ME Seminar

Advanced Liquid Cooling for AI workloads

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ABSTRACT

The future of artificial intelligence depends on solving a fundamental challenge: heat. As AI transforms scientific discovery, healthcare, manufacturing, and everyday technologies, the computational infrastructure enabling these advances is rapidly approaching unprecedented power densities. Modern GPUs, AI accelerators, and heterogeneous packages are moving toward kilowatt-scale power levels, creating thermal challenges that can no longer be addressed through traditional cooling approaches alone. As AI workloads continue to accelerate, data centers are emerging as one of the most critical energy infrastructures of the future. Achieving sustainable AI growth will require innovations that simultaneously address computing performance, energy efficiency, and thermal limitations.

This talk will explore how advanced liquid cooling technologies at scale are becoming a critical enabler for the next generation of AI computing. Emerging solutions, including direct-to-chip liquid cooling, two-phase cooling, embedded cooling, and advanced thermal architectures, will be discussed as pathways to overcome the limitations of conventional thermal management.

ABOUT THE SPEAKER

Srikanth Rangarajan currently works as an Assistant Professor in the School of Systems Science and Industrial Engineering at Binghamton University. He received his M.S. and Ph.D. in Mechanical Engineering from the Indian Institute of Technology Madras in 2017. His research interests include thermal management of electronics digital twinning for electronics thermal management systems, thermal energy storage and data center cooling.

Srikanth leads the thermal section of the IEEE Electronics Co-Design Roadmap chapter. His group recently published a predictive correlation for phase change material (PCM)-based heat sinks in Nature Portfolio's Communications Engineering, providing design guidelines for optimizing PCM thermal energy storage systems. He has published over 40 international journal articles and is also the author of the book "Phase Change Material Heat Sinks: A Multi-Objective Perspective".

Srikanth has received competitive research funding from a broad range of federal and industry-aligned agencies, including ARPA-E, the National Institute of Standards and Technology (NIST), and the Semiconductor Research Corporation (SRC), in support of work on advanced thermal management, digital twins, and AI-enabled engineering systems.

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