Dr. Shubhajit Roy Chowdhury

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About Me

Dr. Shubhajit Roy Chowdhury was born on August 27, 1981. He completed his Ph. D from the Department of Electronics and Telecommunication Engineering, Jadavpur University in the year 2010. He is currently an Associate Professor at the School of Computing and Electrical Engineering and Chairperson of the Centre for Human Computer Interaction, Indian Institute of Technology (IIT) Mandi. Previously, he also served as an Assistant Professor at the Centre for VLSI and Embedded Systems Technology, IIIT Hyderabad and thereafter as an Assistant Professor at the School of Computing and Electrical Engineering, IIT Mandi. He has also taught at Jadavpur University in the capacity of a lecturer from 2006 to 2010. He is a Senior Member of Institute of Electrical and Electronics Engineers (IEEE), member of VLSI Society of India, ACM and a life member of Indian Statistical Institute, Microelectronics Society of India, Institution of Electronic and Telecommunication Engineers and Telemedicine Society of India. He is a member of scientific, technical and editorial committee of Engineering and Natural Sciences Division of World Academy of Engineering, Science and Technology. He is the recipient of university gold medals in 2004 and 2006 for his B.E. and M.E. respectively, Altera Embedded Processor Designer Award in 2007, winner of five best paper awards. He received the award of the Fellow of the Institution of Electronics and Telecommunication Engineers (FIETE) in the year 2024, Fellow of Society of Applied Biotechnology (FSAB) by the Society of Applied Biotechnology in the year 2012. He is also awarded Young Engineers Award 2012-13 by the Institution of Engineers, India for his outstanding contribution in the field of Electronics and Telecommunication Engineering. He also received the award of the Fellow of the Association for the advancement of Biodiversity Sciences in the year 2014. He is the receipient of VIFA Young Faculty Award in the year 2015 and also the recipient of Young Neurologist Award from the World Stroke Organization in the year 2015. He has published over one hundred and eighty papers in international journals and conferences. He is a reviewer of IEEE Transactions on VLSI Systems, IEEE Transactions on Measurement and Instrumentation, IEEE Sensors Journal, ACM Transactions on Design Automation of Electronic Systems, Journal of Medical Systems, Medical and Biological Engineering and Computing and other reputed journals. He is an Associate Editor of IEEE Sensors Journal, IEEE Journal of Translational Engineering in Health and Medicine, IEEE Access Journal, Journal of Medical Systems, Frontiers in Public Health and Frontiers in Medical Technology. He has authored 9 books and book-chapters. He has currently filed six patents and has been granted one US patent and two Indian copyrights in the field of non invasive medical diagnosis. His research interests span around the development of Biomedical Embedded Systems, neurodiagnostic and neurotherapeutic systems, VLSI architectures and near infra-red spectroscopy based non invasive diagnosis. He is keenly interested in the educational system and its necessary transformation.

Areas of Interest

- Biomedical Embedded Systems
- Neurodiagnostic and neurotherapeutic systems
- Medical devices
- Non invasive diagnostic systems
- Near Infrared Spectroscopy
- VLSI Architectures

Educational Qualification

- Ph.D., Electronics and Telecommunication Engg., Jadavpur University, India, 2010
- M.E., Software Engineering (Gold Medalist), Jadavpur University, India, 2006
- B.E., Information Technology (Gold Medalist), Vidyasagar University, India, 2004

Work Experience

- Associate Professor, School of Computing and Electrical Engineering, IIT Mandi, India, June 2019 - Present
- Assistant Professor, School of Computing and Electrical Engineering, IIT Mandi, India, July 2015 - May 2019
- Assistant Professor, Centre for VLSI and Embedded Systems Technology, IIIT Hyderabad, India, July 2010 - June 2015
- Lecturer, Department of Electronics and Telecommunication Engineering, Jadavpur University, India, August 2007 - June 2010
- Laboratory Engineer, Special Manpower Development Programme for VLSI Design and related softwares Phase-II, Department of Electronics and Telecommunication Engineering, Jadavpur University, India, August 2006 - July 2007

Research Visits/Visiting Appointments

- Department of Biomedical Engineering, University at Buffalo, USA during January 2020 - Februay 2020 (as Visiting Associate Professor).
- Universitat Klinikum Freiburg and Albert Ludwig Universitat Freiburg, Germany during November 2016 - December 2016 (under DST-DAAD Fellowship).
- Blekinge Tekniska Hogskola, Karlskrona, Sweden and IT Universitetet i Kobenhavn, Copenhagen, Denmark during September 2016 - October 2016(under Erasmus Mundus Fellowship).
- Advanced Computing and Microelectronics Unit, Indian Statistical Institute, Kolkata, December 2015 - January 2016 (as Visiting Scientist).
- Malardalens Hogskola, Vasteras, Sweden during May 2015 (under Linnaus Palme Fellowship).
- DEMAR Laboratory, Institut national de recherche en informatique et en automatique (INRIA), Montpellier, France during September 2013 (under INRIA Associate Fellowship).

Teaching

- Information Technology and Development
- Bioelectric Systems Modeling (IDD (Bioengg))
- CMOS digital VLSI practicum (M.Tech)
- Computer Organization (B.Tech)

- Biomedical Systems (Ph.D, M.S., M.Tech, B.Tech)
- Design Practicum (B.Tech)
- Applied Electronics Lab (B.Tech)
- Digital Systems Design (B.Tech)
- Basic Electronic Circuits (B.Tech)
- Embedded Hardware Design (B.Tech)
- Introduction to VLSI (B.Tech)
- Embedded Systems I (M.Tech)
- Advanced VLSI Design (M.Tech)
- VLSI Architectures (B.Tech and M.Tech)
- Analog and Mixed Signal Design (B.Tech and M.Tech)
- Digital Design with VHDL (M.Tech)
- Design for Testability (M.Tech)
- Topics in Embedded systems (M.Tech)
- Human Values - Course in Humanities and Social Sciences (B.Tech)

Awards & Recognitions

- Elevated to Fellow, Institution of Electronic and Telecommunication Engineers in the year 2024.
- Nature India mentions our work on Device for early detection of Stroke in the year 2022. Link to the article.
- Selected as a Mentor by IEEE Instrumentation and Measurement Society mentoring programme for mentoring young scientists across the globe in the year 2022.
- Selected as Associate Editor of Frontiers in Medical Technology in the year 2022.
- Project on Urine Albumin Estimation System selected for presentation before Hon'ble Prime Minister of India in the year 2021.
- Selected as Associate Editor of IEEE Sensors Journal in the year 2021.
- Selected as Associate Editor of IEEE Journal of Translational Engineering in Health and Medicine by IEEE in the year 2019.
- Selected as Associate Editor of IEEE Access Journal by IEEE in the year 2018.
- Elected as a member of Award Committee for Gandhian Young Technological Innovation (GYTI) Award by the Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI) in the area of Health Care devices in the year 2018.
- Outstanding Reviewer Award by the Journal of Neuroscience Methods (Elsevier) in 2018.
- Received IAAM Scientist Medal in the European Sensors and Actuators Summit 2017 at Stockholm, Sweden.
- Outstanding Reviewer Award by the journal Computers in Biology and Medicine (Elsevier) in February, 2017.
- Received best poster award from IEEE INDICON 2016 held at IISc Bangalore.
- Elected as Senior Member, IEEE in the year 2016.
- Awarded Young Neurologist Award for outstanding contribution in the field of Neurology at the World Stroke Congress in the year 2016.
- Awarded VIFA Young Faculty Award for outstanding contribution in th field of Biomedical Embedded System in the year 2016.
- Awarded DST-DAAD Fellowship for Indo German Exchange in the year 2016.
- Winner of Best Paper Award at 9th IEEE International Conference on Sensing Technology (ICST) at Auckland, New Zealand in the year 2015.
- Nominated as Coordinator of Wearable Devices, Embedded Systems, and Computer Aided Diagnosis theme under Health Care Sector of pan-IIT-IISc project IMPRINT, Ministry of Human Resource Development in the year 2015.
- Appointed as Member of Editorial Board, of Elsevier journal Computers in Biology and Medicine from the year 2014.
- Appointed as the Associated Editor of the Springer Journal of Medical Systems from the year 2014.
- Awarded Fellow of the Association for Advancement of Biodiversity Sciences (FABSc) by the Association for Advancement of Biodiversity Sciences in the year 2014.
- Recognized Reviewer Status awarded by the journal Computers Methods and Programs in Biomedicine (Elsevier) in July, 2013.
- Awarded Young Engineers Award by the Institution of engineers (India) for outstanding contribution in the field of Electronics and Telecommunication in the year 2012.
- Awarded Fellow of the Society of Applied Biotechnology in the year 2012.
- Winner of Best Poster Award in DST-CSIR sponsored National Conference on Sensors and Actuators 2011 held at Kolkata during March 11-12, 2011.
- Winner of best project award for supervising a project on Medical diagnostic software, “Aarogyam”, by VJ Institute of Engineering and Technology, Hyderabad in 2011.
- Project selected among top 4 projects in World Embedded Software Contest held at Seoul, Korea in the year 2010.
- Awarded the Outstanding Intellectual Diploma of the 21st Century by International Biographical Centre, Cambridge, U.K in the year 2010.
- Winner of second prize in Cadence Analog Design Contest in 2010.
- Project selected amongst the top 4 in the World Embedded Software Contest 2010.
- Reviewer of ACM Transactions on Design Automation of Electronic Systems from the year 2010.
- Reviewer of Journal of Medical Systems from the year 2010.
- Reviewer of IEEE Transactions on VLSI Systems from the year 2009.
- Elected as a member of Scientific, Technical and Editorial Committee of Natural and Engineering Sciences Division, World Academy of Engineering, Science and Technology, France in the year 2009.
- Project proposal selected amongst the best five project proposals in India by Texas Instruments for Texas Instruments Students Analog Design Contest organized on an All India basis in the year 2009.
- Winner of Third Prize in Altera Nios II Soft Core Embedded Processor Design Contest 2007 organized on a worldwide basis.
- Winner of University Gold Medal for ranking first in M.E. in Software Engineering in Jadavpur University in the year 2006.
- Winner of Best Paper Award for presenting a paper on VHDL Modeling and FPGA based implementation of an artificial telediagnostic system at the IEE CSI-EAIT 2006 in Kolkata in February 2006.
- Winner of Special Award in the Paper Presentation Contest at the IETE Conference in Kolkata in 2004.
- Winner of University Gold Medal for ranking first in B.E. (Hons.) in Information Technology in Vidyasagar University in the year 2004.
- Winner of National Scholarship for securing rank in the first 100 in Higher Secondary Examination in the year 2000.
- Winner of National Scholarship for securing ranks in the first 100 in Madhyamik Examination in the year 1998.
- Winner of 2nd Prize in Saibal Roy Memorial Science Talent Examination in the year 1997.
- Winner of third prize in state level technical essay competition organized by Regional Computer Centre, Kolkata in the year 1997.

Professional Experience

I. Reviewer:

- Journal of Medical Systems.
- Computers in Biology and Medicine.
- Computer Methods and Programs in Biomedicine.
- Medical and Biological Engineering and Computing.
- Journal of Neuroscience Methods.
- ACM Transactions on Design Automation of Electronic Systems.
- IEEE Transactions on VLSI Systems.
- IEEE VLSI Design and Test Symposium 2010, 2011.

- IEEE International Conference on Sensing Technology 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018
- IEEE International Conference on Smart Instrumentation, Measurement and Applications 2013.
- IEEE Recent Advances in Intelligent Computational Systems 2013.

II. Associate Editor:

- Journal of Medical Systems.
- Frontiers in Public Health.
- IEEE Journal of Translational Engineering in Health and Medicine.
- IEEE Sensors Journal.
- IEEE Acess.

III. Review Editor:

- Frontiers in Computational Neuroscience.

IV. International Program Committee Member:

- IEEE International Conference on Sensing Technology 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018.
- IEEE International Conference on Smart Instrumentation, Measurement and Applications 2013, 2014, 2015, 2016, 2017, 2018.
- IEEE Emgineering in Medicine and Biology Conference 2014, 2015, 2016, 2017, 2018.
- IEEE Recent Advances in Intelligent Computational Systems 2013.

V. Member of Board of Studies:

- VIT University, Vellore.
- Andhra University, Vishakhapatnam.

VI. Member of National Level Committees:

- Member of expert committee of AICTE for visit and evaluation of engineering institutions in India.
- Member of GATE Committee for Biomedical Engineering.
- Member of Gandhian Young Technological Innovation Award Committee in the Point of Care Testing devices domain.
- Theme Coordinator of Embedded Systems, Wearable Devices, Computer Aided Diagnosis theme of Pan IIT-IISc Project IMPRINT under the Health Care domain.
- Member of Expert Committee of Health Care Domain of National IMPRINT Essay Competition 2015.
- Institute Coordinator for Ericsson Innovation Award 2015-16.

Organisational Membership

- Fellow of the Institution of Electronics and Telecommunication Engineers (FIETE) (Fellowship No. F-235896).
- Fellow of the Association for the Advancement of Biodiversity Sciences (FABSc).
- Fellow of the Society of Applied Biotechnology (FSAB).
- Senior Member of Institution of Electrical and Electronic Engineers (SMIEEE) (Membership No. 92772549).
- Member of Association for Computer Machinery (Membership No. 7483653).
- Member of the VLSI Society of India (Membership No. 1658).
- Member of World Stroke Organization (Membership No. 3280855).
- Life Member of the Indian Statistical Institute (Membership No. L-8870).
- Life Member of the Indian Microelectronics Society (Membership No. LM-367).
- Life Member of the Telemedicine Society of India (Membership No. LM-0051).

Projects

- Integration of digital olfaction with a mobile phone and television, funded by IIT Mandi iHub and HCI Foundation (2023-25). Total budget: 1.07 Crores Status: *Sanctioned* Role: PI
- Remote multimodal point-of-care health diagnostic and consultancy system, funded by Drishti CPS Foundation, IIT Indore (2023-24). Total budget: 9.9 lacs Status: *Ongoing* Role: Co-PI
- Smart medical instrumentation with artificial intelligence, funded by Swedish Research Council, Government of Sweden (2021-23). Total budget: 60000 SEK Status: *Ongoing* Role: PI
- A microfluidic based point of care testing device for measuring urine albumin using a novel organic dye, jointly funded by Ministry of Human Resource Development, Government of India and Indian Council of Medical Research, Government of India (2017-2022). Total budget: 73.2 lacs. Status: *Completed* Role: PI
- Human performance enhancement via tDCS in VR and performance forecasting via machine learning methods, funded by Life Sciences Research Board, Defence Research and Development Organization, Government of India (2021-2024). Total budget: 49.13 lacs (As Co-PI) Status: *Ongoing*
- Design and Innovation Centre, funded by Ministry of Human Resource Development, Government of India (2015-2026). Total budget: 1.3 Crores. Status: *Ongoing* Role: PI
- Development of a non invasive low cost portable device for monitoring blood parameters, funded by M/S Biofi Medical Healthcare Pvt. Ltd, Bengaluru. Total budget: 20.07 lacs. Status: *Sanctioned* Role: PI
- Point of care monitoring of Neuro-Vascular interactions (especially inverse Neuro-Vascular coupling) during spreading depolarizations in brain trauma using simultaneous recording of EEG and NIRS, funded by Department of Science and Technology (BDTD), Government of India (2019-2020). Total budget: 24.68 lacs. Status: *Completed* Role: PI
- Software tools for ARM Embedded processor laboratory, funded by ARM University Programme (South Asia), (2018-2019). Total budget: 50 lacs. Status: *Completed* Role: PI
- Point of care monitoring of neuro-glial-vascular interactions during spreading depolarizations in brain trauma using simulaneous recording of electroencephalography (ECG) and near-infrared spectroscopy (NIRS), funded by Department of Science and Technology, Government of India under DAAD-DST Scheme (2016-2018). Total budget: 8.25 lacs. Status: *Completed* Role: PI
- Development of a low cost low magnetic field MRI for Point of Care Testing, and associated CAD system. jointly funded by IIT Ropar IIT Mandi PGIMER Chandigarh BioX Consortium, Government of India (2016-2018). Total budget: 20 lacs. Status: *Completed* Role: PI
- Development of a point of care screening and monitoring device for ischemic stroke risk assessment, funded by Indian Institute of Technology Mandi, Government of India (2015-2018). Total budget: 5 lacs. Status: *Completed* Role: PI
- Development of pedagogy for Basic Electronics Course under National Mission Project on Education through ICT, funded by Ministry of Human Resource Development, Government of India (2015-2017). Total budget: 5 lacs. Status: *Completed* Role: PI
- Neurophysiological monitoring with low-cost sensors during restorative neurorehabilitation, jointly funded by Institut national de recherche en informatique et en automatique (INRIA), France and Department of Science and Technology, Government of India (2012-2014). Total budget (India): 35 lacs (A collaborative project between IIIT Hyderabad, Institute of Neurosciences Kolkata, IIT Gandhinagar, INRIA France and University of Montopellier, France). Status: *Completed* Role: Co-PI
- FPGA based VLSI Architectures for registration and fusion of multimodal images for surveillance applications, funded by Instruments Research and Development Establishment, Defence Research and Development Organzation, Government of India (2012-2014). Total budget: 24.96 lacs Status: *Completed* Role: Co-PI
- Testing and Failure Mode Detection of FPGA based Missile Interface Unit and On-board Computer, funded by Defence Research and Development Organization, Government of India (2012-2014). Total budget: 10 lacs. Status: *Completed* Role: PI
- Development of Atom Processor based Embedded Systems Laboratory, funded by Intel Corporation(2012-2015).Total

budget: 17 lacs. Status: *Completed* Role: PI
- Development of an ASIC Chip of a Fuzzy Processor, funded, by Department of Science and Technology, Government of India (2011-2013). Total budget: 14.69 lacs. Status: *Completed* Role: PI
- Development of Embedded SOPC Lab, funded by Altera Semiconductors (2010-2011). Total budget: 72 lacs. Status: *Completed* Role: PI
- Development of Advanced VLSI Virtual Lab, funded by Ministry of Human Resource Development, Government of India (2010-2012). Total budget: 15 lacs. Status: *Completed* Role: PI

Post-doctoral Fellow

- Dr. Pooja Sharma (Area of research: Neurodiagnosis of Parkinson's disease through EEG.)

Graduated Ph.D Students

- Mr. Kshitij Shakya (Title of thesis: Hemodynamic characteristics of stenoses in the carotid artery and its interaction with external pressure, 2024)
- Mr. Madhubabu Anumukonda (Tile of thesis: Multichannel phonocardiography system for cardiac diagnosis, 2023.)
- Ms. Bidisha Biswas (Title of thesis: NIR Emissive Functional Cyanine Probes: Design, Synthesis and Application Towards Bioimaging of Albumin Homeostasis under Pathophysiological Conditions, 2023.) (as Co-Guide) (Guide: Dr. Subrata Ghosh and another Co-Guide: Dr. Prosenjit Mondal)
- Mr. Dalchand Ahirwar (Title of thesis: Multimodal Biomarkers for Identification of Stroke, 2023.) (Co-Guide: Prof. Dheeraj Khurana, PGIMER Chandigarh)
- Mr. L.V.R. Prasadaraju (Title of thesis: Fault tolerant multi modal safety related medical systems, 2023.) Presently working on his own start up C2R at Hyderabad.
- Mr. Gaurav Sharma (Title of thesis: Anodal high definition transcranial direct current stimulation for Neurorehabilitation of Chronic Stress and Depression, 2021.) Presently working with National Brain Research Centre, Gurgaon.
- Ms. Yashika Arora (Title of thesis: Neurovascular coupling and cerebrovascular reactivity through Near Infrared Spectroscopy, 2021.) Presently working with National Brain Research Centre, Gurgaon.
- Ms. Swathi Ramasahayam (Title of thesis: Non invasive estimation of blood parameters using fingertip photoplethysmography, 2018.) Presently working with Iowa Department of Public Health, USA.

Current Ph.D Students

- Mr. Md.Najrul Islam (Area of research: Energy efficient and reconfigurable hardware accelerator for Deep Neural Network to be used for medical diagnostics.) (as Co-Guide) (Guide: Dr. Rahul Shrestha)
- Mr. Ankush Arya (Area of research: Therapy of anxiety, depression and clinical disorders through musopathy techniques.) (Co-guide: Dr. Varun Dutt)
- Mr. Yugal Pachori (Area of research: Development of a sensing system for identification of digital smell.) (Co-guide: Dr. Gopal Rawat)
- Mr. Vinod Srivastava (Area of research: Statistical techniques for detection and estimation of volatile compounds in a sensor array.) (Co-guide: Dr. Priyatosh Mahish)
- Mr. Biswajit Das (Area of research: Transcranial photobiomodulation techniques for therapy of anxiety, depression and clinical disorders.)
- Mr. Md. Mushfiqur Rahman Chowdhury (Area of research: Non invasive transspinal electric stimulation targeted at epidural space for restorative rehabilitation of patients with spinal injury.)
- Ms. Arshi Zameer (Area of research: Telestroke network for the diagnosis of stroke and immediate interventionalsupport at the point of care.)
- Ms. Abhishriya Mahanta (Area of research: Neurodiagnostic systems for diagnosis of Parkinson's disease.)
- Mr. Jasmeet Singh (Area of research: Neurobiological studies on alteration of sleep pattern and its therapeutic aids inspired by Indian knowledge systems.)
- Mr. Hiran Kumar Bhammidi (Area of research: Neurodiagnostic systems for diagnosis of stress.)
- Mr. Divyansh Bajpai (Area of research: Deciphering of the Indus Valley Civilization script.)

Current M.Tech(R) (earlier M.S.) Student

- Mr. Maha Vishnu (Area of research: Closed loop control of non invasive brain stimulation.)
- Mr. Shreyas Soni (Area of research: Calibration of sensors in a sensor array for identification of volatile organic compounds.)
- Mr. Upendra Gautam (Area of research: VLSI architectures for ECG signal processing.)
- Mr. Smarth Behl (Area of research: Systems and methods for integration of digital smell.)

Graduated M.S. Students

- Mr. Bodhayan Nandi (Title of thesis: Closed loop control of blood glucose level through simultaneous estimation of blood insulin and glucose, 2020.) Presently working at M/S GE Health Pvt. Ltd.
- Ms. Snigdha Dagar (Title of thesis: A computational investigation on using the Excitation-Inhibition (E/I balance) mechanism to optimize tDCS protocol, 2020.) Presently working for her Ph.D at CERN, Switzerland.
- Mr. Nikhil Bhandari (Title of thesis: FPGA Based High Performance Asynchronous Arithmetic Logic Unit and Asynchronous Finite State Machine Controller using Modified 4-Phase Handshaking Protocol, 2018. Co-Advisor: Dr. Rahul Shrestha.) Presently working with M/S Synopsys.
- Mr. Soumitr Sanjay Dubey (Title of thesis: An FPGA Implementation of Digital Architecture to Estimate the Direction of Arrival for Adaptive Array Antenna Based on Matrix Pencil Technique, 2018. Co-Advisor: Dr. Rahul Shrestha.) Presently working with M/S Shipment.
- Mr. Neeraj Paradkar (Title of thesis: Non-Invasive Diagnosis of Cardiac Arrhythmia and Coronary Artery Disease Through Fingertip Photoplethysmography, 2017.) Presently working with M/S Samsung Semiconductor India RnD Centre.
- Mr. Anand Thati (Title of thesis: Development of a high performance breath acetone sensing device, 2017. Co-advisor: Dr. Tapan Kumar Sau.) Presently working with M/S Eindhan Techsoft Pvt. Ltd.
- Mr. Anirban Guha (Title of thesis: ASIC design of a hybrid pipelined parallel digital fuzzy processor, 2017) Presently working with M/S Red Pine Signals.
- Ms. Mehak Sood (Title of thesis: Studies on cortical excitability regulation and systemic interference effects of transcranial direct current stimulation, 2016.) Presently working with M/S Qualcomm India Pvt. Ltd.
- Mr. Naman Govil (Title of thesis: Algorithms for High Performance Hardware-Software Partitioning, 2016. Co-Advisor: Dr. Rahul Shrestha.) Presently working with M/S Nvidia India Pvt. Ltd.
- Mr. Utkarsh Jindal (Title of thesis: Development of Point of Care Testing Device for NIRS Based Online Imaging During Electric Brain Stimulation, 2016.) Presently working with M/S Practo Pvt. Ltd.
- Mr. Harsh Wardhan (Title of thesis: Electrical Modeling of Biological Cells and Generation of Biopotentials, 2016. Co-Advisor: Dr. Anubha Gupta.) Presently working with M/S Jaggu Pvt. Ltd.
- Mr. Kshitij Agrawal (Title of thesis: FPGA Based VLSI Architecture of Image Registration and Fusion of Multimodal Images for Surveillance Applications, 2015.) Presently working with M/S Intel Corporation Pvt. Ltd.
- Ms. Himani Upadhyay (Title of thesis: Design of High Performance Arithmetic Circuits using Novel Two Transistor (2T) XOR gates, 2015.) Presently working with M/S Xilinx India Pvt. Ltd.
- Mr. Varun Ramchandani (Title of thesis: Maximum power-point tracking of solar photovoltaic array using Kalman Filter, 2014.) Presently working with M/S Qualcomm India Pvt. Ltd.
- Mr. Roopak Dubey (Title of thesis: FPGA based multi-robot reciprocal collision avoidance, 2014. Co-Advisor: Dr. K. Madhava Krishna.) Presently working with M/S Qualcomm India Pvt. Ltd.

- Mr. Neeraj Pradhan (Title of thesis: Two tier globally asynchronous locally synchronous architecture for collision avoidance algorithms, 2014. Co-Advisor: Dr. K. Madhava Krishna.) Presently working with M/S Amazon India Pvt. Ltd.
- Mr. B.V.V. Prem Bhargav (Title of thesis: Memory constrained grid based Markov localization with lossless data compression techniques, 2013. Co-Advisor: Dr. K. Madhava Krishna.) Presently working with M/S Qualcomm India Pvt. Ltd.
- Ms. Charvi Dhoot (Title of thesis: Probabilistic Computing for low power and high speed motion estimation architecture, 2012. Co-Advisor: Prof. Vincent J. Mooney.) Presently working with M/S Qualcomm India Pvt. Ltd.

Graduated M.Tech Students

- Mr. Tanay Srivastava (Title of dissertation: Two Phase Handshaking Protocol Based Asynchronous Pipeline Processor for Low Power Applications, M.Tech (VLSI), 2023.)
- Mr. Hitarth Patel (Title of dissertation: High speed EEG signal compression using multi-core processor, M.Tech (VLSI), 2023.)
- Mr. Arjun Saha (Title of dissertation: Fail-Safe Systems based on Multi-Core Reconfigurable Architecture, M.Tech (VLSI), 2023.)
- Ms. Pritiksha Chand (Title of dissertation: Development of a Circuit Model for Neurovascular Coupling, M.Tech (VLSI), 2022.)
- Mr. Md. Mushfiqur Rahaman Chowdhury (Title of dissertation: Development of FPGA based lossless compressor circuit for compression of EEG signals, M.Tech (VLSI), 2022.)
- Ms. Kashmira Dey (Title of dissertation: Inverse neurovascular coupling and associated spreading depolarization models for traumatic brain injury, M.Tech (Biotechnology), 2021.)
- Mr. Tejas Kumar Hoizal (Title of dissertation: Automotive grade built in self test IP design for on chip memories, M.Tech (VLSI), 2021).
- Mr. Ajay Chauhan (Title of dissertation: High PSRR low drop out regulator, M.Tech (VLSI), 2021).
- Mr. Shashank Mourya (Title of dissertation: Readout interface amplifier for NIRS and PPG readings, M.Tech (VLSI), 2021).
- Mr. Vipin Kumar (Title of dissertation: Architectural design for computation of transcendental function, M.Tech (VLSI), 2021).
- Mr. Amit Sahu (Title of dissertation: Coarse grained reconfigurable architecture for non linear function computation, M.Tech (VLSI), 2021).
- Mr. Anirban Banerjee (Title of dissertation: Mathematical modeling of Neurovascular Coupling: Molecular and System Level Approach, M.Tech (Biotechnology), 2020.)
- Mr. Sompal Singh (Title of dissertation: Signal Processing aspects of neurpvascular coupling, M.Tech (CSP), 2020.)
- Mr. Ashish Tiwari (Title of dissertation: Low noise low power instrumentation amplifier for full band EEG, M.Tech (VLSI), 2020.)
- Mr. Shakti Singh (Title of dissertation: Design of a low leakage low voltage high density 6T SRAM, M.Tech (VLSI), 2020.)
- Mr. Karunanidhan Pandey (Title of dissertation: Low noise low power instrumentation amplifier for EEG signal acquisition, M.Tech (VLSI), 2019.)
- Late Mr. Muneeb Sulthan P.P. (Title of dissertation: Design of a power efficient pulse latch circuit as a solution for Master Slave Flip Flop, M.Tech (VLSI), 2019.)
- Mr. Om Karwal (Title of dissertation: FPGA Based parallelized Architecture for Near Infrared Spectroscopy Based Identification of Ischemic Stroke Patients, M. Tech (CSP), 2019.)
- Mr. Prateek Kumar Sonker (Title of dissertation: Non invasive photoplethysmographic system to monitor blood hemoglobin, M.Tech (VLSI), 2018.)

Current M.Tech Students

- Mr. Gourav Harit (Area of dissertation work: FPGA based heart rate monitoring system.)
- Mr. Anand Raj Singh (Area of dissertation work: FPGA based transcranial alternating current stimulator.)
- Mr. Sandeep Rai (Area of dissertation work: Interval Type 2 Fuzzy Logic Control for Energy Management of Hybrid Electric Autonomous Vehicles.)

Publications

I. Journal Papers (Published/Accepted for publication):

- [63] M.N. Islam, R. Shrestha, S. Roy Chowdhury, "Energy-Efficient and High-Throughput CNN Inference Engine based on Memory-Sharing and Data-Reusing for Edge Applications", IEEE Transactions on Circuits and Systems I: Regular Papers, Accepted for publication, 2024. (IF: 3.605)
- [62] K. Shakya, S. Roy Chowdhury, "A fluid-structure interaction study to analyze the severity of carotid artery stenosis at different locations and its effect on various hemodynamic biomarkers", European Journal of Mechanics: B Fluids, Accepted for publication, 2024. (IF: 2.6)
- [61] G. Sharma, S.N. Rahmantkar, A.K. Rana, P. Sharma, V. Patial, D. Singh and S. Roy Chowdhury, "Preclinical Validation of Electrodes for Single Anodal Transcranial Direct Current Stimulation on Rat Model with Chronic Stress Induced Depression", IEEE Sensors Journal, Vol. 23, No. 11, pp. 12133-12145, 2023. (IF: 4.325)
- [60] A. Biswas, O. Pradhan, A. Thati, D. Mukherjee, T.K. Sau, S. Roy Chowdhury, "Pd Nanoparticle-Mediated Acetone Sensing Performance Improvement of SnO2 Substrate: A Combined DFT and Experimental Study", Current Applied Physics, Vol. 44, pp. 131-143, 2022. (IF: 2.856).
- [59] M. N. Islam, R. Shrestha, S. Roy Chowdhury, "An Uninterrupted Processing Technique Based High-Throughput and Energy-Efficient Hardware Accelerator for Convolutional Neural Networks", IEEE Transactions on VLSI Systems, Vol. 30, no. 12, pp. 1891-1901, 2022. (IF: 2.775)
- [58] K. Shakya, D. Ahirwar, P.M. Nabeel, S. Roy Chowdhury, "Carotid hemodynamic response to external pressure and comparison with induced stenosis progression: A fluid structure interaction study", Computer Methods in Biomechanics and Biomedical Engineering, Vol. 26, No. 13, pp. 1595-1609, 2023. (IF: 2.19)
- [57] D. Ahirwar, D. Khurana, S. Roy Chowdhury,"Modeling, simulation and validation of alteration in blood flow and regional oxygenation under arterial occlusion", Journal of Medical Systems, Vol. 46:74(1-16), 2022. (IF: 4.92)
- [56] D. Ahirwar, D. Khurana, S. Roy Chowdhury, "Identification of Ischemic Stroke Condition based on Hemodynamic Bio-markers", IEEE Sensors Journal, Vol. 22, No. 19, pp. 18944-18952, 2022. (IF: 4.325)
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- [1] S. Roy Chowdhury, "Digital Systems Design using HDL"�, Thomson Learning, 2012.

Collaborations

- Jacob's School of Medicine and Biomedical Sciences, University at Buffalo, USA
- Department of Electrical Engineering, Indian Institute of Technology Madras
- Department of Electrical Engineering, Indian Institute of Technology Ropar
- Design and Innovation Centre, Indian Institute of Technology Delhi
- Institution of Health, Blekinge Tekniska Hogskola, Karlskrona, Sweden
- DEMAR Laboratory, Institut national de recherche en informatique et en automatique (INRIA), Montpellier, France
- Sri Chitra Thirunal Institute of Medical Sciences, Thiruvananthapuram, India

- Post Graduate of Medical Education and Research, Chandigarh
- Centre for Green Energy and Sensing Systems, Bengal Engineering and Science University, Shibpur, Howrah, India.
- Institute of Neurosciences, Kolkata, India.
- School of engineering and advanced technology, Massey University, New Zealand.
- University of Medicine, Gottingen, Germany.
- Department of Neuropharmacology, Universitats Klinikum, Freiburg, Germany.

Patents and Copyrights Filed / Granted

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- [1] S. Roy Chowdhury, H. Saha, "A novel system capable of giving advance information regarding approaching critical condition of a patient", Indian Patent Application no. 593/KOL/2008 dated 25-03-2008.

Courses developed and delivered

- Developed Basic Electronics Course for 1st Year Engineering under MHRD Pedagogy project. The course is available online here
- Developed Video lectures on Verilog-A Hardware Description Language under MHRD EnhanceEdu project. The course is available online here
- Developed Advanced VLSI Virtual Lab. The virtual lab is available online here

Seminars/ Invited Talks delivered

- "Embedded Systems for Biomedical Applications" at the IEEE NITK Circuits and Systems Society-Student Chapter, February 24, 2022.
- "Architectural synthesis of VLSI circuits" at the Faculty Development Programme on Low Power VLSI Design organized by NIT Meghalaya, September 27 - October 01, 2021.
- "Near Infrared Spectroscopy aided by Anodal Transcranial Direct Current Stimulation for Cerebral Oxygenation studies: Prospects and Challenges" at the Computational Neurosciences Meet, IIT Madras, August 14, 2021.
- "IoT for stroke diagnosis at the point of care" at ATAL Faculty Development Programme 2021, Department of Computer Engineering, Women Engineering College, Ajmer, Rajasthan, August 09, 2021.
- "Architectural Design of VLSI Circuits", a series of three lectures delivered at the Faculty Development Programme on Analog and Digital VLSI Design, NITTTR Chandigarh, March 06-08, 2021.
- "Non invasive sensing of pathophysiological parameters at the point of care" at the Faculty Development Programme on Sensor Technology, National Institute of Engineering, Mysuru, September 21-25, 2020.
- "Interdisciplinarity in Research" at the Faculty Induction Programme on Research Methodology, South Asian Institute for Advanced Research and Development, September 20-24, 2020.
- "Architectural Design of Low Power VLSI Circuits" at the Faculty Development Workshop on Low Power VLSI Design for Communication Systems and Networks (LVCSN'20) , NIT Jalandhar, September 16-20, 2020.
- "Architectural and Logic Synthesis of VLSI Circuits" (Series of three lectures) at the Faculty Development Programme on Analog and Digital VLSI Design, NITTTR Chandigarh, August 03-07, 2020.
- "Health Care: Can we have it at home?" at the Department of Electrical Engineering, University at Buffalo, USA, January 29, 2020.
- "Particle Swarm Optimization and its application on Maximum Powerpoint Tracking of Solar Photovoltaic Arrays" at the Centre of Excellence for Green Energy and Sensing Systems, Indian Institute of Engineering, Science and Technology, Shibpur on January 11, 2019.
- "Point of care non invasive medical diagnosis: Can we have a hospital at home?" at Sankalp Semiconductors, Kolkata on January 07, 2019.
- "Translational research for Point of Care Testing Medical Devices" at the Centre for Green Energy and Sensing Systems, Indian Institute of Engineering, Science and Technology, Shibpur on July 09, 2018.
- "Innovation in Point of Care Testing Medical Devices" at the Workshop on Innovation organized by Jawaharlal Nehru Government Engineering College, Sundernagar on March 14, 2018.
- "Point of care testing of patients: Translating health care from hospital to home" at the International Telemedicine Workshop organized by CDAC Mohali on March 07, 2018.
- "Neural Networks: A journey from biology to computing to biology" at the Centre of Excellence for Green Energy and Sensing Systems, Indian Institute of Engineering, Science and Technology, Shibpur on January 30, 2018.
- "Translating health care from hospital to home" at the TCS Innovation Labs, Kolkata on January 29, 2018.
- "A low cost point of care testing hardware for stroke diagnosis" at the TCS Innovation Labs sponsored Indian Stroke Workshop, Bangalore on April 14-15, 2017.
- "Non invasive diagnosis for patient care: From hospital to home" at Indraprastha Institute of Information Technology Delhi, India on April 06, 2017.
- "Near Infrared Spectroscopy for Point of Care Testing Support" at Blekinge Tekniska Hogskola, Karlskrona, Sweden on September 29, 2016.
- "Non invasive diagnosis at the point of care" at IT Universitet, Copenhagen, Denmark on September 23, 2016.
- "Biomedical Systems for the Society: From Non invasive diagnosis to Point of Care Testing", at IEEE International Conference on Control, Measurement and Instrumentation, Kolkata, India on January 09, 2016.
- "Perspectives on Medical Diagnosis", at IC Design and Fabrication Centre, Department of Electronics and Telecomunication Engineering, Jadavpur University on January 07, 2016.
- "Embedded Systems for Non Invasive Diagnosis of patients using Near Infra Red Spectroscopy", at Malardalens HogsKola, Vasteras, Sweden on May 12, 2015.
- "Research in Biomedical Embedded Systems" at Le Laboratoire d'Informatique, de Robotique et de Microelectronique de Montpellier (LIRMM), Montpellier, France on September 02, 2014.
- "Smart Architectures for VLSI" at the Workshop on VLSI and Embedded Systems at TKR College of Engineering, Hyderabad on August 11, 2014.
- "VLSI: A tale of design or a tale of tools" at the Faculty Development Workshop on Recent trends in VLSI Design at Chaitanya Bharathi Institute of Technology, Hyderabad on March 27, 2014.
- "Embedded Systems for Non invasive monitoring of patients" at Advanced Computing and Microelectronics Unit, Indian Statistical Institute, Kolkata on January 04, 2014.
- "Biomedical Embedded Systems for patient diagnosis" at the Center for Health Care Science and Technology, Bengal Engineering and Science University, Shibpur on July 12, 2013.
- DWIH Scientific Lecture: "Non-Invasive Diagnosis of Patients", at the DWIH Exhibition 2013 on April 30, 2013 at Hyderabad.

- "Embedded Systems: Computers outside computers", at the Avanthi Institute of Engineering and Technology, Vishakhapatnam, on March 21, 2013.
- "Learning by doing: A paradigm shift in teaching", at British Council sponsored Instructional Design for e-Content Development Workshop on February 21-22, 2013.
- "Electronics: Past Imperfect, Present Continuous and Future Indefinite", at the Govt. College of Engineering, Pune on July 21, 2012.
- "Reconfigurable Architectures: Prospects and Challenges" at the Vigyan Institute of Engineering and Technology on December 03, 2010.
- "Medical diagnosis through FPGA based smart embedded systems", at IIIT Bangalore on April 21, 2010.
- "VHDL: A modeling language for hardware", at the Department of Electronics and Telecommunication Engineering, Kalinga Institute of Industrial Technology University, Bhubaneswar on May 16, 2009.
- "Medical Diagnosis through Reconfigurable Architectures", at the National Workshop on Software Defined Radio, January 11, 2008.
- "Development of an FPGA based Clinical Diagnostic System" at the Intel India Regional Academic Forum, Kolkata on August 25, 2007.
- "Artificial Intelligence for Clinical Diagnostic Applications" at the Department of Information Technology, Kalyani Government Engineering College, Kalyani on December 20, 2006.
- "Development of embedded systems for smart telemedicine applications" at the Department of Electronics and Communication Engineering, Kalyani University on May 18, 2006.
- "Microprocessor based hardware assembly" at the Department of Physics, Bangabasi College on January 31, 2006.
- "Development of a low cost hardware for telediagnosis" at the e-Governance seminar organized by the Department of Information Technology, Government of Andhra Pradesh on January 12, 2006.
- "Wireless Communication in coal mines" at IISc Bangalore on May 1, 2005.
- "Telemedicine: A gift of Information and Communication Technology" at IETE Kolkata Center on October 15, 2004.
- "ASIC Design of the linearisation circuit of a sensor" at the IC Design and Fabrication Centre, Jadavpur University, Kolkata on June 30, 2004.

Administrative Responsibilities:

- Programme Coordinator, B.Tech-M.Tech Integrated Dual Degree Programme (Bio-engineering), IIT Mandi, (2019-Present)
- Coordinator, Design and Innovation Centre, IIT Mandi, (2016-Present)
- Co-advisor, Alumni Affairs Cell, IIT Mandi, (2019-2021)
- Member of Green Committee, IIT Mandi, (2016-2021)
- Member of Humanities Course Interest Group of IIT Mandi, (2015-Present)
- Member of M.Tech (Biotechnology) Course Interest Group of IIT Mandi, (2017-Present)
- Member of M.Tech in (VLSI) Course Interest Group of IIT Mandi, (2016-Present)
- Member of Doctoral Committee of Prabhjot Kaur (SCEE), Iswar Chandra Mondal (SBS), Saravanan Rajendran (SBS), Ajay Kumar (SBS), Anuj Verma (SCEE), Anant Singh (SCEE), Hrishikesh Tiwari (SCEE), Sukesh Kumar Das (SCEE), Priyanka (SCEE)
- Programme Coordinator, B.Tech (Electrical Engineering), IIT Mandi, (2018-19)
- Faculty Coordinator, ACM Student Chapter of IIT Mandi, (2015-18)
- Chairman, Mathematics and Science in Engineering Track, Exploring Engineering Group, Induction Program Committee, IIT Mandi, (2017).
- Member, BioX Centre Purchase Advisory Committee, (2016-2019).
- Member of Integrated Ph.D in Physics Course Interest Group of IIT Mandi, (2016-2019)
- Faculty in charge, Faculty Common Office (A1), IIT Mandi, (2016-2019)
- Co-Advisor, Society for Collaborative Research and Innovation, IIT Mandi, (2016-2017)
- Editor, Electron Wave: The SCEE Newsletter, IIT Mandi, (2016-2019)
- Member, Safety Committee, IIT Mandi, (2016-2018)
- Member, Institute Newsletter Committee, IIT Mandi, (2016-2018)