Electrical & Computer Engineering

S E M I N A R

Louisiana State University

The Promising Frontiers of Memory-Centric Computing

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Abstract—Memory Bandwidth bottlenecks are the single most pressing challenges in digital computing hardware today. Memory-centric computing is an emerging non-conventional computing paradigm that promises to overcome these bottlenecks with a view to improving energy efficiency, parallel computing performance, and latency of the computing systems. The speaker's research endeavors to tackle inherent design challenges in this computing paradigm with the goal of enhancing the flexibility, efficiency, and performance of memory-centric accelerators. The speaker will discuss his previous research on developing a DRAM-based near-memory computing architecture featuring a novel look-up table (LUT) cluster-based programmable/re-configurable processing architecture, tightly integrated within the DRAM banks for unlocking maximum data-communication bandwidth and minimizing data communication overheads. These architectural innovations in memory-centric computing have led to outstanding performance gains and energy efficiency for data-intensive and data-parallel applications, including Deep Neural Networks and Cryptography acceleration, as well as created a platform for efficient, real-time online learning within the memory device with minimal data relocation.

The speaker will also outline his future research goals of broadening the application spectrum of memory-centric architectural solutions and scaling up these systems to meet the demands of exponentially growing AI workloads, such as Generative and Multimodal AI, Graph Neural Networks, and Full Self-driving Algorithms. Additionally, the speaker will share his plans to extend his research to low-power edge computing applications and memory-oriented security of data and AI algorithms. In addition to outlining his future research directions, the speaker will discuss his strategies for securing funding and forging collaborations to pioneer cutting-edge research in the emerging field of memory-centric computing. Furthermore, he will share insights and experiences with teaching and course development alongside his future teaching interests and visions.

When: Monday, **4 March 2024,** 13:30 - 14:30
Where: Room 3316E Patrick F. Taylor Hall
Info: `https://www.lsu.edu/eng/ece/seminar`
Food: ***Coffee, etc will be served.***