

IEEE Transactions on Circuits and Systems I: Regular Papers

CALL FOR PAPERS

Special Issue for 50th Birthday of Memristor:

Theory and Application of Neuromorphic Computing Based on Memristor

In 1971, Dr. Leon Chua, known as the father of nonlinear circuits and cellular neural networks, postulated the existence of memristor, a portmanteau of memory resistor, in his seminal paper: *Memristor-the missing circuit element* published in IEEE Transactions on Circuit Theory, the predecessor of IEEE Transactions on Circuits and Systems. Thirty seven years after he predicted its existence, in the May 1 (2008) issue of the journal Nature, a team at HP Labs led by the scientist R. S. Williams proved that the memristor was real by formulating a physics-based model of a memristor and build nanoscale devices in their lab that demonstrate all of the necessary operating characteristics. Since then, extensive interest of academic and industrial circles on the neuromorphic computing based on memristor has been skyrocketed. Moreover, the unusual electrical properties of circuits and systems based on memristor can mimic the functionalities of the human brain, and can provide an in-depth understanding of key design implications of memristor-based memories, such as learning and anticipating. As a result, neuromorphic computing based on memristor are expected to bring significant breakthrough in dynamic neuromorphic memories, memristor-based resistive RAM, nonvolatile memory technology, etc.

There is an expectation that the memristor-based circuits and systems have numerous applications, once the principle and mechanism of neuromorphic computing based on memristor have been fully explored and exploited. It is also important to develop effective methods to reveal the principle and mechanism of neuromorphic computing based on memristor concurrently with the development of applications, in order to allow the memristor to be readily applied as an analog memory element. Furthermore, the analysis for neuromorphic computing based on memristor can provide the designer with an exciting variety of properties, richness of flexibility, and opportunities.

Authors are invited to submit Regular papers following the IEEE Transactions on Circuits and Systems I: Regular Papers (TCAS-I) guidelines, within the remit of this Special Issue call. Topics within the scopes of circuits and systems for neuromorphic computing based on memristor include (but are not limited to):

- Memristive devices for neuromorphic computing
- Mathematical/computational analysis or physical architectures of memristive neural networks
- Dynamic memories on memristor-based circuits and systems
- Design high-efficiency memories based on suitable memristor-based circuits and systems
- Analysis of resistive switching memories from the theoretical or experimental points of view
- System-on-chip design and verification methodologies based on memristor
- Circuit and system approaches and implications on neuromorphic computing based on memristor
- Emerging technologies for neuromorphic computing based on memristor

Deadlines

Paper Submission: May 1, 2021
Completion of First Review: July 1, 2021
Completion of Final Review: September 1, 2021
Target Publication: November, 2021

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