VirginiaTech
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Computer Science Seminar Series

National Capital Region

Exploiting Diversity in Sparse Problems to Enable Efficient Computing

Speaker: Prof. Bahar Asgari
University of Maryland, College Park
Friday, April 12, 2024
11:15AM - 12:15PM, NVC R213

Abstract

In the post Moore's Law era, there is a compelling need for a novel computing paradigm that enhances performance scaling beyond relying on technological advances. Domain Specific Architectures (DSA), which tailor their design to meet the precise requirements of distinct applications rather than optimizing for general scenarios, emerge as a promising solution for the future of computing. Nevertheless, DSAs must not just focus on computation as *data* is as important in shaping the design decisions. For instance, while many applications feature *sparse* data, numerous DSAs, akin to traditional general-purpose architectures, are optimized for dense data scenarios. In her talk, Asgari highlights the prevalence of sparsity in data and argues for a design philosophy that prioritizes sparsity. However, she also acknowledges that sparsity is not the sole characteristic of burgeoning applications, which are also marked by their *diversity*. Consequently, in the second part of her talk, Asgari contends that we cannot simply give up designing for common cases. Instead, she proposes replacing traditional programmability with *intelligent reconfigurability*, focusing on how hardware can make sparsity-aware decisions and the mechanisms for implementing such decisions.

Biography

Bahar Asgari is an assistant professor in the department of computer science at the University of Maryland, College Park (UMD), with a joint appointment at UMIACS and an affiliation with ECE. Asgari is a recipient of the DoE Early Career Award 2023. Her research group, Computer Architecture and Systems Lab (CASL) is dedicated to shaping the future of computing, with a primary goal of enabling intelligent dynamically reconfigurable architectures. Prior to UMD, she spent a year on Google, focusing on improving the performance of Google's systems and establishing strategies to balance various trade-offs. She earned her Ph.D. in electrical and computer engineering from Georgia Tech in 2021. During her PhD, Asgari was selected as a Rising Star in EECS in 2019. Her dissertation, in consultation with her advisors Prof. Yalamanchili and Prof. Kim, focuses on accelerating sparse problems efficiently.