Entwining physics and electronics, I explore and design unconventional computational architectures that can transcend computing to an open, interactive and evolving system that can solve a diverse range of problems.

Research outputs

Training energy-based single-layer Hopfield and oscillatory networks with unsupervised and supervised algorithms for image classification

Non-volatile resistive switching mechanism in single-layer MoS2 memristors: insights from ab initio modelling of Au and MoS2 interfaces

Two-Layered Oscillatory Neural Networks with Analog Feedforward Majority Gate for Image Edge Detection Application

Supported Pt Nanoclusters on Single-Layer MoS2 for the Detection of Cortisol: From Atomistic Scale to Device Modeling

Oscillatory neural network learning for pattern recognition: an on-chip learning perspective and implementation

SIFT-ONN: SIFT Feature Detection Algorithm Employing ONNs for Edge Detection

Building Oscillatory Neural Networks: AI Applications and Physical Design Challenges

Simulation and implementation of two-layer oscillatory neural networks for image edge detection: bidirectional and feedforward architectures

A Mixed-Signal Oscillatory Neural Network for Scalable Analog Computations in Phase Domain

Energy-Performance Assessment of Oscillatory Neural Networks Based on VO 2 Devices for Future Edge AI Computing

Oscillatory Neural Networks Applications for Edge Computing
Roadmap for Unconventional Computing with Nanotechnology

Digital Implementation of On-Chip Hebbian Learning for Oscillatory Neural Network

Enabling Multi-programming Mechanism for Quantum Computing in the NISQ Era

Energy-Efficient Machine Learning Acceleration: From Technologies to Circuits and Systems

How fast can vanadium dioxide neuron-mimicking devices oscillate? Physical mechanisms limiting the frequency of vanadium dioxide oscillators.

Oscillatory Neural Network for Edge Computing: A Mobile Robot Obstacle Avoidance Application

Role of ambient temperature in modulation of behavior of vanadium dioxide volatile memristors and oscillators for neuromorphic applications

Réseaux de neurones oscillants pour des calculs économés en énergie

TCAD Electrothermal Simulations of Beyond-CMOS VO2 temperature-sensing neuron devices
Carapezzi, S. & Todri-Sanial, A., 1 Nov 2022

Capillary-force-driven self-assembly of carbon nanotubes: from ab initio calculations to modeling of self-assembly

Oscillatory Neural Networks for Obstacle Avoidance on Mobile Surveillance Robot E4

On-Chip Learning with a 15-neuron Digital Oscillatory Neural Network Implemented on ZYNQ Processor
Solving the Travelling Salesman Problem in Continuous Phase Domain with Neuromorphic Oscillatory Neural Networks
Delacour, C. & Todri-Sanial, A., 1 Sept 2022

Ab Initio Computer Simulations on Interfacial Properties of Single-Layer MoS$_2$ and Au Contacts for Two-Dimensional Nanodevices

Method for recognizing a pattern in an image and associated devices

Electro-thermal simulations of beyond-CMOS vanadium dioxide devices and oscillators

Simulation Toolchain for Neuromorphic Oscillatory Neural Networks Based on Beyond-CMOS Vanadium Dioxide Devices

Multi-programming Cross Platform Benchmarking for Quantum Computing Hardware

How Frequency Injection Locking Can Train Oscillatory Neural Networks to Compute in Phase

Analyzing Strategies for Dynamical Decoupling Insertion on IBM Quantum Computer


Carbon Nanotube SRAM in 5-nm Technology Node Design, Optimization, and Performance Evaluation - Part II: CNT Interconnect Optimization

Effects of Dynamical Decoupling and Pulse-level Optimizations on IBM Quantum Computers

Oscillatory Neural Network as Hetero-Associative Memory for Image Edge Detection

Enabling multi-programming mechanism for quantum computing in the NISQ era
Assessing doping strategies for monolayer MoS$_2$ towards non-enzymatic detection of cortisol: a first-principles study

Introduction to the Special Issue on Monolithic 3D: Technology, Design and Computing Systems Applications Perspectives

How Parallel Circuit Execution Can Be Useful for NISQ Computing?

Advanced Design Methods From Materials and Devices to Circuits for Brain-Inspired Oscillatory Neural Networks for Edge Computing

How Parallel Circuit Execution Can Be Useful for NISQ Computing?

Graphene and Carbon Nanotubes for Electronics Nanopackaging

Mapping Hebbian Learning Rules to Coupling Resistances for Oscillatory Neural Networks

Insights Into the Dynamics of Coupled VO$_2$ Oscillators for ONNs

Digital Implementation of Oscillatory Neural Network for Image Recognition Applications

Exploring 1D and 2D Nanomaterials for Health Monitoring Wearable Devices

Analyzing crosstalk error in the NISQ era

Oscillatory Neural Networks for Edge AI Computing

Multi-Scale Modeling and Simulation Flow for Oscillatory Neural Networks for Edge Computing
Frequency Injection Locking-Controlled Oscillations for Synchronized Operations in VO2 Crossbar Devices

Analyzing crosstalk error in the NISQ era

gprof: a gprof-inspired quantum profiler

Oscillatory Neural Networks Using VO2 Based Phase Encoded Logic

Dedicated Wearable Sensitive Strain Sensor, Based on Carbon Nanotubes, for Monitoring the Rat Respiration Rate †

A Hardware-Aware Heuristic for the Qubit Mapping Problem in the NISQ Era

1D Nanomaterial-Based Highly Stretchable Strain Sensors for Human Movement Monitoring and Human–Robotic Interactive Systems

Electrochemical Glucose Sensor using Single-Wall Carbon Nanotube Field Effect Transistor

Stretchable Strain Sensors for Human Movement Monitoring

Review—Energy Autonomous Wearable Sensors for Smart Healthcare: A Review

Energy Autonomous Wearable Sensors for Smart Healthcare: A Review

Importance of Interconnects: A Technology-System-Level Design Perspective

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Piezoresistive sensor device with amplification module
todri-sanial, a., pandey, r. r. & liang, j., 24 oct 2019, ipc no. g01n 27/414 a1, patent no. w02019201958, priority date 17 apr 2018, priority no. ep20180167680

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Investigation of Pt-Salt-Doped-Standalone- Multiwall Carbon Nanotubes for On-Chip Interconnect Applications

Editorial TVLSI Positioning - Continuing and Accelerating an Upward Trajectory

Power-Supply Noise Analysis for Monolithic 3D ICs Using Electrical and Thermal Co-Simulation

SmartVista: Smart autonomous multi modal sensors for vital signs monitoring

Atomistic- to Circuit-Level Modeling of Doped SWCNT for On-Chip Interconnects

A high-reliability and low-power computing-in-memory implementation within STT-MRAM.

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Variability study of MWCNT local interconnects considering defects and contact resistances-Part II: Impact of charge transfer doping
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Atomistic to circuit level modeling of defective doped SWCNTs with contacts for on-chip interconnect application

Addressing the Thermal Issues of STT-MRAM From Compact Modeling to Design Techniques

A physics-based investigation of Pt-salt doped carbon nanotubes for local interconnects
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A Robust Dual Reference Computing-in-Memory Implementation and Design Space Exploration Within STT-MRAM

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Progress on carbon nanotube BEOL interconnects

Synchronised 4-phase resonant power clock supply for energy efficient adiabatic logic

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The impact of vacancy defects on CNT interconnects: From statistical atomistic study to circuit simulations

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A Survey of Carbon Nanotube Interconnects for Energy Efficient Integrated Circuits

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Investigation of the power-clock network impact on adiabatic logic

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Present and future prospects of carbon nanotube interconnects for energy efficient integrated circuits

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Exploration of carbon nanotubes for efficient power delivery
Lumped electro-thermal modeling and analysis of carbon nanotube interconnects

A Study of 3-D Power Delivery Networks With Multiple Clock Domains

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Investigation of electrical and thermal properties of carbon nanotube interconnects

Physical description and analysis of doped carbon nanotube interconnects

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On analysis of on-chip DC-DC converters for power delivery networks

Message from the general and program chairs

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An architecture-level cache simulation framework supporting advanced PMA STT-MRAM

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An SRAM Based Monitor for Mixed-Field Radiation Environments

Multiple Cell Upset Classification in Commercial SRAMs

An intra-cell defect grading tool

Evaluating a radiation monitor for mixed-field environments based on SRAM technology

Exploring potentials of perpendicular magnetic anisotropy STT-MRAM for cache design

A Complete Resistive-Open Defect Analysis for Thermally Assisted Switching MRAMs

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Electro-thermal characterization of Through-Silicon Vias
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Investigation of horizontally aligned carbon nanotubes for efficient power delivery in 3D ICs

Path delay test in the presence of multi-aggressor crosstalk, power supply noise and ground bounce

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Power supply noise-aware workload assignments for homogeneous 3D MPSoCs with thermal consideration

Protecting combinational logic in pipelined microprocessor cores against transient and permanent faults

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Timing-aware ATPG for critical paths with multiple TSVs

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On the correlation between Static Noise Margin and Soft Error Rate evaluated for a 40nm SRAM cell
On the reuse of read and write assist circuits to improve test efficiency in low-power SRAMs

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