

# Ashis Maity, Ph.D.

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## RESEARCH INTERESTS

1. Energy Harvesting System Design for Powering Microsystems
2. Power Management Integrated Circuits (ICs)
3. Sensor Interfacing Electronics
4. High-Performance Analog and Mixed Signal VLSI Circuits

## RESEARCH/INDUSTRIAL EXPERIENCE

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| 1. <b>Associate Professor</b> , Electrical Engineering, IIT Kharagpur    | November 2025- Present     |
| 2. <b>Assistant Professor</b> , Electrical Engineering, IIT Kharagpur    | August 2017- November 2025 |
| 3. <b>Visiting Scientist &amp; Visiting Lecturer</b> , UT Dallas         | August 2016- July 2017     |
| 4. <b>Senior Design Engineer</b> , National Semiconductor, Tokyo, Japan, | June 2008- June 2009       |
| 5. <b>Member Design Team</b> , Alliance Semiconductor, Bangalore, India  | July 2002- Dec. 2005       |

## TEACHING EXPERIENCE

1. EE61204: Power Management Integrated Circuits
2. EE21202: Measurements and Electronic Instruments
3. IE31001: Instrumentation Devices
4. EE60100: Mixed Signal Circuits and Systems-on-Chip
5. EE60032: Analog Signal Processing
6. IE39001: Instrumentation Devices Laboratory
7. EE69010: Instrumentation Laboratory II
8. EE29004: Measurements and Electronic Instruments Laboratory
9. EE29001: Signals and Networks Laboratory
10. EECT6379: Energy Harvesting, Storage and Powering for Microsystems (at UT Dallas)

## ON-GOING RESEARCH PROJECTS

1. On-chip implementation of dc-dc converter with ultra-fast DVS reference tracking and load transient response for application processors (SERB, Govt. of India)
2. Development of High-Power Grid-Friendly Conducive and Static Wireless Chargers for Electric Vehicles (ANRF):

## ON-GOING CONSULTANCY PROJECTS

3. Design of Integrated Power Management ICs Using Synopsys Custom Design Flow (Synopsys Incorporation, USA)

## COMPLETED RESEARCH PROJECTS

1. Integrated Design of Fixed-Frequency Current-Mode Hysteretic Controlled DC-DC Buck Converter with Fast Transient Response and Improved Load Regulation for Application Processors (APs) (SERB, Govt. of India)
2. Energy Harvesting for Powering an Autonomous Microsystem (ISIRD, SRIC, IIT Kharagpur)
3. A Power Management Integrated Circuit for IoT Applications (SRC, USA)

## COMPLETED CONSULTANCY PROJECT

4. Evaluation and Product Design in High Voltage BCD Processes for Power Management Solutions (Texas Instruments Incorporation, USA)

## RESEARCH GROUP

Integrated System Design Group:

- **Present Members:** 4 PhD scholars (2 single guide, 2 joint guide), 1 MS scholars (joint guide), 1 JRF (single guide), 3 M.Tech. Students (single guide)
- **Graduated Members:** 1 PhD, 1 MS student, 15 M.Tech. Students, 5 DD Students.

## PUBLICATIONS

### Journal Publications:

1. Kaushik Venkata Sri Sai Dadi, Ashish Kumar Jha, and Ashis Maity, "Design Methodology of Sizing Power MOSFETs and Optimising Phase Counts in Multiphase DC-DC Converter for Maximising Power Efficiency," *IEEE Transactions on Power Electronics*, DOI: 10.1109/TPEL.2025.3622644 (In Early Access).
2. Aditi Chakraborty, and Ashis Maity, "A Battery-less Energy Harvesting Front-end for Powering Multiple IoT Nodes Using Single Solar Cell: a System-level Perspective," *IEEE Transactions on Power Electronics*, vol. 40, no. 9, pp. 14072-14083, Sept. 2025.
3. Aditi Chakraborty, and Ashis Maity, "A Fast SIMO Converter for Command-Directed IoT Nodes With State-Driven Priority Sequencing and Delay-Adjusted Fixed Window Hysteretic Control Using Constant Current-Peak Sequential DCM-CCM Operation," *IEEE Journal of Solid State Circuits*, vol. 60, no. 1, pp. 286-297, Jan. 2025.
4. Aditi Chakraborty, and Ashis Maity, "A Time-to-Voltage Converter-based MPPT With 440  $\mu$ s Online Tracking Time, 99.7% Tracking Efficiency for a Battery-less Harvesting Front-end With Cold-startup and Over-voltage Protection," *IEEE Transactions on Circuits and Systems I: Regular Papers*, vol. 71, no. 10, pp. 4499-4511, Oct. 2024.
5. Aditi Chakraborty, Ashish Kumar Jha, Anupama Deo, Ashis Maity, and Amit Patra, "A Scalable Single-Inductor Multiple-Output DC-DC Converter With Constant Charge-Transfer and Power-up Sequencing for IoT Applications," *IEEE Transactions on Circuits and Systems I: Regular Papers*, vol. 71, no. 6, pp. 2964-2975, June 2024.
6. Anupama Deo, Supratik Patra, Ashis Maity, and Amit Patra, "On-Chip Bias-Generating Architecture for an Automotive Application with a Wide Input Dynamic Range," *International Journal of Circuit Theory and Applications*, 2023; 51(10): 4503-4520.
7. Shuvoshree Bhattacharya, Ashis Maity, and Amit Patra, "A valley-sensed emulated peak current controlled buck converter for automotive applications," *Microelectronics Journal*, vol. 123, pp. 105469, 2022.
8. Anupama Deo, Ashis Maity, and Amit Patra, "A voltage-emulated peak current controlled buck converter for automotive applications with in-built over-current protection," *Microelectronics Journal*, vol. 123, pp. 105423, 2022.
9. Tapabrata Sen, Ashis Maity, and Siddhartha Sen, "On-chip implementation of different analog linearization schemes for giant-magnetoresistance sensors with a comparative study," *AEU-International Journal of Electronics and Communications (Elsevier)*, vol. 139, pp. 153903, 2021.
10. Bumkil Lee, Min Kyu Song, Ashis Maity, and D. Brian Ma, "A 25-MHz Four-Phase SAW Hysteretic Control DC-DC Converter With 1-Cycle Active Phase Count," *IEEE Journal of Solid-State Circuits*, vol. 54, no. 6, pp. 1755-1763, June 2019.
11. Ashis Maity, and Amit Patra, "A Hybrid Mode Operational Trans-conductance Amplifier for an Adaptively Biased Low Dropout Regulator," *IEEE Transactions on Power Electronics*, vol. 32, no. 2, pp. 1245-1254, Feb. 2017.
12. Ashis Maity, and Amit Patra, "Analysis, Design and Performance Evaluation of a Dynamically Slew Enhanced Adaptively Biased Capacitor-less Low Dropout Regulator," *IEEE Transactions on Power Electronics*, vol. 31, no. 10, pp. 7016-7028, Oct. 2016.
13. Ashis Maity, and Amit Patra, "A Single Stage Low Dropout Regulator With a Wide Dynamic Range for Generic Applications," *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, vol. 24, no. 6, pp. 2117-2127, June 2016.
14. Ashis Maity, and Amit Patra, "Design and Analysis of an Adaptively Biased Low-Dropout Regulator Using Enhanced Current Mirror Buffer," *IEEE Transactions on Power Electronics*, vol.31, no.3, pp.2324-2336, March 2016.
15. Ashis Maity, and Amit Patra, "Trade-offs Aware Design Procedure for an Adaptively Biased, Capacitor-less Low Drop-out Regulator Using Nested Miller Compensation," *IEEE Transactions on Power Electronics*, vol.31, no.1, pp.369-380, Jan. 2016.
16. Ashis Maity, and Amit Patra, "Dynamic Slew Enhancement Technique for Improving Transient Response in an Adaptively Biased Low Drop-Out Regulator," *IEEE Transactions on Circuits and Systems II: Express Briefs*, Vol.62, no.7, pp.626-630, July 2015.
17. Ashis Maity, Norihisa Yamamura, Jonathan Knight, Amit Patra, "High Gain, Wide Band Error Amplifier Topology for DC-DC Buck Converter Switching at 20MHz," *Electronics Letters*, Vol. 44, No. 11, Pages 655-656, 2008.
18. Ashis Maity, R. G. Raghavendra, Pradip Mandal, "Design of a low power voltage regulator for high dynamic range of load current," *International Journal of Electronics*, Vol. 94, Issue 8, pages 743 - 757, 2007.

### Conference Publications:

1. Madhukar Gosula, and Ashis Maity " CMOS Implementation of Low-Frequency Pattern Generator for Electrochemical Sensing", *2024 IEEE International Symposium on Circuits and Systems (ISCAS)*, Singapore, 2024, pp. 1-5.
2. Aditi Chakraborty, and Ashis Maity " Minimizing Quiescent Power in a Dynamically Biased Comparator and its Application in Relaxation Oscillator", *18th Conference on Ph.D Research in Microelectronics and Electronics (PRIME)*, Valencia, Spain, 2023, pp. 33-36.
3. Anupama Deo, Ashis Maity, and Amit Patra "A High Voltage Level Shifter for Automotive Buck Converter With a Fast Transient Response", *35th International Conference on VLSI Design and 21st International Conference on Embedded Systems (VLSID)*, India, 2022.
4. Anirban Barman, Ashis Maity, "DC-DC Converter for Powering Micro-system Load in Energy Harvesting Front-ends", *34th International Conference on VLSI Design and 20th International Conference on Embedded Systems (VLSID)*, Guwahati, India, 2021, pp. 105-110.
5. Dipak Bhapkar, Ashis Maity, "Power Extraction From an Ultra-Low Input Voltage Source in a Battery-less Thermoelectric Harvester", *3rd International Conference on Energy, Power and Environment: Towards Clean Energy Technologies*, India, 2021, pp. 1-6.
6. Hara Gobinda Naskar, Ashis Maity, "A Gm-C Biquad Programmable Band Pass Filter for Wireless Applications", *International Conference on Computational Performance Evaluation (ComPE)*, Shillong, India, Jul 2-4, 2020.
7. Rohit Chaudhari, Ashis Maity, "Auto-Tuned Transition Scheme in Bias-Flip Rectifier for Piezoelectric Energy Harvesting", *IEEE 62nd International Midwest Symposium on Circuits and Systems (MWSCAS)*, Dallas, Texas USA, August 4-7, 2019, pp. 382-385.
8. Siddharth Agarwal, Ashis Maity, "A 10-MHz Current-Mode Fixed-Frequency Hysteretic Controlled DC-DC Converter with Fast Transient Response", *IEEE 62nd International Midwest Symposium on Circuits and Systems (MWSCAS)*, Dallas, Texas USA, August 4-7, 2019, pp. 945-948.
9. Shubham Negi, Ashis Maity, Amit Patra, and Mrigank Sharad "Adaptive Fractional Open Circuit Voltage Method for Maximum Power Point Tracking in a Photovoltaic Panel", *32nd International Conference on VLSI Design and 18th International Conference on Embedded Systems (VLSID)*, Delhi, NCR, India, 2019, pp. 482-487.
10. Tapabrata Sen, Ashis Maity, and Siddhartha Sen, "On-Chip Implementation of Analog Linearization Schemes for Giant-Magnetoresistance Sensors", *12th International Conference on Sensing Technology (ICST)*, Limerick, Ireland, 2018, pp. 419-423
11. Bumkil Lee, Min Kyu Song, Ashis Maity, and D. Brian Ma, "A 25MHz 4-Phase SAW Hysteretic DC-DC Converter with 1-Cycle APC Achieving 190ns tsettle to 4A Load Transient and Above 80% Efficiency in 96.7% of the Power Range", *International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA, 2017, pp. 190-191.
12. N.J.M.S. Mary, Ashis Maity, and Amit Patra, "Light Load Efficiency Improvement in High Frequency DC-DC Buck Converter Using Dynamic Width Segmentation of Power MOSFET", *27th International Conference on VLSI Design and 13th International Conference on Embedded Systems*, Mumbai, 2014, pp. 563-568.
13. Cheekala Lovaraju, Ashis Maity, and Amit Patra, "A Capacitor-less Low Drop-out (LDO) Regulator with Improved Transient Response for System-on-Chip Applications", *26th International Conference on VLSI Design and 12th International Conference on Embedded Systems*, Pune, 2013, pp. 130-135.
14. Debajit Bhattacharya, Ashis Maity, and Amit Patra, "Design and Implementation of a High-Speed, Power-Efficient, Modified Hybrid-Mode Sense Amplifier for SRAM Applications", *26th International Conference on VLSI Design and 12th International Conference on Embedded Systems*, Pune, 2013, pp. 209-214.
15. Soumik Sarkar, Ashis Maity, and Amit Patra, "Design of an Ultra-Low Powered DC-DC Buck Converter for Wireless Sensor Networks", *Asia Pacific Conference on Postgraduate Research in Microelectronics and Electronics*, Hyderabad, 2012, pp. 126-131.
16. Ashis Maity, Amit Patra, Norihisa Yamamura, Jonathan Knight, "Design of a 20 MHz DC-DC Buck Converter with 84% Efficiency for Portable Applications", *24th International Conference on VLSI Design and 10th International Conference on Embedded Systems Design*, Chennai, 2011, pp. 316-321.
17. Ashis Maity, R. G. Raghavendra, Pradip Mandal, "On-chip Voltage Regulator with Improved Transient Response", *18th International Conference on VLSI Design and 4th International Conference on Embedded Systems Design*, Kolkata, 2005, pp. 522-527.

### PATENTS (GRANTED)

1. Ashis Maity, and Amit Patra, "An Adaptively Biased Self-compensated, Unconditionally Stable, Area Efficient LDO Topology", *Indian Patent Number: 401112*, 2022.

2. Ashis Maity, and Amit Patra, "Dynamically Biased Amplifier Circuit and Methods for Improving its Dynamic Range", *Indian Patent Number: 513102*, 2024.

### **PATENTS (APPLIED)**

1. Ashish Kumar Jha, Mani Shankar Gunda, Kaushik Dadi and Ashis Maity, "Multi-Phase DC-DC Converter System With Frequency-Linked Active Phase Count and Phase Current Equalization", *Indian Patent Application No, 202431033629*, 2024.
2. Ashish Kumar Jha, and Ashis Maity, "Auto-Selected Peak/Valley Current-Mode Based DC-DC Buck Converter Controlling System ", *Indian Patent Application No, 202331025354*, 2023.
3. Ashish Kumar Jha, and Ashis Maity, " System for Distributing Phase Current and Improving Dynamic Response thereof with Active Phase Count ", *Indian Patent Application No, 202231010977*, 2022.

### **BOOK PUBLISHED**

1. Amit Patra, Shailendra Baranwal, Ashis Maity, Samiran Dam, Syed Asif Eqbal, "Power Management Integrated Circuits Architecture, Design and Implementation", *Taylor & Francis Ltd*, 2024.

### **INVITED SEMINAR**

1. Title of the talk: Energy Harvesting Techniques for Powering Self-Sustainable IoT Nodes, as an Invited Speaker in the Research Scholars' Day (RSD EC 2021), organized by ECE Dept., NIT Durgapur, 28<sup>th</sup> December 2021
2. Title of the talk: **Power Management/Energy Harvesting on IoT**: as a Guest Speaker in National Workshop on Sensor Networks, Internet of Things (IoT) and Internet of Everything at IIIT Naya Raipur, 13-15 Dec. 2019.

### **AWARDS**

1. Winner of IESA Techno Inventor Award in IESA Vision Summit 2017 2017
2. Winner as Best Entry in PhD Forum in 29th International Conference on VLSI Design 2016