

Indo-USA Online Short-term Course on "VLSI Architectures for Energy-Efficient Embedded Healthcare Systems"

26-28 February 2021

Organized by

Indian Institute of Technology Bhubaneswar, India and University of Minnesota, USA

Sponsored by

Scheme for Promotion of Academic and Research Collaboration (SPARC), Ministry of Education, Govt. of India



Objective of the Short-Term Course: Life threatening arrhythmias are highly associated with an increased risk of stroke and heart failure in the ambulatory and aging populations. Modern artificial intelligence (AI) powered internet of things (IoT) enabled medical devices play vital role in data-driven predictive cardiac health intelligence networks. However, there are major challenges such as improving battery life and false alarm rate reduction play a primary role in deciding a future of battery-powered long-term IoT monitoring devices and unsupervised monitoring devices. This online short-term course mainly addresses major challenges of data-driven cardiac health monitoring and present possible VLSI signal processing and machine learning architectures.

This workshop is open to all students, research scholars, faculty members and active researchers. No Registration Fee. Limited Seats

Short-Term Course Topics

Day-01 (26th February 2021)

Lecture-01: 10.00 AM-12.00 PM (IST) : Introduction to VLSI DSP Systems: Iteration Bound, Pipelining and Parallel Processing, Retiming, Unfolding, Folding, Systolic Architecture Design and Power reduction

Lecture-02: 2.30-4.30 PM (IST) : Introduction to Verilog, logic design with behavioral models, design and synthesis of data path controllers, programmable logic and storage devices

Day-02 (27th February 2021)

Lecture-03: 10.00 AM-12.00 PM (IST) : VLSI DSP Architectures: Fast Convolution, FIR and IIR Filter, and Fast Fourier Transform Architectures

Lecture-04: 2.00 -4.00 PM (IST) : Systolic arrays, Loop parallelization, Polytope model, Recurrence equations, nested loops and their mapping onto tightly-coupled processor arrays, and code generation

Lecture-05: 4.15-5.45 PM (IST) : Internet of Medical Things – Current Trends, and IoMT architectures, Edge computing and Energy Reduction Mechanisms

Day-03 (28th February 2021)

Lecture-06: 10.00 AM-12.00 PM (IST) : Machine Learning Architectures: Neural networks: multilayer perceptron, restricted Boltzmann machine, deep convolutional neural networks architectures

Lecture-07: 2.00-3.30 PM (IST) : Energy Consumption Reduction Schemes for Wearable Medical Devices: ECG and PPG Signal Quality Assessment and Their Significance, Compressive Sensing, Event-Triggered Data Transmission and Integrated Compression and Parameter Extraction Techniques

E-certificate will be provided to all registered participants if the attendance criteria is satisfied and feedback form submitted

Register on or before Feb 22nd 2021

Link for Registration (Compulsory): <https://forms.gle/mdWuPrPVfKhmdSg6>

Speakers



Prof. Keshab K. Parhi has been with the University of Minnesota, Minneapolis, since 1988, where he is currently Distinguished McKnight University Professor and Edgar F. Johnson Professor of Electronic Communication in the Depart. of Electrical and Computer Engineering. He has published over 650 papers, is the inventor of 31 patents, and has authored the VLSI Digital Signal Processing Systems. His current research addresses VLSI architecture design of machine learning systems, hardware security, data-driven neuroscience and molecular/DNA computing. He served as the Editor-in-Chief of the IEEE Trans. Circuits and Systems, Part-I during 2004 and 2005.

He is a Fellow of the IEEE (1996), a Fellow of the American Association for the Advancement of Science (2017), a fellow of the Association for Computing Machinery (2020) and a Fellow of the National Academy of Inventors (2020). Dr. Parhi is the recipient of numerous awards.

For more details, please visit <http://people.ece.umn.edu/users/parhi>



Dr. M. Sabarimalai Manikandan is currently working as an Assistant Professor with the Biomedical System Lab, School of Electrical Sciences, Indian Institute of Technology Bhubaneswar. He has published over 70 research articles in reputed journals and conference proceedings. He was a Chief Engineer, and was a recipient of the 2012 Outstanding Performance Award at Samsung Electronic India Electronic Pvt., Ltd. His current research includes: Signal Processing; Machine Learning and IoT



Dr. Srinivas Boppu is currently working as an Assistant Professor in the School of Electrical Sciences, Indian Institute of Technology Bhubaneswar since October 2017. His research interest includes high-level synthesis, programmable hardware accelerators, Compilers, Scheduling and Mapping Approaches, low power VLSI design, SoC and IC design automation. He has 15+ years of experience in both academia and industry in the field of VLSI domain. He was awarded a full scholarship by Infineon Technologies Asia Pacific Pte. Ltd for M.Sc. (IC Design) jointly offered by NTU, Singapore and TUM, Germany

Coordinators: Dr. M. Sabarimalai Manikandan and Dr. Srinivas Boppu

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