

# IEEE JOURNAL ON EMERGING AND SELECTED TOPICS IN CIRCUITS AND SYSTEMS

## Call for Papers

### Unconventional Computing Techniques for Emerging Technology Applications

#### Guest editors (*Alphabetical Order*)

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#### Scope and purpose

Most modern real-time applications are often challenging to implement in hardware, using conventional computing methods, as they struggle to simultaneously fulfill sizing, low-power consumption, high-computational performance and massive parallelism. To this end, unconventional computing paradigms are employed to overcome such design limitations. Approximate and stochastic computing, memristive and in- & near-memory processing, are only a few of these techniques and approaches. The first focus of this special issue is to attract fresh ideas and solutions in the field of unconventional computing, targeting emerging applications.

Approximate and stochastic computing are attractive in error-tolerant and hardware-taxing applications like AI-related tasks. Various approximate circuits have been explored, offering significant area, power and energy savings compared to their floating & fixed-point counterparts, at the cost of reduced computational accuracy. Stochastic circuits operate on random bitstreams, which makes arithmetic operations realizable with minimal logic, thus trading accuracy for power and significant area savings. The second focus of this special issue is the exploration of new architectures based on approximate and stochastic computing, to advance their unique benefits and to address their challenges.

In- & near-memory processing has recently received significant attention as an alternative to overcome the Von Neumann bottleneck, with memristive crossbar arrays possibly playing an important role towards this goal. They offer fast operation, low-power consumption and very high integration density. Yet, the design challenges of memristive devices, such as modeling, simulation and reliability are of primary concern. The third focus of this special issue is twofold; to explore advance processing techniques that benefit from in- & near-memory processing in general, and, the potentials and applicability of memristive devices in emerging applications.

#### Submission Procedure

Prospective authors are invited to submit their papers following the instructions provided on the JETCAS website: <https://mc.manuscriptcentral.com/jetcas>. The submitted manuscripts should not have been previously published nor should they be currently under consideration for publication elsewhere.

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## Topics of interest

Topics of interest to this special issue include, but are not limited to:

- Information processing based on Unconventional Computing techniques
- Approximate Computing
  - Approximate circuits: modeling, design and verification
  - High-level systems and architectures based on approximate circuits
  - Approximate storage techniques and strategies
- Stochastic Computing
  - Stochastic circuits: modeling, design and verification
  - High-level systems and architectures based on stochastic circuits
  - Binary-to-Stochastic interface circuits & encoding techniques
  - Deterministic methods for stochastic computing
- Memristive Devices
  - Memristor crossbar array organization for in-memory processing
  - ReRAM devices for logical computations
  - Reliability & processing
  - Logic synthesis for memristive crossbar arrays
- In- & Near-Memory Processing
  - Analog & Digital in-memory processing techniques
  - Stochastic & Deterministic bitstreams for in-memory processing
  - Charge- and resistance-based memory devices for in-memory processing
  - Memory strategies for in- & near-memory processing
- Fault-tolerant circuits and systems based on unconventional computing techniques
- Customized hardware accelerators based on unconventional computing techniques

## Important dates

- Manuscript submissions due: 2022-10-01
- First round of reviews completed: 2022-11-01
- Revised manuscripts due: 2022-11-30
- Second round of reviews completed: 2022-12-31
- Final manuscripts due: 2023-01-15
- Target publication date: 2023-02-01

## Request for information

Corresponding guest editor Professor Paul P. Sotiriadis ([pps@iee.org](mailto:pps@iee.org)) and all the rest Guest Editors (in alphabetical order)

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