Dr. Soumyajit Poddar

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OBJECTIVE

To be a leading educator and researcher of emerging AI based computing paradigms and cyber-physical systems.

RESEARCH INTERESTS

The main focus of my research is to design systems and architecture for emerging computing platforms. I have been working in this area since 14 years. My major research goals are:

- To design the architecture of an artificial brain on silicon employing chaotic reconfigurable neural networks with distributed synchronization.
- To develop associative memories using a blend of brain inspired architectures and analog computing at the edge.
- To develop low power circuits and systems for healthcare applications.
- To design emerging photonic interconnect based solutions for heterogeneous computing systems.

I have strong industry collaboration with the following startups and companies:

- ADLABS Tech Pvt. Ltd., Kolkata, West Bengal
- GRAgritech, Bengaluru, Karnataka
- Electrolab, Kolkata, West Bengal
- Conqueror Innovations Pvt. Ltd., Hyderabad, Telengana
- Cyrrup Solutions Pvt. Ltd., Hyderabad, Telengana

I have strong academic collaboration with the following institutes and universities:

- NIMHANS, Bangalore
- NIT Durgapur
- IIEST Shibpur
- Calcutta University
- IIIT Guwahati
- JKLU, Rajasthan

EDUCATION

Doctor of Philosophy,
Indian Institute of Engineering Science and Technology Shibpur June, 2011 – September, 2016
THESIS - Design and Evaluation of Photonic Networks on Chip for Many-core Architectures

Master of Technology, VLSI Design
University College of Science, Technology and Agriculture
Calcutta University July, 2009 – June, 2011
CGPA: 8.85/10

Bachelor of Engineering, Electronics and Communication Engineering
RV College of Engineering, Bangalore
Visvesvaraya Technological University June, 2005 – May, 2009
Percentage: 70.75%

ISC, Higher Secondary Examination, PCM with Computer Science
St. James' School, Kolkata March, 2005
Percentage: 89.2%

ICSE, Secondary Examination, Science with Computers
St. James' School, Kolkata March, 2003
Percentage: 92.6%

PROFESSIONAL EXPERIENCE

Assistant Professor July 2025 to present
Electronics and Telecommunication Engineering Department
Indian Institute of Engineering Science and Technology Shibpur

- Teaching Embedded Systems with IoT, Data Structures and Algorithms

Technical Advisor January 2022 to July 2025
Electrolab, Kolkata

- Developing a 4 MHz, 100 Watts Electro-surgical unit with Reservoir Computing based feedback and Tissue sense.
- Developed a low cost Controller for 300 Watts 400 KHz Electro-surgical unit.

Assistant Professor June 2016 to December 2022
Electronics and Communication Engineering Department
Indian Institute of Information Technology Guwahati

- Taught a wide range of subjects like Digital Design, Embedded Systems, Basic Electronic Circuits and designed a new course, System on Chip with IoT Applications. I have taken Embedded Systems lab, Digital Design lab and VLSI (Digital) lab also.
- One of my PhD scholars has been awarded PhD degree in Hardware Accelerator for efficient convolution processing. I have also guided another three PhD students in Hardware Accelerator Design for AI applications, AI for voice conversion, Biomedical Signal Processing.
- I have supervised 3 final year postgraduate and 26 undergraduate theses in fields like Neuromorphic Computing, Computer vision, Robotics, Photonic Interconnect, FPGA based embedded systems, Deep Learning using GANs, Audio and image processing, Bin Packing, IoT, ADAS etc. Two UG project students have established startups. We have published several papers in reputed conferences.
- Granted two US Patents, one on AI Hardware Accelerator and the other on Real Time Surface

Tracking in unstructured environments with PhD scholars.

- Have applied and secured funding worth INR 27 Lakhs for a project from SERB, DST, GoI on Reconfigurable 3D IC Hardware Accelerators. Another project worth INR 53 Lakhs has been approved from DST SATYAM. Another project worth INR 12 Lakhs had been approved from TIH, IIT Guwahati on underwater surveillance. Also obtained seed funding worth INR 70,000 from TEQIP for another project on AI based accelerator system.
- Have set up an advanced embedded laboratory with TEQIP funding (worth INR 30 Lakhs) with state of the art infrastructure, development kits and software tools. Partially set up VLSI Laboratory.
- Have organized two workshops, on ARM processor and FPGA based system design respectively.
- Have been appointed ARIIA nodal officer and member of institute Enterpreneurship Cell. I have served as secretary of ECE Department DPPC committee (to look after PG and PhD matters). Earlier served as Associate Technical Coordinator.

Senior Design Engineer April, 2014 – April, 2016
Electrolab, Kolkata

- Developed embedded software for tissue resistance sense system in Electrosurgical unit.

Junior Engineer July, 2009 – July, 2011

- Developed Automatic Tuning (using successive approximation) based 27.12 MHz, 100 Watts Physical Diathermy with Pulsed and Continuous wave output.

Project Faculty November, 2011 – December, 2013
School of VLSI Technology
Indian Institute of Engineering Science and Technology, Shibpur

- Taught two courses, VLSI Design and Low Power IC Design at Post Graduate level.
- Guided several PG students in their Masters final year project. Majority of them have either completed or on the verge of completing their PhD from reputed institutes like IITs.
- Worked on developing an open source Photonic CAD and simulation Tool for optical ring resonators and photonic crystal based computing systems.
- Conducted FPGA Design Workshop.

PUBLICATIONS

Journal

1. A. A. Shaikh, A. K. Mukhopadhyay, **Soumyajit Poddar** and S. Samui, "Toward Robust and Accurate Myoelectric Controller Design Based on Multiobjective Optimization Using Evolutionary Computation" in IEEE Sensors Journal, vol. 24, no. 5, pp. 6418-6429, 1 March, 2024, DOI: 10.1109/JSEN.2023.3347949.
2. A. Thomas K, **Soumyajit Poddar** and H.K. Mondal, "A CNN Hardware Accelerator Using Triangle based Convolution" in ACM Journal on Emerging Technologies in Computing Systems (JETC), vol. 18, issue 4, no. 78, pp. 1-23, Oct. 2022, DOI: doi.org/10.1145/3544975.

3. P. Maji, H. K. Mondal, A. P. Roy, **Soumyajit Poddar** and S. P. Mohanty, "iKardo: An Intelligent ECG Device for Automatic Critical Beat Identification for Smart Healthcare," in IEEE Transactions on Consumer Electronics, vol. 67, no. 4, pp. 235-243, Nov. 2021, DOI: 10.1109/TCE.2021.3129316.
4. Anakhi Hazarika; **Soumyajit Poddar**; Moustafa M. Nasralla; Hafizur Rahaman. "Area and energy efficient shift and accumulator unit for object detection in IoT applications," In Elsevier Alexandria Engineering Journal, June, 2021, DOI: 10.1016/j.aej.2021.04.099.
5. Anakhi Hazarika; **Soumyajit Poddar**; Hafizur Rahaman. "High Performance Kernel Architecture for Convolutional Neural Network Acceleration", In World Scientific Journal of Circuits, Systems and Computers (2021), pages 2150266, DOI: 10.1142/S0218126621502662.
6. Anakhi Hazarika; **Soumyajit Poddar**; Hafizur Rahaman, "Survey on memory management techniques in heterogeneous computing systems", In IET Computers & Digital Techniques, Volume 14, Issue 2, Page 47–60, March 2020. DOI: 10.1049/iet-cdt.2019.0092.
7. **Soumyajit Poddar**, Prasun Ghosal and Hafizur Rahaman, "Design of a High-Performance CDMA-Based Broadcast-Free Photonic Multi-Core Network on Chip", In ACM Transactions on Embedded Computing Systems (ACM TECS), Volume 15, Issue 1, Page 2:1–2:30, 2016. DOI: 10.1145/2839301.

Conference

1. A. Hazarika, N. Choudhury and **Soumyajit Poddar**, "Approximate Vedic Multiplier Architecture for Efficient CNN Acceleration on Embedded Devices," 2024 IEEE 48th Annual Computers, Software, and Applications Conference (COMPSAC), Osaka, Japan, 2024, pp. 473-482, doi: 10.1109/COMPSAC61105.2024.00071
2. B Purkayastha, Anakhi Hazarika, Amal Thomas K, **Soumyajit Poddar**, "Cardiac Anomaly Detection using Embedded Attractors Reconstructed from Multichannel ECG," ACM ICBBE 2022, Kyoto, Japan, 10-13 November, 2022.
3. A Sarkar, R Bhattacharjya, A Goswami, **Soumyajit Poddar**, "SEAMBA: A Semi-Approximate Multiplier using Block-Based Approach and Rounding," IEEE ISDCS 2021, Higashi-Hiroshima, Japan, 3-5 March 2021.
4. AK Mukhopadhyay, **Soumyajit Poddar**, S Samui, "Forearm Orientation Invariant Analysis for Surface Myoelectric Pattern Recognition," IEEE ISES 2020, Chennai, India, 14-16 December 2020.
5. **Soumyajit Poddar**, Amal Thomas K, Gaurav Kumar, "Design of Hardware Accelerators for Fractal based Machine Learning Applications," IEEE ISES 2020, Chennai, India, 14-16 December 2020.
6. SP Kaarmukilan, **Soumyajit Poddar**, H Rahaman, "FPGA based Structural Radial Basis Function Neural Network with Hybrid Optimization for Neural Activity," IEEE UPCON 2020, Allahabad, India, 27-29 November 2020.
7. S. P. Kaarmukilan, **Soumyajit Poddar** and Amal Thomas K., "FPGA based Deep Learning Models for Object Detection and Recognition Comparison of Object Detection Comparison of object detection models using FPGA," 2020 Fourth International Conference on Computing Methodologies and Communication (ICCMC), Erode, India, 2020, pp. 471-474, 11-13 March 2020.
8. Kaarmukilan S.P, Anakhi Hazarika, Amal Thomas K, **Soumyajit Poddar**, Hafizur Rahaman, "An Accelerated Prototype with Movidius Neural Compute Stick for Real-Time Object Detection," IEEE ISDCS 2020, Howrah, India, 4-6 March 2020.

9. M Acharya, **Soumyajit Poddar**, A Chakrabarti, H Rahaman, "Image Classification Based on Approximate Wavelet Transform and Transfer Learning on Deep Convolutional Neural Networks," IEEE ISDCS 2020, Howrah, India, 4-6 March 2020.
10. Amal Thomas K, Kaarmukilan S.P, **Soumyajit Poddar**, "A Portable Artificial Intelligence Based Rehabilitation System," IEEE VLSI Design 2020 (Poster in Industrial Forum), 4-8 January 2020.
11. Amal Thomas K, Kaarmukilan S. P, Sucheta Biswas, **Soumyajit Poddar**, "An efficient Region of Interest detection and segmentation in MRI images using optimal ANFIS network," COMSYS 2020, Jalpaiguri, India, 13-15 January 2020.
12. Anakhi Hazarika, Avinash Jain, **Soumyajit Poddar**, Hafizur Rahaman, "Shift and Accumulate Convolution Processing Unit," IEEE TENCON-2019, Kochi, India, 2019.
13. Pranav Agarwal, **Soumyajit Poddar**, Anakhi Hazarika and Hafizur Rahaman, "Learning to synthesize faces using voice clips for Cross-Modal biometric matching," IEEE Region Ten Symposium, TENSYMP 2019, to be held in Kolkata, India, June 7–9.
14. Anakhi Hazarika, **Soumyajit Poddar**, Hafizur Rahaman, "Hardware Efficient Convolution Processing Unit for Deep Neural Networks," In proceedings of 2nd IEEE International Symposium on Devices, Circuits and Systems (ISDCS), 2019, Higashi-Hiroshima, Japan, 2019, pages 1-4.
15. **Soumyajit Poddar**, "Silicon Photonic Interconnect for High Performance Multicore Processors and Hardware Accelerators," International Conference on Photonics Research, INTERPHOTONICS 2018, Invited Paper, Antalya, Turkey, October 9-12, 2018.
16. **Soumyajit Poddar**, Suraj, Amit Kumar Yadav, and Hafizur Rahaman, "OTORNoC: Optical tree of rings network on chip for 1000 core systems," In proceedings of 7th IEEE International Symposium on Electronic System Design (ISED), 2017, NIT Durgapur, India, December 18–20, 2017, pages 1–5.
17. **Soumyajit Poddar**, and Prasun Ghosal, "Multicore ICs: Recent Trends in Developing Methodologies and Frameworks for Simulation," In proceedings of IEEE International Conference on Nanoelectronic and Information Systems (iNIS), 2015, December 21–23, 2015, Indore, India, pages 53–56.
18. **Soumyajit Poddar**, Prasun Ghosal, and Hafizur Rahaman, "Adaptive CDMA Based Multicast Method for Photonic Networks on Chip." In proceedings of 28th IEEE International System-on-Chip Conference, (SOCC), 2015, Beijing, China, September 8–11, 2015, pages 298–303.
19. **Soumyajit Poddar**, Prasun Ghosal, Priyajit Mukherjee, Suman Samui, and Hafizur Rahaman. "An Area and Power Efficient Dynamic TDMA Based Photonic Network on Chip." In International Symposium on Electronic System Design (ISED), 2013, Singapore, Dec 2013, pages 113–117.
20. **Soumyajit Poddar**, Prasun Ghosal, Priyajit Mukherjee, Suman Samui, and Hafizur Rahaman, "Design of an NoC with On-chip Photonic Interconnects using Adaptive CDMA Links." In proceedings of 25th IEEE International SOC Conference (SOCC), 2012, Held at Niagara Falls, NY, USA, September 2012, pages 352–357.
21. **Soumyajit Poddar**, Prasun Ghosal, Priyajit Mukherjee, Suman Samui, and Hafizur Rahaman "A Photonic Network on Chip with CDMA Links." In Progress in VLSI Design and Test, volume 7373 of Lecture Notes in Computer Science, (LNCS), Springer Berlin Heidelberg, 2012. (VDAT) 2012, held at IIEST, Shibpur, pages 377–378.
22. **Soumyajit Poddar** and Santanu Sinha, "An Open Platform for Integrated VLSI Design Flow," In Proceedings of IEEE CALCON 2011, Jadavpur University, Kolkata, 2011, pages 277–281.

Book Chapter

1. Prasun Ghosal, Tuhin Subhra Das, **Soumyajit Poddar**, Munshi Mostafijur Rahaman and Avik Bose; Nano-CMOS and Post-CMOS Electronics: Circuits and Design, 3D NoC: A Promising Alternative for Tomorrow's Nanosystem Design, pages 337–377, The Institute of Engineering and Technology (IET), 2016.
2. Prasun Ghosal and **Soumyajit Poddar**; Multicore Technology: Architecture, Reconfiguration and Modeling, On Chip Interconnects forMulti-core Architectures, pages 285-298, CRC Press, 2012.

Patent

1. **Soumyajit Poddar**, Amal Thomas K. and Prakash C.R.J. Naidu, US Patent Application No.: US20200258237, METHOD FOR REAL TIME SURFACE TRACKING IN UNSTRUCTURED ENVIRONMENTS (**Granted**)
2. **Soumyajit Poddar**, Anakhi Hazarika, Hafizur Rahaman and Prakash C.R.J. Naidu, US Patent Application No.: US20200264935, HARDWARE ACCELERATOR FOR EFFICIENT CONVOLUTION PROCESSING (**Granted**)
3. Amal Thomas K, Mourina Ghosh and **Soumyajit Poddar**, Indian Patent Application No.: 202331014985, HARDWARE ACCELERATOR FOR PROCESSING IMAGE DATA (Granted)
4. **Soumyajit Poddar**, Hafizur Rahaman, Indian Patent Application No.: 201631013438, A PHOTONIC INTER PROCESSOR COMMUNICATION BUS FOR DATA TRANSFER IN HOMOGENEOUS MULTICORE HIGH PERFORMANCE COMPUTING SYSTEMS (Granted)

Chip Tapeout

Developed a Ternary 16 bit Ultra Low Power Multiplication algorithm, and implemented it in SCL 180nm technology library, ASIC is currently sent for tapeout. Implementation done jointly with NIT Durgapur under SMDP project. Ansys PowerArtist Tool was used to derive the power delay product, about 4 times lesser than state of the art.

FUNDED PROJECTS

- Autonomous Underwater Vehicle For Intelligent Real-Time Monitoring and Surveillance, TIH IIT Guwahati, NM-ICPS, 2022-2023, INR 12 Lakhs, sanctioned, PI: **Soumyajit Poddar**, Co-PI: Dr. Mourina Ghosh (IIITG), Dr. Amitava Nag (CIT Kokrajhar).
- Mixed Signal Neural Network Integrated Circuit for Enhanced Accuracy of Limb Movement Prediction for Yoga Asanas, SATYAM Scheme, DST, 2022-2025, INR 53 Lakhs, sanctioned, PI: **Soumyajit Poddar**, Dr. Hafizur Rahaman (IIEST Shibpur), Dr. Hemant Bhargav (NIMHANS, Bangalore), Dr. Hemanta Mondal (NIT Durgapur).
- Reconfigurable 3DIC Hardware Accelerator Platform for Deep Neural Networks, EMEQ Scheme, SERB, DST, 2019–2022, INR 27 Lakhs sanctioned, PI: **Soumyajit Poddar**.

- Design of Reconfigurable Hardware Accelerator based Machine Learning Applications, TEQIP–III Seed Fund, 2018–2020, INR 70,000 sanctioned, PI: **Soumyajit Poddar**.

SKILLS

Electronic Design Automation Tools

- **Proprietary:** Synopsys, Cadence, ANSYS PowerArtist, OrCAD Design Suite.
- **Non Commercial:** MIT DSENT, Alliance Tool Suite, Magic, KICAD, NGSPICE, GEDA ToolSuite, LTSpice, UGhent IPKISS.

Programming Languages

- **Hardware Description Languages:** Verilog, VHDL, SystemC.
- **Software:** C, C++, Python.
- **Scripting:** Perl, Tcl.

Frameworks

- **Deep Learning:** Tensorflow.
- **Computer Vision:** OpenCV.
- **Graphical User Interface:** GTKmm.
- **Data Analysis:** Pandas.
- **Simulation:** SimPy.
- **Mathematical Tools:** MATLAB, Octave.

Hardware Platforms

- **FPGA:** Xilinx Spartan, Virtex, Artix, Kintex Series.
- **SoC:** Xilinx ZYNQ, Cypress PSoC, STMicroelectronics STM32.
- **IoT:** Raspberry Pi (Model 3B+, 3A, 2), Xilinx PYNQ.
- **EDGE Based Deep Learning for IoT:** Movidius Neural Compute Stick, NVIDIA Jetson AGX Xavier.
- **Microcontrollers:** STM32, Microchip PIC8, PIC18, SAM, AVR Series.
- **Multicore Simulators:** SniperSim, GraphiteSim.
- **NoC Simulators:** NOCSIM.

Embedded Software Platforms

- **Proprietary:** Xilinx Vivado HLS, Xilinx SDK, Keil uVision Pro.
- **Non Commercial:** ATMEL Studio, MPLAB, STMCubeIDE.

MEMBERSHIPS

Professional Member of IEEE, Professional Member of ACM.

REFEREES

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   Email: dipak.kole@cse.jgec.ac.in
   Contact No.: +91 9748111074
3. Professor Jyotiprakash Naidu, JKLU, Rajasthan
   Email: jyotiprakash.naidu@jklu.edu.in
   Contact No.: +91 9449832452

Declaration
I do hereby declare that the particulars of information and facts stated herein above are true, correct and complete to the best of my knowledge and belief.

Date: 26 September, 2025
Place: Howrah

Signature
(/SOUMYAJIT PODDAR/)