



# 北京大学高能效计算与应用中心学术报告

Invited Talk, Center for Energy-Efficient Computing and Applications

## AI AND INTELLIGENT IC/ACCELERATOR DESIGN: A SYNERGISTIC APPROACH

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2019年12月18日 星期三 10:00am

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**ABSTRACT:** The recent artificial intelligence (AI) boom has been largely driven by three confluence forces: algorithms, big data, and computing power enabled by modern integrated circuits (ICs) including specialized AI accelerators. In this talk, I will present a bidirectional approach between AI and IC with two main themes, AI for IC and IC for AI. As the semiconductor technology enters the era of extreme scaling, IC design and manufacturing complexities are becoming extremely high. More intelligent and agile IC design technologies are needed than ever to deliver equivalent scaling to Moore's Law. I will show some case studies how to leverage modern AI hardware and software advancement with domain-specific customizations for agile IC design and manufacturing closure. Meanwhile, customized IC can drastically improve AI performance and energy efficiency by orders of magnitude. I will present some results on the hardware/software co-design for energy-efficient neural networks, in particular with photonic integrated circuits. The bidirectional synergy of AI and IC technologies holds great potential to significantly advance the state-of-the-art of each other.

**BIOGRAPHY:** David Z. Pan is Engineering Foundation Professor at the Department of Electrical and Computer Engineering, University of Texas at Austin. He is also currently a Visiting Professor at MIT EECS Department. His current research focuses on synergistic AI and IC design and automation. He has published over 350 refereed journal/conference papers and 8 US patents. He has served in many journal editorial boards and conference committees, including various leadership roles. He has received many awards, including SRC Technical Excellence Award in 2013, 17 Best Paper Awards at premier forums, DAC Top 10 Author Award in Fifth Decade, ASPDAC Frequently Cited Author Award, Communications of ACM Research Highlights, ACM/SIGDA Outstanding New Faculty Award, NSF CAREER Award, IBM Faculty Award (4 times), UCLA Engineering Distinguished Young Alumnus Award, UT Austin RAISE Faculty Excellence Award, Cadence Academic Collaboration Award, and many international CAD contest awards, among others. He has graduated over 30 PhD/postdoc students who are holding key academic and industry positions, and they have won many awards including the First Place of ACM Student Research Competition Grand Finals in 2018, ACM/SIGDA Student Research Competition Gold Medal (twice), ACM Outstanding PhD Dissertation in EDA Award (twice), EDAA Outstanding Dissertation Award (twice), and so on. He is a Fellow of IEEE and SPIE.