Call for Papers

Special Issue of IEEE Transactions on Nanotechnology:
Cognitive and Natural Computing with Nanotechnology

Background and Scope

This special issue on 'Cognitive and Natural Computing with Nanotechnology' is directed to the broad nanomaterials, nanodevice, nanofabrics, nanocircuit and nanoarchitecture research communities working on novel nanotechnology-enabled directions for non Von Neumann cognitive systems. The special issue seeks papers on innovative ideas for solutions to the principal challenge of realizing architectures that are enabling decision-making, intelligent information and sensorial processing, and autonomous learning and adaptation, in function similar to that of natural complex self-organized systems, such as the brain and others. These systems may employ a variety of fundamental principles and do not need to emulate the biological or natural automata. Rather, their key distinguishing aspect is that their plasticity, reconfiguration, and functional underpinnings are achieved without involving software. In particular, such systems could (1) introduce new architectural concepts enabled by nanoscale capabilities, resembling the neocortex and natural systems; (2) leverage new materials and nanodevices and their interactions to achieve core cognitive functions; (3) design or build on novel nanofabrics enabling efficient implementation of cognitive computational approaches including achieving high degree of connectivity and collective functions. All submitted papers should clearly articulate a vision for a cognitive computing direction beyond von Neumann microprocessors and show how their approach or component contributes to this vision.

Topics of interest include but are not limited to the following:

- Unconventional computing paradigms and nanoarchitectures based on Bayesian frameworks, spike-and-fire neuromorphic systems, cellular neural networks, sparse-data based architectures and other conceptual approaches.

- "Computing by Nature" directions based on self-organized complex dynamics systems, which naturally generate the solutions.

- Computing paradigms such as supervised learning and/or more general combinatorial optimization problems in relation to cognitive computing, and their physical implementation.

- Novel nanomaterials, nanodevices, nanoelectronic circuits and manufacturing/integration frameworks that are enablers of cognitive computing.

- Nanofabric directions that can lay the foundation for plasticity, calibration, inhibition, enhancement, measurement, and re-organization at various levels of abstraction.

- Applications of cognitive and natural computing with nanotechnology for real-life problems such as weather or stock market prediction, cyber security, text processing, web knowledge synthesis, motion analysis and others.

- Embedding cognitive capabilities into every-day systems that are ultra-low power and low area.

Submission Format

The submitted papers must be written in English and describe original research which is not published nor currently under review by other journals or conferences. Extended conference papers should contain at least 50% new material and will pass through the normal review process. Author guidelines for preparation of manuscript can be found at the IEEE Transactions on Nanotechnology website (http://tnano.org/InfoAuthors.html).

For more information, please contact: andras@ecs.umass.edu, wang@ee.ucla.edu

Submission Guidelines

All manuscripts and any supplementary material should be submitted through the TNANO Manuscript Central (http://mc.manuscriptcentral.com/tnano). Authors should select manuscript type *Special Section*, technical area *Other*, state in the cover letter that the paper is for the special issue on "Cognitive Computing with Nanotechnology,'' and select Csaba Moritz as the *Preferred Editor*.

Important Dates

- Paper submission: August 1, 2014 through October 15, 2014
- Acceptance notification: December 15, 2014
- Final papers: January 31, 2015

Guest Editors

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