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Memories in the Future of Information Processing

Piscataway, NJ – October 6, 2015 – If computers are to evolve to greater domestic use and beyond their current usage as “the medium is the message,” then the future of information processing must start to include memories. The latest issue of *Proceedings of the IEEE*, the most highly cited general interest journal in electrical engineering and computer science, explores both memories and information processing on a multi-dimensional level, rather than looking at the traditional scaling and deterministic style of the past six plus decades.

Memory is simply defined as the representation of a past incident, but information is not so easily defined, as information is both objective with symbolic references and subjective with a meaning. For engineers, this information quandary is not unlike a biologist seeking to define “life.” Biologists use a list of criteria that query the observable effects of “life,” a quite unsatisfactory answer to purists. Under the guidance of guest editor, Sandip Tiwari, this issue looks at the future of information processing and how a memory-centric foundation may affect computing, from what a device integrating memory and information would look like, to a look at the brain, to the practical implementations of the bioinspired information processing efforts and examples of their successes.

Some of the papers in this issue of *Proceedings of the IEEE* follows:

“Emerging Trends in Design and Applications of Memory-Based Computing and Content-Addressable Memories” by Karam et al. There are already some visions of what computer memory architectures would look like in the not-too-distant future and the potential impact on an industrial scale. This paper explores computing that is centered around memory, with newer memory architectures appropriate to such initial ventures as content-addressable, associative, and transactional memory, and the paper ties them to the more recent device explorations. It particularly stresses the mapping that exists between the properties of the memory to the role it can play in information processing.

“Evolution of Memory Architecture” by Nair. The paper tackles new applications of how to use memory architecture for computers and defines how it evolves. Nair discusses how several of the new ideas for memory architecture are already questioned and how system architecture is likely to change. Applications are moving toward near-data processing and other uses, such as in-memory processing, are quite foreseeable.
“Bioinspired Programming of Memory Devices for Implementing an Inference Engine” by Querliz et al. Emerging memory structures have several characteristics that are suitable for use in neural networks, like pattern recognition. This paper connects the behavior of these “new” memory devices to artificial intelligence tools like inference engines and provides a connection between the behavior of different devices and the learning algorithms.

To learn about all of these concepts, or see the list of upcoming issues, visit the *Proceedings of the IEEE* website.

**About the *Proceedings of the IEEE***

Founded in 1912 and first published in early 1913, (originally as *Proceedings of the IRE*), *Proceedings of the IEEE* is the most highly cited general interest journal in electrical engineering and computer science. This journal provides the most in-depth tutorial and review coverage of the technical developments that shape our world, enlisting the help of guest editors and authors from the best research facilities, leading edge corporations and universities around the world. For more information on *Proceedings of the IEEE* and the latest ideas and innovative technologies, visit [www.ieee.org/proceedings](http://www.ieee.org/proceedings).

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