**, **KAARYASHALA** from **SERB.**
9. Got INR **1,50,000** for organizing an event titled "**Multi-layered TMD FET-based Biosensor for the Ultrasensitive Detection of DNA through Multiscale Modeling Approach: Material to Device**" under **Accelerate Vigyan Scheme**, **VRITIKA** from **SERB.**
10. Got INR **90,000** for organizing an event titled **"Detection of Platinol Drug using 2D-Pd/Rh-doped and layered Transitional Metal Dichalcogenide materials: A DFT based approach"** under **Accelerate Vigyan Scheme**, **VRITIKA** from **SERB.**
11. Low power ADC design for Microfluidic Biochip applications (Guide: Prof. Hafizur Rahaman, Dept. Of IT, IIEST, Shibpur, Howrah, India)
12. Development of multichannel Read-Out-Controller (ROC) ASIC for PET imaging applications (Guide: Prof. Hafizur Rahaman, Dept. Of IT, IIEST, Shibpur, Howrah, India)
13. Design, Layout, Simulation and Verification of a Ultra Low Power 20MHz 8-bit CORDIC Rotator. (Guide: Dr. Bharadwaj Amrutur, Associate Professor, Microelectronics Dept., ECE, IISc, Bangalore, India.)
14. Ultra low power Radio Receiver Design (Guide: Dr. Bharadwaj Amrutur, Associate Professor, Microelectronics Dept., ECE, IISc, Bangalore, India.)
15. Comparator based Switched Capacitor Circuit design (Guide: Dr. Bharadwaj Amrutur, Associate Professor, Microelectronics Dept., ECE, IISc, Bangalore, India.)

Teaching Experience:

I worked as an Assistant Professor in Dept. of Instrumentation and Control Engg. in Academy of Technology and Dept. of Applied Electronics and Instrumentation Engg. in

Haldia Institute of Technology from August, 2010 to December, 2011. I served as a Project Faculty in School of VLSI Technology, IIEST, Shibpur from December, 2011-December, 2014. I rejoined as Assistant Professor of Dept. of AEIE, Haldia Institute of Technology since January, 2015. I served as Associate Professor since February, 2016 and as Head of the Department from July, 2016 to June, 2017. Presently I am serving as Assistant Professor, Department of Electronics Engineering, IIT (ISM), Dhanbad since 15th June, 2017.

Industrial Experience:

I worked as a Design Engineer in Cosmic Circuits from October, 2009 to July, 2010. There I have worked on Bandgap Voltage and Current References. I have designed references in technology generations like 0.13 µm, 0.09 µm, 0.065 µm. Also I have experience of designing curvature compensated Bandgap references.

Student affairs and Lab Development:

- Lab-in charge of VLSI Circuit Simulation Lab
- Developed a PG level course on "Neuromorphic Engineering"(ECO502) which will be offered from Monsoon semester, 2023 onwards
- Coordinator, Executive M. Tech (Microelectronics and Semiconductor Technology) (2023)
- Member, M. Tech. Admission Committee (2023- continuing)
- Faculty-in-charge, Robotronics Club, NVCTI (2023- continuing)
- Warden, Jasper Hostel (July, 2022- June, 2023)
- Warden, Sapphire Hostel (July, 2023 - continuing)
- Member, DPGC (2020-2022)
- Member, DFSC (2020-2022)
- Co-coordinator of Departmental Review Committee (2020-2022)
- FIC, Time-table in charge (Exam.) (2019- continuing)
- Faculty Advisor (B. Tech, EIE, Final year)
- Faculty-in-charge, JRF (2018-2019)
- Co-coordinator, M. Tech(VLSI Design) (2017-2020)
- Member, Smart India Hackathon Committee (2022)

Academic Achievements:

S. No.	Name of Award	Awarding Agency	Year
1.	Senior Membership	IEEE	2022
2.	Fellowship	IETE	2022

3.	Best Researcher Award	VDGOOD Professional Association	2021
4.	Membership	IEI	2019
5.	Life Membership	Instrument Society of India	2016
6.	Institute Gold Medal for securing 1st rank in Class during M. Tech. studies in IISc, Bangalore	IISc, Bangalore	2006
7.	National Scholarship	Govt. of West Bengal	1998
8.	Fellowship during Master degree studies	MHRD, Govt. of India	2004
9.	AIR-7 in Instrumentation Engineering, GATE, 2004 with 99.87 percentile	IIT Delhi	2004
10.	AIR-19 in Instrumentation Engineering, GATE, 2003 with 99.60 percentile	IIT Madras	2003

Best Paper Awards:

- IEEE International Conference on Data Analytics & Management, Jaipur, 2021
- IEEE International Conference on Microelectronics, Circuits & Systems, Kolkata, 2021
- IEEE ICEE, Bangalore, 2018 (Best Poster Award)
- IEEE INDICON, Bombay, 2013

Outreach:

- Coordinated a One Week Workshop on **Emerging Nanomaterial-Based Devices for Future VLSI Applications** as a **PI** under **Accelerate Vigyan Scheme**, **KARYASHALA** from **SERB** (16-22 December, 2022, INR 5.0 Lakh fund).
- Delivered a **talk** on **"Modeling and Simulation of 2D material FET"** in the 5-day short-term course on **"Emerging Semiconductor Material, Device Technology,**

and Manufacturing" organized by the Department of Electronics and Communication Engineering, **NIT Rourkela** during 4-8 December, 2023.

- Delivered a **Webinar** on **"Nanotechnology"** under the aegis of **IEI, West Bengal State Centre** on 29th July, 2023.
- Delivered an **Invited Lecture at IEEE ISDCS, 2023** conference in May, 2023.
- Coordinated a one-day workshop on "Real Time Data Acquisition" using NI Software and Hardware on 7th March, 2018 in Dept. of ECE.
- Served as Technical Committee member of a seminar entitled "**Advancements in Instrumentation Technology & Prototype Design Competition for Mankind"** at Heritage Institute of Technology, Kolkata on 12th April, 2016.
- Delivered an invited lecture on **"Sensors and its Interfacing circuits"** in the FDP on ``**Microelectronics and MEMS"** organized by Department of AEIE, Heritage Institute of Technology, Kolkata during 4th - 8th July, 2016.
- Successfully organized a 2 day's Hands on Workshop on ``**Workshop on Arduino"** jointly organized by Dept. of AEIE and ICE in association with ISA, HIT, Student Chapter during 9th – 10th February, 2017.
- Successfully organized a 2 day's Hands on Workshop on ``**Workshop on IoT"** jointly organized by Dept. of AEIE and ICE in association with ISA, HIT, Student Chapter during 31st March – 1st April, 2017.
- Reviewer and PC member of several IEEE conferences i.e. ICACC-2016, ISED-2017, ICCDC-2017, ISDCS-2018, ISDCS-2022, ISDCS-2023, VLSID-2024 etc.
- Reviewer of Journals i.e. IETE Journal of Research, IEEE- Transactions on Circuits and Systems I-Regular Papers, Journal of Computational Research etc.

Seminar/Workshop/Training courses attended:

- 3-day International Workshop on **Device Modeling for Microsystems** conducted by Indian National Academy of Engineering, March 16-18, 2012 at JIIT, Noida.
- 5-day course on **Low Power Digital Design** conducted by Dept. of Electrical Engineering, IIT Kanpur, September 24-28, 2012.
- Two week ISTE Workshop on **Analog Electronics** conducted by IIT Kharagpur from 4th to 14th June, 2013 under National Mission on education through ICT (MHRD).
- 2-day National Seminar on **Research Scholars' day** from 29-30th January, 2014 at BESU, Shibpur.
- 2-day workshop on **Nanoelectronics and Bio-chips** at ISI, Kolkata from March 18-19, 2014.
- 3-day workshop on **Emerging and Post CMOS Technologies** at IIEST, Shibpur from June 16-18, 2014.
- 3-day Workshop on **Nanotechnology and Biochip** at IIEST, Shibpur from July 1-3, 2014.
- 2-day INUP Familiarization workshop on **Compact Modeling** at IISc, Bangalore from 22-23rd August, 2014.

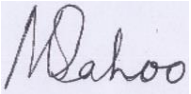
- One-week Faculty development program on **Contemporary Engineering practices** conducted by Haldia Institute of Technology from 5th -11th January, 2015.
- One-week Faculty development program on **Bridging Gap between Academia and Industry** conducted by Haldia Institute of Technology from 5th -11th February, 2015.
- One-week Faculty development program on **Management Research Methodology** conducted by Haldia Institute of Technology from 12th July-19th July, 2015.
- 1-day seminar on **Advancements in Instrumentation Technology & Prototype Design Competition for Mankind** at Heritage Institute of Technology, Kolkata on 12th April, 2016.
- One-week National Workshop on **Industrial Automation and Control** conducted by Haldia Institute of Technology from 25th January-29th January, 2016.

Hobbies: Playing Cricket, Football, Table Tennis, Badminton, Trekking, Listening music.

References:
1) Prof. Bhargab Bhattacharya, Ex-Professor, IIT Kharagpur and ISI, Kolkata,
Email: bhargab.bhatta@gmail.com.
2) Dr. Hafizur Rahaman, Professor, Dept. of IT, IIEST, Shibpur, Howrah, India.
Mob: 07980352792, Email: hafizur@vlsi.iiests.ac.in, rahaman.h@gmail.com
3) Dr. Sajal K. Paul, Professor, Dept. of Electronics Engineering, IIT(ISM), Dhanbad
Mob: 09471191520, Email: sajal@iitism.ac.in.
4) Dr. Rohit Y. Sharma, Associate Professor, Department of Electrical Engineering, IIT Ropar, Mob: 08288002273, Email: rohit@iitrpr.ac.in.

Declaration: I declare that the foregoing Information is correct and complete to the best of my knowledge and belief and nothing has been concealed. If I am at any time found to have concealed any material information or given any false details, my appointment shall be liable to termination.

Date: 4th August, 2024



(Signature)
Dr. Manodipan Sahoo