

# IRPS 2021 – SSD Memory Workshop

**Brief summary:** Advances in 3D NAND enable endurance gains, capacity increase, lower power consumption and cost reduction, thus making SSD technology attractive for new applications such as AI and cloud computing. At the same time, 3D NAND exhibits new reliability challenges that affect both the resiliency and performance at the system level, e.g., increased number of bit errors, threshold voltage instabilities, frequent read retries, higher read latency, etc. To cope with these issues, modern NAND controller architectures become complex. Resilient FW/HW co-design is critical to ensure the reliability and performance requirements of modern SSDs. Machine learning can aid by offering a valuable tool for prediction and anomaly detection. Analytics together with domain knowledge can provide valuable insights of failure modes and error events relevant to system reliability. On the other hand, blind application of machine learning algorithms can lead to pitfalls. Representative datasets for training, models that provide interpretability and repeatability of the results are key enablers in this quest.

This workshop will discuss the reliability challenges of modern SSDs and the requirements for new applications such as AI, cloud or edge computing. Another intent is to discuss the role of machine learning and analytics in improving the resiliency of modern SSDs through accurate prognostics and prediction.

## Moderators

### Dr. Jay Sarkar, Micron Technology



Jay Sarkar is a Principal Data Scientist at Micron Technology, San Jose, USA. He received his PhD in Electrical and Computer Engineering from the University of Texas at Austin in 2007, M.S. in Applied Physics from Rice University, Houston in 2004, and B.S. in Physics

from Indian Institute of Technology, Kharagpur in 2001.

He is currently focused on research and development on solid-state storage (SSD) system analytics, prognostics, design-aligned machine learning and associated robustness modeling methodologies. He has authored/co-authored over 20 peer-reviewed international conference and journal papers, along with filed/issued patents spanning modeling of system and device designs, machine learning and robustness relevant to SSD, Phase Change Memory and 3-D NAND memory technologies. He is a Senior Member of the IEEE and serving the IRPS 2021 System Electronics Reliability Committee as Emeritus Chair.

### Dr. Nikolaos Papandreou, IBM Research



Nikolaos Papandreou is a Research Staff Member at IBM Research – Zurich, Switzerland. He received his Diploma and Ph.D. degree in Electrical and Computer Engineering from the University of Patras, Greece, in 1998 and 2004, respectively.

His current research interests include solid-state memory technologies, in particular phase-change memory and 3D NAND flash, memory controller development with a focus on performance and reliability, signal processing and machine learning with emphasis in algorithmic design and optimization.

Nikolaos has published more than 70 articles in journals and conference proceedings and holds over 60 granted patents in the area of solid-state memory. He is a Senior Member of the IEEE and he currently serves in the IRPS 2021 System Electronics Reliability Committee.