



Association for  
Computing Machinery

## NEWS RELEASE

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### **Ke Fan and Daniel Nichols Named Recipients of 2024 ACM-IEEE CS George Michael Memorial HPC Fellowships**

**New York, NY, August 14, 2024** – ACM, the Association for Computing Machinery, and the IEEE Computer Society announced today that Ke Fan of the University of Illinois at Chicago and Daniel Nichols of the University of Maryland are the recipients of the 2024 ACM-IEEE CS George Michael Memorial HPC Fellowships. The George Michael Memorial Fellowship honors exceptional PhD students throughout the world whose research focus is high-performance computing (HPC) applications, networking, storage, or large-scale data analytics.

Fan is recognized for her research in three key areas of high-performance computing: optimizing the performance of MPI collectives, enhancing the performance of irregular parallel I/O operations, and improving the scalability of performance introspection frameworks. Nichols is recognized for advancements in machine-learning based performance modeling and the advancement of large language models for HPC and scientific codes.

#### **Ke Fan**

Fan's research focuses on improving the performance of data movement associated with collective communication and parallel file I/O operations on large-scale supercomputers. Her most recent focus has been on two main areas: (1) Optimizing inter-process data movement, particularly in the context of all-to-all collectives, where all processes engage in data exchange. In this area, she has developed a new class of parameterized hierarchical algorithms that substantially improve the performance of both uniform and non-uniform all-to-all collectives. (2) Optimizing parallel I/O, targeting applications that generate unbalanced, irregular I/O workloads. Fan has specifically developed spatially aware data aggregation techniques that enhance load balancing and improve overall parallel I/O performance.

In addition to these two areas, she has made significant progress in improving the scalability of performance introspection frameworks, which help developers understand data movement capabilities in HPC systems. With these new insights, developers can identify bottlenecks and optimize performance at scale.

## **Daniel Nichols**

Nichols' research is broadly centered around the intersection of machine learning (ML) and high-performance computing. His most recent focus has been on two main areas: (1) developing novel ML-based performance models to make use of all available performance data when making predictions about code runtime properties, and (2) adapting state of the art large language model (LLM) techniques to HPC applications. By utilizing recent advances in representation learning and further advancing them to handle the unique challenges of performance modelling, Nichols' research seeks to develop models that make use of all available data when predicting performance. This research has the potential to significantly improve both the quality and applicability of performance models.

By adapting LLM's to HPC applications, Nichols' work has improved their performance on HPC development tasks. He has created scientific and parallel code capable LLMs and methods for improving the quality of current models for HPC. This is part of his goal towards creating specialized LLMs to solve software complexities and allow scientists to focus on their domain research and less on the intricacies of HPC development.

## **About the ACM IEEE CS George Michael Memorial Fellowship**

[The ACM-IEEE CS George Michael Memorial HPC Fellowship](#) is endowed in memory of George Michael, one of the founders of the SC Conference series. The fellowship honors exceptional PhD students throughout the world whose research focus is on high performance computing applications, networking, storage, or large-scale data analytics using the most powerful computers that are currently available. The Fellowship includes a \$5,000 honorarium and travel expenses to attend the [SC conference](#), where the Fellowships are formally presented.

## **About ACM**

[ACM, the Association for Computing Machinery](#), is the world's largest educational and scientific computing society, uniting computing educators, researchers, and professionals to inspire dialogue, share resources, and address the field's challenges. ACM strengthens the computing profession's collective voice through strong leadership, promotion of the highest standards, and recognition of technical excellence. ACM supports the professional growth of its members by providing opportunities for life-long learning, career development, and professional networking.

## **About SC**

[SC, the International Conference for High Performance Computing](#), sponsored by ACM and IEEE-CS offers a complete technical education program and exhibition to showcase the many ways high performance computing, networking, storage, and analysis lead to advances in scientific discovery, research, education and commerce. This premier international conference includes a globally attended technical program, workshops, tutorials, a world class exhibit area, demonstrations, and opportunities for hands-on learning.

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